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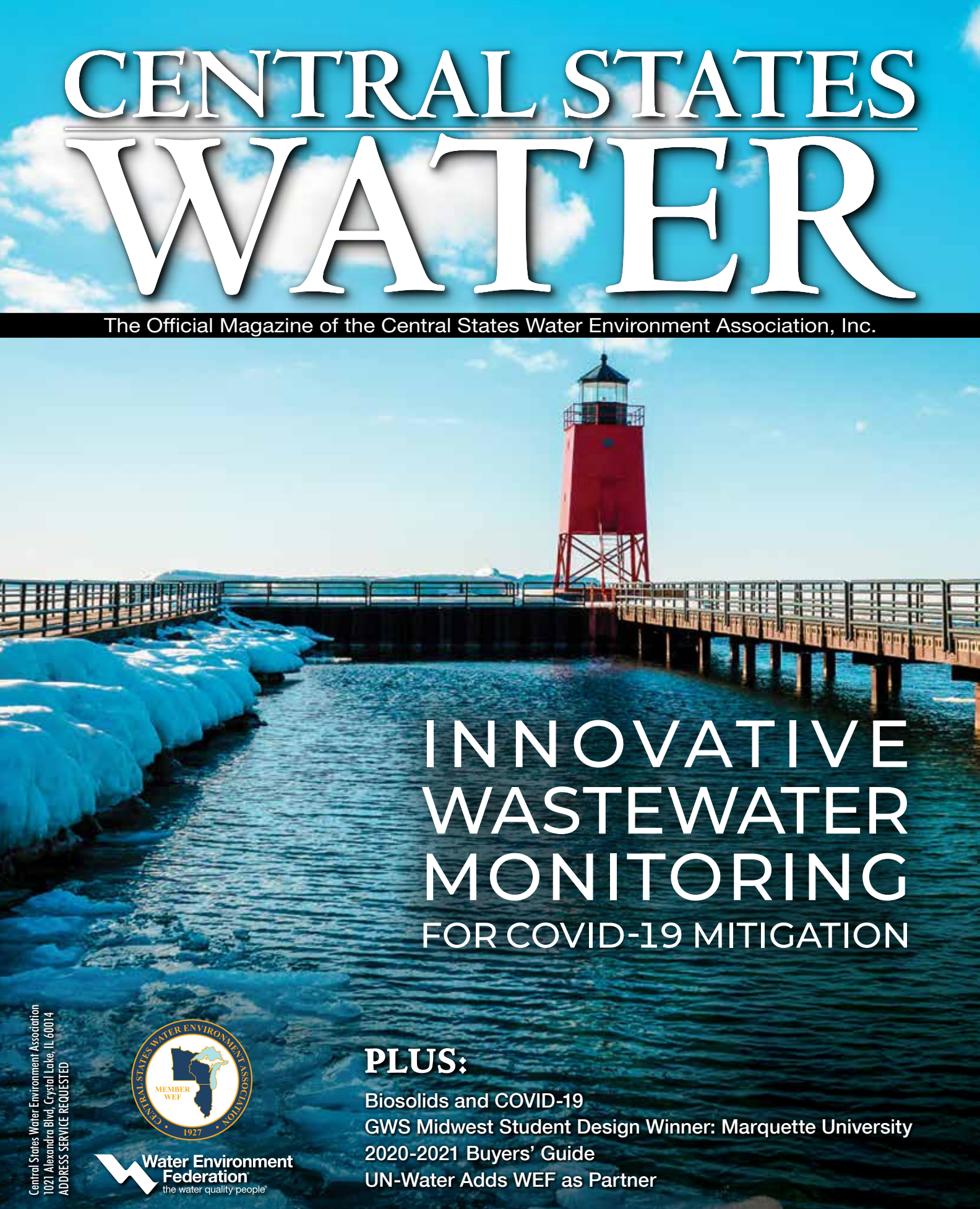
The Official Magazine of the Central States Water Environment Association, Inc.



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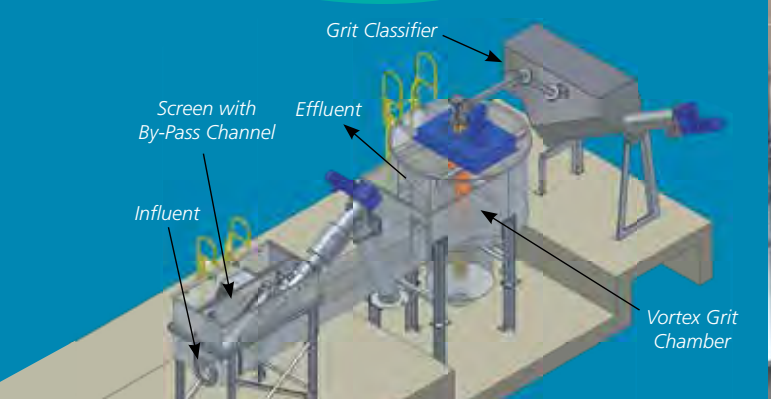

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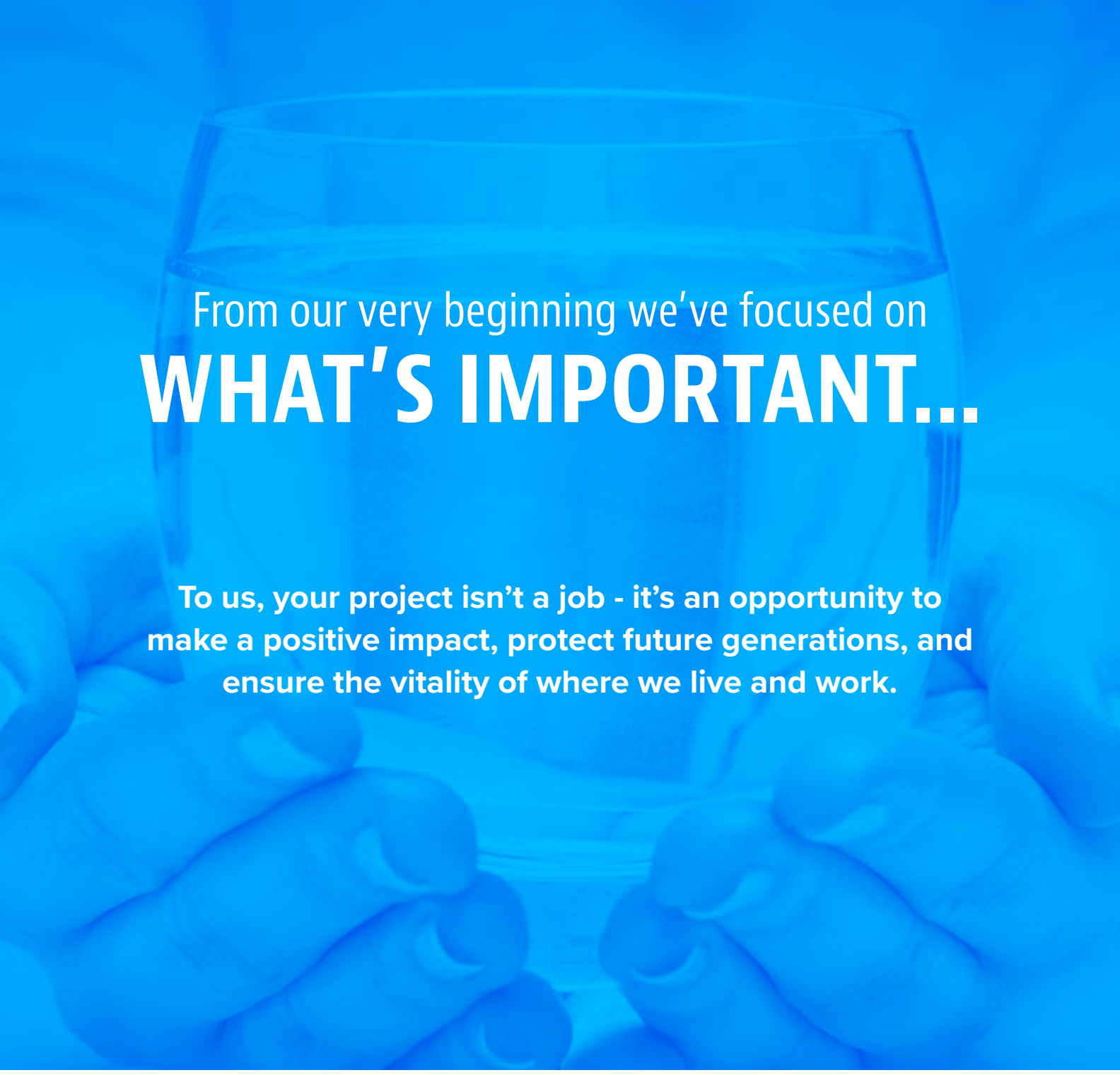

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Lemonade

By Mark Eddington

Does anyone remember Carnac the Magnificent? Let me rephrase; does anyone other than Rusty or Beth remember Carnac the Magnificent? I am assuming there are a few of us, but for you millennials: go to your Google machine and YouTube it. Carnac was a recurring character portrayed by Johnny Carson on the Tonight Show (yes, there was life before Jimmy Fallon). For you crazy kids that have never heard of Johnny Carson, he was a thing. Johnny Carson is to the 1980s what Charli D'Amelio (ask your teenager) is to the 2020s. In any event, Carnac's "gift" was he could "psychically 'divine' unknown answers to unseen questions." Carson would come on-stage in full costume and his trusty sidekick (Ed McMahon) would hand him hermetically sealed envelopes with unknown questions inside. Carnac would put the sealed envelope to his head, divine the answer and announce it to the audience. For example, Carnac would loudly answer "Sis Boom Bah," tear open the envelope (in his special way),and read the question "Describe the sound made when a sheep explodes." Then, the audience would go wild.

Fast forward to today, 2020 has not given us much to laugh about, and I am no Carnac. But if I were to be handed an envelope today (11/02/20) the answer I would give to the unseen question is "The largest public infrastructure and jobs stimulus bill since the New Deal." The question is, "What will politicians in Washington, DC develop to put people back to work, repair our nation's crumbling public infrastructure, improve our environment, and stimulate our economy?" If you are a POTW or a consultant that has not prepped your public boards and clients to get their ducks in a row for massive public infrastructure stimulus grants coming down the pike you should be charged with malpractice. If anything was learned from the financial crisis of 2007-2008, it was public works projects with planning and design complete will achieve massive grant assistance. This money will need to hit the street in the fall of 2021 and those that are, please forgive me for using this term, "shovel-ready," will again be in the cat-bird's seat. My district learned an important lesson after the 2008 national election; always have a project planned, designed, and on the shelf ready to take full advantage of grant opportunities. Through grants and free financing, we shaved $13 million off $26 million of treatment plant improvements. That savings allowed my district to dramatically accelerate initiatives towards cleaner water, energy independence, and regionalization. In my humble opinion, the only difference between now and the fall of 2008 is that the status of our nation's health and economic crisis are significantly more challenging. More folks are sick and out of work while our public infrastructure continues to crumble, and we sit on the precipice of an environmental breaking point. Perhaps we can all agree on a few things (1) 2020 sucks, (2) we are all weary of COVID-19, (3) our environment is screaming out for help, and (4) we are all tired of the polarizing effect of politics.

"Our industry is in store for a renaissance and there is no better time to be a member of the clean-water community."

What can we do to become part of the solution to these interconnected crises? Consider this: the water industry is perfectly positioned to affect transformational change. Wastewater surveillance testing can aid our health crisis. Construction projects can put people back to work while renewing our broken infrastructure. Innovators can develop new technology to create energy and reduce duplicate government service. There is literally something here for everyone. The environmentalist can grasp clean water and a decreased carbon footprint, entrepreneurs and innovators can build their companies and products, and government watchdogs can cheer the reduction of duplicate government services. 2020 does suck, but it is time to quit complaining about it and recognize that 2020 and the confluence of events will provide an opportunity that comes by once a career to "move the needle" on clean water.

