CENTRAL STATES WATER

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

2ND ANNUAL
MIDWEST
DESIGN COMPETITION

GWS Problem Statement: Samara

PLUS:

93RD Annual Meeting Award Winners
WEFTEC Recap
CRWD Receives WEF Municipal Stormwater and Green Infrastructure Award
Water Quality Trading
GWS Midwest Student Design Winner: Tecnológico de Costa Rica

Central States Water Environment Association
1021 Alexandra Blvd, Crystal Lake, IL 60014
ADDRESS SERVICE REQUESTED

Water Environment Federation
the water quality people

LOOKING FOR A SCREW PUMP UPGRADE?
LAKESIDE REPLACES ALL BRANDS AND TYPES

Lakeside's screw pumps offer the ideal and cost-effective "drop in" replacements for less reliable designs. Improve pumping performance and reduce maintenance costs with our superior dual upper bearing design and heavy-duty self-aligning lower bearing designs. For decades we've been the go-to source for replacing all screw pump brands. Replacements typically require little or no structural modifications. It's what you expect from Lakeside Equipment—known for nearly a century for efficient and dependable operation in all wastewater, drainage and industrial applications.

For more information on how you can achieve Lakeside quality and performance, contact one of our experts at **630.837.5640**, email us at **sales@lakeside-equipment.com** or visit our website **www.lakeside-equipment.com.**

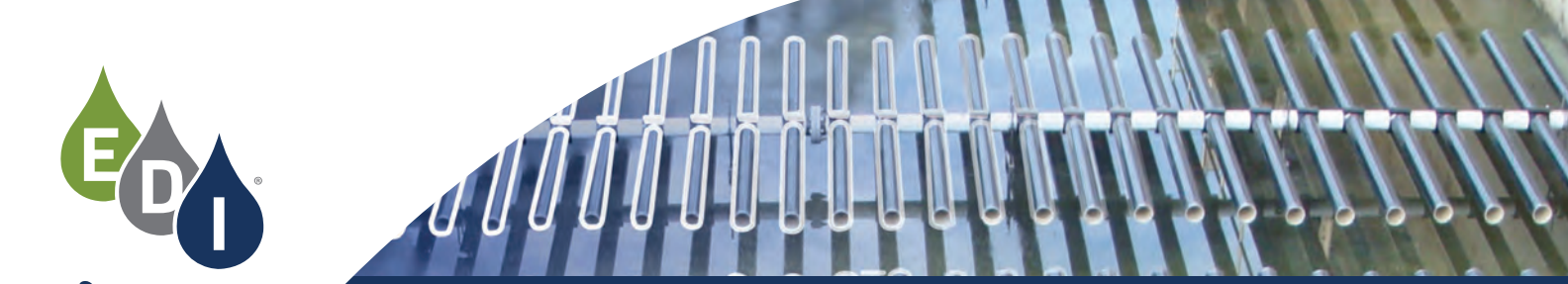
LAKESIDE
EQUIPMENT CORPORATION
Water Purification Since 1928

Cleaner Water for a Brighter Future®

Screw Pumps

Open Screw Pumps
Enclosed Screw Pumps

A Nexom BRAND



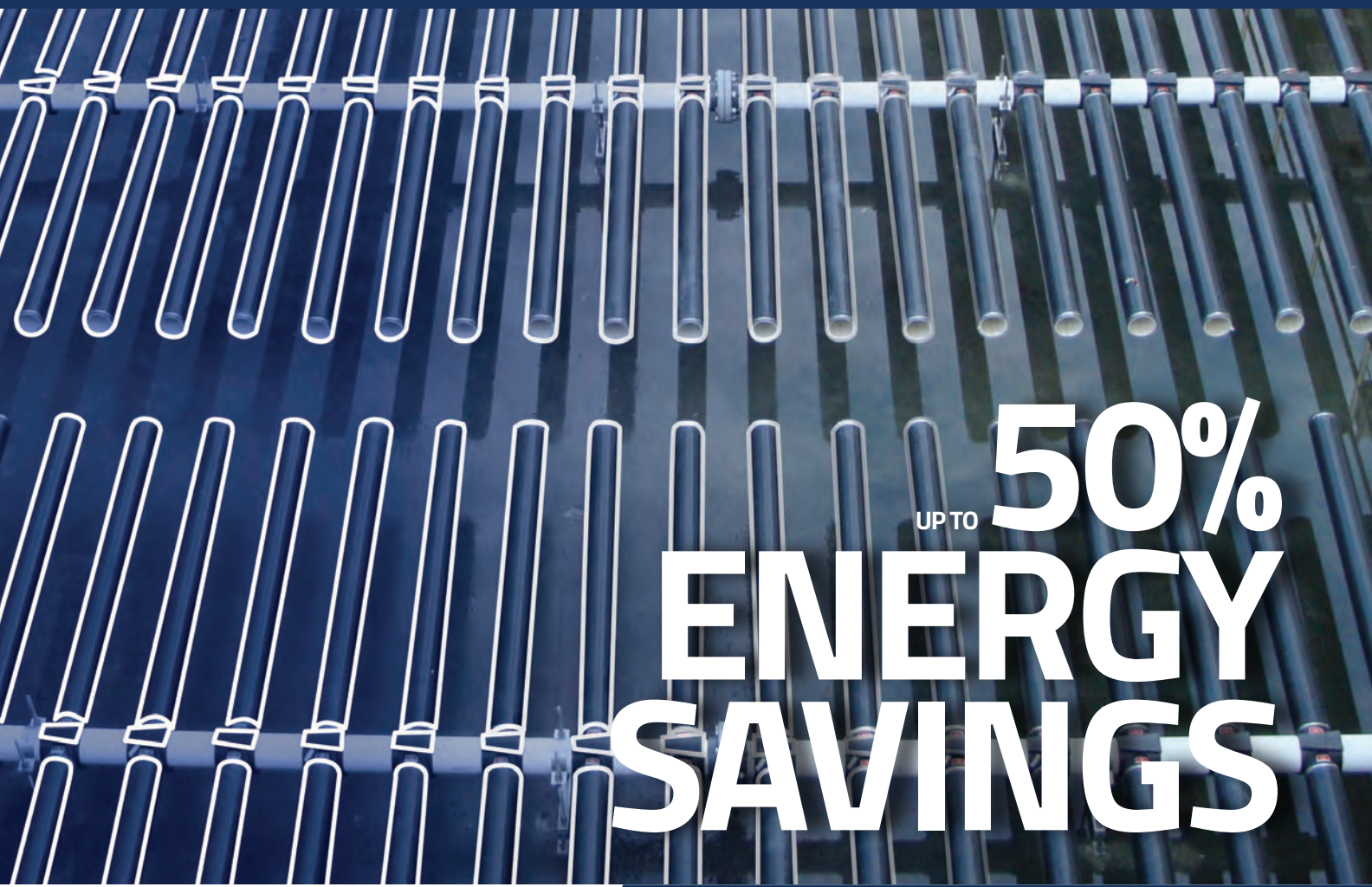
HIGH-EFFICIENCY WASTEWATER

AERATION

SYSTEMS | PARTS | SERVICE | SUPPORT

INTEGRATED SYSTEM SOLUTIONS
SINGLE SOURCE RESPONSIBILITY

Diffusers | Mixers | Blowers | Controls



UP TO **50%**

ENERGY SAVINGS

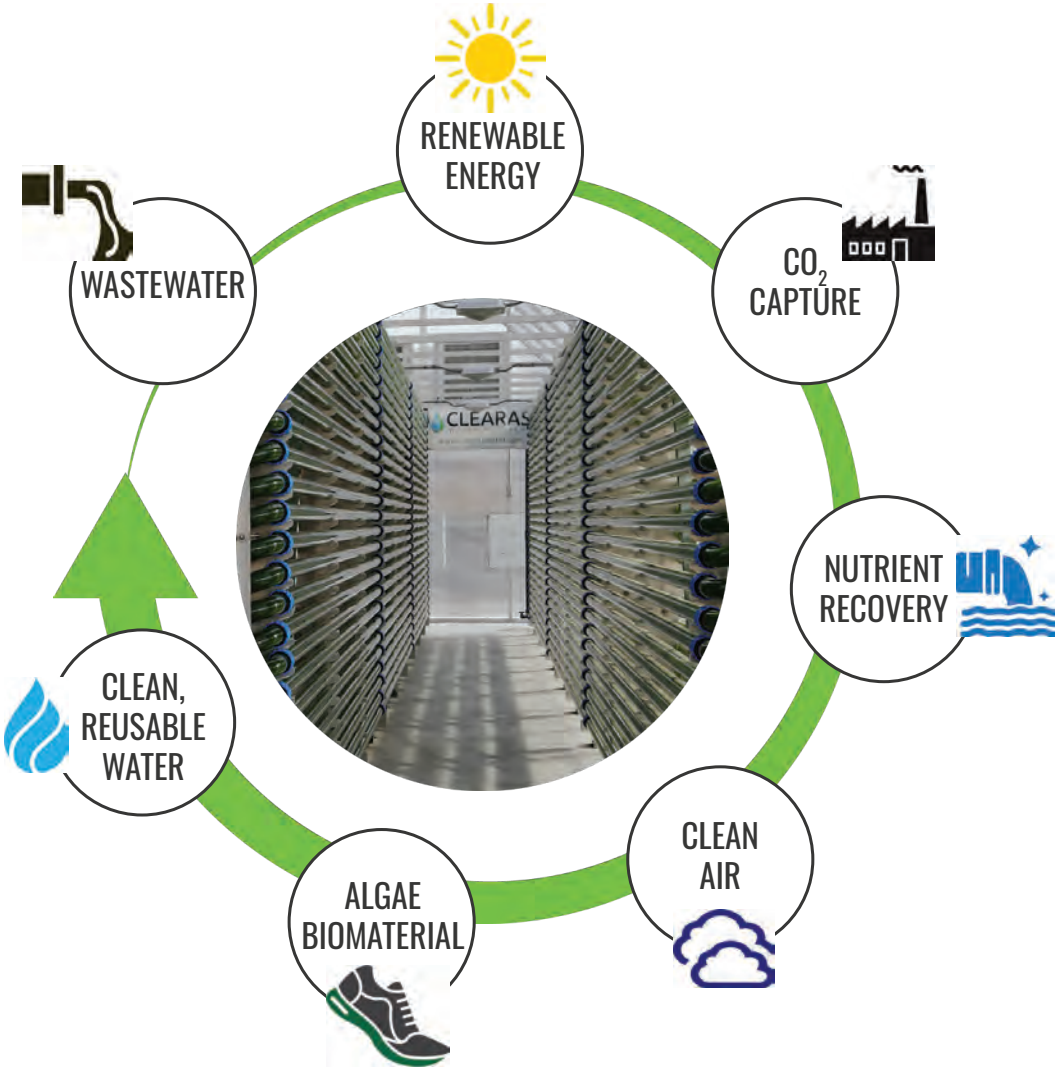
wastewater.com

Innovating Since	Installations	Countries Served
1975	7,000+	100+

Environmental Dynamics International, Inc. | +1.573.474.9456 | 5601 Paris Rd, Columbia, MO 65202 | United States

CLEARAS
WATER RECOVERY

THE FUTURE OF RESOURCE RECOVERY IS NOW...



ABNR DELIVERS SUSTAINABLE PHOSPHORUS AND NITROGEN RECOVERY AND IMPROVES BIODIVERSITY OF RECEIVING WATERS.

CLEARAS' Advanced Biological Nutrient Recovery (ABNR™) system is your zero-waste, resource recovery solution.

- **Performance**: Best-in-class phosphorus and nitrogen recovery
- **Sustainability**: Biological process, captures greenhouse gases and reduces chemical use requirements
- **Scalability**: Modular, flexible and bolts-on to existing infrastructure
- **Valuable Co-Product**: Negative carbon biomass that displaces fossil fuels
- **Cost Advantage**: Lowest net total cost of ownership

Visit clearaswater.com or Call (406) 363 4139

The Village of Roberts new ABNR resource recovery facility is designed to **meet a strict phosphorus discharge limit**, **reduce chemical and energy use**, and generate **recurring sale** of **plant-based biomaterial** into diverse markets.

FEATURES

DEPARTMENTS

Messages

CSWEA/WEF

Section News

Follow us on Twitter @cswea Link up with CSWEA on LinkedIn

Published by:

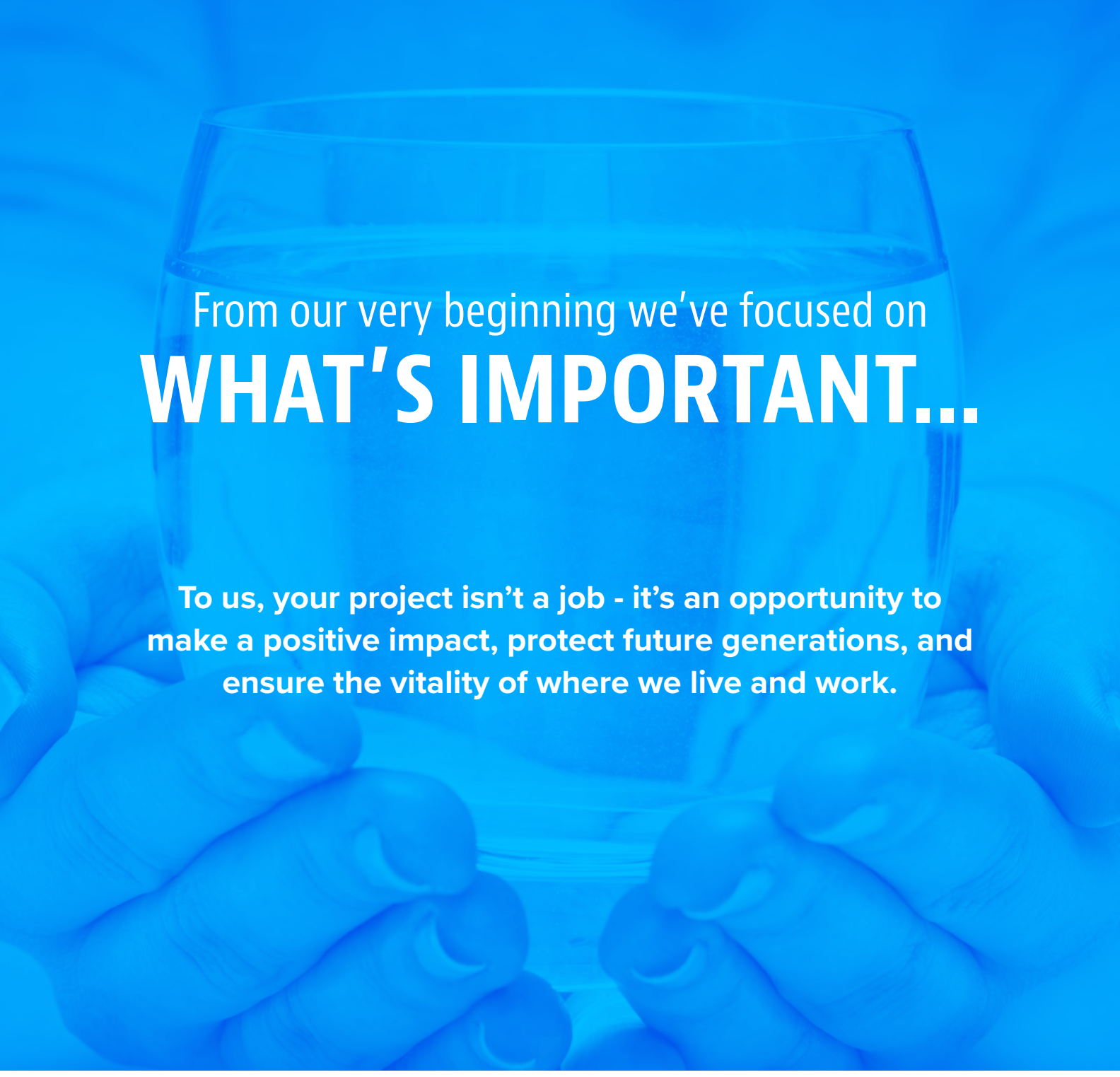
Craig Kelman & Associates

Tel: (866)985-9780 Fax: (866) 985-9799
www.kelmanonline.com *info@kelman.ca*
Design/Layout: Dia Chea
Marketing Manager: Darrell Harris, *darrell@kelman.ca*
Advertising Co-ordinator: Stefanie Hagidiakow
Federal tax# 23-7378788

Central States Water, the official magazine of the Central States Water Environment Association, Inc., is published four times per year. Send comments, news items, gloss photographs or digital images to Mohammed Haque, *mhaque@cswea.org*

Send undeliverable addresses to: CSWEA, 1021 Alexandra Blvd, Crystal Lake, Illinois 60014

Follow us on Twitter @cswea
Link up with CSWEA on LinkedIn



Providing engineering and related services to help clients achieve success.

