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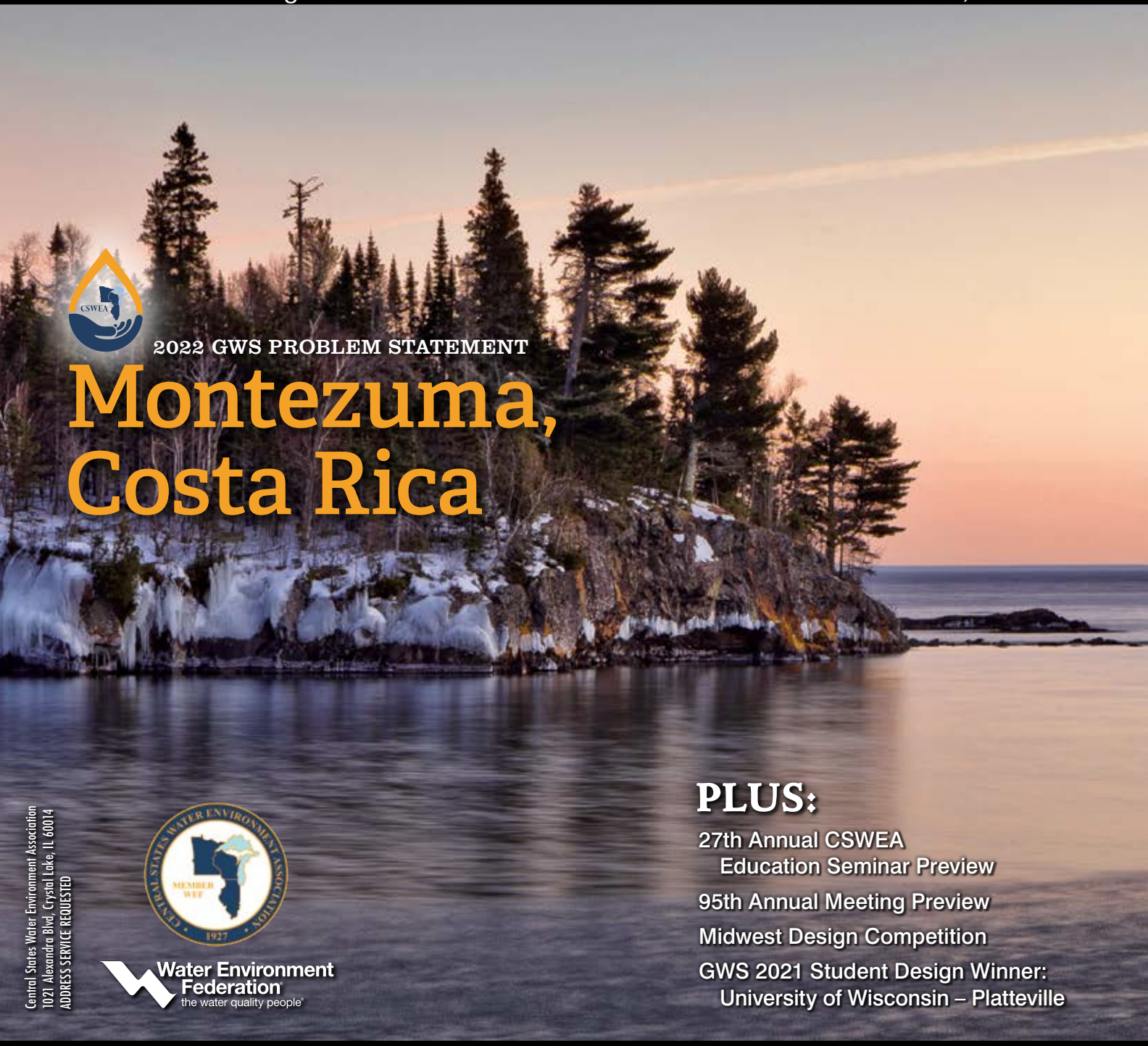
The Official Magazine of the Central States Water Environment Association, Inc.



2022 GWS PROBLEM STATEMENT

Montezuma, Costa Rica

PLUS:

- 27th Annual CSWEA Education Seminar Preview
- 95th Annual Meeting Preview
- Midwest Design Competition
- GWS 2021 Student Design Winner: University of Wisconsin – Platteville

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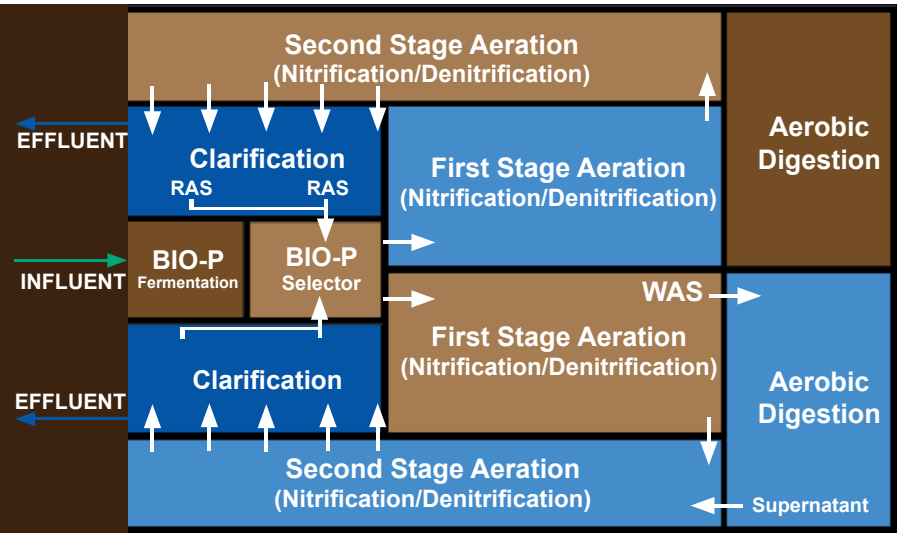

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Section News

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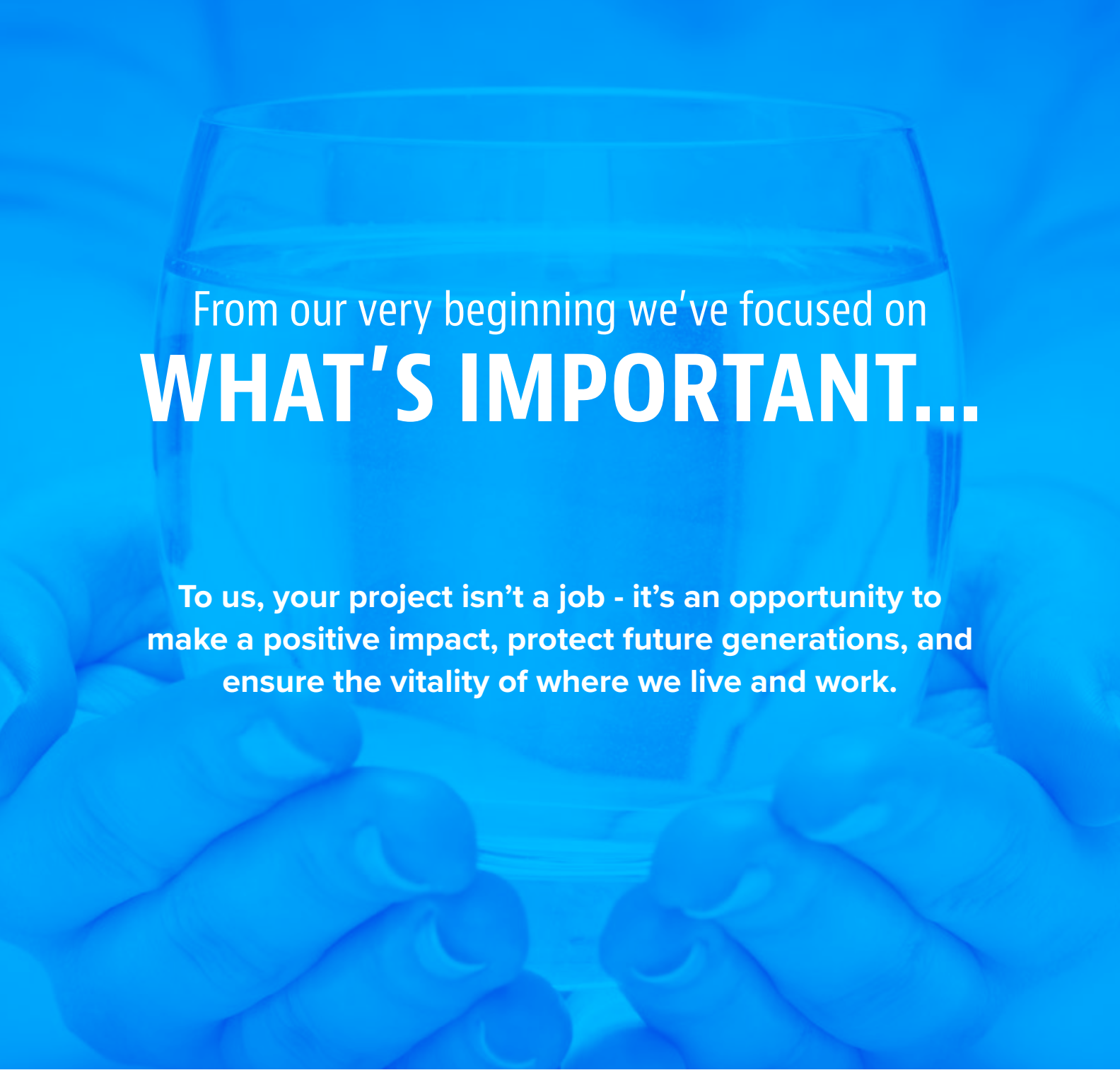

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Stronger Together

By Jane Carlson

Welcome to 2022! It's a new year, so it would normally be time to reflect on new beginnings. It's difficult to do that, though, when things still seem like the Groundhog Day movie. Perhaps we can each set a new year's resolution related to cleaner water and water conservation, though! That's something we are all passionate about.