"Like it or not, we live in times of danger and uncertainty. But they are also more open to the creative energy of man than any other time in history. All of us will ultimately be judged, and as the years pass will surely judge ourselves on the effort we contributed to building a new world society and the extent to which our ideals and goals have shaped that event." – RFK

So, let this be an industry-wide clarion call to all essential water professionals, now is your time to affect transformational change. Now is the time to advocate for your clients and the environment alike. Opportunities like this do not come around very often. Do not be the last one to know. Reach out and contact your local government representatives and remind them the value of clean water and the unbounded opportunities that will flow from of a comprehensive national public infrastructure package. There are not many initiatives our politicians can agree on, but robust infrastructure bills have historically been points of bi-partisan cooperation. An infrastructure bill will happen, regardless of who is elected on November 3rd. What we do not know yet will be the size and the "flavor" of this infrastructure package. My guess is it will either be huge or gargantuan. *The 2009 American Rehabilitation and Recovery Act* (ARRA) provided $3.5 billion nationally to clean water SRF programs. A 2021 Stimulus package could provide up to $75 billion or more to clean water SRF programs. Do not get caught flat-footed. Be ready and do not be bashful when sharing your story with decision makers. Our industry is in store for a renaissance and there is no better time to be a member of the clean-water community.

"Our future may lie beyond our vision, but it is not completely beyond our control. It is the shaping impulse of America that neither fate, nor nature, nor the irresistible tides of history, but the work of our own hands, matched with reason and principle that will determine our destiny. There is pride in that, even arrogance, but there is also experience and truth. Either way, it is the only way we can live." – RFK CS

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WEF is Working for You

By David Arnott and Tracy Ekola

David Arnott

Tracy Ekola

WEFTEC is the start of a new year for WEF Delegates. During this time, we reflect and report on the previous year's progress and set the priorities for the upcoming year. Derek Wold completed his WEF Delegate position for CSWEA at the WEF House of Delegates (HOD) meeting held virtually on October 3, 2020, during WEFTEC Connect. This report provides a review of our WEF HOD activities and progress.

David Arnott began his term as WEF Delegate, replacing Derek Wold. Tracy Ekola will continue to serve her term as WEF Delegate. Please feel free to reach out to David or Tracy with any ongoing WEF questions or for ideas on where you can get involved with WEF. As part of the transition, David attended HOD Orientation and collaborated with both Derek and Tracy on the role and responsibilities of a HOD Delegate. HOD members participate in WEF Workgroups, attend HOD meetings throughout the year, and report back to their member associations. Workgroup topics are selected each year and provide support as well as knowledge sharing opportunities to our member associations.

The WEF House of Delegates is the deliberative and representational body of the Federation. It advises the WEF Board on matters of strategic direction and public policy development.

WEF Strategic Plan, Goals, and Financial Update

WEF 's strategic plan includes these five critical objectives and strategic goals:

1) Develop an engaged membership that is representative of the multiple practice areas of the water environment industry.
2) Provide a broad range of professional content and programming that is relevant and widely valued by the water sector worldwide.
3) Generate an increased public awareness of the value of water leading to increased funding to protect water quality through appropriate levels of infrastructure, management approaches, and services.
4) Establish the conditions that promote accelerated development and implementation of innovative technologies and approaches in the water sector.
5) Operate a sustainable business that supports our mission and enables WEF to seize new opportunities in the emerging water sector.

Further detail on these five critical objectives and strategic goals is provided in WEF's strategic plan provided on WEF website: *www.wef.org/globalassets/assets-wef/1---about/about-wef/wef-strategic-plan.pdf*

WEF is financially sound and has a sustainable budget plan. This is due to the reserve/rainy day fund established in 2014 by the WEF Board. WEF exceeded their FY20 budgeted operating funds, however the reserve fund provided support to WEF in addition to deliberate reductions in expenses/overhead and eliminating non-essential programs during the COVID-19 pandemic.

WEF Initiatives

Two new WEF initiatives include a focus on the MS4 program and working with ASCE to establish an Infrastructure Report Card for stormwater infrastructure similar to their report cards on transportation, water and wastewater infrastructure. *www.asce.org/templates/press-release-detail.aspx?id=32309.*

Ongoing WEF Initiatives include WEFTEC Connect, Brave Blue World, WEF InFlow (Introducing Future Leaders in Opportunities in Water), WEFMAX, LIFT (Leaders Innovation Forum for Technology), and Access Water. Access Water is an online platform that offers water professionals, researchers, consultants, professors, and students an authoritative body of more than 20,000 informational resources covering all aspects of the profession, written by and for water professionals. Users can log onto Access Water from any internet-enabled device. This resource provides valuable information that can help professionals on the job, at home, in the field, or anywhere else. *www.accesswater.org.*

WEF's Diversity, Equity, and Inclusion Sub-Committee was recently created as a result of DE&I taskforce recommendation. This group will be advisory to WEF Board of Directors. This initiative was highlighted during HOD meetings and other WEFTEC Connect events. There will also be a future HOD workgroup to assist with this effort as well.

HOD Workgroups 2021:
The new workgroups began meeting October 3, 2020. Tracy Ekola is participating in Financial Diversification and Federal Advocacy; David Arnott is participating in Public Education and

Conference Resources. Workgroups are open to delegates as well as any WEF member that has a specific interest in these topics. Please contact Tracy or David if you have an interest and would like to get involved in an HOD Workgroup.

2021 WEFMAX

In addition to the four WEFMAX locations for 2021 – Utah, Pennsylvania, Idaho, Prince Edward Island – WEF is also planning a separate Virtual WEFMAX.

2021
WEA of Utah in Springdale, UT, April 7-9
Pennsylvania WEA in Pittsburg, PA, April 21-23
Pacific Northwest CWA in Boise, ID, May 5-7
Atlantic Canada WWA in Charlottetown, PE, May 26-28

2020 MA Grant Program: The five awards were made as below before the program was halted and funds shifted to COVID Relief Program. The WEF Member Coronavirus Relief Program was established by Board of Trustees and consists of six committee members appointed by WEF President. The purpose of this committee is to provide emergency financial assistance to MAs. The WEF FY20 Budget includes $200,000.

Congratulations to CSWEA for the $10,000 Student Design Initiative grant award and thank you Mohammed Haque and Mike Holland for efforts in obtaining the funding and implementing the spectacular 1st Annual Midwest Design Competition! CSWEA was one of five member associations to receive the grant award. Other member associations included Alabama for Student Membership Website Initiative, Alaska for Membership Website Upgrades, Michigan for Developing Training Course, and New York for Work in Water Initiative. CS

2019-2020 MA $100,000 Grant Program

- Reviewed applications from Member Associations.
- Funded 5 MAs ($61,275).
- Remaining funds transferred to WEF's new COVID Relief Grant Program.

Alabama	Student Membership Website Initiative	$5,800
Alaska	Membership Website Upgrade	$15,476
Central States	Student Design Initiative	$10,000
Michigan	Develop Training Courses	$10,000
New York	Work in Water Initiative	$20,000

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The Value of Water

By Veronica Loete

It has been a couple months since I last wrote to you and the big news stories keep coming at a breakneck pace, but the world is much the same in that these are still turbulent times in our society politically and from a public health perspective. The difference is that it is getting colder and the days are getting shorter. Many of the outdoor activities that filled our time this summer are coming to an end. Despite the challenges, we carry on. Work, school, and life all carry on. CSWEA is carrying on as well. Things may look a little different, but we are finding ways to carry on.

It will be over by the time you read this, but on November 19 we will hold the Wisconsin Section's Annual Business Meeting. For the first time the meeting will be fully virtual. Even though reviewing the budget line-by-line can be tedious and it may be even more challenging to do so via Zoom, I am looking forward to it. Setting the budget provides needed funds to carry out the Section's important activities. These activities are the lifeblood of the organization and I am glad they can continue even if they have to be virtual for now. Besides, this meeting will be my first chance to use the official CSWEA Wisconsin Section gavel. I don't think it will have the same impact when I'm alone in my home office, but its not every day you get bang a gavel, so it's pretty cool. On that day, the 2020 Stormwater and Watershed Webinar will also take place.

Speaking of virtual events, the different CSWEA sections have been doing a great job in coming together to coordinate events for 2020. The Wisconsin Section took the lead on coordinating a joint Operations Seminar that is scheduled for December 3 and 10, 2020. The virtual webinar will be split over two afternoons with one session focusing on solids management and one session focusing on wet weather management. I know one of the things people miss about in-person seminars and conferences is the ability to interact with others. Both sessions of the Operations Seminar will include a bull session with moderated open discussion. You will hopefully receive this issue of the magazine before the Seminar takes place, so don't miss out!

The last thing on my mind these days is not CSWEA-specific, but it is related to water. October 21 was the 6th Annual Imagine A Day Without Water. My employer, Brown and Caldwell, and many other organizations participated in this event which is part of a national education campaign that strives to bring together diverse stakeholders to highlight how water is essential, invaluable, and in need of investment. As water professionals who are members of CSWEA, I imagine that we understand the value of water and its associated infrastructure more than the average Joe, but it is still possible for us to take water for granted. Most of us live in communities where clean water is available at the turn of the faucet handle. We use that water in our homes all day long for a variety of important tasks, but it is also used everywhere else as well. It is used for watering crops, used in schools and hospitals, used to put out fires, used to manufacture the goods we use, and it plays an important role in preventing the spread of disease. The list of ways we use water is endless. A day without water is not a good day. So please remember to value water and keep up the good work when it comes to maintaining and improving our existing water and wastewater systems. We must also work to improve access to clean water for those who go without. The lack of reliable access to clean water is an important public health issue for some communities in the US and millions of people around the world. Let's get to work! CS

"The list of ways we use water is endless. A day without water is not a good day. So please remember to value water and keep up the good work when it comes to maintaining and improving our existing water and wastewater systems."

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Communication is Key

By Anna Munson

While sheltering in-place last spring, I had the opportunity to explore some new professional topics. One topic area I found particularly important for water professionals was effective communication with the communities that we serve.

In June, I attended a virtual workshop presented by WEF called *Communicating about Emerging Contaminants in Biosolids*. The speakers provided guidance and approaches for communicating technical and scientific information to our communities. Despite the technical nature of our work, empathy and trust are two keys to effective communication. Samantha Villegas, APR, Senior Consultant at Raftelis, stressed the adage "people don't care what you know until they know you care."

Whether speaking with a colleague or a customer calling to complain about an odor problem, asking questions and really listening to their response demonstrates respect. If your conversation is not occurring in-person, consider that the tone of your voice is key to conveying your understanding of the issue and empathy. Work to build trust through understanding their point of view and acknowledging their feelings.

Villegas recommends we attempt to discuss facts only when we think the other person knows we care about their issue. When ready, provide information that is scientifically correct and give perspective for scientific terms that might be hard to understand. For example, if providing information about health advisories for a perfluorooctanoic acid (PFOA) concentration in parts per trillion, mention that one part per trillion is equivalent to one drop of food coloring in 14 million gallons of water. Be honest about what you don't know or what the scientific community hasn't figured out yet.

Trust is built through honest interactions and transparency. Many cities have developed programs to encourage the public to learn about their water and wastewater facilities. New York City's Newtown Creek Wastewater Resource Recovery Facility went so far as to offer Valentine's Day tours of their plant, including access to the high observation deck at the top of the egg-shaped digesters. According to CBS News, the tour reservations sold out within 16 minutes, though it wasn't clear if the primary draw of the event was the view from the observation deck or the plant itself. My own city, Apple Valley, hosted a Public Works Day and invited the community to mingle around information stations about environmentally friendly home-maintenance practices, sit in the driver's seat of a snowplow and tour their renovated water treatment plant. Public Works staff served up lunch from the grill and answered questions. The event gave our community a chance to see the results of more than a year of construction at the water treatment facility, and perhaps more importantly, allowed the public to meet and talk with the water treatment plant operators and Public Works leaders.