WATER ENGINEERING | CIVIL ENGINEERING | GIS | MUNICIPAL FINANCIAL SERVICES | ASSET MANAGEMENT
INSTRUMENTATION & CONTROLS | ELECTRICAL ENGINEERING | STRUCTURAL ENGINEERING | COMMUNICATION SERVICES

AE2S

THINK BIG. GO BEYOND.

Advanced Engineering and Environmental Services, Inc.

www.ae2s.com

Happy New Year…

By Mark Eddington

Every month when Mohammed reaches out with a dreaded email that reads 'Hey, Mark I need a 1,000-word President's message for the next CSWEA Magazine', I usually think of a few things to eat up space.1) restate the question, 2) add a long quote, 3) ask Mo to increase the font size. Good and good, only 936 more words to go. So here you have it…

Welcome back! Hopefully, you have returned to work safe and sound from some sort of holiday break. I was lucky enough to burn some vacation time and spend the last two weeks of 2020 at home with my family. After two weeks, my family was sick of me and I have returned to work just in time. I returned refreshed and eager to start 2021.

I sat down and had every intention to write the proverbial "let's kick 2020 to the curb and move forward" message. I was going to share a couple jokes about how I have run out of new cocktails to try to make, that every room in my house has been purged of crap, and how "we got this." You know the rah-rah trope – the vaccine is becoming available, elections are finally over, and in my mind (at least) our country had turned a corner.

But then I flipped on the news…

I, like many of you I am sure, watched with dismay as a mob literally stormed the Capitol Building while both houses of Congress were in session to certify the electoral votes. I was lucky enough to tour of the Capitol Building during Water Week in 2018 and this insurrection struck me deeply. More death and destruction aided and abetted by sinical opportunists. More examples of poor leadership, double standards, and another incremental step towards forsaking all societal norms. Just when you think things cannot get worse, we devolve to *Lord of the Flies* (Golding, 1954) incarnate. Apparently, this is what we have become. All this while, lest we forget, nearly 4,000 of our fellow citizens are dying every day from the pandemic. I would love the opportunity to talk to the January 2020 version of myself and tell him to live it up because hell is coming to breakfast in the form of a medical, social, economic, educational, governmental, political, and environmental calamity. Further, we cannot begin to comprehend the long-term physical mental health ramifications this "experience" will have, especially on our children. Not a week goes by without some sort of breakdown in my house, and we are fortunate enough to live in the most comfortable of circumstances possible.

Environmental impacts seem small when compared to all other ills wreaking havoc in our lives today. But are they? I am not going to pretend that a cleaner environment is a panacea. Over the course of the past three decades, many have shouted down climate change and its potential impacts through selectively deployed cognitive dissonance. The notion that decades of environmental degradation are unrelated to our current pandemic is a dubious proposition. I predict, in the months and years to come, more and better data will reveal through lines from a weakened environment to weakened health. The worse we treat the environment the worse it seems to treat us. Increased and more extreme

flooding, drought, wildfires, and the like will only hasten the next human calamity. To make matters worse, these catastrophes disproportionately impact our most vulnerable citizens. Are we really surprised that carbon emissions contribute to chronic respiratory conditions (asthma, emphysema, etc.), which make one more susceptible to a pandemic like COVID-19?

How can we become a solution? If we have learned nothing else over this past year, it is that our collective capacity to adapt and solve problems creatively is bounded only by the limits of our imagination. Some thought leaders claim that technology has jumped ahead five to seven years in the past nine months. But it is not just technology that has advanced. I believe our "approach" to how we work and where we work from has taken a quantum leap forward from which there will be no looking back. Necessity is truly the mother of invention and these advances are truly the silver lining to take away from this soul-sucking morass.

> "The notion that decades of environmental degradation are unrelated to our current pandemic is a dubious proposition. I predict, in the months and years to come, more and better data will reveal through lines from a weakened environment to weakened health. The worse we treat the environment the worse it seems to treat us."

I maintain that Central States is uniquely positioned to lead our industry and our society out of this mess. I am continually impressed by the youthful (in age and in spirit) exuberance of our membership and its talent and was reminded of such during an opportunity to present (via Zoom) the CSWEA YP Award for Stephanie Cioni of Downers Grove Sanitary District.

As we all move forward, let's take the time to create positive change in our world and throughout the water and wastewater industry. Our annual conference, virtual this year, will take place on May 17-20, 2021. Its theme, Adapt and Thrive, represents our mindset today and how our positive approach will echo through our history in the coming years.

"The answer is to rely on youth, not a time of life, but a state of mind. A temper of the will, a quality of imagination, a predominance of courage over timidity, of the appetite for adventure of the love of ease. The cruelties and obstacles of this swiftly changing planet will not yield to the obsolete dogmas or outworn slogans. It cannot be moved by those who cling to a present which is already dying, who prefer the illusion of security to the excitement and danger that come with even the most peaceful progress." – RFK CS

THE INDUSTRY AUTHORITY ON AIR GAP BREAK TANKS

Manufactured In-House & Custom Engineered by Metropolitan Industries

- Eliminate the risk of cross-contamination at treatment plants, lift stations, and laboratories.
- More efficient than standard backflow preventers.
- Integrates with our in house custom manufactured and intuitive controls.
- Per project customizations; meets unique application requirements.
- Factory assembled and tested in-house. Arrives at the job site ready to go.

Metropolitan Industries, Inc.

815-886-9200
metropolitanind.com

Emmons Metro LLC

518-694-0404
emmonspump.com

Water Environment Federation
the water quality people®

David Arnott

Tracy Ekola

WEF in Action

By WEF Delegates, David Arnott and Tracy Ekola

Warm winter greetings from your WEF Delegates David Arnott and Tracy Ekola. WEF is busy adapting to the many new routines that are necessary in the current pandemic. This update will cover the current state of WEF, 2021 WEFMAX planning, and give an update on the Standing Committees and Workgroups we are on.

WEFTEC Connect took place October 5-9, 2021. WEFTEC was completely virtual this year, hence the modified name. Although overall registration was down compared to historical levels, there was still a lot of great content shared at WEFTEC this year. WEFTEC is historically the largest annual revenue source for WEF. Since WEFTEC registration was down, there was a negative affect on WEF financially. At the House of Delegates meeting on December 9, 2020, WEF leadership explained that WEF is still in a strong position financially though WEF had to draw off its reserves. The specialty conferences and WEFMAX events were virtual in 2020. Attendance and the resulting revenue were both down from the events. However, expenses were down as well. The overall negative financial impact was not as large as first feared in early 2020. Nonetheless, WEF has implemented furloughs among select staff to reduce expenses. Leadership has stressed to the Delegates that overall, WEF is still in a strong position for the long term.

WEF did announce at the December House of Delegates meeting that the Specialty Conferences and WEFMAX events for 2021 will be virtual as well. However, WEF is challenging themselves to make their conferences and seminars even more interactive and useful to registering members compared to 2021. For example, at the December meeting, a new virtual meeting platform, Remo, was explored. At the meeting, Delegates were able to move from table to table and chat with others. We also experimented with a white board to document ideas and collaborate all while being connected with video and audio at each table. Each table answered the question "How is your Member Association Handling Virtual Seminars and Conferences?" Four aspects of this general question were explored: content, revenue, marketing, and participation. The results from the meeting will be shared on at a future WEF Delegate report.

WEFMAX conferences are where Member Associations share best practices, members can network, and friends are made. The 2021 WEFMAX dates are shown below. Recently, WEF sent out a survey to the Member Associations to gauge interest in various topics for the events. Thanks to members of the Executive Committee that gave feedback to us on what interests them. The most popular topics were 'Operations Training' and 'Recruiting and Retaining Members'. Look for those topics and more at the virtual WEFMAX conferences.

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

Each WEF Delegate participates in Standing Committees and Workgroups. The Standing Committee are topics areas that need development and progress year after year for WEF to operate. The WEF Standing Committees are as follows: Steering, Budget, Nominating, WEFMAX, and Outreach.

Workgroups can change every year. A fresh look is taken every year on what appropriate work areas need development. The WEF Speaker Elect determines the Workgroups each year. The majority of our time as delegates is spent at the Workgroup level. The 2021 Workgroups are: Public Education; Conference Resources; Financial Diversification; Federal Advocacy; and Diversity, Equity, and Inclusion.

David Arnott is on the Outreach Committee and WEFMAX Committees and is starting to get up to speed on the committee goals and activities for 2021.

David is also on the part of the Public Education and Conference Resources Workgroups. For Conference Resources, the group met on December 16. The two main charges of this Workgroup for 2021 are to make an infographic to outline which virtual meeting platforms are best suited for various types of seminar and conferences. Part of this effort is also to summarize lessons learned for virtual conferences and seminars. The group wants to create a deliverable that Member Associations can use to efficiently plan for and implements impactful virtual seminars and conferences.

Click HERE to return to Table of Contents

The focus of the Financial Diversification Workgroup is to gather information on successful revenue streams. The Workgroup is looking for ways that Member Associations can supplement Annual Conference revenues with other income streams. Tracy is working with this workgroup to survey member associations to document best practices to share the information with Member Associations in 2021.

Tracy is also participating in the Federal Advocacy Workgroup to amplify WEF's advocacy messages and priorities through Member Associations. WEF has been able to advocate for more resources for our communities and utilities including additional funding resources, providing technical comments/science-based evidence on regulatory issues, and more recently recommendations on worker safety. A sustainable federal advocacy effort that generates results needs to have a strong grassroot base. Recent successes have been because of members writing Members of Congress, visiting their representatives, and being engaged on the issues. The focus of this workgroup is to increase engagement with Members of Congress and WEF Member Associations to amplify WEF's advocacy priorities, develop a tool kit, and help increase participation in the WEF Fly-in.

In closing, we want to stress that the WEF Delegate role is to represent the interests of the Member Associations to the House of Delegates and WEF. If something is on your mind, please feel free to call or email us so we can covey those concerns onward. WEF is very sensitive to fact that they have to be responsive and reactive to the needs and concerns of the Member Associations. The WEF Delegates are the conduit by which this communication happens.

Until our next update, stay safe and keep warm! CS

"WEF is challenging themselves to make their conferences and seminars even more interactive and useful to registering members compared to 2021."

Goodbye 2020, Hello 2021!

By Veronica Loete

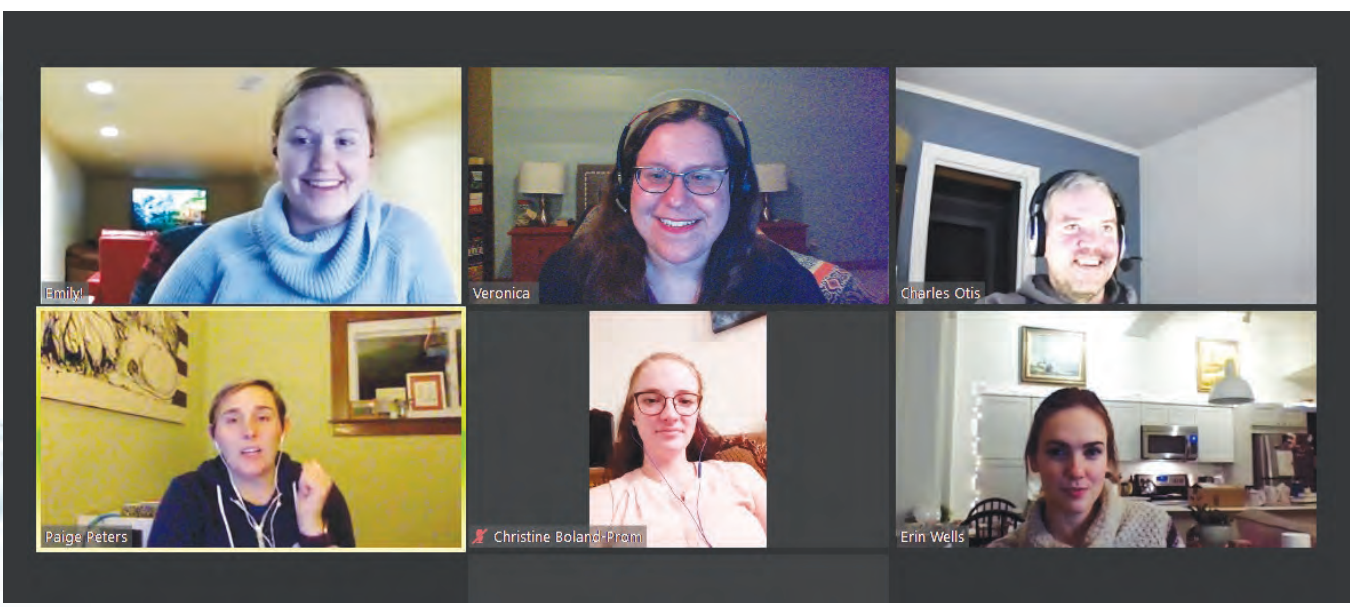
These messages for the magazine keep sneaking up on me – the time seems to be flying by! I'm writing this before the holidays. A few days off from work and holiday fun with family (even if it has to be via Zoom) are ahead of me, but by the time you read this the holidays will be over. We'll be deep into winter and there's a good chance we'll be getting sick of the dark and the cold. I don't know what we'll be feeling or talking about in February, but I do know that there are great CSWEA events, past and future, to talk about.

In November we held a well-attended virtual version of the WI State Section Annual Business Meeting. This meeting is usually jam packed since it includes budget discussions and election of new board members, but this year we had a fun additional agenda item – celebrating award winners! We used this meeting as a chance to honor some of the CSWEA 2020 award winners since there weren't the usual in-person events where the awards are given out. Congrats to the winners! I'm thankful for all their efforts and contributions to CSWEA and proud of how well they help us represent Wisconsin.