In October, we had a great time at WEFTEC. Many of us Central Staters masked up, showed our vaccine cards, and went. It was great to see our CSWEA Pumpers and Shovelers teams do so well in their operations challenge competitions. Our teams are composed of a mix of members from different wastewater agencies, which helps form bonds and increases camaraderie but makes it difficult to compete with the big agency teams. Kudos to those who trained and participated! The lower number of attendees made the exhibit hall more relaxed and enjoyable to me, as compared to past years of trying to make and travel to one appointment after another. Thanks to our exhibitors who stuck with it this year; I truly hope they felt it was worthwhile and that attendance is higher at 2022 WEFTEC in New Orleans. WEFTEC is scheduled for October 8-12, 2022.

Later in October, we were deeply saddened by the loss of one of our younger members and rising stars, Ryan Giefer of Wisconsin Rapids Wastewater Treatment. The Wisconsin Section operations committee kindly drafted the poignant tribute that was sent to members by e-blast. All three state sections and the CSWEA Executive Committee voted to make a monetary donation to Ryan's wife and young children. A GoFundMe page is still collecting funds if you are interested in a personal donation (*www.gofundme.com/f/surrounding-the-giefer-family-with-love*). Ryan was Chair of the Technical Program Committee and the other committee members decided to hold his chair position open to honor him. Committee members Mandy Sheposh and Emma Larson are now sharing leadership duties. We thank them and the committee for all they are doing, which presently includes reviewing abstracts for the Annual Meeting. I know many of you were friends and colleagues with Ryan and are still hurting badly from the loss. There have been many other losses in the industry and in some of our families, although no other CSWEA members, to my knowledge. Please take care of yourselves and each other during these difficult times.

> "We continue to plan for in-person CSWEA events at Monona Terrace in Madison this year: the Education Seminar in April and the 95th Annual Meeting in May. We hope to see you!"

We continue to plan for in-person CSWEA events at Monona Terrace in Madison this year: the Education Seminar in April and the 95th Annual Meeting in May. We hope to see you! Projections (and my Pollyanna view) indicate that the omicron variant will be well past peak by then, and the shows will go on unless we are told that we can't gather. We intend to follow applicable health mandates. According to Destination Madison, Dane County (where Madison is located) has one of the highest vaccination rates in the country and, relatively speaking, COVID-19

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case numbers have stayed low. For more information, go to *www.visitmadison.com/reopening*, which is updated regularly with information for visitors on things like masking, testing sites, and vaccination rates. The county currently has a mask mandate in place, which is set to expire in February but may be extended.

Our Annual Meeting Local Arrangements Committee (LAC) Chair Lindsey Busch and her committee have worked out many of the details for the conference and these will be finalized in the next few months. It is shaping up to be a "back to normal" kind of event with golf, social event, exhibit hall, technical presentations, special topics tracks, awards banquet, and the usual business meetings. There are several hotels to choose from. It will be May 17-19. Find more information at *www.cswea.org/events/cswea-95th-annual-meeting*.

The Annual Meeting theme is *Stronger Together*. The LAC was recently mulling over what we mean by this theme. It means many things – the obvious one is that we are stronger when we work together than we are as individuals. It implies that we will (hopefully) be together again in person this year. It implies we are stronger when we are together in all our celebrated diversity – diversity of gender, race, ethnicity, age, technical backgrounds, sexual orientation, opinions, and more. We are stronger when we work together on our core business of clean water and resource recovery, and on really big problems like climate change. I like that this theme has nuances, and I know that even if we can't always be together in person (our January executive committee meeting was just moved online, for example), we are still together in spirit and are continuing to communicate effectively.

We hope you're taking advantage of the webinars CSWEA has been offering. There are many other great events coming up in 2022 as listed at *www.cswea.org/upcoming-events*.

CSWEA is still looking for assistance with *Central States Water* for magazine theme planning and soliciting articles. Please contact Mohammed Haque if you have an interest in becoming involved (*mhaque@cswea.org*).

If you would like to learn more about CSWEA and take full advantage of your membership, I encourage you to join a committee. The state section committees are a great place to start. Each Section can be accessed on our website (*www.cswea.org*). Click on the state you need, and then the 'About Us' bar, and you'll see the list of officers and committees. If you are a student, a young professional, or are new to the profession, a state section students & young professionals committee may be a great place to start. There are committees to suit many other interest areas: stormwater, government affairs, industrial wastes, energy and resource recovery, seminar planning, and more. Feel free to reach out to a chairperson or to me (*jane.carlson@wisc.edu*) if you have any questions.

Please continue to stay safe and take care of each other. Enjoy this beautiful winter. I look forward to seeing you online or in person soon! CS

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Important Membership News

For more than a year, CSWEA'S Executive Committee has discussed the possibility of adjustments to our membership dues. On December 6 2021, a subgroup of the executive committee met to develop a recommendation for full Executive Committee consideration and action. This team included Mark Eddington, Tracy Hodel, Alan Grooms, Amy Underwood, Mohammed Haque, and Jane Carlson. The consensus was to recommend a dues increase, which will be implemented over three years.

Reasons for the recommendation include:

- The WEF House of Delegates Financial Diversity Workgroup is recommending all Member Associations (MAs) consider increasing dues to assist with financial diversification.
- Our largest revenue generator is in-person meetings, and the COVID-19 Pandemic has shown us how important it is to diversify revenue streams.
- Inflation is increasing expenses, including operational costs.
- The increase will keep CSWEA on par with other MAs, particularly multi-state MAs. Additionally, many other MAs either are or will soon be considering a dues increase.
- The last CSWEA dues increase was 2016/17 and was as follows:

WEF DUES INCREASE (January 1, 2016)

	2015	2016
Professional WEF/CSWEA Dues	$116	$133
Academic	$116	$133
PWO	$62	$71

CSWEA DUES INCREASE (Voted on May 19, 2016)

	2016	2017
Corporate/Young Professionals	$20	$25
Academic/PWO/ Executive/ Professional	$25	$30
Retireees/Students	$20	$20

Shortly after the 2017 increases, CSWEA eliminated the Student Member dues increase.

The recommended increases for 2022/23 are $5/year for three years ($15 total) for all membership types, except for corporate ($20 increase total) and retirees ($10 increase total) and students (remain at $0 dues). Current dues and recommended dues are as follows:

	Current	2022	2023	2024	2025
Professional Member	$30	$30	$35	$40	$45
Corporate Member	$25	$25	$35	$40	$45
Executive Member	$30	$30	$35	$40	$45
PWO Member	$30	$30	$35	$40	$45
Academic Member	$30	$30	$35	$40	$45
Student Member	$0	$0	$0	$0	$0
Retired Member	$20	$20	$25	$30	$30
Dual Member	$30	$30	$35	$40	$45
Associate Member	$30	$35	$40	$45	$45
Young Professional	$15	$15	$20	$25	$30

Note: Associate Members are CSWEA-only (not WEF) so there will be less lag time for the increase to go into effect.

The change will be voted on by members at our Annual Business Meeting in May 2022. CSWEA's Statements of Policy (SOPs) will also be updated to incorporate changes to the dues. CS

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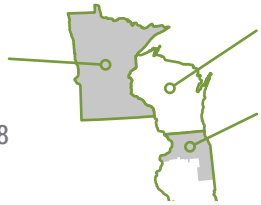

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New WEF Workgroups in 2022

By WEF Delegates, David Arnott and Tracy Ekola

David Arnott

Tracy Ekola

Greetings,
A lot of exciting things are happening now at WEF. Please see the following update to catch up on the latest news from the Water Environment Federation.

The WEF administrative year traditionally starts at WEFTEC. New officers include:

- Speaker of the House Steven Drangsholt (Pacific Northwest Clean Water Association)
- Speaker House-Elect Donnell Duncan (Georgia Association of Water Professionals)
- WEF President Jamie Eichenberger (Rocky Mountain Water Environment Association)
- WEF President-Elect Ifetayo Venner (Florida Water Environment Association)

The WEF HOD meeting was held on October 16, 2021. At this meeting, there was an interactive Diversity, Equity and Inclusion (DE&I) exercise that demonstrated the variety of backgrounds that we come from and how this shapes us as individuals (you will hear more about this later in the update).