Beyond public events, transparency can take the form of an easy-to-navigate and engaging website. It might mean including articles in the City newsletter about ways citizens can manage stormwater to protect lakes and programs the City offers to help. Danielle Kaeding, reporter for Wisconsin Public Radio and a speaker at the WEF communication workshop, suggested building relationships with local journalists so that they know who to call for facts and perspective about water and wastewater issues.

CSWEA continues to be a resource for the water industry for facts, creative ideas and perspective. There are plenty of opportunities to keep our professional skills sharp and engage with our CSWEA community. For now, all CSWEA events and meetings are being held virtually.

The Minnesota Section of CSWEA and the Upper Midwest Section of the Air and Waste Management Association hosted the Annual Conference on the Environment on November 5. The conference offered concurrent technical sessions covering topics such as PFAS testing and removal, industrial by-product management and regulatory updates of air, waste, and water rules. The Minnesota Section business meeting, normally held on the same day as COE, instead occurred on November 19.

The three state sections are collaborating to develop webinars to serve the educational needs of professionals across the organization. The Stormwater and Watershed Webinar took place on November 19 and introduced watershed plans and implementation. An Operations Seminar on December 3 will cover topics in solids management and wet weather operations. Plans are being made to offer a Collections System workshop in January. Thank you to the volunteers who are working to create and lead these webinars. Information and registration for the MN Section and Association events is available on the CSWEA website.

These events can be tools for obtaining the information we need to be factual when communicating about water. We can draw on our CSWEA relationships and support to respond to public concerns with empathy. We can be transparent with our decision-making processes. All these actions will help us communicate more effectively with the communities we serve. CS

Great Things in Our Future

By Amanda Streicher

It could be the fact that I'm a new mom, or that everything seems to have changed in 2020, or that it's an election year, or maybe it's just the fact that seasons are shifting and snow has fallen. Either way, I've been thinking about how quickly things evolve and how we must always be looking ahead to our future.

Looking at the past, I can see all of the great things our Section has done. Looking at the present, I can see the drive to continue to do great things, but I also see the struggle to find the time. To look ahead to our future, we must know where we've come from, where we're at, and where we really want to be.

I had the opportunity to sit down with Mike Holland over some beer the other month, and we had a great, candid conversation about where we really think the IL Section could go. We recognized the need to spark the flame that we once had. We thought, "Gee, Central States does this idea exchange event (CSX) that works really well to generate new ideas and promote new ways of thinking about how we operate as an organization, and Global Water Stewardship does an exchange (GWX) too. So does the MN Section. Maybe this is something IL Section should do!" So, began the planning of the IL Section's first Section Exchange event, IL-X.

Following closely to the guidelines and agenda the MN Section has used for previous MNX meetings, I've posed the following questions to the IL Section.

- What does IL Section want to be known for? What are we doing to get that out of the Section?
- What do you believe CSWEA IL should identify as one of its core values and why?
- How is our niche unique relative to other professional organizations in wastewater and stormwater?
- Is there anything we can do to reach deeper into the state and make it easier for those not in the Chicagoland area?
- How can the leadership of CSWEA IL do a better job supporting initiatives that you believe in?
- Should your committee structure and/or leadership be changed for 2021?

I'm hoping these questions spark positive discussion about how we can grow to be the Section we want to be. This discussion has not been had in IL on a section level. I'm excited to hear from new members, experienced members, members who maybe haven't been active in a while, and those who want more from us as a Section. All of these different experiences with CSWEA's IL Section will help promote good discussion and hopefully lead to a few action items on where we will move as a section. Things are always changing and the IL Section needs to adapt and grow with the times. As we discuss who we want to be as a section, it's important to know where we've come and what we want our future to hold. Planning for the future will be a big part of the discussion during IL-X.

How can we bring all members together to discuss the needs of our Section for the improvement of the IL water community? It may be difficult leading good discussion virtually, but I'm counting on everyone's investment in this Section to provide an active and engaging discussion. We will need to consider how we can move forward as a section with both virtual and in-person events. It may be our new reality that all events have a virtual aspect to them. How can we as a section capitalize on this new way of involvement while still maintaining a personal relationship with our members? More good questions to think about!

We are hosting this event at the end of October, unfortunately after this letter is due. I'm hoping the next message from the Chair will have all of the great ideas from IL-X in it and will be filled with optimism and energy for the great things the IL Section wants to become. For now, I challenge the IL Section to find new or improved ways to keep our Section active and to bring energy back into our Section.

We have great things in our future, and I'm looking forward to embracing the change that has been 2020 and using it to grow our Section. CS

"Looking at the past, I can see all of the great things our Section has done. Looking at the present, I can see the drive to continue to do great things, but I also see the struggle to find the time. To look ahead to our future, we must know where we've come from, where we're at, and where we really want to be."

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FACT SHEET

Biosolids and COVID-19

Biosolids are a product of the wastewater treatment process that are used as a soil amendment and nutrient source on farmland, turf grass, golf courses, and parkland throughout the world. Although there is some uncertainty about how the COVID-19 virus (SARS-CoV-2) is transmitted, **there is no evidence that COVID-19 can be spread through biosolids.**

Biosolids are subjected to processes prescribed by the US Environmental Protection Agency that are specifically designed to inactivate pathogens (disease-causing organisms) including enteric viruses, which are the hardiest viruses. The process of producing biosolids takes from two weeks to over two years. Biosolids are treated to kill pathogens by methods such as being held at a temperature of 95° F for at least 15 days. Exceptional quality biosolids are further treated for periods ranging from weeks to years by processes such as heat-drying at above 176° F, composting at above 131° F, or air-drying in the sun.

Because of its structure, the COVID-19 virus can be easily inactivated. Although this virus is new, information about the coronavirus family helps us understand how to control it. Coronaviruses have a fragile "skin" that is easily damaged by heat and detergents, which is why washing with soap is so effective at inactivating them. Coronaviruses are unstable and do not survive well in the environment outside a living host such as the human body.

University of Arizona studies found that coronaviruses die off or become inactivated in wastewater within two to three days due to harsh conditions. **Coronaviruses cannot survive outside a living cell in water or wastewater for more than a few days, and it is unlikely that the COVID-19 virus would survive the long duration of the treatment process and still be active in biosolids.**

Infectious COVID-19 virus is unlikely to be present in wastewater in the first place, though remnants of the inactivated virus are detectable. Unlike viruses that thrive in the digestive system, the COVID-19 virus primarily infects the respiratory system. A recent study published as a Nature online article (Wölfel et al., April 1, 2020) found high levels of the COVID-19 virus in coughing and sneezing droplets and in throat and lungs of hospitalized COVID-19 patients in China, but no infectious virus was found in stool or urine samples.

Because the COVID-19 virus does not survive in wastewater, the Occupational Safety and Health Administration and the US Centers for Disease Control and Prevention do not recommend additional personal protective equipment for wastewater treatment plant workers or procedures for handling of biosolids to prevent COVID-19 infection. CS

Aboubakr, H.A., T. Sharafeldin, and S. Goyal. 2020. *Stability of SARS-CoV2 and other coronaviruses in the environment and on common touch surfaces.* DOI: 10.31219/osf.io/y2rth, available at: *https://www.researchgate.net/publication/340890178*

Mallapaty S. 2020. *How sewage could reveal true scale of coronavirus outbreak.* Nature 580, 176-177, available at: *https://www.nature.com/articles/d41586-020-00973-x*

Central States Water Environment Association *www.cswea.org*
Illinois Water Environment Association *www.iweasite.org*
Illinois Association of Wastewater Agencies *www.ilwastewater.org*

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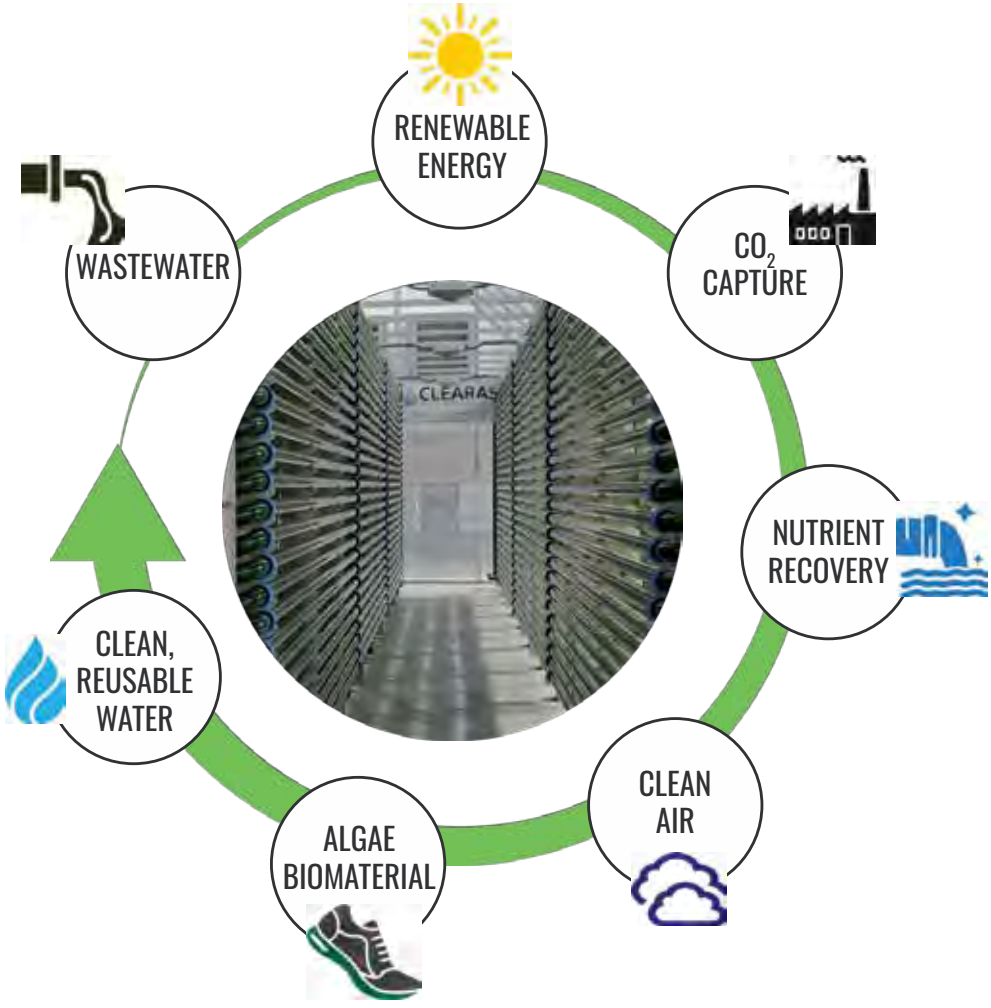

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INNOVATIVE WASTEWATER MONITORING FOR COVID-19 MITIGATION: Part 1

By Martin Shafer PhD, Senior Scientist & Research Lead, Wisconsin State Laboratory of Hygiene
Photos by Jan Klawitter, Public Affairs Manager, Wisconsin State Laboratory of Hygiene

BACKGROUND/ HYPOTHESES/OBJECTIVES

The unparalleled crisis resulting from the COVID-19 pandemic calls out for innovative scientific approaches to address this public health and economic emergency. Key to COVID-19 mitigation efforts are effective tools for monitoring the presence and spread of the virus. However, the dynamics of SARS-CoV-2 (the virus that causes COVID-19) in communities are particularly challenging to monitor via traditional human testing. Not all communities have easy access to COVID-19 testing; testing/diagnosis requires people to actively seek out the testing – many do not; and importantly, as many as 1 in 3 people with COVID-19 are asymptomatic and incubation times can be as long as 14 days – thus they do not seek out or delay testing. Virus dynamics, potential stress on the health care system and the success of mitigation efforts are therefore not easily tracked. COVID-19 transmission may occur for days, or longer, in a community until it is detected by testing people and that is unacceptable. Effective COVID-19 mitigation requires a more robust strategy.