In December, there was the virtual three-state version of the Operations Seminar that Wisconsin Section members were involved with planning. I haven't heard about attendance numbers yet, but they put together a good-looking program. Also, our section's YP committee held another happy hour event as a way for YPs to connect during the pandemic. Virtual happy hour was a fun, casual event that gave attendees a chance to talk about a wide variety of topics. We talked about – and saw some cute children and pets. We also talked about current projects at work, Global Water Stewardship projects, dream travel destinations, what it is like working a job where you are responsible for your billable hours, and movies. We even heard a story about one YP who spontaneously arranged at WWTP tour when they were on vacation and discovered that their campground was across the street from the WWTP. We discovered lots of shared connections and mutual acquaintances. It's a small world! The committee is building good momentum to move into 2021.

If you missed out on any of these events and the cold, dark days of February are getting you down, don't worry! There are some great events coming up as well. Virtual versions of Wisconsin's Government Affairs Seminar (February), Spring Biosolids Symposium (March), and the CSWEA Annual Education Seminar (April) are all coming up. Be sure to keep an eye on your email or check out CSWEA.org for more details about those great events.

I hope you had a healthy and happy holiday season and that your 2021 is off to a good start. Spring is on its way and so is more great virtual content from CSWEA and the Wisconsin Section! CS



Click HERE to return to Table of Contents

CSWEA Proud

By Anna Munson

January: a month for making plans and for reflecting on the previous year. It is a month of relative calm after the end-of-year scramble. The cold and snow enhance the quiet and solitude of this time of year. This is one of my favorite months of the year because it feels as if I have a chance to begin anew, adjust things that aren't working and recognize those that are working well. It feels fresh and hopeful.

I hope our members feel proud when reflecting on what CSWEA accomplished in 2020. When many professional associations went quiet after the onset of the pandemic, CSWEA pivoted and persisted. We upped our webinar game. Beginning in April, CSWEA prepared and hosted more than 20 webinars with topics for engineers, utility managers, operators, and planners. In addition, CSWEA put together a virtual Annual Meeting, and the MN sections of CSWEA and the Air and Waste Management Association teamed up to offer a Virtual Conference on the Environment. Our members dedicated countless hours to prepare the content for these events. Our professional community benefited from the information sharing and learning opportunities presented virtually.

Last year presented many CSWEA MN Section members the unique opportunity to collaborate with professionals outside of our state section. Whether organizing webinars, preparing content or actively participating, many of us got to collaborate with our counterparts in the other two states. Some professionals were able to attend training that might have been prohibitively expensive or time consuming in-person. While Minnesota, Wisconsin, and Illinois are similar in many ways, each state has unique challenges. Collaboration among the state sections can build the relationships and knowledge needed to help address the challenges.

We have many things to look forward to in 2021. The COVID-19 vaccine and a return of warmer weather in the spring might help us return to in-person working and social events. Until then, WEF is offering learning opportunities virtually. On January 21, WEF will host a webinar on utility management in a time of crisis and beyond. Five speakers will address cultural shifts in employee expectations, operations with limited essential staff, workplace stress and skills, and technologies needed to keep a utility operating well. The annual WEF Collection Systems conference is scheduled for March 23 to 25. To ensure this virtual event provides the best experience for attendees, WEF is offering a smaller number of sessions than would be offered at an in-person event. However, the sessions will be curated to provide the most innovative or impactful material in the shortened session time. Peer to peer networking opportunities will also be provided. Looking into the spring, WEF will be presenting the virtual Odors and Air Pollutants Conference in April and the virtual Residuals and Biosolids Conference in May. So far, the Stormwater Summit is still coming to Minneapolis, set to kick off on June 21 at the Hyatt Regency. CSWEA is sure to be well-represented at the Stormwater Summit.

WEFMAX will be virtual this year, with programming created to help member associations exchange ideas and learn from each other. These sessions are a great way to get involved in planning and leadership in CSWEA and connect with other WEF leaders. The WEFMAX on April 8 will provide information on producing great virtual conferences and operator initiatives. Topics for April 22 will be 'MA engagement with academic institutions' and 'recruiting

"I hope our members feel proud when reflecting on what CSWEA accomplished in 2020. When many professional associations went quiet after the onset of the pandemic, CSWEA pivoted and persisted."

and maintaining members'. The WEFMAX on May 6 will cover operator initiatives and recruiting and maintaining members. As Section Chair, I plan to attend the meetings on April 8 and 22. Please reach out to me if you are interested in joining in. The Minnesota section budgets for sponsoring WEFMAX attendees each year.

CSWEA continues to provide excellent learning opportunities and ways to connect to our industry colleagues. February will be a busy month. Events include:

- CSWEA Joint Collection Systems Seminar (January 26, February 2 and 9).
- Innovative Approaches to Wastewater Operational Problems Conference (February 16 and 18).
- WI Government Affairs Seminar (February 17 and 18).
- CSWEA Operator Training Webinar Activated Sludge 1 (February 17).

Seminars and conferences are scheduled in March, April, and May as well. The CSWEA website Events page provides information about all upcoming CSWEA and state section events.

I encourage you to stay engaged with CSWEA and WEF by joining any of the upcoming events that interest you.

Our section will host another business meeting in February. We hold these meetings to help keep us engaged as a section, to plan activities for the next quarter, set funding priorities and share ideas. This year we have the opportunity to provide additional financial support for scholarships, subcommittee events, outreach activities, and other efforts to attract, support and retain CSWEA members. New ideas are welcome. Please reach out to me with your ideas or, better yet, join our February business meeting. Meeting details will be emailed to our section in a CSWEA email blast and will also be posted on the CSWEA website's Upcoming Events page.

As you do your own planning for 2021, I hope you reserve some time and energy for participating in at least one of the many CSWEA and WEF events. You'll certainly learn something new, and there is a very good chance you'll make some new professional connections. I wish you all a healthy, productive and enjoyable year. CS

Click HERE to return to Table of Contents

Adapt and Thrive

By Amanda Streicher

Adapt: verb, make (something) suitable for new use or purpose; become adjusted to new conditions.
Thrive: verb, grow or develop well or vigorously; prosper; flourish.

Wow, that's a powerful theme! We all can relate to that theme in every part of our lives, especially this past year.

Over the winter months, the IL section has been working on putting together the 94th Annual Meeting with the theme 'Adapt & Thrive'. The first adaptation our group made was the switch to a virtual Annual Meeting, while this was done for the 93rd Annual Meeting, we are looking at making changes to adapt to the challenges that were presented. This decision was made early on in planning to allow time to form the best approach to a virtual conference with an audience that is, frankly, Zoomed-out. While the agenda is still only in draft form as I write this letter – our group has worked hard to find a work-conference-life balance during this Annual Meeting, a big difference from the past Annual Meetings that can be a three-day 'Go!-Go!-Go!' event. However, as the times have changed, our group has adapted!

The Technical Program saw a significant reduction in abstract submittals from the past year. While there is still plenty of quality content to create a valuable conference, I wonder if all of this adaptation to our new way of doing things has changed the way we thrive. In the past, technical conferences have been a chance to sit in on informational presentations as well as carry on the conversation with enthusiasts after the talk has ended. With a virtual format, these ad-lib conversations can be a bit more challenging and the ability to exchange ideas does not come as freely as an in-person conference. As I mentioned in one of my past articles, I believe our industry has increased communication and is no longer focused on having in-depth discussions mainly at conferences. I think this presents a great opportunity for our virtual conference, as there is potential for the presentations to expand on conversations had over the past year and incorporate some of those questions into the presentation. I am looking forward to the final selections of abstracts for the conference and am excited to listen to how our industry is thriving through this time of extreme change.

Each Annual Meeting typically consists of an outing to a local water resource recovery facility. This outing has always been a great event where professionals could learn about a new plant, identify new ways of operating similar technologies, and find similarities among various facilities to increase the bond within the industry. In recent years, stormwater tours have been added to the conference agenda to learn about unique and innovative ways of managing stormwater. This year, these tours are taking on a different shape – yep, virtual! Both the facility and stormwater tours are going to be a pre-recorded video covering the unique aspects of the facilities and stormwater design. The video through the Northern Moraine WRD is going to be a drone flight through the plant. I would say our industry has adapted well to the use of new technology! Although these plant tours are so beneficial to have in person, I am amazed how well our industry has adapted to new technologies and is thriving on the information they can present.

The 5k is one of my favorite events of the conference. It is a chance to run off some of the maybe not-so-smart, potentially alcohol-related decisions from the social events the night before. After starting off, what could-be a rough morning, with a nice, refreshing run, I am ready to tackle the conference and the packed day that lay ahead. This year there will be no 5k; however, that does not mean CSWEA is not going to do anything. This year instead of a 5k run, it will be a much broader, virtual race. For those who wish to participate, a pledge will be made by each individual at the registration of the conference. This pledge is to identify how many minutes of activity (any activity, like yoga, walking, lifting weights, swimming, etc.) they plan to do each day of the conference. Activity minutes will be reported for each day of the conference, and the total will be calculated at the end of the conference where a winner will be announced. This is a great way to get our bodies in motion after sitting at a computer all day. Our bodies and minds will thrive after this conference!

Another one of my favorite events that is adapting to the change is the Meet & Greet Social. As I have said before, the IL Section, and CSWEA as a whole is a very sociable group. We seem to like each other's company. The social events are always a great time where everyone can see others they maybe haven't seen since the last conference and catch up. With the IL Section hosting the Annual Meeting this year, of course we are going to have a social event! I am really looking forward to the trivia event and having a fun time in our breakout groups with others I have not seen in over a year! It will be a great time to test our brains and share a few laughs. To the group I end up in for Trivia: just because I love the game, does not mean I am any good – but hey, at least we will have fun! We will adapt and thrive and come out with laughs and maybe learn a few new fun facts.

I think we can all wish things were back to 'normal' and that everything we talk, write, and plan for doesn't have to involve pandemic considerations. However, I think as a group and as an industry we are doing our best to adapt and thrive through these unprecedented times. I am writing this letter and by the time you are reading it, I am sure there have been new hurdles to conquer and bigger lessons learned. Again, just another sign that we have all gotten good at adapting, and thriving in this rapidly changing world. I am looking forward to this Annual Meeting and seeing what our industry experts have to share on their experiences and what new adventures they have gone on in the past year. CS

Click HERE to return to Table of Contents

$600 in Cash Prizes

WATER'S WORTH IT®

CSWEA ESSAY CONTEST

CSWEA of Illinois invites you to join the WATER'S WORTH IT campaign by writing a short essay about water scarcity.

ESSAY TOPIC: OPTIMISM IN THE FACE OF A GLOBAL WATER CRISIS

Water is essential to life, yet one in nine people lack access to a clean source. Much of the story of water is that of problems – water shortages due to climate change, lack of sanitation, polluted natural waterways, contaminated drinking water, and so on. These issues are very real and impact the lives of billions of people, but there is still hope for the future. New innovations and technologies are continuously being created that can positively change the future of water. Help shine a light on the potential solutions to water scarcity by selecting one of the prompts listed below and writing a short essay.

RESEARCH PROMPT | 1ST PLACE PRIZE OF $200, RUNNER-UP PRIZE OF $100

Research a region of the world that is currently facing a water crisis. Describe the issues they face regarding water. Explain, if any, the measures that have been taken to bring clean water to the area. If nothing has been done, why? What innovations or technologies do you believe have the potential to help with this region's water crisis? Explain what steps would need to be taken to put these new innovations and technologies into place, what difficulties there might be (ex: funding) and how these issues could be overcome. Finally, if implemented, how would these new innovations change the lives of those in this region for the better?

CREATIVE WRITING PROMPT | 1ST PLACE PRIZE OF $200, RUNNER-UP PRIZE OF $100

Imagine the year is 2041. You live in a region of the world that struggled with a water crisis (scarcity, pollution, lack of sanitation, etc.) but through new innovations and technologies, clean water is now available for your community. Write a first person narrative describing life before and after these technologies were brought to your region; be sure to include where you live, what water issues your community faced, how these issues were solved, and how life is better now that you have access to clean water.

GUIDELINES

- Students must be in 6th-8th grade and reside in Illinois.
- Only one essay may be submitted per student and each student must choose between the creative writing prompt and the research prompt.
- Essays must be between 300-500 words and typed in an easy to read 12 pt font. Any cited references do not count towards the word count of the essay.
- Each essay must be submitted with a cover page containing the following information: Student's name, age, grade, name and city of school, teacher's name, teacher's email, and which prompt the student selected (creative writing or research).

Essays must be digitally submitted in either WORD or PDF format no later than 12 am CST April 15th, 2021**

Submit essays to: *www.cswea.wufoo.com/forms/2021-waters-worth-it-essay-competition*

**If special circumstances require a handwritten essay, or you have any questions, please contact *scioni@dgsd.org*. CS

93RD ANNUAL MEETING AWARD AND WEF AWARD WINNERS

WILLIAM D. HATFIELD
Stephan Brand, City of Oshkosh, WI

LABORATORY ANALYST EXCELLENCE
Derek Budsberg, City of Wisconsin Rapids, WI

Madison Metropolitan Sewerage Dist

GEORGE W. BURKE, JR. FACILITY SAFETY AWARD
Madison MSD
(Pictured Kayce Board, Safety Manager)

Arthur Sidney Bedell
Not Awarded

GUS H. RADEBAUGH
"Doubling Down on Phosphorus"
Rachel Lee, LAI, Ltd (formerly Ostara)
Mikaela Verigin, Ostara
Dr. Matt Seib, Madison MSD
Aaron Dose, Madison MSD

BILL BOYLE EDUCATOR OF THE YEAR
Dr. John Katers,
University of Wisconsin – Green Bay

WEF SERVICE AWARD
Eric Lynne – WEF Delegate 2016-2019

COLLECTION SYSTEM – WISCONSIN
Joan Hawley,
Superior Engineering, Muskego, WI

COLLECTION SYSTEM – ILLINOIS
Chris Dufort, City of Elmhurst, IL

STUDENT DESIGN – ENVIRONMENTAL
Christine Boland-Prom, Blake Bostwick, Rebekah Janquart, Jamie Nguyen, Julian Sonn, and Jamie Sykora
"Municipal Wastewater Treatment Facility – Joyabaj, Guatemala"
Milwaukee School of Engineering

MSOE UNIVERSITY

OPERATIONS – ILLINOIS
Jason Neighbors, Glenbard WW Authority, IL

COLLECTION SYSTEM – MINNESOTA
Christopher Harrington,
HR Green, Minneapolis, MN

OPERATIONS – MINNESOTA
Corey Bjornberg, City of Rochester, MN

Click HERE to return to Table of Contents





STUDENT DESIGN – GLOBAL WATER STEWARDSHIP – NORTH AMERICA
Caitlyn Graeber, Nicole Heyniger, Rebecca Joseph, Grace Scarim, and San Marie Thomson "La Fortuna, Costa Rica Sewer and Treatment Design" Marquette University

MARQUETTE UNIVERSITY

STUDENT DESIGN – GLOBAL WATER STEWARDSHIP – OVERALL
Sharon Castillo, Jafet Castro, Raul Garita, Nicolas Morales, Alejandro Morales, Maria Jesus Peralta, Lidia Rodriguez, Anotony Torres, and Deilin Urena "La Fortuna, Costa Rica Sewer and Treatment Design"
TEC University, Costa Rica

SUSTAINABILITY & GREEN INFRASTRUCTURE
Michael Mucha, Madison MSD

WATER STEWARDSHIP
Matt Streicher, Glenbard WW Authority

OPERATIONS – WISCONSIN
Cody Schoepke, City of Fond du Lac WTRRF, WI

WATER TECHNOLOGY INNOVATOR AWARD
Tracy Hodel, City of St. Cloud

YOUNG PROFESSIONAL – ILLINOIS
Stephanie Cioni, Wheaton SD, IL

YOUNG PROFESSIONAL – WISCONSIN
Paige Peters, Marquette University, WI

YOUNG PROFESSIONAL – MINNESOTA
Sam Lobby, Western Lake Superior SD, MN

ACADEMIC EXCELLENCE – UOFM – TWIN CITIES
Anndee Huff

CSWEA SERVICE AWARD
Doug Henrichsen, CSWEA President
2019-2020

CSWEA SERVICE AWARD
Beth Vogt, Treasurer
2016-2020

CSWEA SERVICE AWARD
Alison Sumption, Minnesota
Trustee 2018-2020

CSWEA SERVICE AWARD
Jillian Kiss, YP Representative
2018-2020

WEFTEC RECAP

Operations Challenge 2020

BY LUKE MARKKO

2020 brought us a lot and much of it was pretty tough – but those willing to make the most of it found a lot of good. As they say, when the going gets tough, the tough get going. I find this true especially when fun is involved. A crazy type of fun! The kind of fun in repetitively cutting 8" PVC pipe by hand, getting laboratory procedures as efficient and accurate as possible, running a simulated wastewater treatment facility, breaking down and rebuilding pumps like a NASCAR pit crew, rescuing a 150 lb. dummy from a confined space, and testing one's knowledge of everything wastewater. This is Operations Challenge!