At the WEF Leadership Forum on October 17, 2021, a new Biosolids Communications toolkit was introduced. Samantha Villegas presented highlights of the toolkit and the importance of having a proactive outreach program for biosolids for use in your community. View the toolkit by visiting *www.wef.org/globalassets/assets-wef/3---resources/topics/a-n/biosolids/biosolids-communications-toolkit.pdf*.

HOUSE OF DELEGATES POLICIES AND PROCEDURES

The HOD Policies and Procedures updates were formally approved at the WEF Delegate quarterly meeting on December 9, 2021. The updates were changed to be in-line with the recently updated HOD bylaws.

WEFMAX 2022

WEFMAX events are designed to foster idea and best practice sharing among the MAs. This year, these events will be live. For those that cannot attend in person, a portion of the WEFMAX events will be available in a virtual format. In addition, a separate virtual WEFMAX is scheduled. Stefanie Farrell (*stefanie@blueframetech.com*) is the WEFMAX Committee Chair.

This year, 2022 WEFMAX events will be in:

- Honolulu, Hawaii April 20-22, 2022 at the Ala Moano Hotel
- Charleston, South Carolina May 11-13, 2022 at the Francis Marion Hotel
- Fargo, North Dakota June 1-3, 2022 at the Radisson Hotel

The 2022 WEFMAX will be held virtually in May. Dates are yet to be determined.

WEF TECHNICAL COMMITTEES

Joining a WEF committee is easy and can be a great way to gain and share information with your CSWEA committees or state section committees to help build and inform our industry network. If you are interested in joining a WEF technical committee, please go to *www.wef.org* and navigate to membership then committees to review the committees. To apply to a WEF committee, send an email to *committees@wef.org* with the following information: your name, WEF ID Number, committee of interest, and one to two sentences explaining your interest in the committee.

Please note that the WEF Outreach Committee has been disbanded. WEF felt that the committee fulfilled is charge and was ready to move to focus on other initiatives.

Additionally, the former **WEF DE&I** and workgroup is now a committee. In 2021, the workgroup created a toolkit for MAs to use in creating their own DE&I committees. The link to the toolkit can be found at *www.wef.org/dei*. DE&I continues to be an important initiative at WEF. WEF has partnered with the Silverene Group for consulting services on its DE&I program. The Silverene Group is available to help MAs directly for thier DE&I programs. MAs should contact Lisa Ruane at WEF if they are interested in using the Silverene Group.

WEF CODE OF CONDUCT

The new WEF Code of Conduct (CoC) was discussed at the HOD quarterly meeting December 4, 2021. The CoC was written for WEF and can be found on page 4 the WEF Volunteer Handbook at *www.wef.org/globalassets/assets-wef/2---membership/committees/committee-resources-pdfs/wef-volunteer-handbook-aug21.pdf*.

This applies to all WEF events and MA events by extension. MAs are strongly discouraged to just use WEF's CoC, however, it can be used a guideline. The WEF CoC Committee will not hear MA member conduct complaints. MAs encouraged to write their own enforceable CoC that are written around their specific operations.

THE INFRASTRUCTURE BILL

The WEF Government Affairs Committee has been tracking the Infrastructure Bill which was signed into law on November 15, 2021. The main parts of the bill are as follows:

- **More than $20 billion** for safe drinking water
- **$15 billion** in dedicated funding to replace lead pipes
- **More than $12 billion** to ensure clean water for communities
- **$1.8 billion** to protect regional waters
- **$135 million** for additional water improvements

Further detail on the Clean Water for Communities portion of the bill is as follows:

CLEAN WATER FOR COMMUNITIES	
$11.7 billion	**Clean Water State Revolving Funds (CWSRF)** 49% of funds will be available for grants or principal forgiveness loans. 51% of loans will be available for low-interest loans. State match is reduced to 10%.
$1 billion	**Addressing Emerging Contaminants** Funding through Clean Water State Revolving Funds. All funds provided as grants or principal forgiveness loans. State match is not required.

It is important to note that new programs in the bill are not funded yet. They have to go through future appropriations process in Congress to receive actual funding. Steve Dye, WEF Legislative Director, is leading the effort to track developments of this bill. Steve can be reached at *sdye@wef.org*.

HOD WORKGROUPS

New workgroups have been formed for the 2022 administrative year.

The Communications workgroup aims to help people with a technical background communicate more effectively. Communications is an important discipline within the water sector, just like engineering, project management, and other technical areas. Our ability to fulfill WEF's Strategic Plan, enhance our communities and protect the environment hinge on our ability to communicate the right message to the right audience in a way they can receive it and act. But, for too long, we have relied on our own abilities as engineers, scientists, and technical leaders to create and deliver these messages – often resulting in ineffective communications. Therefore, this workgroup will focus on building allies that support and advocate for increased communication efforts in the water sector to create change. This workgroup will utilize expertise from communication professionals in the water sector to share case studies that demonstrate the value of communication, methods to measure communication effectiveness to gain buy-in, tips on how to increase budget and staff to expand communication efforts and more. This workgroup will support a collaborative effort with the Public Communications and Outreach Committee (PCOC) to increase committee engagement, MA participation and demonstrate WEF's commitment to growing communication professionals.

Dave Arnott is on this workgroup.

The Emerging Leaders workgroup is another workgroup recently formed at WEF. WEF relies on a constant influx of new leaders to join Committees, the House of Delegates, Member Association Boards, the Board of Trustees, and other leadership opportunities. Many of these roles are filled by the same group of individuals and have overlooked emerging leaders from elsewhere in WEF including the Students and Young Professionals Committee. For WEF to continue to grow, we need the engagement and advancement of new leaders from within the organization. Therefore, this workgroup will support the organization by identifying barriers to entering leadership positions, creating pathways into leadership roles, and developing resources that better enhance emerging professional transitions.

Dave Arnott is on this workgroup.

The Federal Advocacy workgroup is the final new group formed at WEF. This workgroup will continue the work from 2020-2021 to assist with amplifying WEF's advocacy messages and priorities and will collaborate closely with the WEF Government Affairs Committee (GAC). WEF has been able to, in collaboration with other organizations in Washington, DC, advocate for more resources for our communities and utilities. In the legislative side, advocacy efforts have been able to maintain appropriations by Congress to the Clean Water Revolving Fund (CW SRF), and recently was successful in getting the CW SRF reauthorized and funding levels increased. Additionally, Congress recently established several new infrastructure funding programs to address a variety of priority areas for wastewater and stormwater. Continued grassroots advocacy will be critical to maintain funding for these programs. On the regulatory side, WEF has been instrumental in providing technical comments and science-based evidence on matters related to permits, methods development and more recently, recommendations on worker safety. Our successes recently have been because of our members writing Members of Congress, visiting their representatives, and being informed on the issues.

Tracy Ekola is on this workgroup.

> "As WEF Delegates, we are here to support you and represent the interests of the CSWEA to the House of Delegates and WEF. We are here to serve you/CSWEA and be a liaison to WEF leadership."

As WEF Delegates, we are here to support you and represent the interests of the CSWEA to the House of Delegates and WEF. If something is on your mind, please feel free to call or email. We are here to serve you/CSWEA and be a liaison to WEF leadership. We look forward to hearing from you! Email us at *tekola@brwncald.com* or *darnott@ruekert-mielke.com*. CS

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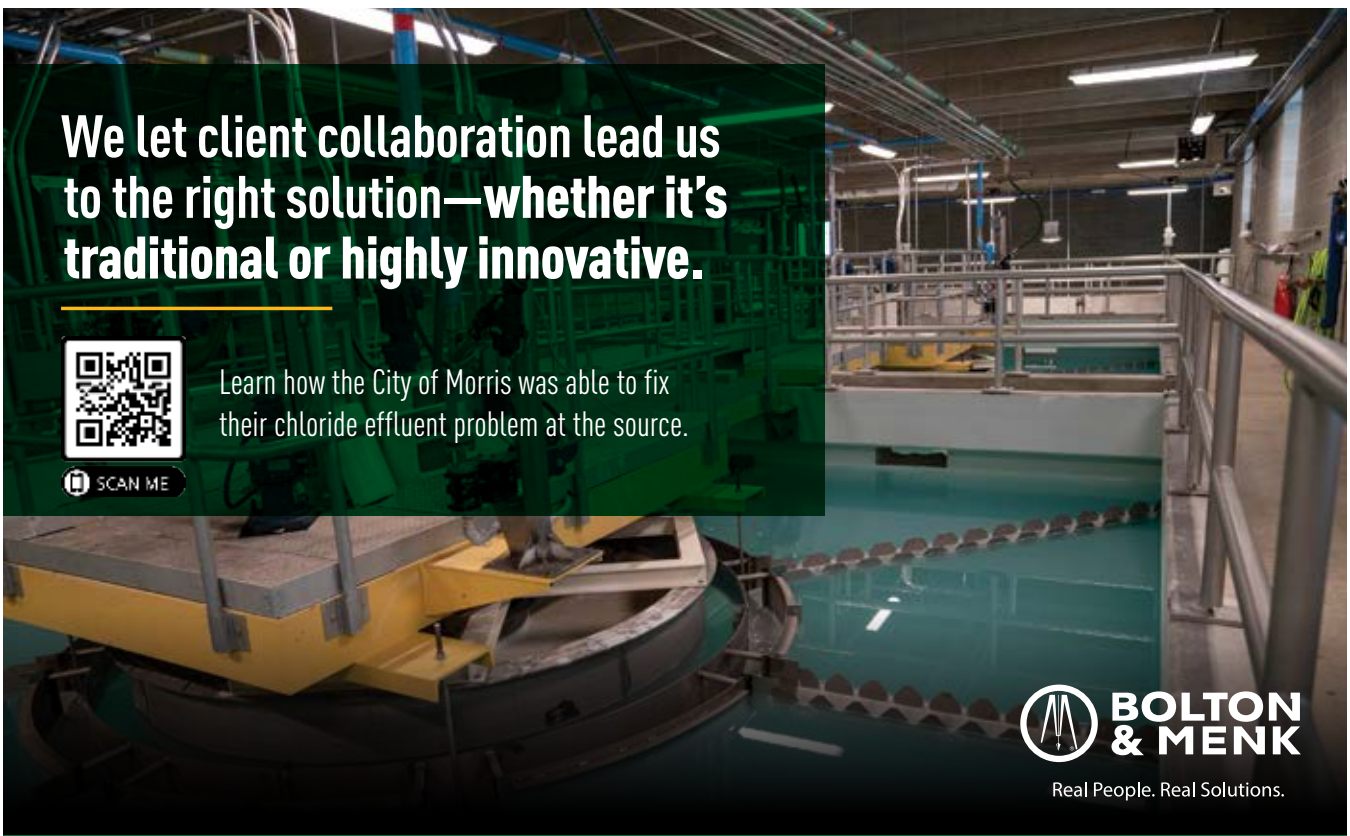