Sewage surveillance for SARS-CoV-2 holds great promise for COVID-19 trend analysis and as an early warning system for virus dynamics in the community serviced by the sewerage system. SARS-CoV-2 is shed from infected humans in their fecal matter and detected in untreated wastewater. Sanitary sewer systems collect and aggregate wastewater to a central location and by the time it reaches the treatment facility, it is a well-mixed sample of many households and businesses; thus by sampling the influent at wastewater treatment facilities (WWTFs) a representative sample of the whole population served by the WWTF can be obtained. Wastewater SARS-CoV-2 measurements therefore reflect infection burden at a community-wide scale and such an approach provides a non-invasive monitoring and early warning system that is not dependent on testing of COVID-19 infected individuals. This use of wastewater for community surveillance of infectious diseases is not new, but rarely has near real-time monitoring been attempted during a global pandemic. In the case of COVID-19, wastewater surveillance can provide critical information to public health officials and direct their actions to manage this crisis.

The Wisconsin State Laboratory of Hygiene (WSLH) is currently building a statewide network for sewage surveillance of SARS-CoV-2 with a goal of monitoring nearly 60% of the state's population by sampling over 100 WWTF. Though facility recruitment is ongoing, the sampling was initiated in September 2020 and monitoring will continue through at least June 2021, a period expected to overlap with the introduction and deployment

Dr. Dagmara Antkiewicz places a plate of samples into the qPCR instrument for analysis.

of vaccines for the virus. The WSLH at the University of Wisconsin-Madison is operating the program in collaboration with the School of Freshwater Sciences at the University of Wisconsin-Milwaukee. The Wisconsin Department of Health Services (DHS) and the Wisconsin Department of Natural Resources (DNR) are providing valuable assistance.
The study will provide researchers and public health expects with a better understanding of COVID-19 dynamics across the state of Wisconsin and the research will provide valuable data for informing future public health practices while maximizing containment efforts with the least disruption to people's lives and well-being.

Wastewater samples from WWTFs in both populated areas and rural regions of the state are being monitored to tell us:

(1) **If COVID-19 is circulating in a community.** People may be shedding virus into wastewater for days before significant health outcomes are observed. ***Detection*** of the virus in sewage in an area where cases have not been reported may be an early indication of spread to and within that area – thus wastewater monitoring can serve as an early warning response system for identifying emergence of COVID-19.

(2) **If COVID-19 transmission is increasing or decreasing in a given community.** In communities where cases are already present, trends in virus concentrations in wastewater over time will inform as to whether the spread is increasing or decreasing. Trends between communities can also be compared. If trends in levels of the viral genetic material are increasing, public health officials can proactively adopt measures to minimize transmission of the virus and better prepare for a surge. Conversely, where levels in wastewater samples are low, indicating minimal levels of infection in the community, mitigation resources can be directed elsewhere.

Thus, wastewater monitoring of SARS-CoV-2 will provide public health officials (and the public at large) a new tool to identify the magnitude of COVID-19 transmission within a community, and potentially early warning detection of outbreaks.
The pandemic response is constantly evolving and new approaches to assist in decision-making are needed.
The approach will function in parallel with human testing efforts and may help direct those efforts. An important objective of the study is to determine how best to translate the findings to actionable mitigation strategies.
The WSLH will, in a timely manner, provide wastewater SARS-CoV-2 data to population health experts at DHS and on the UW-Madison campus. Working with both human epidemiological data (COVID-19 testing, community infection rates, and hospitalizations), and wastewater data, these experts will monitor the trends/detections and advise the communities and state as to the efficacy of ongoing containment/control efforts and whether mitigation strategies should be modified.

APPROACH A: Sampling Strategy

WWTF Selection: 102 WWTFs were selected for inclusion in the statewide study, representing a balance of statewide population coverage and geographic coverage. Enrollment began in late June 2020 and as of mid-October 73 WWTFs had signed-up – 72% of goal. This represents 3.0 million of the 3.4 million population planned for inclusion in the study.
The recruitment process included a letter of introduction and description of the program, a FAQ document, and a facility survey to gather information that might impact interpretation of the SARS-CoV-2 wastewater data. Follow-up documents to further our recruitment goals were sent to wastewater utility managers. The Central States Water Environment Association (CSWEA) advanced our recruitment efforts by directly contacting their members and also allowing the WSLH to detail the study in a series of presentations on scheduled CSWEA web-based listening sessions. Though the general response from WWTFs has been very positive, there remain 15-20 key, larger facilities where participation would significantly improve the impact of the study.

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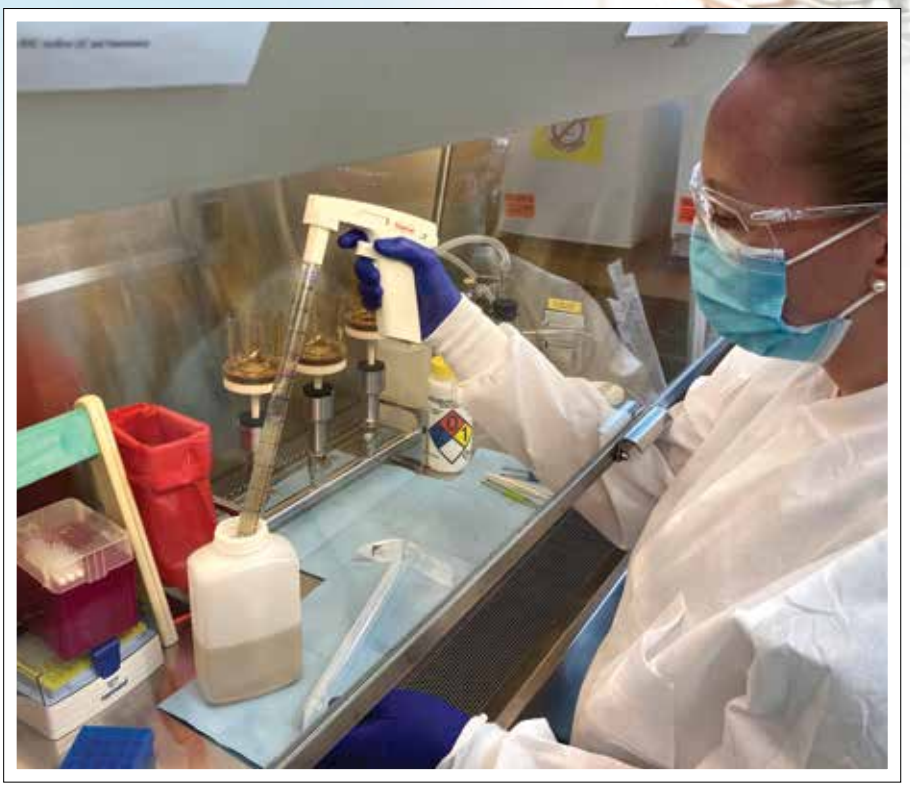
The overall sampling strategy incorporated the following goals:

1. Recruit TWO WWTFs from each of the most populated 23 WI counties (47 total facilities) for at least weekly sampling. These counties represent 75% of Wisconsin's population and our goal was to cover 40% of the population in those counties via the influent sampling.
2. Recruit 50 smaller and/or rural WWTF, for weekly sampling, to provide important geographic coverage and where human testing has been inconsistent or where COVID-19 case rates are low.
3. Recruit as many tribal facilities as processing capacity allows. Currently five tribal WWTFs are enrolled.
4. Include ALL WWTFs in the state serving >10,000 people, at a sampling frequency of at least once per week. To date, 74% of the 57 facilities serving >10,000 people in the state, have signed-up to participate in the program.
5. Include as many WI counties as practical. The plan includes WWTFs in all but five of Wisconsin's 72 counties.
6. The influent sampling plan, if fully implemented, will cover 60% of the state's population.

WWTF Sampling Frequency:
The plan for sampling frequency reflects WWTF size and location, constrained to some extent by analytical capacity. As the sampling program advances and trends emerge (either up or down) we have the flexibility to change the frequency of sampling to reflect current best-practices for trend detection.

1. All facilities are sampled at a frequency of at least once per week
2. At least one facility in each of the 23 most populated WI counties is sampled at a frequency of at least twice per week
3. Five of the largest facilities in the state are sampled daily (weekday)

Sample Type: Samples are taken from the flow-weighted 24-hr composite influent samples that are routinely collected at each facility. Two 250 mL sub-samples are collected – one immediately processed upon receipt at the WSLH laboratory, the other archived.



Dr. Kayley Janssen pipettes sewage samples before beginning the filtration process.

Sample Meta-data: Supporting information that will be needed to interpret factors influencing viral concentrations and loads are also being gathered. Wastewater flow metrics are requested on the chain-of-custody forms; pH and conductivity are measured immediately upon receipt at the WSLH; total suspended solids (TSS) and biological oxygen demand (BOD) data will be harvested monthly from the WDNR.

Sampling Logistics: The WSLH is supplying the appropriate sample bottles (250 mL polypropylene), transport coolers, site-specific sampling instructions, chain-of-custody forms, and pre-paid express shipping labels to all participating facilities. They are requesting that samples be shipped back to the WSLH laboratory (where the viral RNA will be quantified) the same day they are collected, though delays in return shipping do not, in general, impact viral titers (studies have documented that wastewater can be kept refrigerated for at least one week without change in viral RNA). The express shipping is designed to facilitate more rapid turnaround and timely reporting of virus levels.

WWTF Sampling Duration: Routine wastewater sampling was initiated in September 2020 and sampling will continue through at least June of 2021.

APPROACH B: SARS-CoV-2 Quantification

The WSLH and UW-Milwaukee laboratories are quantifying the genetic material (characteristic viral RNA), not the infectivity or viability of the virus. The evidence to date indicates that if intact SARS-CoV-2 viruses are present in WWTF-collected influent, that they are NOT viable.

SARS-CoV-2 Quantification: The viral RNA is collected and concentrated from the wastewater by a filtration-based method – typically multiple replicates of 15 to 60 mL of wastewater are processed through separate charged-HA filters. The filters are then homogenized

Dr. Kayley Janssen adds sewage sample to a filter. The wastewater sample will be filtered

Filter with wastewater sample (left) and clean filter (right).

in a MP Biomedicals FastPrep-24 5G bead-basher. From there, the viral RNA is then extracted and purified from the homogenate using a wastewater-optimized magnetic-resin extraction chemistry kit (Maxwell HT Promega, WI, USA) on a Kingfisher Flex automation platform. Finally, multiple markers of the SARS-CoV-2 virus are then quantified in these extracts using quantitative PCR technology (either qPCR or ddPCR). The wastewater samples are handled in a BSL2+ lab following UW-Madison Biosafety-approved protocols. The final data product is gene copies per liter (GC/L) for each quantified gene marker (N1, N2).

SARS-CoV-2 Quantification QA/QC: Virus recovery is being assessed using a bovine coronavirus (BCoV) surrogate, by spiking a known amount of the BCoV virus into each influent sample prior to analysis and determining the percent recovery after virus concentration, extraction and PCR amplification. Routine QA/QC also includes spiking the Bovine Respiratory Syncytial Virus (another enveloped virus like SARS-CoV-2) into extracts to check for PCR inhibition from the sample matrix, method blanks, and positive and negative controls for the quantitative PCR reactions. Moreover, every influent sample is also being analyzed for two well-validated, ubiquitously shed human fecal markers (PMMoV and HF183) to provide a reference point for overall dilution of the fecal signal in the sewerage system.

APPROACH C: SARS-CoV-2 Data Reporting

The SARS-CoV-2 and supporting data are being shared with DHS epidemiologists as well as with environmental epidemiology and data science researchers at the UW-Madison. Together, they will interpret the data in context with the available human epidemiological (COVID-19 testing) data. In parallel with the data release to DHS, the WSLH will provide timely reports to the WWTF operators/wastewater utility as well as to local public health agencies.