I have been lucky enough join the professionals that represent CSWEA in this annual event at WEFTEC several times now. While every year is different, in 2020 the global pandemic caused by COVID-19 forced WEFTEC and its many events to move to a virtual platform. This included the Operations Challenge.

Under normal circumstances CSWEA forms two teams to compete in Ops Challenge, usually consisting of a rookie and a veteran team known as the Pumpers and Shovelers, respectively. New CSWEA Collections and Operations award winners are invited to participate on the rookie team while a contingent of veterans is put together based on the number of times they have participated and availability. Then a group of operators from Minnesota, Wisconsin, and Illinois convene at the City of Janesville's Wastewater Treatment Facility for two, two-day crash courses in the competition events.

The logistics of getting a team together to practice for a virtual competition required adaptations to this formula. Current PWO Kathy Crowson and outgoing PWO Chris Lefebvre put out a call to veteran competitors to see if regional teams could be put together consisting of people that were located a reasonable distance from one another so that they could meet to practice. Unfortunately, many could not. However, we were lucky enough to scrape together a few folks from Northeastern Illinois to form a team. Matt Streicher and Jason Neighbors of the Glenbard Wastewater Authority answered the call along with me, Luke Markko of the Northern Moraine WRD. This left us looking for one more… Mike Holland of the Kishwaukee WRD – while not a veteran of Ops Challenge but Collections Award winner – was gracious enough to throw his hat in the ring as our rookie. At Northern Moraine located in Island Lake, IL we found ourselves

Click HERE to return to Table of Contents

convening in an old horse barn converted to a garage. We made the most of it and it became our Ops Challenge Arena! The City of Janesville, WI was kind enough to truck in all of the CSWEA equipment used to practice for Ops Challenge each year. We had the tools, and we had the talent. It was time to get to work.

With 27 teams competing from separate locations not only across the country, but also across the globe, the 2020 Ops Challenge was pared down to three events consisting of Collections, Laboratory, and Process Control. Additional Divisions were created, and CSWEA found itself competing in Division 1 for what may be the first time ever. While every team wants to rank well in scoring, this year had a different feeling to it, a feeling of keeping a tradition alive in the face of adversity. It was more about showing the world that while even under times of extreme circumstances we could still pull this off. This is the dedication found in wastewater professionals in communities across the globe, and part of why I love this career and why I love Ops Challenge. It has created so many networking opportunities for the individuals lucky enough to be involved, while instilling a level of confidence that can be attained by being presented with the daunting task of putting oneself on the world stage and testing their mettle with some of the best.

So many involved in Ops Challenge helped to see this realized. The officials and organizers at WEF did an amazing job providing all of the teams with a platform to showcase their talents. I'd like to thank those that are near and dear to CSWEA that helped their team compete this year. Firstly our sponsors, Strand Associates, Hazen, AllMAX Software, Process Equipment Repair Services, Brown and Caldwell, SEH, Trotter and Associates, and Donohue. Thank you for giving us the resources to compete. Secondly I'd like to thank the City of Janesville, WI, the City of Stevens Point, WI, Glenbard Wastewater Authority, Kishwaukee WRD, and Northern Moraine WRD, for sharing their staff and resources. And, last but not least, I'd like to thank my teammates and all the veteran competitors before us that have been and continue to remain a resource for us all. Thank you! CS

MSOE Team Comes in 4th at WEFTEC Connect

Congratulations to the CSWEA Milwaukee School of Engineering Student Design Team for their achieving 4th place in the 2020 WEF Student Design Wastewater Competition with their design *Municipal Treatment Facility - Joyabaj, Guatemala*. The team consisted of Christine Boland-Prom, Blake Bostwick, Rebekah Janquart, Jamie Nguyen, Julian Sonn, and Jamie Sykora. William Krill, MBA, PE acted as Faculty Advisor. The WEF Student Design Competitions were developed to provide a forum to showcase top students who will be future water quality professionals. The competitions provide university students with an opportunity to highlight their skills and share their enthusiasm for the water environment while addressing real world design challenges. This year, the conference was held virtually.

(Left to Right) Christine Boland-Prom, Jamie Sykora, Jamie Nguyen, Rebekah Janquart, Blake Bostwick, and Julian Sonn.

Abstract:

The municipality of Joyabaj, Guatemala has a growing population with insufficient wastewater treatment infrastructure. Untreated wastewater is currently flowing into a river, jeopardizing the health and safety of the community and the surrounding environment. Five sites were chosen as locations of potential wastewater treatment facilities. Of the five sites, three have been designed by a Chilean engineering firm. This project focuses on the design for one of the two remaining sites. To ensure long-term feasibility with this project, five criteria were determined to address the needs of the community: reliability, land requirement, maintenance simplicity, energy consumption, and safety and security. These criteria are most impactful on the secondary treatment system, and after evaluating seven processes, a trickling filter was selected. The preliminary, primary and tertiary treatments are designed in accordance with the requirements of a trickling filter. This facility will intercept the current wastewater collection system and treat the water in accordance with Acuerdo 236 before discharging into the nearby river. The effluent concentration limits are 100 mg/L BOD5 and 100 mg/L TSS. This project will target effluent limits of 50 mg/L BOD5 and 50 mg/L TSS to ensure that standard limits are met as the community grows.

To read the full report, check out the Summer 2020 issue of *Central States Water*. CS

CRWD Receives WEF Municipal Stormwater and Green Infrastructure Award

BY KATIE WOYCHYSHYN

Education is key to protecting the environment, especially in the stormwater and wastewater industries. So when the staff at Capitol Region Watershed District (CRWD) successfully engaged 11,000 residents in outreach programming, which included tours and special events at the new building, their outstanding performance drew some attention. This work and CRWD's success in a wide variety of projects has now resulted in a Municipal Stormwater and Green Infrastructure Award – an annual award presented by the WEF Stormwater Institute in coordination with the US Environmental Protection Agency (EPA).

Capitol Region Watershed District consists of 40 square miles that include portions of Falcon Heights, Lauderdale, Maplewood, Roseville, and St. Paul, MN The District includes four major lakes (Como Lake, Crosby Lake, Loeb Lake, and Lake McCarrons) and all CRWD land eventually drains to the Mississippi River. The District aims to protect, manage, and improve its water resources. It accomplishes this with watershed rules and permitting programs; stormwater, lake, river, and Best Management Practice (BMP) monitoring; water resource improvement projects; education and outreach programs; and by providing technical assistance and funding through a grant program.

Their 2018 move to an office facility on a former EPA Brownfields site in St. Paul, MN, helped them further achieve their goals. The space not only serves as an office for CRWD staff, it also serves as community center for watershed education.

"The building is located in the heart of our watershed District, in the heart of the city of St. Paul, so it was very important that our building embodied sustainable practices and values," stated Anna Eleria, Planning Projects and Grant Division Manager at CRWD, in a video detailing the project.

The office facility was designed to meet the Leadership in Energy and Environmental Design (LEED) Gold Standard, a certification given by the US Green Building Council (USGBC), a designation that aligns with CRWD's core values. According to a blog by the staff of CRWD, the project included several large rain gardens, tree trenches, and permeable pavement added to collect rainwater and allow it to soak into the ground. These features prevent rainwater from flowing over roads, sidewalks, and parking lots to carry pollution through storm drains and into the Mississippi River. The building also uses a 3,000-gallon cistern that passes rainwater through a pre-treatment system so it can be used to flush toilets, wash equipment, and more. It is also 25% sustained by solar power and includes a variety of recycled materials: the carpets in the building are made from recycled fish net and the wood panels on the wall were harvested from an invasive elm species at nearby Willow Reserve.

An especially important part of the project is the Pocket Park water feature, which is an interactive educational exhibit

Click HERE to return to Table of Contents

Como Lake

> THE PROJECT USED STACKED GREEN INFRASTRUCTURE (SSGI) TO REACH DENSITY, SUSTAINABILITY, AND VIBRANT SPACE GOALS.

that represents an urban watershed. It uses rainwater to communicate complex information in a creative and understandable way. The Pocket Park is part of a green space that neighbors, staff, and visitors can enjoy.

According to the *WEF Stormwater Report*, the move into the new office allowed the District to even better engage adults and children in green infrastructure and watershed conservation in partnership with local environmental groups, leading to a better understanding in the community on the watershed and how a community must work together to protect its lakes and rivers.

CRWD has worked on nearly 1,750 clean water projects since it was formed in 1998. The District also oversees a massive, regional rainwater reuse and infiltration system that manages approximately 80,000 m3 (2.5 million ft3) of runoff each year, as well as more than 500 rain gardens.

A notable CRWD project is the rehabilitation of Como Lake, an urban shallow lake heavily impacted from runoff from its watershed. The biggest challenge for Como Lake is the excessive amount of phosphorus in the water – three times the state standard – which interrupts the surrounding ecosystem. Since beginning their work with Como Lake, CRWD has helped reduce the addition of phosphorous from the watershed by 20%. They are also managing phosphorous inside of the lake by treating 75% of the lake (the deepest parts) with Alum, which prevents phosphorus from being consumed by algae. The treatment has greatly improved the clarity of Como Lake, and can last anywhere from five to 20 years.

CRWD has also tackled Como Lake's curly-leaf pondweed, an invasive species that decomposes and releases phosphorus into the lake, with a community-inspired 20-year management plan to reduce curly-leaf pondweed with the assistance of non-toxic, environmentally friendly herbicide treatments to restore balance to the ecosystem.

Another notable project is the redevelopment of the Snelling-Midway Site, otherwise known as Allainz Field. Before the stadium construction, the site's stormwater runoff ran untreated into the Mississippi River. According to the project overview, "CRWD saw an opportunity to demonstrate stormwater innovation for thousands of District and metro area residents. The project would be one of the largest and most visible redevelopments in the city's history and creating new green infrastructure improvements to the site would be essential to advancing CRWD's mission of improving the District's water resources."

The project used stacked green infrastructure (SSGI) to reach density, sustainability, and vibrant space goals. It resulted in improvements that include the addition of comprehensive rainwater and stormwater capture; reuse systems; as well as tree trenches and rain gardens that help improve water quality, reduce use of potable water supplies, and enhance the city's tree canopy to reduce urban air temperatures and improve air quality.

> CRWD HAS WORKED ON NEARLY 1,750 CLEAN WATER PROJECTS SINCE IT WAS FORMED IN 1998.

The Allainz Field project was completed in Spring 2019 and uses reclaimed water from rooftop runoff to irrigate the three-quarter-acre park north of the stadium, site trees, and other green spaces. When fully connected, CRWD estimates that upwards of two million gallons of water per year can be conserved from the site.

CRWD is governed by a five-member Board of Managers that guides the District in carrying out its Watershed Management Plan. It greatly encourages residents to partner with CRWD to protect their water by doing their part: cleaning their curb, covering loose soil and sand, scooping pet waste, picking up litter, sweeping salt, and planting native species that filter stormwater runoff.

The annual Municipal Stormwater and Green Infrastructure Award, developed in 2015, honors the administrators of municipal separate storm sewer systems (MS4s) that perform beyond regulatory requirements. This year, 18 high-performing municipalities received recognition in the sixth annual National Municipal Stormwater and Green Infrastructure Awards. The awards recognize excellence in program management, innovation, and overall performance. Both Phase I and Phase II MS4 permit holders in good standing may apply.

Submissions undergo an expert committee review and selection process. Each applicant is designated a bronze, silver, or gold within three categories: program management, innovation, and overall performance.

"This year's National Municipal Stormwater and Green Infrastructure Award winners inspired the selection committee with their outside-the-box approaches to permitting, financing, outreach, innovation, and more," said Fernando Pasquel, Chair of the Stormwater Institute Advisory Committee. "Their ingenuity has driven better outcomes for public health and the environment in their communities and created models for stormwater organizations across the US that demonstrate the true benefits of effective stormwater management." CS

2021 MIDWEST DESIGN COMPETITION

2021 STUDENT DESIGN COMPETITION GUIDELINES

The Midwest Student Design Competition is intended to promote "real world and hands on" design experience for students interested in pursuing an education and/or career in water/wastewater engineering and sciences field. This year, the Midwest Student Design Competition will be virtually on **Wednesday, April 28, 2021**. This is a unique opportunity for students at the college level to demonstrate their engineering, environmental or biological science skills and practices by researching and preparing a design for a water quality-based project and presenting their project to water industry professionals.

There are three categories of Student Design Competitions available for students:

- WEF Wastewater Design
- WEF Environmental Design
- Global Water Stewardship

WEF STUDENT DESIGN COMPETITION

The WEF categories at the Midwest Student Design Competition, feed into the national WEF competition at the WEFTEC conference in October of 2021. The WEF competition requires teams of students to design and present a program meeting the requirements of a problem statement, developed by the students. **There are two categories of the WEF competition**; a conventional Wastewater Design category which includes traditional **wastewater design** projects and an **environmental design** category which would include contemporary engineering design topics like sustainability, water reuse, wetland construction and Engineers Without Borders projects.

The WEF Student Design Competition is designed to be a function of the WEF Student Chapters program but being part of a WEF Student Chapter is not required to compete at the Midwest Student Design Competition. However, the winning teams will have to ultimately be WEF student members to participate in the national WEF competition at the WEFTEC conference.

GLOBAL WATER STEWARDSHIP STUDENT DESIGN COMPETITION

The Global Water Stewardship (GWS) category at the Midwest Student Design Competition requires teams of students to design and present a project meeting the requirements of the real-life problem statement for the town of Samara, Costa Rica titled 'Global Water Stewardship: Samara District, Costa Rica'. Winning teams will receive a stipend of up to $1,000 per student for travel and lodging expenses to accompany GWS representatives on their August fact-finding trip to Costa Rica and to present their project to local community representatives.

WORKLOAD: The project should include a problem statement, a development of alternatives, and a recommended solution. The depth of the effort should be comparable to preliminary design. A key criterion in the judging of the competition is the manner and level of effort spent in evaluating the alternatives. Students are expected to work with little assistance from an advisor and/or professor, and the students are expected to work together as a team to find a solution to their problem. Students may use whatever references or resources they choose.