It's a New Year

By Mary-Frances Klimek

Out with the old and in with the new. 2021 and even 2020 were rough years for many of us and we are ready to put those years behind us and move forward to easier, happier, and more enjoyable times. This is our chance to reset and start over with new projects, plans, hopes, and dreams – and for many, new or additional responsibilities or employees.

It is certainly not news that the past couple of years have been rough for most in the wastewater world. COVID-19 (with its variants, vaccines, and illnesses) continues to take a toll on our personal and professional lives. Some are more restrictive of themselves and expect others to do the same and when this is not the case, conflicts and hurt feelings arise as does availability and willingness of employees to cover additional hours and tasks that are not normally within their jurisdiction.

We all have had coworkers leave for what they view as greener pastures. I don't know if it is the same for you, but I know that many of us are struggling with both hiring and retention. Some of you may have started a new positon or at least considered making a move.

How do we stop the exodus and get back to the way things used to be? Understand I believe that change can be good, but when I say 'how things used to be,' I mean the days when employees were here to stay if not forever, at least for a long time. Realize that some employees will leave and that to some extent an employer is training the employee for the next position at the next place, but this cannot be the norm.

Many of us do not have the authority or ability to address the two main reasons employees cite for leaving – namely, money and benefits – but we are able to make some changes that employees want.

Start by involving employees in the process. What do they want and what has value to them? Even without asking, I can give you some of their answers.

FLEXIBILITY

Can you offer staggered start and end times? What about weeks that are four ten hour days? Is remote work an option, even if only for a short time, say when the repair guy is coming or the kids have a day off?

FREQUENT COMMUNICATION

Make sure conversations don't only happen on day one and when there is a problem. Get to know the people you work with. Ask them about their families, their weekend and what they would like to learn or do while at work. You may have a member of you lab staff that would do a great job keeping an eye on the microbiology of your plant, but if you never ask, you will never know.

BE ACCESSIBLE

This is different than communication, but the two often go hand in hand. Answer emails in a timely manner, stop in the lunch room, leave your office door open when you are able and follow-up with employees regarding their interests.

OPPORTUNITIES TO LEARN AND BECOME INVOLVED

Forward information about classes, webinars, and presentations. Invite employees to CSWEA meetings and conferences and once they are comfortable, offer opportunities to take part in presentations or serve on committees. Show employees where they can find upcoming events on the CSWEA calendar (*www.cswea.org/wisconsin/events/upcoming-events*) and be open to making it possible for them to attend. There are interesting events coming up and too often employees miss out because they don't know that the Operations Seminar is February 1 and 2, 2022; the Government Affairs Seminar is February 17, 2022; the Education Seminar will be on April 12, 2022; and the Annual Meeting is May 17 through May 19. There are both virtual and in-person events, so hopefully something to interest everyone and address every employer's policies.

Follow-up on the ideas that employees gave you when you asked them what non-monetary benefits were important to them. There is nothing more frustrating to an employee than to feel that their input was ignored. As well, be empathetic and understanding.

There is no quick fix for retention issues, but those suggestions are a good place to start. Managers, supervisors and HR staff need to realize that the public and private sector are now competing for the best employees. There is not winner or loser; we all simply need to do what is best for our employees.

Happy New Year! CS

Saying Goodbye to 2021

By Emma Larson

"Surround yourself with people that do their job better than you do."

I heard this on the radio a few months ago while driving. It hit home so much that I made my husband find a scrap of paper to write it down so I that I didn't forget it. When searching online for the entire quote, it seems to be accredited to Jose Miguel Sokoloff; but it turns out there are a lot of different, but very similar lines of thinking.

When the world is telling us that we always have to be the best, have the best, do the best, show the best – how does this leave room for others to be the best? How can we support those around us to be the best and do the best, when we are so focused on ourselves? As a supervisor and colleague (and friend), surrounding yourself with a team that knows their job inside out and every direction will not only save you from having to know a lot of jobs, but it means your team can grow and thrive where others can't. Giving your team, your colleagues, your family and friends the time and space, support and encouragement to be their best, will not only inspire you to be your best but it will be a self-giving reward.

2021 has been a lot of things. Chaos being one of them. Sad being another. With the loss of our friend Ryan Giefer in November, it is a good reminder that life is short, and should be cherished. Even when we don't feel like cherishing.

In Minnesota Section we have a few things lined up to get us back together in 2022. The Innovative Approach to Wastewater in St. Cloud is scheduled for February 8, 2022. We are really hoping to be able to continue to get together in person through 2022 and return to the colleagues and friends we have missed these last few years. CS

"When the world is telling us that we always have to be the best, have the best, do the best, show the best – how does this leave room for others to be the best? How can we support those around us to be the best and do the best, when we are so focused on ourselves?"

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Thank You, Sewer System Technicians

By Bob Swirsky

Happy winter everyone. It's December 28, 2021, we are in a pandemic resurgence, and Chicago just got the first measurable snowfall of the season, which breaks the previous record for the latest snowfall ever recorded since recording began in 1909. This follows a spring and summer where rainfall was sporadic and below the usual average. It appears the pattern of weather extremes is here to stay. The cycle of drought and then severe wet weather makes the operation of a sanitary sewer system with a substantial amount of public mainlines and building sanitary sewer services (dating back as far as 1904) very interesting. These severe wet weather events have a significant impact on the performance of the sewer system. The problems that the wet weather brings from inflow and infiltration of ground water into the system are possible basement backups and manhole overflows due to surcharging in the mainline. Prolonged drought can cause issues as well, flat or inconsistently pitched lines can benefit from some I&I because in these defective lines increased flow can help a scouring velocity to be achieved.

An annual cleaning program of the sewer system helps keep the sewer lines clear of these solids and obstructions in order to maintain the optimum flow and volume. Normally with the weather being so mild and having no snow until the end of December we would be caught up or ahead with our regular sewer system cleaning program. Being a small sanitary district and having no superfluous employees on the sewer system maintenance crew, the problem of executing a regular annual maintenance program as it is designed has been challenging during the pandemic. Most of the time all you can do is what absolutely needs to be done when not dealing with emergencies. The Downers Grove Sanitary District has a repair assistance program that allows us to do repairs to private building sanitary services that have qualifying defects. The operation of this program makes it necessary for our technicians to enter customer's buildings and do inspections. As you can imagine a pandemic has made this process and other in person interactions challenging. It starts with the disturbing task of asking the customer that has applied for the program questions about the status of their heath and bodily functions. The technician then televises the customer's sewer service line which in normal circumstances is not always pleasant but add to that the fact that it is being done during a pandemic and you can imagine the added stress for the technician. They are required to respond to emergency backup calls in all kinds of weather and at all hours of the day and night from customers that are not happy and are sometimes abusive. These technicians are the true ambassadors of the sewer system they are almost always able to relieve a customer's anxiety and leave with the customer being informed and thankful. I have great admiration and appreciation for our sewer system technicians, they are unrecognized frontline workers that do a difficult job each day and they have done a remarkable job during this pandemic.

We will be scheduling an Illinois section meeting to be held remotely in January. We will most likely need to discuss if the seminars being planned by the various committees can be held in-person or not. I am hopeful that the pandemic recedes and that we can all meet together in Madison in May.

Thank you,

Bob CS

"I have great admiration and appreciation for our sewer system technicians, they are unrecognized frontline workers that do a difficult job each day and they have done a remarkable job during this pandemic."

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CSWEA ESSAY CONTEST

- Illinois Students: Grades 6-8
- Creative Writing and Research Prompts
- $1000 in Cash + other prizes!
- Submissions accepted through April 15th, 2022

The Central States Water Environment Association of Illinois invites you to join the WATER'S WORTH IT campaign by writing a short essay about the human role in the water cycle.