There is no cost for WWTF participation in this program – all costs are covered by a grant to the WSLH. CS

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Wastewater Collection & Treatment System Design Global Water Stewardship –

GLOBAL WATER STEWARDSHIP

La Fortuna, Costa Rica

OPUS College of Engineering
MARQUETTE UNIVERSITY





By Caitlin Graber, Nicole Heyniger, Rebecca Joseph, Grace Scarim, and San Marie Thomson

On April 17, five students from Marquette University competed in the virtual CSWEA Student Design Competition, Global Water Stewardship (GWS) category. The objective of the competition was to design and present a collection system and treatment facility for La Fortuna, Costa Rica. The team consisted of Caitlin Graber, Nicole Heyniger, Rebecca Joseph, Grace Scarim, and San Marie Thomson, all senior level engineering students, with their project focuses listed below. Matt Castillo, PE of MSA Professional Services, served as the Marquette University Engineer Advisor as well as the CSWEA Engineering Advisor for the project.

Concern

La Fortuna is a semi-rural city located in Northern Costa Rica. As shown in Figure 1, La Fortuna consists of three smaller communities, named Barrio Dora, La Fortuna, and Zeta Trece. This group of communities is looking for a permanent solution to their sanitation problem. La Fortuna's current collection and treatment system consists of septic tanks that do not adequately treat their wastewater. These septic tanks pose a threat to the health and environment of La Fortuna, due to overflows, backups, and leach fields. The current population of these communities is 15,500 people, with an annual tourism population of 250,000. It is assumed the resident population will grow by 2% each year and tourism will grow by 4%. La Fortuna desires a low maintenance, aesthetically pleasing, and energy neutral process for this treatment and collection system. The location of the treatment facility needs to be adequately sized for anticipated flow, future growth, and infiltration and inflow (I/I) based on an annual precipitation of 3,500 mm/yr. This design competition is sponsored by the Central States Water Environment Association – Global Water Stewardship. This organization hosts a Midwest Student Design Competition annually, which promotes a realistic and firsthand design experience for collegiate level students. These projects focus on water and wastewater issues and topics.

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Objective

The goal of this project was to design a collection system and treatment facility for anticipated flows due to future growth, and to treat to an effluent limit of 50 mg/L biochemical oxygen demand (BOD), 50 mg/L total suspended solids (TSS), and 50mg/L Total Nitrogen as determined by the Global Water Stewardship. Three locations were proposed as well as three treatment process alternatives. Using decision matrices, one location, and one treatment process were selected for the final design.

Constraints

Issues of concern for this project are centered on operations and maintenance, location, cost, and sustainability. The design for the treatment facility will require minimal operations and maintenance since there is little to no training about wastewater management for an operator in the community. Additionally, an optimal location needs to be selected which optimizes various factors including the proximity to the community, size, accessibility, and elevation head due to heavy rains and possibly flooding in the area. The final treatment and collection system must also consider sustainability goals including financial, environmental, and cultural sustainability, along with a resiliency aspect. The capital cost of the project must be minimized to the resources available in the community

Also, user fees to run the collection and treatment system must be lower than 5,000 colones (roughly $8.40 USD) per month due to the socioeconomic status of the community. The treatment system also aims to achieve low energy use, to conserve resources, and keep cost low. One of the most important aspects of the design is cultural acceptance: to design a system that the community will actively use and benefit from. The community values and wishes were kept in high regard while designing the system.

Site Locations

Three site locations were proposed for the La Fortuna wastewater treatment system. As shown in Figure 2, the three locations are represented by A, B, and C markers. Location A is a site purchased previously by the government. Locations B and C were chosen by the team via aerial satellite maps and elevation data. Aerial satellite maps aided in selecting

FIGURE 1: *Aerial Map of La Fortuna Communities, courtesy of GWS*

FIGURE 2: *Location Alternatives in La Fortuna*

land that appeared to contain open space unoccupied by the residents. A weighted scoring decision matrix was utilized to determine which location would be selected for the final design. The selection criteria scored included cost of land, proximity to community, accessibility, elevation head, aesthetic, flood risk, and size. Cost of land and distance from the town was heavily considered when finalizing the location due to the values of the community. In terms of proximity, the site should be close enough to residential areas to limit piping costs for the collection system. Accessibility refers to the ease at which workers could enter the site for maintenance of the plant. Proximity to existing roadways was evaluated for this criterion. For the elevation of the site, it was necessary to choose land with an elevation lower than the community's so that the collection system can flow by gravity, which keeps with the project's goal of energy neutrality. When considering aesthetics, the treatment plant must be placed far enough away from residential areas to minimize unfavorable smells and the unsightliness of the industrial plant in comparison to the community's beautiful landscape. Flood risk was also considered based on the elevation and stormwater drainage of La Fortuna.

Lastly, the size of the sites was evaluated to ensure that there was enough space for the treatment facility and the potential for expansion after the 20-year design period. Based on the weighted chart for the site location, the government owned site had the highest weighted score, so it was chosen as the final location of the wastewater

FIGURE 3: *Government owned site: chosen treatment site for La Fortuna, courtesy of GWS*

TABLE 1

Minimum Water Consumption per Costa Rican Design Standards:				
Metro areas =	375	L/person/day	99.1	g/person/day
Infiltration flow for PVC pipe =	0.25	L/sec/km	0.106	g/sec/mile
	21,600	L/day/km	9,183.10	g/day/mile
*Assume 80% of water consumed/person is sent to the sanitary system				
Design Flow Parameters:				
Average daily base flow =	1,234,723.10	L/day	5,081,276.20	gal/day
Infiltration and inflow =	626,744.60	L/day	165,568.40	gal/day
Design flow =	19.9	MLD	5.2	
Peak Hour Wet Weather Flow Parameters:				
Population =	64.2	per thousand		
Average hourly flow =	19.9	MLD	5.2	MGD
Peak hourly flow =	43.2	MLD	11.4	MGD
Peaking factor =	2.18			
Peak hour wet weather flow =	94	MLD	24.8	MGD

treatment process. The aerial map of the location is shown in Figure 3.

Evaluation of Design Flowrates

The first step towards the final design was determining the design population for the given design period, which was 20 years from the year 2020. Accounting for a 2% increase in full-time residents per year and a 4% increase of tourists per year, a final design population was determined to be 64,116 people. This takes into consideration all the residents of La Fortuna and 80% of the peak tourist population per month, following NR 110 codes. These assumptions were made because some resorts have their own private treatment systems, which means not all the flow should be accounted for from the tourist population. Using this design population, a design flow and Peak Hour Wet Weather Flow was determined, as seen in Table 1. These values account for the average daily base flow and infiltration and inflow from the collection system pipes. Using the influent concentration, the loads for BOD and TSS were calculated using the design flow, as seen in Table 2. Both loads need to be reduced to 50 mg/L, per the Costa Rican Design Standards, using the appropriate treatment technology before being discharged into a local stream. Understanding these flows and loads will dictate the unit processes and treatment technologies utilized in La Fortuna.

Collection System

After choosing the site, a wastewater collection system was designed to collect the waste from the communities. The collection system designed using the EPA-SWMM software and will be laid along the existing roadways (Figure 4). As per Wisconsin code SPS 382.35(d)(1b), a manhole is located every 400 feet (121.92 meters) of the collection system. Based on the elevation data provided, the system was designed to run by gravity to eliminate the need for pumps as per community goals. The base flow used in the model is based on the peak hour wet weather flow from which the pipe diameters were determined using Manning's equation. Based on these parameters, the system runs to the chosen site with no issues in the model.

Design Alternative #1
– Aerated Lagoons

The first design alternative is an aerated lagoon system. This treatment process includes the following: three hand cleaned bar racks, three aerated lagoons in series, one settling pond, and one UV disinfection chamber. Sludge drying beds will be used for solids handling. The advantages of aerated lagoons are consistent five-day biochemical oxygen demand (BOD5) removal, less space required than anaerobic or facultative lagoons, and minimization of smells [1]. The disadvantages of aerated lagoons are increased operation and maintenance (O&M) costs and more frequent sludge removal [1]. BOD5 and total nitrogen effluent limits will be reached after exiting the third aerated cell with a hydraulic retention time of one day.

Diffused aerators will be used over surface aerators because they are more efficient, which will decrease O&M costs for oxygen requirements. As there is minimal soil data provided, all the cells and the settling pond will be lined with a liner material to prevent seepage into the ground. TSS effluent limits will be reached in the settling pond. A fabric structure will be utilized to partially cover the top of the settling pond to reduce algal growth in the effluent [1]. A two-channel UV disinfection chamber will be used for pathogen removal. Each channel will consist of two banks, twelve modules per bank, and eight lamps per module. All sludge will be handled using the sludge drying beds and the effluent will discharge into a nearby stream on the property.

Design Alternative #2
– Sequencing Batch Reactor

The second design alternative is a sequencing batch reactor or SBR system. An SBR is a mix and fill activated sludge

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process that works by utilizing various cycles, aeration, and microbes to achieve BOD5 and TSS removal. After mixing flow with air for specific time intervals and adding a decanter, wastewater then flows to the SBR digester. The aerobic digester produces solids, which can be dewatered and directly land applied. The SBR system process would include three hand cleaned bar racks, one horizontal grit chamber with a Parshall flume, four SBR basins, an SBR digester, equalization basin, and UV disinfection. An SBR system is advantageous due to the ability to manipulate the cycles by changing air added, food-to-microbe ratio, flow capacity, and time. This allows for variable flow characteristics like the flow in La Fortuna. Another advantage of the SBR system is that there is no need for primary treatment. However, there are some disadvantages to the SBR system. It requires a higher level of operation and maintenance, along with high electricity costs due to aeration, which may not be beneficial for the La Fortuna community.

Design Alternative #3
– Upstream Anaerobic Sludge Blanket

The third design alternative is an upstream anaerobic sludge blanket (UASB) reactor. This reactor is ideal for systems located in a hot climate needing to keep cost, energy use, and land space minimized [2]. Advantages of the system include low cost, low maintenance, low sludge yield, minimal land use, and potential for energy production [2]. Disadvantages of the system include a long start-up time to develop a sufficient sludge blanket, sensitivity of the reactor to potential toxins in the influent, minimal to no nutrient removal, potential for insufficient disinfection, and potential for odors if the biogas is released instead of captured [2]. The treatment train for this system is shown in Figure 5, where the blue and red lines dictate liquid and solid streams, respectively. The wastewater will receive removal and settling of most inorganics and larger organics during the preliminary treatment stage bar screens and grit chamber/Parshall flume. The wastewater will then receive biological treatment in the UASB reactors for BOD5/ chemical oxygen demand (COD) removal. In this stage, the water will flow through the bottom of the reactor into a sludge blanket via an influent distribution system.