REQUIREMENTS: Teams may consist of more than four members, but only four students may present at the competition. Student teams will compete through oral presentations, in PowerPoint format. Each presentation will be 20 minutes followed by a 10-minute question and answer period.

The winning teams of the WEF competition categories will be required to submit a design notebook complying with the WEF competition requirements set forth in the WEF design competition entry guidelines. These guidelines will be provided to competitors when published, usually in May.

TIMELINE

March 1, 2021: Submittal of the Entry Form for the 2021 Student Design Competition is due. Submittal of Entry Form found online at *www.cswea.org/students-yps/design-competition*.

April 28, 2021: Design Competition will be held virtually.

SELECTION

Representatives from wastewater industry will judge the design competition. The results of the competition will be issued to participants at the conclusion of the competition.

AWARDS

WEF Competition Categories: The winning teams (max. of 4 members) from each category of the WEF competition will receive free registration from WEF to the WEFTEC conference in Chicago, IL (October 16 - 20, 2021 – COVID Pending). Stipends for travel and lodging expenses to Chicago vary depending on the student's respective WEF Member Association (MA).

Prizes for the winning team at the national WEFTEC conference will vary depending on sponsorship opportunities. Monetary awards typically provided by WEF for the top 4 design teams are: 1st place $2,500, 2nd place $1,500, 3rd lace $1,000, 4th place $750.

Global Water Stewardship Category: The winning team (max. of 4 members) from the GWS category will receive a travel and lodging stipend of up to $1,000/student (which is typically sufficient to cover travel and lodging) to accompany the next GWS team trip to Costa Rica for site analysis and investigations.

FOR ADDITIONAL INFORMATION, CONTACT:

Mike Holland, Midwest Student Design Competition Chair
mholland@kishwrd.com

SPONSOR TODAY

MEET FUTURE WASTEWATER PROFESSIONALS

The Midwest Student Design Competition is intended to promote 'real world and hands on' design experience for students interested in pursuing an education and/or career in water/wastewater engineering and sciences field. This is a unique opportunity for students at the college level to demonstrate their design for a water quality-based project and presenting their project to water industry professionals.

An estimated 60-80 Students attending from throughout the Midwest and Costa Rica! Teams include entries from:

MSOE University · University of Notre Dame · University of Minnesota · Universidad de Costa Rica · University of Illinois at Urbana-Champaign · Iowa State University · Marquette University · Purdue University · University of St. Thomas Minnesota · University of Wisconsin Platteville · TEC Tecnológico de Costa Rica

SPONSOR - $500

TO BECOME A SPONSOR of the 2nd Annual, Midwest Water Design Competition, please email our chair, Mike Holland at *mholland@kishwrd.com* for more information or visit *www.cswea.wufoo.com/forms/2021-cswea-msdc-sponsorship*.

SPONSORSHIP DEADLINE

Friday, March 26, 2021

Click HERE to return to Table of Contents

Greetings,

On behalf of Global Water Stewardship (GWS), I would like to introduce you to the GWS Student Design Competition. The GWS Student Design Competition is a unique opportunity for students at the college level to demonstrate their engineering skills and practices by researching and preparing a design for a real-world sanitation project in a Costa Rican community and to present their project to water industry professionals. This year, the competition will be held virtually as part of the Midwest Student Design Competition on **Wednesday, April 28, 2021**.

The GWS Design Competition requires teams of students to design and present a project meeting the requirements of the real-life problem statement titled 'Global Water Stewardship: Samara District, Costa Rica'. Winning teams will receive a stipend of up to $1,000 per student for travel and lodging expenses to accompany GWS representatives and wastewater professionals on their August fact-finding trip to Costa Rica and to present their project to local community representatives.

Given the current environment of virtual courses, we will be as flexible as possible in working with students and professors to afford the opportunity to participate on the design competition date. Please read over the attached guidelines and let us know if you have any questions.

I look forward to hearing from you with any questions or if you need additional information on how to participate in these events I can be contacted at *lapastora@nmwrd.org*.

Best Regards;

Joe Lapastora
Community Design Chair
Global Water Stewardship

Global Water Stewardship; Samara District, Costa Rica 2021 Problem Statement

Samara Beach – Samara, Costa Rica

Project Understanding

- Location: Samara District, Costa Rica including the towns of Cangrejal/ Samara/Torito.
- Population (Year 2020): *Source – (INEC, 2014).*
  - Cangrejal – 1483
  - Samara – 1567
  - Torito – 853
- Number of Water Services (Year 2020):
  - Cangrejal – 353
  - Samara – 373
  - Torito – 203
- Water Usage: See Project Considerations Section
- Annual Average Precipitation: 2500 mm *[Source – (IMN, 2008)]*
- Average Temperature: 27 Degrees Celsius *[Source – (IMN, 2008)]*
- Geologic Characteristics; Source – *(SoilGrid)*.
  - Typical Groundwater Level: 1.7m below ground
  - Average Apparent Density: 1.17 g/cm ^ 3
  - Average Porosity: 56%
  - Average Hydraulic Conductivity: 0.8 cm/hr
  - Soil Types Present;
    - Clay
    - Sand
    - Silt
- Typical **Influent** Characteristics;
  - Parameter
    - BOD5 = 280 mg/l
    - TSS = 220 mg/l
- Required **Effluent** Characteristics;
  - Parameter
    - BOD5 = 50 mg/l
    - TSS = 50 mg/l
    - Total Nitrogen= 50 mg/L
    - Fecal Coliform = **only applicable if considering water reuse**, refer to Table 7 in "Reglamento de Vertido y Reuso de Aguas Residuales" document in Google Drive.

Costa Rica has very few centralized wastewater treatment systems. In rural areas, septic tanks are a common way of treating wastewater; greywater is often discharged directly overland. The leach fields are very small and very shallow and although the law states the leach fields must stay within each individual property, they often do not. Shallow bedrock, poor soils, poor cleaning and maintenance practices, and poor designs often contribute to improper treatment of septic tank effluent. Further exasperating the issue, it is not uncommon for sludge cisterns to dump collected material in rural areas (polluting) instead of trucking the sludge to a distant WWTF.

The area of concern for this year's problem statement is a collection of communities in the Guanacaste province on Costa Rica's Pacific coast, generally referred to as the Samara District. The district is mostly known for its palm-lined main beach, Playa Samara, and is also characterized by livestock development and a reliable fishing industry. The Samara district is located 35 kilometers from Nicoya, Costa Rica (an economic and administrative hub of the region) and 160 kilometers West of San Jose. The district is significantly developed compared to a typical rural Costa Rican community, and the local communities are known as favorite vacation spot for both Costa Ricans and foreigners.

The planning area is composed of three communities including Cangrejal, Samara, and Torito. These areas are mainly residential with a heavy dependence on tourism (hotels, restaurants, and shops). The region hosts roughly 120,000 tourists per year. Roughly ¾ of the tourists visit between November and June. A centralized sanitary wastewater solution is desired along with a reliable collection/conveyance system. Costa Rica's electrical grid consists of 110-volt power, a combination of single phase and three phase and unexpected power outages do occur. For the Samara district design,

assume that three-phase power will be readily available.

The residential population is relatively steady with no current plans for major developments, or significant residential population growth. However, as tourism grows in the region, more businesses and residents may move in. Assume a residential population growth of no more than 2% per year, and tourism growth of no more than 4% growth per year. Use your best engineering judgment regarding projections.

Almost every home and business located within the Samara district is connected to a private septic tank. In a few cases, some homes discharge wastewater directly to latrines. Recent studies suggest that there is evidence of malfunctioning septic tanks due to the high groundwater table in the area, which causes contamination by septic tank effluents that do not infiltrate the ground but are washed away by runoff. This situation of mismanagement of wastewater has caused concern on the part of its inhabitants, the tourism sector, MINAE, the Municipality of Nicoya, AyA and the ASADAs involved in Cangrejal, Samara, and Torito, who promote the Sanitation Project.

The local utility has been proactive in seeking a centralized wastewater treatment solution and would like a preliminary conceptual design of a treatment system along with a collection system. **The design team must propose three locations for the treatment site. Additionally, the design team must propose three alternative treatment systems** (each system may be one type of treatment or a series of treatment processes). The community values the great variety of flora and fauna in the area and the design team should hold this community interest in high regard while considering treatment alternatives. Also of note: the Playa Samara Beach is home to an impressive coral reef that is located near the coast. The ultimate design should not impede or negatively affect any of the community interests.

Given the complexity and status of the project, the design team must work on **an optimal site selection** and **a preliminary design proposal**. The design should be as intensive as possible (design the actual hp of pumps, actual diameter of pipes, accurate elevations and stationing, etc.).

Unlike most Costa Rican communities, the Samara District has one potential site that is set to be donated to the local ASADA for a future wastewater treatment site. When considering three locations for the centralized treatment site, **note that the potential government owned site should be one of the three proposed sites**. For the design team's final recommendation for ideal site location one should consider proximity to the Samara community while also considering cost to acquire new land. See 'Addendums' folder in the Google Drive for potential donated site location.

In Costa Rica, especially in rural areas, toilet paper is not disposed of in the toilet. This is due to low water pressure, smaller pipe sizes and general goal to reduce solids entering into septic tanks or treatment systems. Used toilet paper is typically collected in trash cans and is disposed of along with other solid waste. Design of wastewater collection and treatment improvements should follow Costa Rican design standards as much as possible, otherwise typical US standards.

It is Costa Rican law that the property owner is responsible for their individual connection to the sewer main, however, it is necessary to plan for funding the entire connection. It is also Costa Rican law that if you have water service once a sewer main is constructed in front of a property, the property owner must pay for the service whether they chose to connect to the system or not.

Project Considerations

- The Cangrejal ASADA has provided water consumption data, which is available in the Google Drive folder. The community has also provided the official design standards for potable and sanitation treatment systems: *Section 5 of the design standards cover sanitation systems*. For the communities of Samara and Torito, use 'minimum water consumption' values provided below.

  Minimum water consumption per Costa Rican design standards are as follows:
  Rural Areas: 200 Liters/person/day
  Urban Areas: 300 Liters/person/day
  Coastal Areas: 375 Liters/person/day
  Metropolitan Area: 375 Liters/person/day

- Wastewater production can be estimated assuming 80% of water consumed/person will be sent to the sanitary system.
- Water consumption data should be analyzed and compared to the given minimum water consumption guidelines.
- Infiltration flow for PVC pipe material is 0.25 Liters/sec/km.

Project Approach

For this project, GWS is soliciting designs for a long-term solution to the sanitation problem in this region. In general, the solution approach should be to design a centralized treatment system with a complete collection system.

Additional Information can be found by using the following link. Note that the link may need to be copy-pasted into the URL – *https://drive.google.com/drive/folders/1dhn9sDxFSkM0fwcFGCMQfttthy45CZic*.

Additional Project Considerations

The specific areas of concern with the collection and wastewater treatment system are described as follows:

1. The treatment facility must be adequately sized for anticipated flow, future growth, with seasonal rainfall variability taken into account.
2. Seasonal variability of flows due to tourism should also be taken into account.
3. Treatment facilities should be designed to be able to treat the effluent to meet the limits as described in this document.
4. Due to the socioeconomic status of the community, user fees must be lower than 5,000 colones per month.
5. The location of the treatment facility needs to be easily attainable and needs to be located in an area that is not at risk of flooding and landslides. Additionally, be aware of and protect existing drinking water sources. Treatment site location also needs to be evaluated for ease of construction and potential impacts on nearby homes and businesses. The average and maximum flows for the proposed collection system need to be determined.

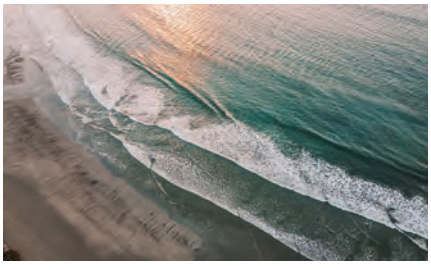
Design Objectives and Constraints

The following are the items that should be discussed or implemented as part of the design project. The design that best accomplishes these goals will have the highest likelihood of long-term success.

1. The project must take into consideration the local climate (temperature and heavy rainfall) and high variability due to tourism.
2. Avoid offensive odors and minimize impacts on landscape aesthetics.
3. The equipment must have a level of redundancy to maintain treatment if some equipment is in temporary disrepair.
4. The solution must utilize a minimum of space and energy. Special consideration will be given to designs that are energy efficient and/or partially self-sustaining from an energy standpoint.
5. The project capital cost must be minimized.
6. The system must be easy to operate and maintain. There is no wastewater training available in the area or wastewater operators' associations. Local staff will have to be trained on the system operation and maintenance, but may be available only on a part-time basis, so the system should be fairly self-operational.
7. The wastewater treatment equipment must be easily replaceable with parts readily available.
8. Treatment equipment must be compatible with the existing electrical system.
9. Consider simplicity (less O&M the better) in design whenever possible.
10. It is recommended that the teams design for the year 2040 (20 years). Provide justification with any variances.
11. Use best engineering judgment in consideration of separation requirements for potable water and sewer main. Potable water typically runs along the road Right-of-Way.
12. Designate the following in the report/presentation;

a. Three (3) proposed treatment plant sites.
b. Designate one (1) of those three (3) proposed sites as the **recommended** site location.
c. Three (3) alternate treatment processes.
d. Designate one (1) of those three (3) proposed treatment processes as the **recommended** treatment process. CS

Figure 1. Community Extents for the three communities of interest. A KMZ file of these extents are provided in the Google Drive.



Click HERE to return to Table of Contents

Ready To Ship

SUBMERSIBLE WASTEWATER PUMPS & CONTROLS

Assembled, Tested & Ready For Your Application

Grundfos and our partners want to ensure you have what you need to continue facilitating and delivering essential water services. We have a large inventory of in stock SE/SL submersible wastewater pumps, LC controls, SEG grinders and competitor guide rail brackets that are ready for immediate shipping.

Competitor Guide Rail Brackets Are Available For EASY RETROFITS

SE/SL Pumps

High performing, efficient and easy to maintain submersible wastewater pumps

SEG Grinders

Designed for pumping effluent and untreated sewage in small communities or sparsely populated areas.

LC Controls

Offer comprehensive features for control and monitoring of pumps in wastewater applications.

Minnesota Pump Works
Fluid Handling Professionals

AUTHORIZED GRUNDFOS DISTRIBUTOR

TOLL-FREE 877-645-8004

www.minnesotapumpworks.com
www.wisconsinpumpworks.com

Wisconsin Pump Works
Fluid Handling Professionals

be
think
innovate

Grundfos Americas
Brookshire, TX 77423

www.grundfos.us

GRUNDFOS

GWS 2020 Student Design Winner

TEC | Tecnológico de Costa Rica

COLLECTION SYSTEM AND WASTEWATER TREATMENT PLANT DESIGN GLOBAL WATER STEWARDSHIP – La Fortuna, Costa Rica

By María Jesús Peralta

GWS Midwest Student Design Winner:
Tecnológico de Costa Rica

On April 6th, six Environmental Engineering students from the Costa Rican Institute of Technology competed in the CSWEA Midwest Student Design Competition (MSDC), which was carried out virtually. The competition was based on the design of a collection system and wastewater treatment plant (WWTP) for La Fortuna, Alajuela, Costa Rica. The team members were María Jesús Peralta, Sharon Castillo, Antony Torres, Lidia Rodríguez, Deilin Ureña, and Nicolás Morales. Raúl Garita, Jafet Castro, and Alejandro Morales, students of Electromechanical Engineering, Construction Engineering, and Architecture, respectively, also helped with the development of the design. Diana Zambrano was the Costa Rican Institute of Technology Engineer Advisor for the project, and Mohammed Haque, Joe Lapastor, Zachary Wallin, and Mike Holland served as the CSWEA engineer advisors.