GUIDELINES:

- Students must reside in Illinois and be in grades 6-8.
- Select a prompt for your essay: research or creative writing. Students may only submit one essay for the 2022 contest.
- Essays must be between 400-700 words. Source citations are suggested but not required. Citations do not count towards word count.
- Font size should be between 10-12 and font should be legible (ex: Arial or Times New Roman).
- Essays must include a cover page containing: essay title, student's name, grade, school, and which prompt the student chose.
- Essays must be submitted in Word or PDF format by the end of the day, April 15, 2022.

ESSAY SUBMISSION LINK:
www.cswea.wufoo.com/forms/2022-waters-worth-it-essay-competition

ESSAY TOPIC: THE HUMAN WATER CYCLE

The natural water cycle is a vital process that enables the availability of water for all living organisms. In today's world, humans directly change the dynamics of the water cycle through the construction of dams for water storage and through water withdrawals for industrial, agricultural, and domestic purposes. Despite the importance, most of us rarely think of the efforts, energy, and vast infrastructure required for the treatment and transportation of drinking water and wastewater. The journey of water to and from your home (or a factory, store, or farm) is one full of impressive innovations and technology that, while important to modern civilization, can impact the water quality and environment in a number of ways.

RESEARCH PROMPT

Research your local water supply. Where does it come from? Where does it go? Explain the journey of water before it reaches your home and after it goes down your drain. What happens next? Questions to consider while researching:

- Is the water cleaned in any way, when, and why?
- How and where is the water returned to nature?
- Does water used in an industrial setting need to be cleaned differently than water from your home?
- How is your water source different than other communities across the globe?
- What kind of infrastructure is required?
- Are there any impacts on the environment?

Conclude your essay by reflecting on the importance of what you learned during your research.

CREATIVE WRITING PROMPT

The journey of water to and from your faucet is much more complex than many realize. Envision yourself as a drop of water traveling to your home faucet. Write a first-person essay about your journey. Questions to consider while writing your essay:

- Where have you traveled from?
- Where do you go?
- Who do you meet?
- What are you used for?
- Do you feel valued or disrespected in any way?
- How does today's journey differ from that of last week, year, or century?

Conclude your essay by reflecting on how your life (as water) has been impacted by those you have met on your journey and how you would like things to change for your future adventures.

WATER'S WORTH IT®

CSWEA ESSAY CONTEST

- Illinois Students: Grades 6-8
- Creative Writing and Research Prompts
- $1000 in Cash + other prizes!
- Submissions accepted through April 15th, 2022

REGIONAL WINNERS

Winning essays will be selected for both the Research and Creative Writing categories! Winners will receive a cash prize of $50, swag bag, certificate of achievement, and will move on as finalists for the state-wide grand prize!

STATE WINNERS

State-wide winners for both the Research and Creative Writing categories will be selected from the three regional winners. Grand prize winners in each category will receive:

- **$300 cash prize + a swag bag!**
- **Certificate of Achievement!**
- **Their essay published in *Central States Water*, CSWEA's Official Magazine!**

REGIONS BY COUNTY

Northern Illinois

Counties: Boone, Bureau, Carroll, Cook, Dekalb, DuPage, Fulton, Grundy, Henderson, Henry, JoDaviess, Kane, Kankakee, Kendall, Lake, LaSalle, Lee, Marshall, McHenry, Mercer, Ogle, Putnam, Rock Island, Stark, Stephenson, Whiteside, Will, Winnebago.

Central Illinois

Counties: Adams, Brown, Calhoun, Cass, Champaign, Christian, Clark, Coles, Cumberland, DeWitt, Douglas, Edgar, Ford, Fulton, Greene, Hancock, Henderson, Iroquois, Jersey, Knox, Livingston, Logan, Macon, Macoupin, Mason, McDonough, McLean, Menard, Montgomery, Morgan, Moultrie, Peoria, Piatt, Pike, Sangamon, Schuyler, Scott, Shelby, Tazewell, Vermilion, Warren, Woodford.

Southern Illinois

Counties: Alexander, Bond, Clay, Clinton, Crawford, Edwards, Effingham, Fayette, Franklin, Gallatin, Hamilton, Hardin, Jackson, Jasper, Jefferson, Johnson, Lawrence, Madison, Marion, Massac, Monroe, Perry, Pope, Pulaski, Randolph, Richland, Saline, St. Clair, Union, Wabash, Washington, Wayne, White, Williamson.

Questions? Contact Stephanie Cioni at *scioni@dgsd.org*.

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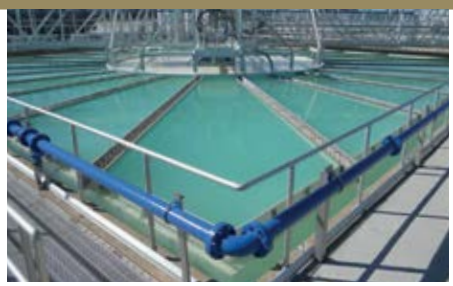


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27TH ANNUAL CSWEA

EDUCATION SEMINAR

Activated Sludge and Beyond:
Harnessing New Technology to Solve Old Problems

Presented by the Central States Water Environment Association

8:00-8:10 am	Welcome and Introductions
8:10-8:55 am	Data Needs to Operate the WRRF of the Future | Dr. Adrienne Menniti, PE
8:55-9:30 am	Innovation and Operation of Metro Water Recovery | Liam Cavanaugh
9:30-9:50 am	Poster Session & Break
9:50-10:25 am	Advanced Operational Control Strategies and Tools | Will Martin, PE
10:25-11:00 am	Understanding Process Data: Seeing a Story in the Noise | Dr. Matt Seib
11:00-11:30 am	Morning Panel Q&A
11:30 am-12:40 pm	Lunch with Poster Session
12:40-1:15 pm	Balancing Data, Modelling and Machine Learning | Dr. Adrienne Menniti, PE
1:15-1:50 pm	Data: What Does It Mean? How Do You Get It? How Do You Really Use It? Is There Such as Thing as Too Much? | James Kerrigan, PE
1:50-2:05 pm	Early Afternoon Q&A
2:05-2:20 pm	Afternoon Break
2:20-2:45 pm	Monitoring and Control for Stable EBPR | Cody Schoepke
2:45-3:10 pm	Wastewater Treatment Optimization Using Data Driven AI/ML Models | Fenghua Yang, PE, BCEE
3:10-3:35 pm	There's Some Good in This Data, and It's Worth Fighting For | Corey Bjornberg, PE
3:35-4:00 pm	Panel Session Q&A

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APRIL 12
2022

ACTIVATED SLUDGE AND BEYOND:
HARNESSING NEW TECHNOLOGY TO SOLVE OLD PROBLEMS
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Mark your calendars for the CSWEA 27th Annual Education Seminar to be held in person on April 12th, 2022 at the Monona Terrace in Madison, WI. We have an exciting program to discuss the acceleration and evolving science behind data collection, management, and utilization in Wastewater Facilities.

We have assembled an impressive list of speakers who will discuss current research, case studies, along with numerous innovations as they relate to recent innovations in the wastewater field. The program will allow attendees to appreciate both practical and theoretical approaches being conducted both locally and nationally.

8:10-8:55 am

Data Needs to Operate the WRRF of the Future

Dr. Adrienne Menniti, PE
Principal Process Engineer,
Clean Water Services

Clean Water Services owns and operates multiple water resource recovery facilities (WRRFs) in Washington County, OR that are required to meet low level effluent phosphorus permit requirements. Years of optimization have focused on limiting energy use and chemical use to achieve performance limits. This has led CWS to the evaluation of a range of instrumentation and control strategies at their facilities. These efforts are broad but most are focused on biological phosphorus removal operation. Dr. Menniti will provide an overview of the various instrumentation and control, data collection, and rate testing that has been completed at CWS. The presentation will discuss implementation considerations, operational benefits, and staffing requirements for the different optimization efforts.

12:40-1:15 pm

Balancing Data, Modelling, and Machine Learning

Dr. Adrienne Menniti, PE
Principal Process Engineer,
Clean Water Services

Collecting data and implementing control strategies has been a key aspect of operational optimization for CWS. In parallel, CWS has invested in the development and use of innovative modeling efforts to inform biological phosphorus removal (BPR) operations. Modeling has been completed on two fronts. The first is using mechanistic process models to explore and learn about BPR process performance. The second is the application of Artificial Intelligence and Machine Learning (AI/ML) in an effort to develop a model that forecasts BPR operational stability. Dr. Menniti will provide an overview of the two modeling efforts, discuss how the two parallel efforts are utilized by CWS, and provide opinions on the future of AI/ML in the wastewater sector.

ADRIENNE MENNITI, PHD, PE is a Principal Process Engineer at Clean Water Services, the water resource recovery utility serving in Washington County, OR. Adrienne received her bachelor's degree in Civil and Environmental Engineering from the University of Cincinnati and her master's and doctoral degrees from the University of Illinois at Urbana-Champaign. Dr. Menniti has extensive experience in planning, design, optimization, and troubleshooting of treatment processes. Her role at CWS includes managing the advanced instrumentation program to ensure data quality is maintained and that instrument needs and costs are balanced.