The sludge blanket will utilize the microbes present to breakdown and reduce organics. During this process, biogas is

TABLE 2

Influent		
Concentration		
BOD5 =	280	mg/L
TSS =	220	mg/L
TKN =	52	mg/L
Load		
BOD5 =	5561.2	kg/day
	12260.4	lbs/day
TSS =	4369.5	kg/day
	9633.2	lbs/day
TKN =	1032.8	kg/day
	2276.9	lbs/day

FIGURE 4: *Collection System Layout*

FIGURE 5: *UASB Treatment Train*

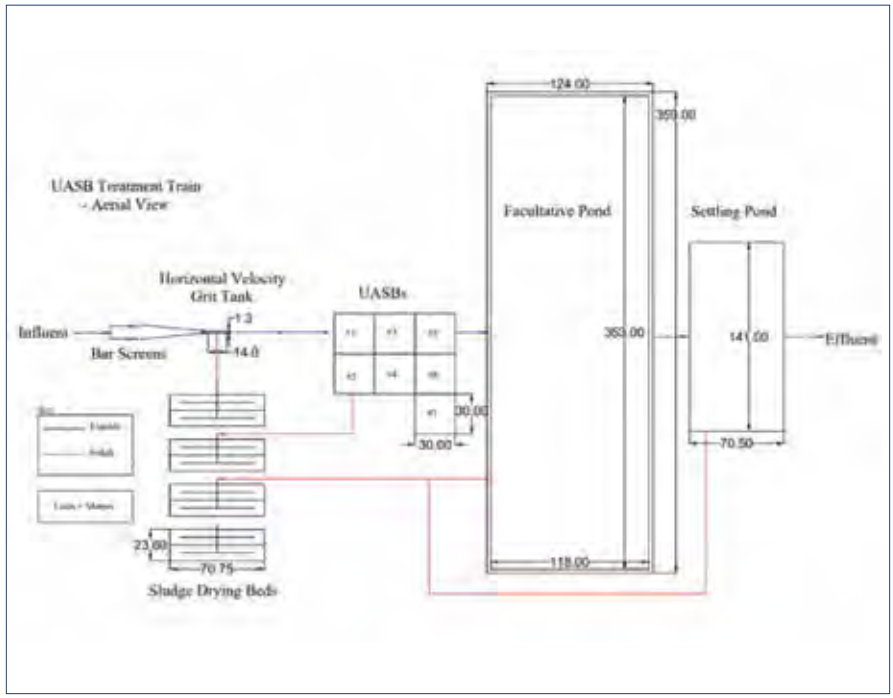


FIGURE 6: *Construction Plan*

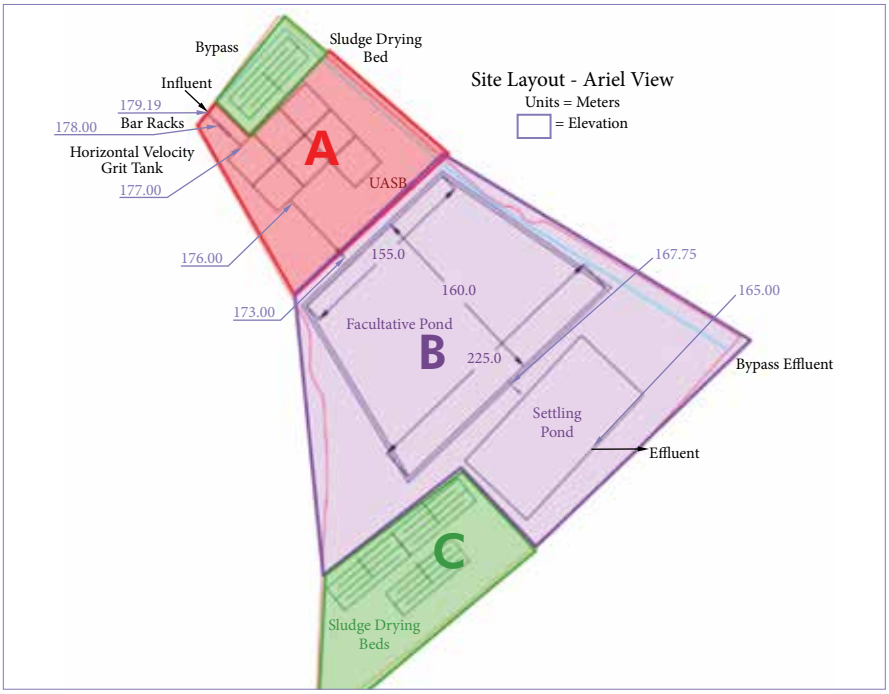
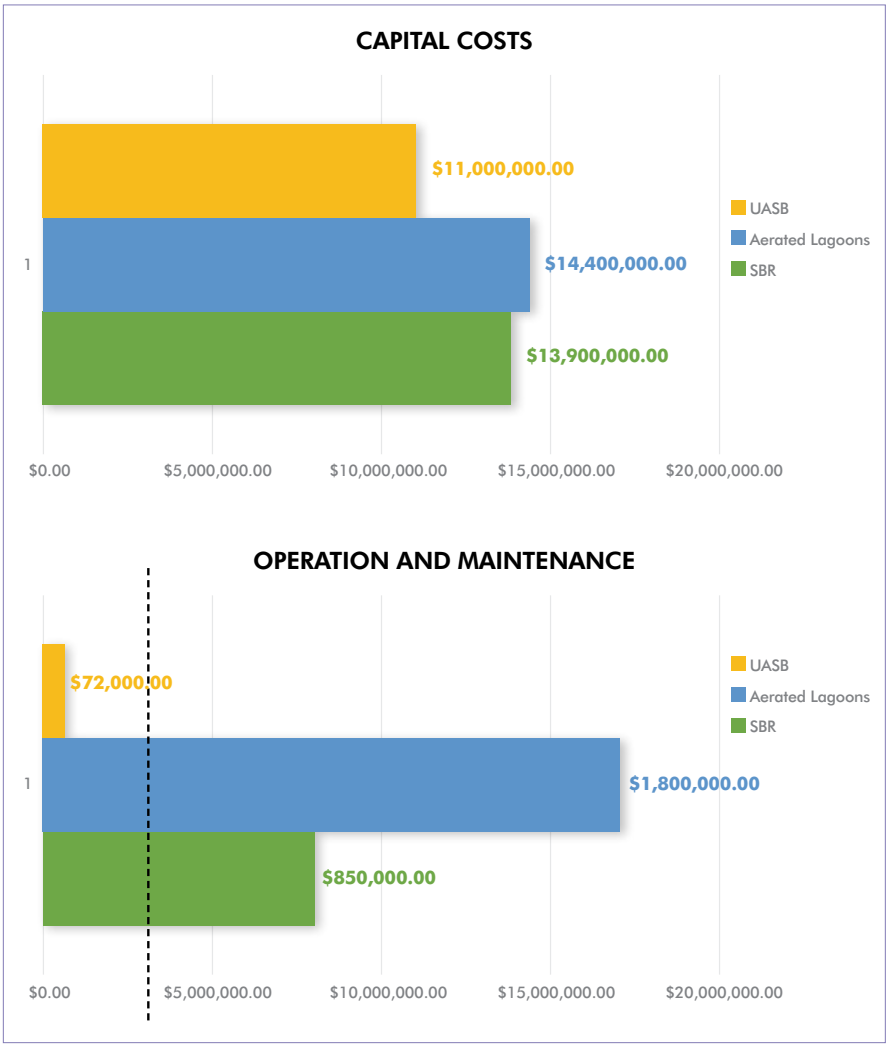


FIGURE 7: *Cost Analysis*



produced and can occasionally lead to movement of a small fraction of solids towards the top of the tank. Upwards of the tank will be a phase separator where the effluent, clean water, the biogas produced, and the solids that escape upwards will be separated. If sufficient biogas is produced, the biogas captured can be burned for energy use in the treatment plant. The time frame for sludge removal from the reactor is recommended to be determined experimentally [2]. The UASBs will meet the effluent standards set by GWS, but because UASBs provide little to no removal of macronutrients like phosphorus and nitrogen, the addition of a stabilization pond system is recommended.

For planning, it focused the strategy around the economic, environmental, and social benefits to the community. Lastly, the Materials would hopefully be sourced from local communities, but it is difficult to estimate now because of the lack of direct access to La Fortuna.

Construction

While the final design implementation will be decided by GWS, construction of the project was planned to proceed by dividing the government site into three construction zones and building the collection system simultaneously. This layout is shown in Figure 6, with relative elevations of the site marked in blue. Zone C would act as a laydown area while construction proceeds on Sites A and B. To meet the given schedule timeline, technical work would continue in Site A while two excavators complete the large excavation of Site B. Using this construction plan, the entire project would take a little over a year to complete.
The duration of the project's construction assumes a five-day workweek with eight-hour days. Construction will begin in November, at the beginning of La Fortuna's six-month dry season, so that the bulk of excavation can be undisturbed by rainfall.

Once the sludge is adequately dry, it can be land applied. The system will discharge effluent to a nearby stream. However, experimentation on the characteristics of the stream must be completed before implementation. If it is devised that the stream is not suitable for handling discharge effluent, other discharge mechanisms must be evaluated. One is non-potable water use for irrigation. This could be beneficial for the La Fortuna community due to the significant number of farms in the surrounding area. The UASB

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system might shift nutrients such as nitrogen and phosphorus to a more chemically soluble species, comparable to chemicals in fertilizers. Most of the farms in Costa Rica produce consumables, for which non-potable water use would not be a viable option, but some farms in the area consist of flowers, oil palms, and ornamentals [15]. These non-consumable crops would be a suitable habitat for a non-potable water use application.

The American Society of Civil Engineer's (ASCE) Envision Framework was adopted as a means to assess sustainability within the project. A Materiality Assessment was completed to determine the five of fourteen indicators that had the highest economic, environmental, social, or resilience impact and that the engineers have the highest ability to control. A Streamlined Assessment was conducted using the top five indicators for the Materiality Assessment to determine a score from 0-5 (0 being Very High Impact and 5 being Restorative) for the Project Lifecycle. The Streamlined Assessment indicated certain criteria to consider when designing and choosing alternatives. These criteria include Energy, Wellbeing, Resilience, Planning, and Materials. In terms of Energy, it suggested that the UASB Design Alternative would be the best option because it is close to neutral. For Wellbeing, it encouraged to minimize the sites and smells by selecting a location that would promote the community's aesthetics. Resilience pushed for consideration of the expansion potential of each alternative, so there could be simple modifications after the 20-year design period.

Completion of Selected Design

The UASB system detailed in the Design Alternative #3 section was chosen for the final design. All parameters and dimensions calculated for the hand cleaned bar racks, horizontal velocity grit chamber, Parshall flume, UASBs, stabilization ponds, and sludge drying bed in the treatment train were checked by mentor Matt Castillo. System drawings were produced with respective elevation via AutoCAD. A bypass structure was added to the design to account for any overflow events due to heavy rain. This bypass channel connects to a nearby stream, and it can be assumed flow will be diluted enough to safely discharge. The system will take advantage of the natural slope of the land and will run by gravity, removing the need for any lift stations or pumps.

A cost analysis was produced to compare alternatives and the design is set to meet the cost restrictions of the community. The system is not anticipated to require any additional energy inputs because of biogas produced which will meet the ideals set by GWS of an energy neutral system. Additional energy may be required during the startup period or during cooler months when the biogas produced is smaller. The system also uses roughly only 50% of the land of the government site selected for construction leaving plenty of room for expansion and navigation. The area will be fenced to prevent wildlife from intruding upon the property (specifically the stabilization ponds).

Sludge drying beds were designed to handle the solids from the chosen treatment process. The sludge drying bed consists of a sand layer that is 380 millimeters deep and a gravel layer that is 400 millimeters deep. The drying beds will also include underdrain piping to collect the drainage with a diameter of eight inches and a minimum slope of 1% [5]. The leachate will be sent to the facultative pond for further treatment. For the volume of sludge produced four drying beds are required, each bed containing two rectangular cells.

Cost Analysis

A preliminary cost comparison of each design alternative was done and can be seen in Figure 7. In terms of capital costs, none of the designs were strongly preferable over the other. However, for operation and maintenance costs, the UASB was significantly less expensive. This worked strongly in the UASB's favor in the final design selection. Low operation and maintenance costs were important criteria for the community. User fees were to be limited to $8 per month per household or $277,288 of O&M costs annually.

This is marked by the dashed black line on the graph, and the UASB is the only design that achieves this goal. A more detailed cost analysis of the final design, including UASB system and collection system, shows that the project cost would be around $10 million, and if a road and a primary treatment building were to be added if needed it would be estimated to cost another $2 million. The costs that were calculated were based on US unit costs, so it can be expected that costs would be lower in Costa Rica, where labor costs are less expensive.

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2020-2021 CSWEA Buyers' Guide

Welcome to the annual Central States Water Buyers' Guide. When making purchasing decisions about products and services in the wastewater industry throughout the Central States region, please support the companies whose advertising makes *Central States Water* possible.