CONCERN

La Fortuna is located in north central Costa Rica, in the Alajuela province. The area has several weaknesses in the water resource sanitation; the wastewater is, in certain cases, managed by septic tanks, with low capacity to cover the whole population, low operation and maintenance (O&M) and a high percentage of the sewage is dumped without any previous treatment (Global Water Stewardship, 2019); that is why Central States Water Environment Association – Global Waster Stewardship determined that La Fortuna needs to improve sanitation with a centralized wastewater treatment system to protect the water resource and public services, without compromising the development of the local tourism and adapting to the growing population density. The design required several considerations, including flow variability, local climate, odors and aesthetics, space and energy use and O&M simplicity. Additionally, the purpose of the WWTP was to comply with the Costa Rican Reform of Wastewater Discharge and Reuse Regulations

TEC team members: María Jesús Peralta, Sharon Castillo, Antony Torres, Lidia Rodríguez, Deilin Ureña, Nicolás Morales, Raúl Garita, Jafet Castro, and Alejandro Morales.

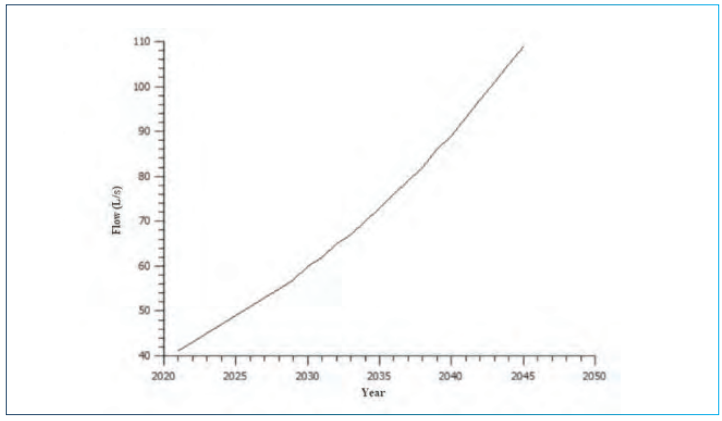


Figure 1. Wastewater production during design period.

Click HERE to return to Table of Contents

(N° 40699-S-MINAE, 2017): maximum 50 mg/L BOD, 150 mg/L COD, 50 mg/L TS.

In order to develop the design correctly, the demand, population (including both residents and tourists) and flow were first estimated. The per capita demand (112 L/person/day) was calculated using the domestic consumption data and the average population per living unit, given by Global Water Stewardship (2019). The population density of the area is highly influenced, as it receives around 3000 tourists per day, with a higher activity between November and June (Global Water Stewardship, 2019).

The floating population was determined based on the average flow and the demand, with a growth rate of 4% (Research Program in Sustainable Urban Development, 2014). The floating population corresponds to the difference between the total and the resident population, the latter was calculated and projected based on INEC (2011), with a grow rate of 4.2%. To determine the design flow, a return factor of 0.8 and a design period of 26 years were considered, to give a total of 109 L/s.

Figure 2. Site location.

SITE SELECTION

Around 2004, La Fortuna joined forces to develop the *Anteproyecto de Alcantarillado Sanitario y Pluvial* (2004), followed by alternatives, studies, land-purchase and management of the project, which was key for the development of the selection and design of the WWTP. Since the ASADA already had made a great effort to purchase a land for this purpose, only this site was considered for the design. In addition, it had favorable topography, without the need for large ground movements for terracing.

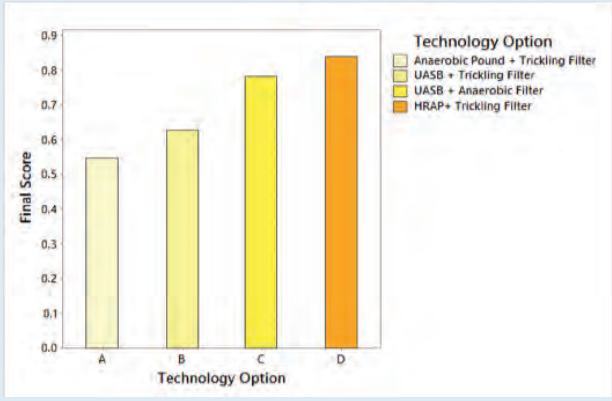


Figure 3. Selection model results.

Criterion	Indicator	Unit	a	b	c	d
Economic	Initial investment costs	¢	59.851.212	172.858.400	260.813.779	56.731.087
Environmental	Odors and insects production	Scale (1-3-5)	5	3	3	3
	BOD effluent	BOD mg/L	25,10	23,20	24,61	25,10
	Energy consumption	Scale (1-3-5)	3	3	1	3
	Sludge generation	g SS/person/day	60,00	40,00	23,00	25,10
	Sludge digestion	Scale (1-3-5), 5 is the most digested	3	3	5	3
	Noise generation	Scale (1-3-5)	1	1	3	37,00
Technical	Technical simplicity of operation	Scale (1-3-5) per technology average	4	4	5	3
	Maitenance need	Scale (1-3-5) per technology average	2	2	1	1
	Space requirement	m^2	2832	824	2093	2131
Social	O&M costs (NPV 25 years)	¢	393.582.608	409.615.596	374.489.442	289.489.271

Table 1. Criterion and indicators considered, evaluated for each alternative.

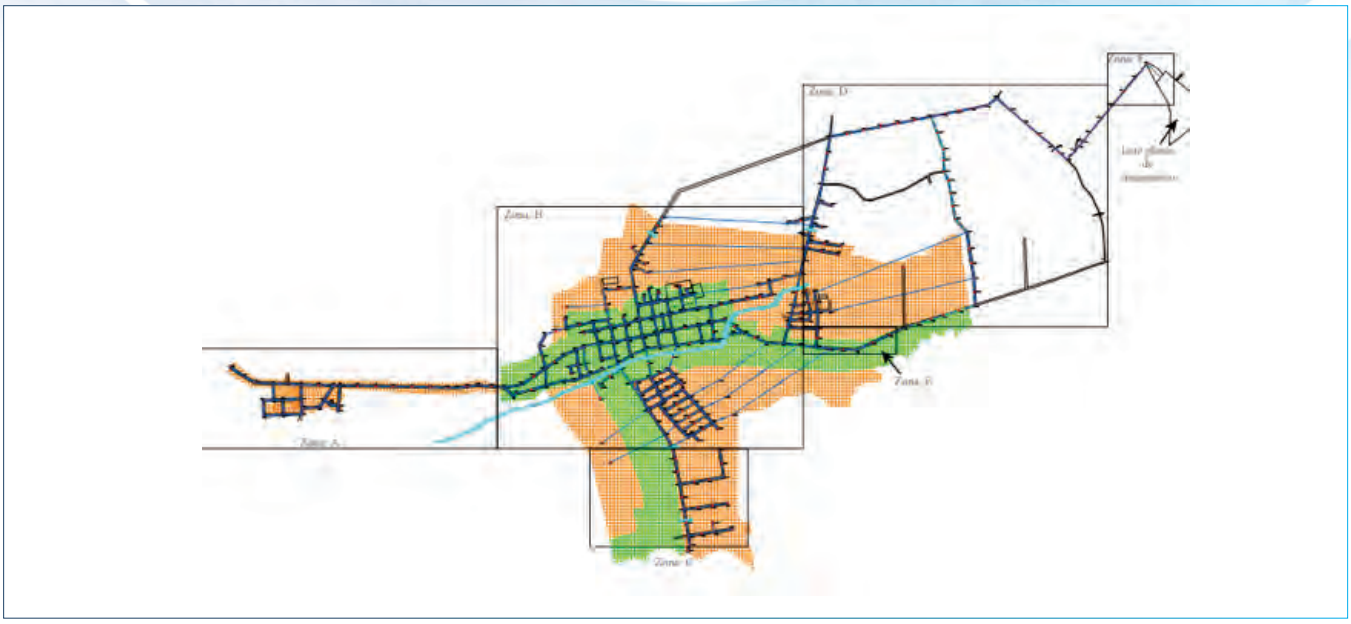


Figure 4. La Fortuna wastewater collection system.

EVALUATION OF ALTERNATIVES

Once flow was projected, a methodology to develop the design of a WWTP was created. Since it was needed various alternatives to be considered, the Multicriterion model by Hierarchy Grey Relational Analysis (Zeng et al, 2006) was used for the evaluation of the best treatment line. Additionally, all the considered alternatives were based on the axes of sustainability (economic, technical and social), nature-based solutions, reduction of energy consumption and applicability in Latin America; as well as the combination of an anaerobic system followed by an aerobic, since it is a very efficient coupling when it comes to wastewater treatment, low sludge production and high-quality effluent (Noyola *et al*., 2013).

PROCESS SELECTION

The model considered economic, environmental, technical and social criterion, using a weight of 4%, 44%, 16%, and 36%, respectively. The weights were determined by a consultation to the ASADA La Fortuna members. Each criterion had specific indicators that were considered as the most important to take into consideration.

DESIGN SOLUTION

According to the model and the considered criteria, the best alternative was the one composed by a high rate anaerobic pond (HRAP) (primary treatment), followed by a trickling filter (secondary treatment).

TREATMENT SYSTEM

In regards to the liquid line, the pretreatment is composed by coarse screening and grit removal. Next, the water is pumped from a HRAP to a trickling filter, and then it will pass to a secondary settler. The HRAP has a removal efficiency of 70% and is very simple in terms of operation and construction. It works very well with high loads and reaches good efficiencies (Duncan Mara, 2003). On the other side, trickling filters need less energy than other secondary technologies and are very easy to operate (Metcalf and Eddy, 1997). In addition, a recirculation of water will be carried out from the settler to the trickling filter of the second module, for reasons that will be explained later. This pump will have a frequency variator, in order to reduce its power during the years of recirculation.

For the solids line, it is produced in the pond and secondary settler. As part of the design optimization and due to the great sludge digestive capacity of the pond, the possibility of recirculating the settler sludge to the pond was considered. To develop the idea, a MATLAB optimization model was elaborated, which allowed to determine the variables that minimize the O&M cost, which was the objective function of the model. The model showed that the optimum recirculation rate is 99%. It should be noted that the settler sludge will be pumped into two thickeners, so the solids concentration will be increased from 2% to 4.5%, before getting in the pond. The 1% non-recirculated sludge and the digested pond sludge will be pumped into six drying beds of 40 m^2 each, which will be at room temperature, with a transparent cover and drying time of 21 days. In addition, there will be recirculation of sludge to the thickener, in order to avoid the generation of odors.

For the gas line and its energy use, the gas comes from the pond and is captured by a geotextile there. Next, it will be taken to a biofilter, followed by a gas holder and, lastly, a microturbine. The biofilter has a gas flow of 24 m^3/h, an initial H2S concentration of 58 mg/L and a retention time of 40 seconds. Also, a double membrane Sattler gas holder will be used, with an outer diameter of 11 m. The microturbine will be Capstone C65 model. Also, as part of the biogas study over time, a biogas accumulation strategy will be proposed, in order to produce biogas at certain times of the day; however, from

the year 2042 in advance it would be continuously produced and the microturbine would work at a load of 70%. The biogas produced will be 299 m^3/day/unit, which leads to an annual energy production of 455 572 kWh/year. That way, 18 tCO2/year would not be emitted.

COLLECTION SYSTEM

The designed sewerage system covers 10 communities: Zeta Trece, Barrio Pastoral, Palmas, El Centro, Barrio Olivos, Barrio Monolo, Barrio Pito Pito, Barrio La Rivera, Barrio Dora y Barrio Pilo. The design started from the review of the topographical information to set the flow direction, wells location and afferent areas and infiltration flow determination. The wastewater flow was calculated for each area, considering the land use and the residential and mixed population. The sewerage system network, diameters, slopes and full hydraulic capacity use were also calculated. It turned out to be a 28.2 km sewerage network.

SITE LAYOUT

Due to the La Fortuna rapid increase in wastewater annual production, the implementation of two parallel units of a HRAP and trickling filter is proposed as a reliable and cost-effective solution. The simultaneous installation of both units helps to guarantee the water would still be treated if one unit fails or requires maintenance. However, in order to minimize O&M cost, it is recommended the operation of one unit only until its treatment capacity allows it. Thus, it was examined the operational flexibility given by the HRAP, trickling filter and sludge thickener, according with the expected wastewater production growth and BOD5 concentration of 280 mg/L, during the design period. Therefore, according to design criteria recommended by Peña (2011) for satisfactory operation, one HRAP is expected to treat effectively all the wastewater production until the year 2034, when the start-up of the second unit is suggested, in order to avoid overloading of the first unit. From this moment, the flow to be treated will be distributed equally between the two ponds.

Similarly, considering the design criteria suggested for optimum treatment of tricking filters given by Tchobanoglous *et al*. (2003), one trickling filter is projected to have capacity to treat effectively the complete effluent of the HRAP until the year 2034, when the start-up of the second unit is needed for satisfactory operation. In order to reduce the risk of diminished capacity due to inadequate biofilm humectation, a minimum wetting rate of 0.5 L/m^2/s in the trickling filter must be maintained (Tchobanoglous *et al*., 2003). Thus, from 2034 to 2040 is suggested to direct 43 L/s to one trickling filter and the remaining incoming flow to the other unit. This flow distribution

causes the need of only one recirculating line from a secondary clarifier to a trickling filter, instead of two, to maintain the minimum wetting rate recommended and, therefore, reducing the maintenance and power consumption required. From 2040, the incoming flow is recommended to be distributed equally between the two trickling filters, the expected amount is enough to maintain the adequate moisture of the biofilm in the two units, without the need of recirculation. Finally, according with the gravity thickener design proposed, it is recommended to start-up the first unit in 2023 for effective trickling filter sludge concentration, and the second unit in 2040, to concentrate the sludge coming from the second trickling filter.

COST ANALYSIS

The cost analysis was based on the unit costs for materials and services, which were multiplicated by the total quantities for each of the given material or service. The collection system, WWTP and O&M costs were considered. The total estimated corresponds to US$1,902,862, US$3,283,277, and US$6,827 per month by 2045, respectively.

REFERENCES

CATERPILLAR. (2009). *Manual de rendimiento*. Recuperado el 4 de junio del 2018 de: *www.erods.files.wordpress.com/2010/09/49502978-manual-de-rendimiento-caterpillar-edicion-39-en-espanol.pdf*

Colegio Federado de Ingenieros y de Arquitectos de Costa Rica (2017). Código de instalaciones hidráulicas y sanitarias en edificaciones. SAN JOSÉ, Costa Rica.

Coopelesca. (2020). *Tarifas eléctricas*. *www.coopelesca.com/wp-content/uploads/2020/01/2020_04-cvc-tarifas-ele%cc%81ctricas-sitio-web.pdf*

CSWEA. (2019). CSWEA Student Design Competition. Illinois: Mission Statement. Recuperado de *www.cswea.org/student-yps/design-competition*

Duncan Mara, D. (2003). Domestic Wastewater Treatment in Developing Countries. Earthscan. UK, USA.