HOTEL ACCOMODATIONS

There are a number of hotels within walking distance of the Monona Terrace Convention Center. The Hilton Madison Monona Terrace Hotel (1 West Dayton Street) is adjacent to the convention center and parking is available for a fee.

For reservations, please call 877-510-7465. Other hotels in the vicinity include but are not limited to: the Best Western Premier Park Hotel (608-285-8000), AC Hotel by Marriott Madison Downtown (608-286-1337), and the Madison Concourse Hotel (608-356-8293).

8:55-9:30 am

Innovation and Operation of Metro Water Recovery

Liam Cavanaugh
Chief Operating Officer,
Metro Water Recovery

Over the past decade, Metro Water Recovery (MWR) has been undergoing transformational change at their water reclamation facilities (WRFs). Located in Denver, CO, MWR has been planning for low-level nutrient limits while also

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adapting to large population growth, decreasing water availability, and climate change. They have implemented three technologies that were "one of the first" installations in North America (MagPrex, post aerobic digestion, InDENSE) while also optimizing two separate WRFs to achieve Enhanced Nutrient Removal limits. A key to implementing innovative strategies and operational approaches has been managing information generated from data collection, modeling, and pilot testing to inform decisions related to design and optimization efforts. This presentation will discuss the information generated from modeling, data collection, and pilot testing, and how this information has been used to inform operations and design decisions that have transformed MWR over the past decade.

LIAM CAVANAUGH is the Chief Operating Officer and Deputy CEO for Metro Water Recovery, overseeing the Operations, Maintenance, and Resource Recovery and Reuse functions for an organization serving a population of two million people in the Denver metropolitan region. Liam has a Bachelor of Science in Environmental Engineering from the University of Colorado Boulder, a Master of Science in Environmental Engineering and Science from Colorado School of Mines, and is currently a doctoral candidate in Civil and Environmental Engineering at Colorado School of Mines. Liam has worked in engineering and operations at multiple utilities since 2009, and is a licensed Professional Engineer and Class A Wastewater Treatment Plant Operator. His main interests lie in sustainable wastewater treatment technologies and resource recovery opportunities. A native of Colorado, Liam enjoys hiking, skiing, fishing, and other activities that take advantage of our most precious natural resource – water.

9:50-10:25 am

Advanced Operational Control Strategies and Tools

Will Martin, PE
Associate, Hazen and Sawyer

The water industry is beginning to recognize and apply machine learning (ML) as a tool to optimize system operations in a way that was not possible even a few years ago. Well-trained (or calibrated) models can explore and process massive datasets in real time while also providing extremely rapid predictions, insights, and/or recommendations for operators – a difficult and sometimes impossible task for a human, especially in a short time frame. One of the most compelling benefits of building machine learning models (with continuous retraining) is that is allows the user to always have an up-to-date model of their system. This differs from most mechanistic modeling software packages that have to be recalibrated by a human every couple of years and that likely have significant drift during that time period (e.g., biological process simulators, collection system models). In addition, machine learning models can account for some real-life variations that may not be captured in mechanistic models. This presentation will describe two applications of ML in the water space – one a fully deployed model predicting influent wastewater flow for wet weather management, and the second a desktop model predicting the percent total solids (%TS) in cake on any given day.

WILL MARTIN is an Associate in Hazen and Sawyer's St. Paul office. He has approximately 15 years of experience in design, operation, and construction of water and wastewater facilities and in compliance and regulatory reporting for industrial pretreatment facilities. His experience includes hydraulic and process modeling, energy management, and design of improvements of wastewater treatment facilities.

10:25-11:00 am

Understanding Process Data: Seeing a Story in the Noise

Dr. Matt Seib
Process and Research Engineer,
Madison Metropolitan Sewerage District

Process sensors provide a wealth of information to wastewater facility operators. Sensor data is key for understanding all aspects of operations such as permit compliance, process stability, and troubleshooting. However, oftentimes operators and practitioners are focused on the information right in front of them and lose sight of the greater system or historical trends connected to the processes being operated. This presentation will discuss several real-world examples of how taking a systems-level approach to understanding process data can provide greater operational insights.

MATT SEIB is the process and research engineer at the Madison Metropolitan Sewerage District in Madison, WI. In this role, Matt assists with facility operations and leads operational research efforts, allowing him to bridge the worlds of innovation and daily operational challenges. Matt holds a PhD in Civil Engineering from Marquette University and partners with several faculty at the University of Wisconsin. Matt currently serves on several committees with the CSWEA, WEF, and the Water Research Foundation.

1:15-1:50 pm

Data; What does it mean? How do you get it? How do you really use it? Is there such a thing as too much?

James Kerrigan, PE
Senior Project Engineer,
Fox River Water Reclamation District

FRWRD recently completed $60 million biological P removal upgrades at its 7.75 mgd and 25 mgd treatment plants. In this presentation, FRWRD will overview the process to put new biological P

removal facilities on line with a focus on data collection, analysis, and real-world use for decision making. This talk will also address using the data in the process model to identify treatment issues and the resulting decisions for incremental changes to improve treatment made by the design and operations team.

JAMES KERRIGAN is a Senior Project Engineer at Fox River Water Reclamation District based in South Elgin, Illinois since 2013. He is a registered Professional Engineer with over 16 years' experience in Wastewater Engineering, and holds a Bachelor's Degree in Civil Engineering from Napier University, Edinburgh.

2:20-2:45 pm

Monitoring and Control for Stable EBPR

Cody Schoepke
Wastewater Superintendent, Fond du Lac Regional Wastewater Treatment and Resource Recovery Facility

The Fond du Lac Wastewater Treatment and Resource Recovery Facility (WTRRF) is faced with an upcoming effluent phosphorus limit of 0.19 mg/L. To achieve this limit, the facility staff are focused on implementing a range of advanced monitoring and control concepts to better understand enhanced biological phosphorus removal (EBPR) stability. This presentation will discuss online monitoring alternatives, rate testing, data analytics, and modeling tools that have been used to inform and develop operational strategies for optimal EBPR performance.

CODY SCHOEPKE graduated from the University of Wisconsin – Stevens Point with a Bachelor of Science Degree in Soil and Waste Resource Management. He began his career as an Operator in Milwaukee at the Jones Island Water Reclamation Facility where he worked for five years. Cody has been at the Fond du Lac Regional Wastewater Treatment and Resource Recovery Facility (WTRRF) for seven years with the last four as the Wastewater Superintendent. He has been Chair for the WWOA Southern Region, is a member of the WWOA Technical Committee, and is currently Chair of the CSWEA – Wisconsin Operations Committee.

2:45-3:10 pm

Wastewater Treatment Optimization Using Data Driven AI/ML Models

Fenghua Yang, PE, BCEE
Senior Environmental Research Scientist, Metropolitan Water Reclamation District of Greater Chicago

Whether you call it digital water, smart water, intelligent water, digital twins or smart infrastructure, the water industry is progressing towards the digital utility of the future. Applying advanced data analytics through machine learning (ML) artificial intelligence (AI) to make more informed decisions is emerging across water, wastewater, and stormwater industry. This presentation will share several case studies using data driven models in wastewater treatment process, and focus on an example that demonstrates how machine learning model use existing operational data and online instrument data to predict key operational parameters and optimize chemical dosage, without impacting the downstream enhanced biological phosphorus removal process. The presenters will also discuss the data management, transfer, and security consideration for the project. Additionally, the presentation will explore challenges and opportunities in developing data-driven machine-learning models within

a wastewater treatment unit process for optimization and operational support that reduces chemical and energy cost and improves operational reliability for energy efficient water reclamation facility.

FENGHUA YANG, PE, BCEE is currently working as senior environmental research scientist in the Metropolitan Water Reclamation District of Greater Chicago. Prior to this, she worked as senior project manager for the Milwaukee Metropolitan Sewerage District. Additionally, she has one year of experience working in the Iowa Department of Natural Resources, and 10 years' experience in the consulting business as a process engineer, project manager and lead engineer. Fenghua's current work focuses on the evaluation of new and innovative technologies to improve wastewater treatment and resource recovery. She is interested in applying artificial intelligence to improve wastewater process, operation optimization, and decision support.

3:10-3:35 pm

There's Some Good in This Data, and It's Worth Fighting For

Corey Bjornberg, PE
Process Control Engineer, Rochester Water Reclamation Plant

Data collection and management is resource intensive and historically has been the primary focus of many treatment plants. The Rochester Water Reclamation Plant is similar in this regard and continually generates significant amounts of data. The question then becomes, are we utilizing this data effectively. Corey will discuss how Rochester views different data collection efforts depending on the need for the data, desired outcomes, and personnel involved. Corey will provide examples where data collection provided insights to plant performance that led to cost savings measures as well as times where data generated raised more questions than answers.

COREY BJORNBERG has been the Process Control Engineer for the Rochester Water Reclamation Plant since 2013. His primary role is to support the operations staff by evaluating process performance, improving efficiency and looking toward innovation to reduce costs. Prior to this Corey worked as a consulting engineer working on wastewater treatment plants in Minnesota and Ohio. Corey has his BA in Civil Engineering and master's degree in Environmental Engineering, both from North Dakota State University.