OUR CSWEA BUYERS' GUIDE CONSISTS OF TWO SECTIONS:
A categorical listing of products and services, including a list of companies which provide them.
An alphabetical listing of the companies appearing in the first section. This listing includes name, contact info, website, and more.

LISTINGS BY **CATEGORY**

Acoustic Inspection
InfoSense, Inc.

Activated Carbon
CEI Carbon Enterprises Inc.

AMI Communications
Badger Meter

AMR
Badger Meter

Architecture
McMahon Associates, Inc.

Biogas Upgrading
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Chemical Processing & Feed Systems
Centrisys/CNP
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Force Flow/Halogen Valve Systems

Cloud SCADA
Metropolitan Industries, Inc.

Coatings, Lining & Corrosion Control
Bolton & Menk, Inc.
Process Equipment Repair Services, Inc.
RELINER/Duran Inc.
SEH

Contractors
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InfoSense, Inc.
Process Equipment Repair Services, Inc.

CSO/SSO Controls, Water Resources, Distribution & Collection
AE2S
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Deuchler Engineering Corporation
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AECOM
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Clark Dietz, Inc.
Deuchler Engineering Corporation
Donohue & Associates, Inc.
Electric Pump, Inc.
Energenecs
Energy Systems Group
Environmental Dynamics International, Inc.
HR Green, Inc.
Integrated Process Solutions
McMahon Associates, Inc.
Ruekert & Mielke, Inc.
SEH
Starnet Technologies,
An Electric Pump Company
Strand Associates, Inc.
TKDA
Trotter and Associates Inc.

Filter Media/Filter Media Remove/ Installation
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Filtration
AECOM
CEI Carbon Enterprises Inc.
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Smith & Loveless Inc.

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Ruekert & Mielke, Inc.
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Grit Removal/Headworks
Lakeside Equipment Corporation
Smith & Loveless Inc.

Hydrants
American Flow Control

Inside Drop Manholes
RELINER/Duran Inc.

Intake Screens
Lakeside Equipment Corporation

Land Surveying
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Manufacturer
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Meters/Meter Testing
Badger Meter
Energy Systems Group
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An Electric Pump Company

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Electric Pump, Inc.

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Electric Pump, Inc.
Gasvoda & Associates
JDV Equipment Corporation
LW Allen, LLC
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Metropolitan Industries, Inc.
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Smith & Loveless Inc.
Starnet Technologies,
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Strand Associates, Inc.
TKDA

Pump Service, Parts, and Repairs
Minnesota Pump Works

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Energy Systems Group

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Septage Receiving Facility/Systems
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Service and Repair
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Centrisys/CNP

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USALCO Appoints Ken Gayer, CEO/Founding Members to Co-Chair Board of Directors

USALCO, LLC, a leading producer of high-quality aluminum-based chemicals used in water treatment and refinery catalyst manufacturing, has appointed Ken Gayer as its first non-family chief executive officer (CEO). Founding family members Peter and David Askew, both of whom have served as former USALCO CEOs, will continue to serve the Company as co-chairmen of the Board of Directors.

Founded in 1980 and headquartered in Baltimore, MD, USALCO supplies high quality products with best-in-class service and industry-leading research and development to design solutions that meet its customers' individual needs and ever-changing regulatory requirements. USALCO operates an efficient network of nine plants in the Mid-Atlantic, Midwest, and Southeast US and an extensive logistics platform. Over the past decade the Company has grown significantly through new product introductions, capital investment, and acquisition. In June 2020, HIG Capital announced a strategic investment in USALCO to further accelerate the Company's growth objectives.

Keval Patel, Managing Director at HIG Capital, said, "We see significant opportunities for USALCO to continue building its exceptional technology and engineering-based client service capabilities and to partner with customers to find new ways to address their most pressing needs. Since forming the partnership with Peter and David last June, we are seeing even more growth potential than initially envisioned. Ken is a great addition to lead an already strong management team and help us deliver on the promise of this investment."

"We are excited to welcome Ken to USALCO as the next step in our ongoing growth plan, said Board of Directors Co-chairman Peter Askew. "Ken has decades of leadership experience in the chemicals sector and a proven track record of adding value for customers, employees, and shareholders."

Co-chairman David Askew added, "I am pleased with the progress against our strategic plan and look forward to continuing to be a part of shaping USALCO's future. We will always remain focused on the safety and health of our employees and the environment and stay committed to providing exceptional products and service to our customers."

Gayer most recently served as CEO of Gelest, a specialty silicones and silanes producer recently sold to Mitsubishi Chemical Company. Prior to Gelest, Ken was Business President of Honeywell Specialty Products and had a 15-year tenure at Honeywell in a variety of leadership positions. Prior to Honeywell, he held leadership roles at McKinsey & Company, the Polaroid Corporation, and served as a Lieutenant in the US Navy Nuclear Submarine Force. Gayer holds an MBA from MIT Sloan School of Management, a Masters in Chemical Engineering from MIT, and a Bachelor of Science in Chemical Engineering from the New Jersey Institute of Technology.

About USALCO

USALCO is a leading provider of high-quality aluminum chemicals used in water and wastewater treatment, refinery catalysts and other industrial end market applications in the US. Headquartered in Baltimore, MD, USALCO operates nine manufacturing facilities throughout the US. For more information, visit *www.usalco.com*.

About HIG Capital

HIG is a leading global private equity and alternative assets investment firm with over $41 billion of equity capital under management. Based in Miami, and with offices in New York, Boston, Chicago, Dallas, Los Angeles, San Francisco, Atlanta, and Stamford in the US, as well as international affiliate offices in London, Hamburg, Madrid, Milan, Paris, Bogotá, Rio de Janeiro, and São Paulo, HIG specializes in providing both debt and equity capital to small and mid-sized companies, utilizing a flexible and operationally focused/value-added approach.

Since its founding in 1993, HIG has invested in more than 300 companies worldwide. The firm's current portfolio includes more than 100 companies with combined sales in excess of $30 billion. For more information, please refer to the HIG website at *www.higcapital.com*.

UN-Water Adds WEF as Partner

The Water Environment Federation (WEF) is now an official partner of UN-Water, which coordinates the efforts of United Nations (UN) entities and international organizations working on water and sanitation issues.

The designation comes as WEF continues to focus on its role as a global water organization, with members in 78 countries, Member Associations and Corresponding Associations representing 36 countries, and partnering organizations on every continent (except Antarctica).

Last year the WEF Board of Trustees unanimously approved a position statement in support of the UN's Sustainable Development Goals (SDGs). Water professionals have a direct role in meeting SDG 6, which calls for sustainable, universal access to water and sanitation. Some of the targets associated with SDG 6 include water-reuse volumes, reductions in untreated wastewater, and water-supply resilience, which WEF members help address every day.

"WEF is honored and excited to become a partner of UN-Water, working alongside the world's most influential and prestigious water organizations," said WEF President Lynn Broaddus. "This designation recognizes the critical work that WEF and its members do to advance global access to water and sanitation, We look forward to collaborating with UN-Water and its partners, and continuing to advance progress on SDG 6 as well as the many other health, education, and security goals that tie to it"

There is no single UN entity dedicated exclusively to water issues. Over 30 UN organizations carry out water and sanitation programs, reflecting the fact that water issues run through all of the UN's main focus areas. UN-Water's role is to coordinate so that the UN family delivers a unified response to water related challenges. The overarching focus of members and partners, like WEF, is to support UN Member States to sustainably manage water and sanitation.

UN-Water's members and partners have helped place water and sanitation at the heart of recent milestone agreements such as the 2030 Agenda for Sustainable Development, the 2015-2030 Sendai Framework for Disaster Risk Reduction, the 2015 Addis Ababa Action Agenda on Financing for Development, and the 2015 Paris Agreement within the UN Convention Framework on Climate Change.

UN-Water's consolidated technical advice from UN entities and external organizations helped shape Sustainable Development Goal 6 (SDG 6) to "Ensure availability and sustainable management of water and sanitation for all." As a result, SDG 6 and its various targets take the entire water and sanitation cycle into account.

More information about UN-Water can be found at *www.unwater.org*.

More information about WEF, the United Nations and SDGs can be found at *www.wef.org/advocacy/global-programs/wef-the-united-nations-and-sdgs* CS

(Press release retrieved from *www.wef.org*)


$1,000
SCHOLARSHIP
As the publisher of Central States Water magazine, we at Craig Kelman & Associates have a deep appreciation for our readers and members of CSWEA whose task it is to ensure that water taken from and put back into our precious Mother Earth is clean and safe for the people, animals and plants whose very existence depends upon it.
To demonstrate our admiration and respect for the association, its members and the water industry as a whole, we have established a yearly educational scholarship of $1,000 to be funded through a percentage of advertising sales generated in Central States Water.
On behalf of the publishing professionals who form part of our team, as well as our advertisers who use the pages of Central States Water to convey their important messages, we look forward to helping a worthy individual further their education in the water industry.


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Brave Blue World Documentary Film Available on Netflix

The new *Brave Blue World* documentary, which paints an optimistic picture of how humanity is adopting new technologies and innovations for a sustainable water future, is coming to Netflix on October 21.

The Water Environment Federation (WEF) is a production partner for the film, which will now be available to an audience of 193 million worldwide Netflix subscribers and subtitled in 29 languages.

"It is important to convey a sense of hope for water and that is why WEF originally welcomed the opportunity to be a production partner for *Brave Blue World*," said WEF President Lynn Broaddus. "We are absolutely thrilled that this inspiring story of water can be seen by Netflix's global audience and believe that by showing there is a path to a sustainable water future. *Brave Blue World* can help us to influence leaders, increase resources, change policies, and improve stewardship."

Narrated by Liam Neeson, the documentary includes interviews with a variety of water experts, as well as activists Matt Damon and Jaden Smith. It features compelling stories, beautiful scenery, and examples of novel ways of tackling water problems from across five continents. The film explores developments in areas such as water reuse, nutrient recovery, energy generation, decentralized treatment, and the digitalization of water. *Brave Blue World* also includes a segment and interview with Tom Kunetz, a WEF Past President, at the world's largest nutrient recovery facility, the Stickney Water Reclamation Plant in Illinois.

"It is thanks to the support of the global water community, including those who have already hosted grassroots screenings, that we have reached this extraordinary milestone and are able to finally give water the profile it deserves," said Executive Producer Paul O'Callaghan.

"It's a great film and we all need to see it – every school and every college needs to see it," said Liam Neeson. "Every kid has heard of climate change; the film deeply connects with this. It makes water local – something so many of us take for-granted."

Brave Blue World was produced by the Brave Blue World Foundation, in association with its production partners that in addition to WEF include SUEZ Water Technologies & Solutions, DuPont Water Solutions, Xylem, L'Oreal, Aqualia, and the Dutch Water Alliance.

More information and the film trailer can be at *www.braveblue.world*. CS

(Press release retrieved from www.wef.org)

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DECEMBER

CSWEA Operator Training Webinar – Fundamentals Of Preliminary & Primary Treatment
December 17
Virtual Event

JANUARY/FEBRUARY 2021

2021 CSWEA Joint Stormwater/Collections Systems Seminar
January 26-February 9
Virtual Seminar

APRIL 2021

26th Annual Education Seminar
April 13
Online Event

2021 Virtual Midwest Student Design Competition
April 28

For up-to-date CSWEA events, visit our website ***www.cswea.org***.

WEF/Central States WEA
Membership Application 2021

Water Environment Federation
the water quality people

Personal Information

Last Name	M.I.	First Name	(Jr., Sr., etc.)
Business Name *(if applicable)*			
Street or P.O. Box ❑ Business Address ❑ Home Address			
City	State	Zip	Country
Home Phone Number	Mobile Number	Business Phone Number	
E-mail Address to receive *WEF Highlights Online*		Date of Birth (mm/yyyy):	

❑ Please send me information on special offers, discounts, training and educational events, and new product information to enhance my career.