Instituto Costarricense de Acueductos y Alcantarillados. (2017). Norma Técnica Para Diseño Y Construcción De Sistemas De Abastecimiento De Agua Potable, De Saneamiento Y Pluvial. Costa Rica: La Gaceta N° 180. Recuperado de *www.aya.go.cr/noticias/documents/norma%20dise%c3%b1o%20y%20construccion%20sistemas%20agua,%20saneamiento%20y%20pluvial.pdf*

Instituto Nacional de Estadística y Censos INEC (2011). X Censo Nacional de Población y VI de Vivienda 2011 Resultados Generales Censo 2011. Edición ICE. Recuperado desde: *www.inec.cr/sites/default/files/documentos/inec_institucional/estadisticas/resultados/repoblaccenso2011-15.pdf.pdf*

Lemos Chernicharo, C.A. (2007). Biological Wastewater Treatment Series de la International Water Association Volumen 4. Anaerobic Reactors. Department of Sanitary and Environmental Engineering Federal University of Minas Gerais, Brazil.

Ley N° 40699-S-MINAE. Reglamento de Vertido y Reuso de Aguas, Costa Rica, 2017.

Matches. (2014). *Matches' Process Equipment Cost Estimates*. Matches. *www.matche.com/equipcost/default.html*

MATRA. (s.f). *Movimiento de tierra*. Recuperado el 4 de junio del 2018 de: *www.matra.co.cr/content/equipo-nuevo/movimiento-de-tierra*

Medina, A. (2017). Maquinaria para la construcción de vías. Instituto Tecnológico de Costa Rica

Metcalf y Eddy, Inc. (2003). Wastewater Engineering Treatment and reuse. Cuarta Edición. McGraw-Hill Companies.

Ministry of Finance of Costa Rica. (2017). *Manual de valores base unitarios por tipología constructiva*. *www.hacienda.go.cr/docs/5a383b222f943_manual%20de%20valores%20base%20octubre%202017.pdf*

Ministry of Labor and Social Security of Costa Rica (2017). Salarios mínimos por ocupación, primer y segundo semestre 2017.

Ministry of Labor and Social Security of Costa Rica. (2020). *Salarios Mínimos*. *www.mtss.go.cr/temas-laborales/salarios/documentos-salarios/lista_salarios_2020.pdf*

Ministry of Public Works and Transport of Costa Rica. (2017). *Tarifas para alquiler de maquinaria contenidas en la tabla denominada Costos Máximos Horario de Equipo y Maquinaria", para la atención de las vías nacionales*. Recuperado el 4 de junio del 2018 de: *www.cne.go.cr/.../3971-mopt-tarifas-para-alquiler-de-maquinaria-2017-40182*

Municipalidad de San Carlos, Alajuela, Costa Rica. (2014-2024). Plan de Desarrollo Distrital de La Fortuna. Costa Rica: Juntos Desarrollando El Cantón. Recuperado de *www.munisc.go.cr*

Murillo, A. (2017). *Análisis comparativo de tecnologías para el tratamiento colectivo de las aguas residuales en poblaciones menores a 5000 habitantes equivalentes en Costa Rica [Trabajo Final de Graduación, Universidad de Costa Rica]*. *www.repositorio.sibdi.ucr.ac.cr:8080/jspui/bitstream/123456789/7417/1/41957.pdf*

Programa de Investigación en Desarrollo Urbano Sostenible. (2014). Plan Regulador del distrito de Fortuna de San Carlos Propuestas. Costa Rica. Recuperado de *www.arenaladifort.com/wp-content/uploads/2017/01/propuestas-la-fortuna-de-san-carlos.pdf*

Solano, J. (2010). Análisis y revisión de costos de renglones de pago en obras contratadas por el CONAVI. Cartago, Costa Rica: Instituto Tecnológico de Costa Rica

Tarifas para alquiler de maquinaria, Costos Máximos Horarios Equipo y Maquinaría, para la atención de vías nacionales. Ministerio de Obras Públicas y Transporte de Costa Rica.

Varnero, M. (2011). *Manual de biogás*. Santiago de Chile, Chile: FAO.

Zeng, G., Jiang, R., Huang, G., Xu, M., & Li, J. (2007). Optimization of wastewater treatment alternative selection by hierarchy grey relational analysis. *Journal Of Environmental Management*, 82(2), 250-259.

EFFICIENCY SAVES MONEY.

CONVENIENCE SAVES TIME.

WE OFFER BOTH.

It's the synergy that comes from supplying both pump equipment and electrical controls to operate those pumps. It's the one stop shop for selection and sizing as well as after-market service to the end user.

We sell solutions that provide the highest operational efficiency. We have premium-efficient pumps and motors along with advanced control strategies to reduce energy costs.

We understand your needs and the dynamics of your situation. We'll develop customized solutions and enhanced services that you can't find anywhere else. With one call, find out why L.W. Allen pumps and Altronex control systems have become the leading provider of pumps, controls, technical assistance and superior customer service.

L.W. ALLEN PUMP SYSTEMS

ALTRONEX CONTROL SYSTEMS

Reduce your energy costs and save time. Call (800) 362-7266.

4633 Tompkins Drive • Madison, WI 53716
(608) 222-8622 • FAX (608) 222-9414 • www.lwallen.com

Water Quality Trading:
Basics and Best Practices

By Andrew Skog, PE, MSA Professional Services, Inc. (MSA)

In 2003, the Environmental Protection Agency (EPA) issued the first Water Quality Trading Policy. This document was designed to provide guidance to states, interstate agencies, and tribes in developing responsible trading programs to reduce pollution in our nation's waterways. It answers to requirements set forth by the *Clean Water Act* pertaining to permits, anti-backsliding provisions, the development of water quality standards, National Pollutant Discharge Elimination System (NPDES) regulations, water quality management plans, and total maximum daily load (TMDL) limits.

Water quality trading is an alternative means for municipal and industrial point source facilities to comply with water quality-based effluent limitations (WQBELs). The limits are set for good reason. They protect the water quality of local and downstream bodies of water, preserving the integrity of this vital resource for communities and generations to come. Water quality trading is beneficial to facilities who are attempting to comply with the oftentimes strict effluent limits set forth by the EPA or state agencies. Trading provides greater flexibility on the level of technology a facility needs to install to meet compliance, which generally equates to a reduction in overall costs. It can also allow the community more time to accurately plan and budget for any future major wastewater upgrades. The goal of water quality trading is to support the three Ps: people, planet, and profit. Environmental groups, governmental agencies, and industries all have a vested interest in making water quality trading work.

The Basics of Water Quality Trading

Limits and Credits

Facilities and industries are required to comply with established effluent limits. These limits often pertain to nutrients such as phosphorus and nitrogen as well as to sediment loads, all of which can adversely affect water quality. This is why water quality trading is sometimes referred to as "nutrient trading." Some effluent limits, such as new phosphorus limits, can be so stringent that municipal and industrial permit holders may be unable to comply by simply optimizing or completing upgrades to their facilities. In many cases where a major upgrade is needed, it may be more cost effective and beneficial for the permittee to instead work with another landowner, business, or entity in the local watershed to reduce discharges of the targeted pollutant.

This is where credits come in. A permittee can purchase or generate "credits" in their local watershed to achieve compliance. A credit is a unit of pollutant reduction typically measured in a per-pound equivalent. They can be generated by a permitted facility or "point source" over-controlling its discharge limits, by trading with another point source, or by trading with a non-point source such as a stormwater utility or rural farming operation. Trading can be done either directly or through a third party. All trades must be legally binding and protections must be made so that the trades result in a water quality improvement. Compliance is demonstrated by comparing discharge data with available credits and permit limits, as determined by a permitting authority. The policy does not support any trading activity that would cause a toxic effect, exceed a human health criterion or

cause an impairment of water quality. The EPA does not support trading of persistent bio-accumulative toxic pollutants at this time.

Acceptable Practices Per Industry

Permittees can generate credits in one of two ways:

Point-to-Point Trading

This type of trading is most often done between permitted publicly or privately owned wastewater treatment works. Essentially, one treatment facility – possibly with more relaxed limits and/or excess treatment capacity – accepts a lower treatment limit in order to sell credits to a downstream facility. This type of trading can be considered low risk since the credit generator must accept a permit with a more stringent limit and the credit is easily measured by reviewing effluent flows and loads from the credit generator. Also, the credits are generated in the receiving water of the downstream user, so it is easy to measure the environmental impact of this type of trade. One disadvantage of point-to-point trading is that it is market driven, and depending on the regulatory framework of the specific watershed, no credits may be available to purchase or the cost may be driven higher due to competition between facilities.

Point to Non-Point Trading

This type of trading occurs when credits are generated by reducing sources of non-point source pollution. Sources of non-point source pollution include urban stormwater, agricultural runoff, and erosion from natural sources such as streambanks or gullies. In this case, the permittee would pay to improve non-permitted stormwater facilities or privately owned lands. Credits are developed through a legal process in which the credit generator agrees to reduce the amount of pollutant they currently discharge. Point to non-point credits are often inexpensive to generate. However, these types of credits hold less certainty than point-to-point trades since they are frequently based on computer modeling and not actual monitoring data. To account for this uncertainty, a permittee would be required to produce more point to non-point credits than if a credit user only participated in point-to-point trading.

Benefits of the Three Ps

People

Trading is an opportunity to bring urban and rural community members together to gather collaborative input about where improvements in the watershed will be most impactful. Trading can also be used to fund land improvement projects that can revitalize a community's look, feel or sense of place. Landowners and farmers can use the trading process to add value to their property by reducing pollution, improving wildlife habitat, or expanding operations in an environmentally sensitive manner – all without incurring major costs.

Planet

In many cases, more pollution may be prevented through implementation of a trading program than by completing a more expensive wastewater treatment upgrade. When considering the more prevalent concerns of surface water and groundwater contamination, water quality trading may be more beneficial for preserving water quality and the function of local ecosystems and riparian habitats.

Profit

Water quality trading offers financial benefits. The cost to implement trading can be as much as three times less expensive than a major wastewater treatment facility upgrade. These cost savings can be passed on to residents and businesses of the local community by maintaining low municipal sewer rates or they can be used to improve the profit margins of a permitted industry. Costs savings can be even greater if outside funding from government agencies is considered. The benefits are both short and long term, cutting annual expenditures and increasing life cycle savings.

In summary, water quality trading under *the Clean Water Act* is a viable option for communities looking to meet permit goals while achieving substantial cost savings. Each municipality must weigh the short and long-term budgetary, water quality, and infrastructure needs in order to make the most informed and sustainable decision. Trading can be an effective tool if thoughtfully planned and executed, helping to chart a successful path forward for a community, and for the greater public and environmental good.

About Andrew Skog, PE

*Andrew Skog, PE, is a Water Resources Engineer specializing in the fields of wastewater and agriculture, Certified Soil Tester (CST) & Private Onsite Wastewater Treatment Systems (POWTS) Inspector. He is employed by MSA Professional Services, Inc.*CS

94TH ANNUAL MEETING
ADAPT & THRIVE
MAY 17-20, 2021 | VIRTUAL

EXHIBIT + SPONSOR

EARLY REGISTRATION DEADLINE: FEBRUARY 19, 2021
LATE REGISTRATION DEADLINE: APRIL 19, 2021

CSWEA is a non-profit professional member association and a 501(c)(3) organization.
All our funding is exclusively sourced through membership dues, event participation, sponsorships, and advertising revenue. We are grateful for each and every commitment you can make. Thank you.

pheedloop

94TH ANNUAL MEETING

ADAPT & THRIVE

MAY 17-20, 2021

We invite you to sponsor and advertise at this event virtually. The annual meeting will be held over four partial days from May 17-20, 2021. Multiple opportunities exist to integrate your company into the virtual Pheedloop program, conference advertising and social media promotion, ensuring you get maximum exposure.
Sign up here!

EXHIBIT OPPORTUNITIES

CSWEA is offering many ways for you to market your company:

Exhibitor Registration - $180

- Full Registration for 1 person ($130 value)
- Exhibit Hall Listing & Portal in Pheedloop
- Visitor Data in Pheedloop
- Face-to-Face Video Calls & Chat Feature
- Listing in Central States Water

Lead Retrieval - $100

- Real-time leads

Product/Service Showcase - $300

Present a unique and refreshing 10-minute product or service demonstration. Your prerecorded presentation will be scheduled on demand to add value to sponsor and attendees.

Register by **February 19, 2021** to be listed in the Spring edition of Central States Water magazine.

WHY EXHIBIT WITH CSWEA?

- Connect with water professionals.
- Advertise your services and products
- Multiple channels for promotion and impressions
- Build brand recognition and loyalty
- Show your support for Water Professionals

EXHIBIT SPONSOR CONNECT

pheedloop

94TH ANNUAL MEETING

ADAPT & THRIVE

MAY 17-20, 2021

SPONSORSHIP OPPORTUNITIES

CSWEA is offering four (4) sponsorship levels to allow your company to be part of 94th Annual Meeting. Gain exposure with conference attendees and support CSWEA!

Platinum Sponsorship - $2,500

- Company logo displayed on highly visible virtual portal login page
- Plus everything included with Gold Sponsorship

Gold Sponsorship - $1,500

- Company logo on highly visible banner in the virtual lobby
- Plus everything included with Silver Sponsorship

Silver Sponsorship - $1,000

- Company logo on Virtual Event Carousel
- Company logo and information included in Exhibitors listing in the virtual platform and in Spring edition of Central States Water magazine
- Plus everything included with Bronze Sponsorship

Bronze Sponsorship - $500

Company logo included in Sponsor listing in all eblasts and publications marketing the Annual Meeting

Registration Deadlines • Early: February 19, 2021 • Late: April 9, 2021

WHY SPONSOR?

- Connect with over 400 water quality professionals.
- Increasing corporate visibility and marketing opportunities to a diverse audience of water quality industry professionals
- Gaining relationship-building access to key influencers in water quality industry services, technology, and policy
- Earning recognition as an environmental leader among peers, clients, and customers

We look forward to your participation and support of the 94th Annual Meeting.
If you have any questions, please contact the CSWEA office at info@cswea.org
Thank you for considering our event!

Sign up to Exhibit/Sponsor Online >>

pheedloop

94TH ANNUAL MEETING

ADAPT & THRIVE

MAY 17-20, 2021

ADVERTISING OPPORTUNITIES

For 2021, we will continue using the Pheedloop Virtual Meeting Platform. Pheedloop offers multiple a la carte advertising opportunities, in addition to what is included with Sponsorhips.