3:35-4:00 pm – Panel Session Q&A CS


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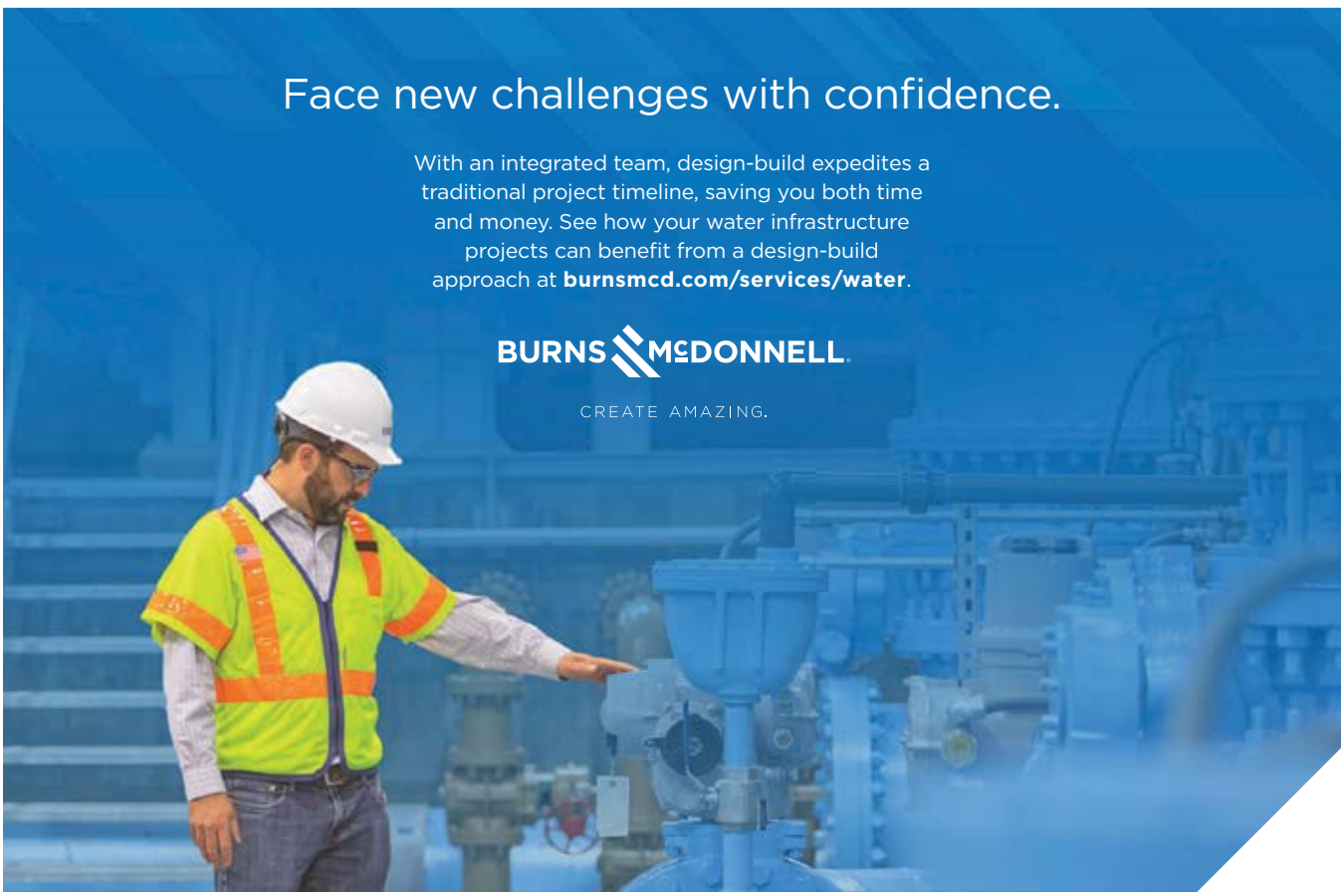
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MONONA TERRACE

95th Annual Meeting Highlights

The 95th Annual Meeting of the Central States Water Environment Association will be held May 17-19, 2022 at Monona Terrace in Madison, Wisconsin. This year, we are planning on returning to an in-person format, as well as our continuing utility pricing, leadership and ethics sessions, operations track, resource recovery track, and utility management track.

OPERATIONS and MAINTENANCE by OPERATORS and MAINTENANCE:

- Time management or new process startup
- Efficiency (pumps, motors, lights, UV disinfection, HVAC, etc.)
- Technology/SCADA/Web-Based maintenance programs/ GIS applications
- Troubleshooting – Traditional facilities (activated sludge, BNR), new processes (nutrient recovery) etc.
- Case studies of retrofitted facilities
- Case studies of completed projects
- Optimization
- Prioritization – wastewater treatment and new processes, operations perspective
- Nutrient removal
- Process control
- Start-up case studies

WATERSHEDS and STORMWATER MANAGEMENT:

- Implementing new MS4 permit requirements
- Adopt a storm drain, pond etc. program case studies
- Anti-degradation and other regulatory issues
- Using grants and other funding sources to implement stormwater management as part of CIP projects
- Habitat or groundwater protection or restoration
- Non-point pollution source modeling
- Water quality trading and watershed management issues and initiatives, including adaptive management
- Green infrastructure solutions and best management practices
- Total maximum daily loads involving point and non-point sources
- Education and outreach

UTILITY MANAGEMENT:

- Communications
- Employee retention and development
- Succession planning
- Project funding
- Utility rate development and reviews
- *America's Water Infrastructure Act* (AWIA) – Risk and Resilience
- Dental office category regulation (40 CFR Part 441) program implementation
- Hazardous waste pharmaceuticals program implementation

ENHANCED RESOURCE and ENERGY RECOVERY:

- Resource recovery – sourcing raw materials, nutrient recovery
- High strength waste and pretreatment programs
- Digester gas production and treatment technologies
- Lessons learnt from co-digestion
- Heat recovery case studies
- Alternative energy use
- Energy management and savings to utility management or enhanced RER

COLLECTION SYSTEMS:

- Collection system rehabilitation technologies/methods
- Collection system rehabilitation case studies
- Educating the public on how to protect the system
- CMOM program development and implementation
- Collection system design and operation
- Green infrastructure case studies
- Infiltration/inflow management case studies
- Stormwater and combined sewer overflow management

RESEARCH and DESIGN:

- New/innovative technology research and application
- Nutrient removal technologies
- Sustainability in Design and construction
- Toxics/emerging pollutants monitoring and control
- Treatment design
- Wastewater reuse, applications, technology and regulatory issues

RESIDUALS, SOLIDS and BIOSOLIDS:

- Pollutants of Emerging Concern – PFAS
- Environmental management systems – National Biosolids Partnership
- Public education and awareness, case studies
- Fertilizer production – Class A case studies
- Standard or advanced treatment and stabilization

GENERAL:

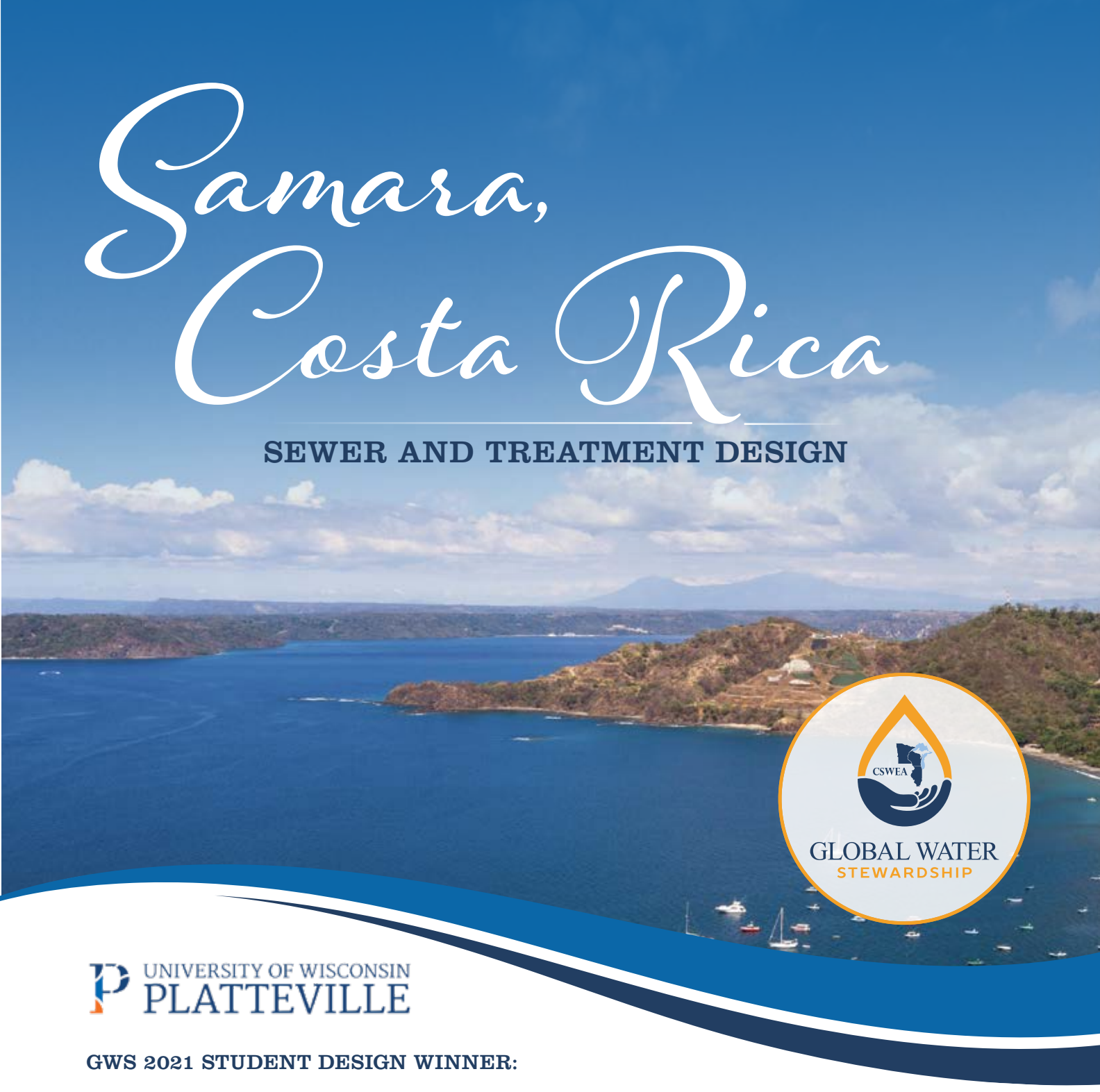
- Laboratory issues and bench-scale studies
- Pretreatment, industrial treatment, and pollution prevention
- Pollutants of emerging concern – PFAS, chlorides etc.
- Public education to address emerging concerns – chlorides; water softener use, leachate, flushable wipes, etc.
- Regulatory issues
- Security issues
- Engineering ethics training