Demographic Information

The following is requested for informational purposes only. **Gender:** ☐ Female ☐ Male

Education: ☐ Doctorate ☐ MA/MBA/MS ☐ BA/BS ☐ AA/AAS ☐ Technical School ☐ High School

Did anyone recommend that you join WEF?

Referring member's name:	Referring member's email address:

Membership Information

Membership Categories (select one only)		**Member Benefit Subscription**	**Dues**
☐ **Professional**	Individuals involved in or interested in water quality.	✔ *WE&T* (including *Operations Forum*) ✔ *Water Environment Research* (Online) ✔ *WEF Smart Brief* ✔ *Central States Water Magazine*	**$170.00**
☐ **Executive**	Upper level managers interested in an expanded suite of WEF products/services.	✔ *WE&T* (including *Operations Forum*) ✔ *World Water* ✔ *Water Environment Research* (Online) ✔ *WEF Smart Brief* ✔ *Central States Water Magazine*	**$340.00**
☐ **Professional Operator**	Individuals involved in the day-to-day operation of wastewater collection, treatment or laboratory facility, or for facilities with a daily flow of < 1 mgd or 40 L/sec. **License #:** _____	✔ *WE&T* (including *Operations Forum*) ✔ *Water Environment Research* (Online) ✔ *WEF Smart Brief* ✔ *Central States Water Magazine*	**$105.00**
☐ **Young Professional (YP)**	WEF members or former WEF Student members with 5 or less years of experience in the industry and less than 35 years of age. This package is available for 3 years.	✔ *WE&T* (including *Operations Forum*) ✔ *Water Environment Research* (Online) ✔ *WEF Smart Brief* ✔ *Central States Water Magazine*	**$64.00**
☐ **Student**	Must be enrolled for a minimum of six credit hours in an accredited college or university. Must provide written documentation on school letterhead verifying status, signed by an advisor or faculty member.	✔ *WE&T* (including *Operations Forum*) ✔ *Water Environment Research* (Online) ✔ *WEF Smart Brief* ✔ *Central States Water Magazine*	**$20.00**
☐ **Corporate**	**One person is entitled to receive member benefits.** Companies engaged in the design, construction, operation or management of water quality systems. **Designate one membership contact.**	✔ *WE&T* (including *Operations Forum*) ✔ *Water Environment Research* (Online) ✔ *WEF Smart Brief* ✔ *Central States Water Magazine*	**$393.00**

Additional Subscriptions

Dependent upon your membership, $55, $47, or $20 of your membership dues is allocated towards a subscription of Water Environment & Technology (WE&T) magazine that is non-deductible from the membership dues.

❑ *World Water*	$75	$
❑ *World Water: Stormwater Management*	$55	$

PAYMENT Forms received without payment will not be processed.

☐ Personal Check | ☐ Company Check — Check No.

Credit Card
☐ American Express
☐ MasterCard
☐ VISA

Card Number — Exp Date — CVV

Signature I authorize WEF to charge my credit card for the amount indicated.

Name on Card

Billing Address *(if different than above)*

City/ State/Province

Zip/Postal Code — Country

GRAND TOTAL $

☐ **Yes, please AUTO RENEW my membership!**
Your membership can be conveniently renewed on your membership anniversary when you sign up for automatic renewal. At the beginning of your membership year, you will automatically be charged for the next membership period to guarantee uninterrupted access to benefits, services, and subscriptions. Members can update their automatic renewal preferences at any time by contacting WEF Customer Service.

Signature _____ **Date** _____
(Signature required for all applications)

Online: www.wef.org/joinwef

Mail Form and Payment:
WEF Membership
P.O. Box 38008
Baltimore, MD 21297-8008 USA

Phone: 1.800.666.0206 or 1.571.830.1545 globally
Fax: 1.240.396.2471

Email: csc@wef.org

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MEMBERSHIP PROFILE

Please take a few moments to tell us about your background and professional interests.

1. What is the nature of your ORGANIZATION? (circle one only) - required

01 Public/Private, Wastewater and/or Drinking Water and/or Stormwater
02 Public/Private Wastewater only
03 Public/Private Drinking Water only
04 Industrial Systems/Plants
05 Consulting or Contracting Firm
06 State, Federal, Regional Government Agency
07 Research or Analytical Laboratories
08 Educational Institution
09 Manufacturer of Water/Wastewater/Stormwater Equipment or Products
10 Water/Wastewater/Stormwater Product Distributor or Manufacturer's Rep.
11 Public/Private Stormwater (MS4) Program Only
12 Public Finance, Investment, and Banking
13 Non-profits
99 Other (please specify) _____

2. What is your Primary JOB FUNCTION? (circle one only) (JOB)

01 Management: Upper or Senior
02 Management: Engineering, Laboratory, Operations, Inspection, Maintenance
03 Engineering & Design Staff
04 Scientific & Research Staff
05 Operations/Inspection & Maintenance
06 Purchasing/Marketing/Sales
07 Educator
08 Student
09 Elected or Appointed Public Official
10 Other (please specify) _____

3. What areas do you consider to be your KEY FOCUS AREAS? (circle all that apply) (FOC)

01 Collection Systems
02 Drinking Water
03 Industrial Water/Wastewater/Process Water
04 Groundwater
05 Odor/Air Emissions
06 Land and Soil Systems
07 Legislation (Policy, Legislation, Regulation)
08 Public Education/Information
09 Residuals/Sludge/Biosolids/Solid Waste
10 Stormwater Management/Floodplain Management/Wet Weather
11 Toxic and Hazardous Material
12 Utility Management and Environmental
13 Wastewater
14 Water Reuse and/or Recycle
15 Watershed/Surface Water Systems
16 Water/Wastewater Analysis and Health/Safety Water Systems
17 Other _____

4. Optional Items (OPT)

Education/Concentration Area(s) (CON)

1. Physical Sciences (Chemistry, Physics, etc.)
2. Biological Sciences
3. Engineering Sciences
4. Liberal Arts
5. Law
6. Business

COMPANY	PAGE	TELEPHONE	WEBSITE
ABB Inc.	49	800-752-0696	www.abb.com/drives
AMERICAN Flow Control	47	205-325-7701	www.american-usa.com
Advanced Aquaculteral Technologies, Inc.	46	574-457-6193	www.advancedaquaculturaltechnologies.com
Advanced Engineering and Environmental Services (AE2S)	6	763-463-5036	www.ae2s.com
AECOM	50	312-373-7700	www.aecom.com
Badger Meter, Inc.	10	800-876-3837	www.badgermeter.com
Baxter & Woodman, Inc.	48	815-459-1260	www.baxterwoodman.com
Bolton & Menk, Inc.	44	507-625-4171	www.bolton-menk.com
Brown and Caldwell	48	651-298-0710	www.brownandcaldwell.com
Burns & McDonnell	32		www.burnsmcd.com
CDM Smith	32	651-772-1313	www.cdmsmith.com
CEI Carbon Enterprises, Inc.	44	800-344-5770	www.ceifiltration.com
Centrisys/CNP	41	262-654-6006	www.centrisys-cnp.com
Clark Dietz, Inc.	50	262-657-1550	www.clark-dietz.com
CLEARAS Water Recovery	20	541-930-3201	www.clearaswater.com
Crawford, Murphy & Tilly, Inc.	48	217-787-8050	www.cmtengr.com
Deuchler Engineering	41	630-897-4651	www.deuchler.com
Donohue & Associates, Inc.	56	920-208-0296	www.donohue-associates.com
Electric Pump, Inc.	35	800-211-6432	www.electricpump.com
Energenecs	32	262-377-6360	www.energenecs.com
Energy Systems Group	7		www.energysystemsgroup.com
Environmental Dynamics International (EDI)	9	573-474-9456	www.environmentaldynamics.com
Force Flow	40	800-893-6723	www.forceflow.com
Gasvoda and Associates	55	708-891-4400	www.gasvoda.com
Greeley and Hansen	34	800-837-9779	www.greeley-hansen.com
HR Green, Inc.	50	800-728-7805	www.hrgreen.com
InfoSense, Inc.	10	877-747-3245	www.infosense.com
Integrated Process Solutions (IPS), Inc.	43	218-435-1703	www.ipsamerica.biz
JDV Equipment Corporation	45	973-366-6556	www.jdvequipment.com
Lakeside Equipment	2	630-837-5640	www.lakeside-equipment.com
L.W. Allen, Inc.	12	608-222-8622	www.lwallen.com
McMahon Associates, Inc.	25	920-751-4200	www.mcmgrp.com
Metropolitan Industries	15	815-886-9200	www.metropolitanind.com
Minnesota Pump Works	54	877-645-8004	www.minnesotapumpworks.com
Pentair Myers	8		www.pentair.com/virtualdemo
Pittsburg Tank & Tower	10	270-826-9000	www.pttg.com
Process Equipment Repair Services, Inc.	25	262-629-1059	
RELINER/Duran Inc.	4	800-508-6001	www.reliner.com
Ruekert & Mielke, Inc.	50	262-542-5733	www.ruekertmielke.com
SEH	37	651-490-2000	www.sehinc.com
Smith & Loveless Inc.	4	704-844-1100	www.smithandloveless.com
Starnet Technologies	38	262-886-0228	www.starnettech.com
Strand Associates, Inc.	43	608-251-4843	www.strand.com
Swanson Flo	49		
TKDA	36	800-247-1714	www.tkda.com
Trotter & Associates Inc.	39	630-587-0470	www.taiengr.com
Unison Solutions, Inc.	32	563-585-0967	www.unisonsolutions.com
Vega	3		
Wisconsin Pump Works	54	877-645-8004	www.wisconsinpumpworks.com
Xylem	47		www.xyleminc.com

Central States Water would not be possible without the advertising support of these companies and organizations. Please think of them when you require a product or service. We have endeavoured to make it easier for you to contact these suppliers by including their telephone numbers and, where applicable, their websites. You can also go to the electronic version of ***Central States Water*** at *www.cswea.org* and access direct links to any of these companies.

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The Vaughan Conditioning Pump is a Vaughan Submersible Chopper Pump mounted on a portable stand and fitted with a high-velocity mixing nozzle. The Conditioning Pump recirculates wet wells, chopping and mixing to produce a homogeneous slurry that is more easily pumped out. Floating mats are removed and solids that have accumulated on the floor are re-suspended. Being portable, it can be used in multiple applications at a single job-site, facility or municipality. In one recent project, the Vaughan Chopper Pump paid for itself in 2.5 months. Contact us to see what we can do for you.

APPLICATIONS

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- Basin Conditioning
- Influent Station/Channel Conditioning
- Holding Tank Conditioning
- Digester Cleanout/Homogenization

For more information contact your local representative:

GASVODA & ASSOCIATES, INC.
1530 Huntington Drive, Calumet City, IL 60409
Ph: 708-891-4400 | Fax: 708-891-5786 | E-mail: info@gasvoda.com

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Congratulations, City of Medford!

ACEC Wisconsin 2020 Engineering Excellence

Grand Award*

Medford Wastewater
TREATMENT FACILITY

DONOHUE

Low-Level Compliance Achieved Full-Scale Simply, Cost-Effectively, and Within a Small Footprint

On a continuous improvement path towards sustainability, the City of Medford, Wisconsin, collaborated with Donohue to convert its facility to biological phosphorus removal and add tertiary phosphorus removal. On July 7, 2019, the new disc filtration system's advanced coagulation and flocculation systems started meeting, and far exceeding, the City's stringent, future 0.075 mg-TP/L effluent limit. The facility is now a resource for other owners and operators facing low-level phosphorus limits.

*The American Council of Engineering Companies (ACEC) of Wisconsin recognizes exceptional engineering ideas and innovations through its annual Engineering Excellence Awards program. Consulting engineers may submit candidate projects in one of 12 categories. Best of State awards are issued to the highest rated projects. The Grand Award winner is selected from the Best of State winners and given to the project that best represents the spirit of the competition: *engineering innovation and excellence.* A Donohue wastewater project has received this prestigious award three times in the last seven years.