Session Commercial Video - $500

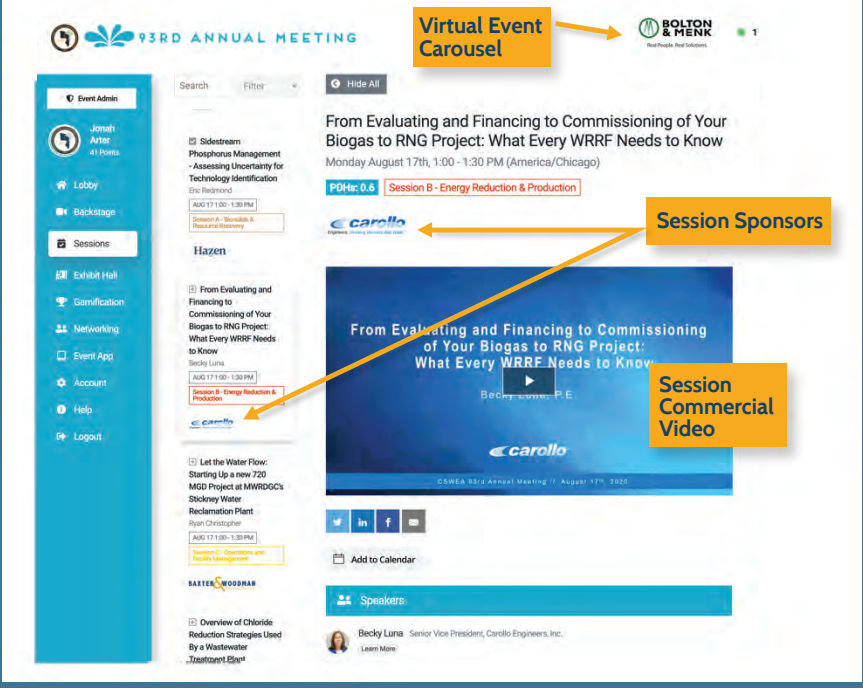
Your pre-recorded 1-minute commercial will be scheduled to play twice during Technical Sessions. The looping video is played on repeat before a session is live in the virtual portal (20 spots available)

Session Sponsorships - $100 per 2 sessions

Your company logo will be displayed for your chosen sessions in the session listing and the session detail pages.

Virtual Event Carousel – Included with Platinum, Gold & Silver Sponsorship

Your company logo will be displayed on a rotating banner on the upper right hand side of all



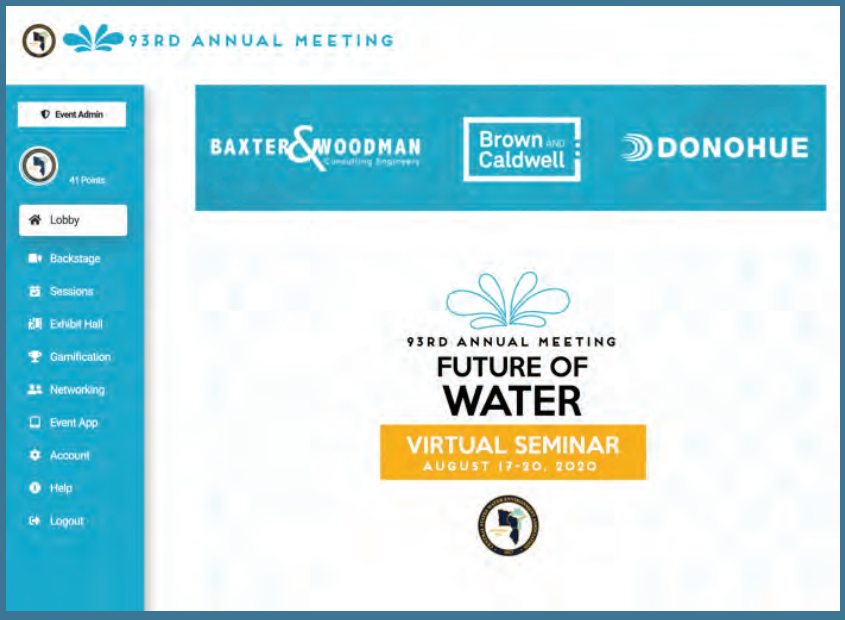
94TH ANNUAL MEETING
ADAPT & THRIVE
MAY 17-20, 2021

pheedloop

ADVERTISING OPPORTUNITIES

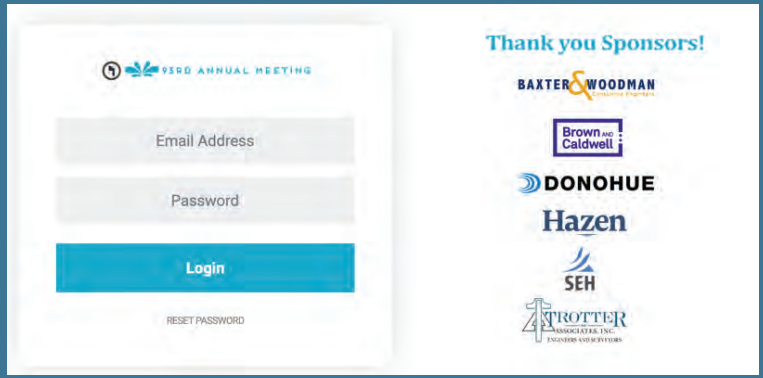
Virtual Portal Lobby Banner Image – Included with Platinum & Gold Sponsorship

Your company logo will be displayed on a rotating banner on the main lobby page of the virtual



Virtual Portal Login Logo – Included with Platinum Sponsorship

Your logo will be displayed on the highly visible virtual portal login page



MAXIMIZE THE IMPACT
OF YOUR 92nd ANNUAL MEETING EXHIBIT

If you are sponsoring at this outstanding marketing event, being part of the *Central States Water Spring Show-Guide* issue is a must!

Advertise in this issue as 1/4 page ($600) or larger and you will receive:

- An enhanced Exhibitor listing (25 word write-up)
- A great looking display stand to showcase your ad and your support for CSWEA's publication (will be dropped off at your booth)
- Unbelievable exposure prior to the event and bonus distribution at the show
- *Central States Water* will be made available to attendees and will be handed out to all exhibitors

The Spring Issue Will Feature:

Session Times • Exhibitor Listings • General Information • Floor Plan • Scheduling • And More!

DEADLINE: February 19, 2021

For more information please contact Darrell Harris, Marketing Manager
Toll Free: 877-985-9793 E-mail: darrell@kelman.ca

SPONSORSHIPS

For the first time, CSWEA will be offering **Annual Sponsorship** packages that combine our Annual Meeting sponsorships as well as Sponsorships of our State Section Events. Different packages are available as outlined below. As a volunteer, non-profit association, we value contributions at all levels and thank you for your consideration.

Go! You Packers Go! — $6,000

- Wisconsin Section Platinum Sponsor (All Events)
- Annual Meeting Platinum Sponsor
- Annual Meeting Golf Outing Sponsor
- Ops Challenge Sponsor
- Student Design Competition Sponsor
- WEFTEC Reception Sponsor
- Global Water Stewardship – Corporate Steward

Skol Vikings — $6,000

- Minnesota Section Platinum Sponsor (All Events)
- Annual Meeting Platinum Sponsor
- Annual Meeting Golf Outing Sponsor
- Ops Challenge Sponsor
- Student Design Competition Sponsor
- WEFTEC Reception Sponsor
- Global Water Stewardship – Corporate Steward

Bear Down — $6,000

- Illinois Section Platinum Sponsor (All Events)
- Annual Meeting Platinum Sponsor
- Annual Meeting Golf Outing Sponsor
- Ops Challenge Sponsor
- Student Design Competition Sponsor
- WEFTEC Reception Sponsor
- Global Water Stewardship – Corporate Steward

Midwest All-Star — $8,000

- Wisconsin, Minnesota and Illinois Section Platinum Sponsor (All Events)
- Annual Meeting Platinum Sponsor
- Annual Meeting Golf Outing Sponsor
- Ops Challenge Sponsor
- Student Design Competition Sponsor
- WEFTEC Reception Sponsor
- Global Water Stewardship – Corporate Steward

For questions or inquiries, contact Amy Haque at *ahaque@cswea.org*

MARCH 10

2021 Illinois Government affairs seminar
Virtual seminar

MARCH 11

CSWEA Operator Training Webinar – Health and Safety in Wastewater Treatment Plants
Online Event

APRIL 13

26th Annual Education Seminar
Online Event

APRIL 15

CSWEA WI/IL 2021 Student Essay Competition
Essays Must Be Digitally Submitted in Either Word or PDF Format No Later than 12 am CST

APRIL 28

Midwest Student Design Competition
Virtual Event

MAY 17

CSWEA 94th Annual Meeting
Virtual Event

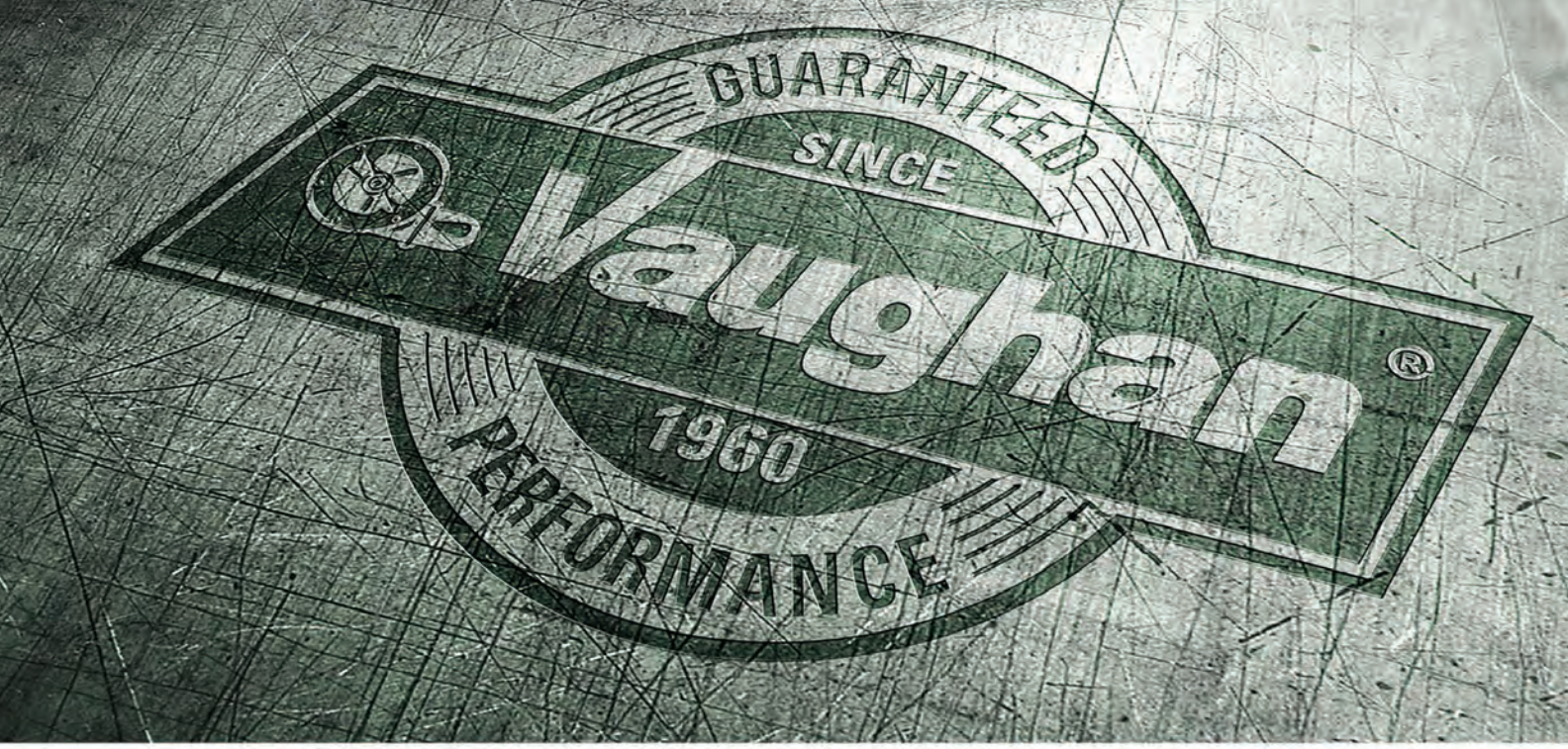
For up-to-date CSWEA events, visit our website ***www.cswea.org***.

ADVERTISER PRODUCT & SERVICE CENTER

Central States Water is made possible by the companies below who convey their important messages on our pages. We thank them for their support of CSWEA and its publication and encourage you to contact them when making your purchasing decisions. To make it easier to contact these companies, we have included the page number of their advertisement, their phone number, and, where applicable, their website.

COMPANY	PAGE	TELEPHONE	WEBSITE
Advanced Aquacultural Technologies, Inc.	7	574-457-6193	www.advancedaquaculturaltechnologies.com
Advanced Engineering and Environmental Services (AE2S)	6	763-463-5036	www.ae2s.com
AECOM	52	312-373-7700	www.aecom.com
Badger Meter, Inc.	11	800-876-3837	www.badgermeter.com
Baxter & Woodman, Inc.	15	815-459-1260	www.baxterwoodman.com
Bolton & Menk, Inc.	27	507-625-4171	www.bolton-menk.com
Brown and Caldwell	8	651-298-0710	www.brownandcaldwell.com
Burns & McDonnell	50		www.burnsmcd.com
CDM Smith	50	651-772-1313	www.cdmsmith.com
Centrisys/CNP	42	262-654-6006	www.centrisys-cnp.com
Clark Dietz, Inc.	52	262-657-1550	www.clark-dietz.com
CLEARAS Water Recovery	4	541-930-3201	www.clearaswater.com
Crawford, Murphy & Tilly, Inc.	35	217-787-8050	www.cmtengr.com
Deuchler Engineering	51	630-897-4651	www.deuchler.com
Donohue & Associates, Inc.	56	920-208-0296	www.donohue-associates.com
Electric Pump, Inc.	37	800-211-6432	www.electricpump.com
Energenecs	50	262-377-6360	www.energenecs.com
Energy Systems Group	40		www.energysystemsgroup.com
Environmental Dynamics International (EDI)	3	573-474-9456	www.environmentaldynamics.com
Force Flow	41	800-893-6723	www.forceflow.com
Gasvoda and Associates	55	708-891-4400	www.gasvoda.com
Greeley and Hansen	48	800-837-9779	www.greeley-hansen.com
HR Green, Inc.	52	800-728-7805	www.hrgreen.com
InfoSense, Inc.	13	877-747-3245	www.infosense.com
JDV Equipment Corporation	42	973-366-6556	www.jdvequipment.com
Lakeside Equipment	2	630-837-5640	www.lakeside-equipment.com
L.W. Allen, Inc.	38	608-222-8622	www.lwallen.com
McMahon Associates, Inc.	54	920-751-4200	www.mcmgrp.com
Metropolitan Industries	9	815-886-9200	www.metropolitanind.com
Minnesota Pump Works	31	877-645-8004	www.minnesotapumpworks.com
Pittsburg Tank & Tower	52	270-826-9000	www.pttg.com
Process Equipment Repair Services, Inc.	54	262-629-1059	
Ruekert & Mielke, Inc.	17	262-542-5733	www.ruekertmielke.com
SEH	24	651-490-2000	www.sehinc.com
Smith & Loveless Inc.	16	704-844-1100	www.smithandloveless.com
Strand Associates, Inc.	29	608-251-4843	www.strand.com
Swanson Flo	50	800-288-7926	www.swansonflo.com
Trotter & Associates Inc.	40	630-587-0470	www.taiengr.com
Unison Solutions, Inc.	26	563-585-0967	www.unisonsolutions.com
Wisconsin Pump Works	31	877-645-8004	www.wisconsinpumpworks..com
Xylem	14		www.xyleminc.com

Click HERE to return to Table of Contents



ADD A CONDITIONING PUMP TO THE MIX

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

- Lift Station Conditioning
- 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

Chopper

ChopperPumps.com

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.