SOFT SKILLS/LEADERSHIP:

- Leadership skills
- Managing the ill or injured employee
- Generational integration
- Anti-harassment and discrimination training for managers
- Getting the most out of employee performance evaluations
- Union negotiations
- Handling the grievance and arbitration process
- Managing in a union environment
- Labor Law
- Management rights for Managers
- Social media and the workplace CS

Samara, Costa Rica

SEWER AND TREATMENT DESIGN



GLOBAL WATER STEWARDSHIP

UNIVERSITY OF WISCONSIN PLATTEVILLE

GWS 2021 STUDENT DESIGN WINNER:

UNIVERSITY OF WISCONSIN – PLATTEVILLE

By Ashlin Caelwaerts, Jonessa Haas, Timothy Kunshier, Travis Noel, and Mathew Vincent

In spring of 2021, a team of five students from the University of Wisconsin – Platteville (UW-P) participated in the Global Water Stewardship (GWS) portion of the CSWEA Student Design Competition and won. The competition, held virtually, tasked the participants to design and present a collection system and wastewater treatment facility for the three towns within the Samara District of Costa Rica. The team consisted of Ashlin Caelwaerts, Jonessa Haas, Timothy Kunshier, Travis Noel, and Mathew Vincent, all senior Environmental Engineering students. Dr. Michael Penn and Dr. Samir El-Omari of UW-P served as advisors for the team, along with GWS advisor Joseph Lapastora.

PROJECT NEED

The main area of concern for this project is a collection of communities in Costa Rica's Guanacaste province, referred to as the Samara District. This area is highly developed and is known for its beautiful beaches and a thriving fishing industry. Samara also relies heavily on tourism, hosting roughly 120,000 tourists annually.

Almost every home and business in the Samara District relies on septic tanks for disposal of wastewater, with recent studies suggesting there are leakages due to improper upkeep and the high groundwater table. The local utility is seeking a centralized wastewater treatment and collection system. Construction of a centralized wastewater treatment system would protect drinking water sources, increase sanitation, and promote a healthy local environment. For this project, the team was required to propose three possible locations for treatment, a conveyance system, and three alternative treatment systems.

APPROACH

An analysis table was first used to determine a preferred and two alternative locations for the WRRF. After the locations were determined, design of the sanitary collection system was completed by finding an effective route through the communities. Next, dimensions of pipes, material, slopes, velocities, lift station requirements and pump information, as well as location of connections to the proposed WRRF facilities were determined. The three wastewater treatment designs considered treatment order, influent concentrations, required effluent concentrations, sludge disposal options, wet season capacity, and energy use.

After the collection system and treatment processes had been finalized, capital cost as well as operation and maintenance costs for the collection and treatment systems were estimated for the project's 20-year lifespan. The team also set out to keep user fees below 5,000 cólones per resident per month.

Figure 1. The six WRRF locations analyzed within the Samara District.

LOCATION ANALYSIS

The analysis of potential sites for the WRRF was required in order to set the optimal location for the design. The team inspected the region's topography and investigated the three locations already proposed by the Cangrejal Administrations Associations of the Communal Aqueduct and Sewer Systems (ASADAS) and GWS site visit. Additionally, three additional locations were explored based on their proximity to the community, possible effluent discharge locations, and topography.

The six potential locations, seen below, were analyzed using a decision matrix. Each location was ranked using a weighted average on the following criteria: impact to the coral reef, impact on local flora/fauna, odor concerns, distance from the communities, flooding impacts, constructability, effluent options, and need for pumping. Locations one, two, and three – those proposed by the site visit – were found most feasible for the WRRF.

Site one is located on 37.5 hectares of open land near the Buena Vista River. This property has a low elevation which requires minimal pumping of effluent to the river. There would be low impact on the coral reef located in the east side of Samara Bay, as the Buena Vista River discharges to the West. This site is not heavily forested, meaning there would not be a large impact on the flora and fauna. Its location outside of the communities means that there will be little odor concerns from the treatment facility. During the rainy season, approximately 80% of the land floods, however, there is one portion of the land not impacted by flooding. The owner also would like to develop this land as a wetland for birds, so there may be issues with acquisition.

According to the ASADAS, site two would be the easiest to acquire with an area of 1 hectare. However, this site is located approximately 5 to 10 meters above the average level of the communities, extra pumping to the facility will be required. The closest outlet point would be a stream that discharges into the Buena Vista River, but children often bathe in this water during the summer. This would pose issues with improper effluent dilution. If this site were chosen the effluent should be treated to higher

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fecal coliform standards. Like site 1, effluent would not have an impact on the reef and it is located away from dense population. However, most of this site is forested and would need to be cleared.

At site three, there are two farms adjacent to the airport, 20 hectares in area. ASADAS intends to purchase these farms in the future, but may not be able to do so quickly, as the property value is high. This location is also at a higher elevation than site two, leading to concerns regarding pumping. This site is located away from the reef and communities, and altering farm fields would have minimal impact on flora/fauna.

FLOW ANALYSIS

Per the data provided by GWS, the current population of all three cities within the Samara District was 3,903 in 2020 with 120,000 tourists visiting annually. It was assumed that the citizen population would increase 2% through the design life, bringing total population to around 6,400, while tourism would increase 4%, bringing the total to around 340,000 tourists per year. These projections were at the top of the range provided by GWS to ensure that the new facility could handle peak population increases.

Based on estimates of water usage provided by GWS, consumption values of 300 and 500 liters/person/day were assumed for residents and tourists, respectively. For residents, data provided stated that 80% of the water consumed was generated as wastewater, equaling 240 liters/person/day. Tourist generation values did not differ from consumption, as a factor of safety. Wastewater flows, not including inflow and infiltration, were found to be 0.59 MGD (2,235 m^3/d) for start-up and 1.3 MGD (4,924 m^3/d) for end of design.

> **The design consisted of three lift stations and two inverted siphons and considered future system expansion, proximity to water mains and wells, and the feasibility of construction.**

Average annual precipitation in Costa Rica amounts to 2500 mm (98 in), due to this high level of rainfall GWS provided an I/I value of 0.25 L/s/km. Using an approximate length of pipe from the sewer main and laterals of 42,000 meters, the wastewater flows were adjusted to include I/I. The startup flow was found to be 0.65 MGD (2,462 m^3/d) with an end of design flow of 1.65 MGD (6,250 m^3/d).

COLLECTION DESIGN

The design process consisted of first mapping the area using data provided by Bing Maps, applied to a World Geodetic System 1984 coordinate system. These images were used to locate homes, hotels, restaurants, and geographical features. The collection system was designed using the Bentley SewerCAD software and the terrain was mapped using contour maps provided by GWS. The model was created following regulations from both Costa Rica and Wisconsin DNR cod, NR110. Diurnal flow and three types of wastewater loads, homes, hotels, and restaurants, were applied to the model for both start up and end of design. The design consisted of three lift stations and two inverted siphons and considered future system expansion, proximity to water mains and wells, and the feasibility of construction.

The west lift station is located on the west side of downtown Samara, where Route 160 joins with Calle Samara Street. It is required that the parking lot be 10 meters wide and 20 meters long to accommodate the maintenance vehicles. The parking lot will also require 60 meters of fence. The lift station will consist of three circular sections. The section with the shutoff valve for the station will be 1.66 meters in diameter and 3 meters deep and will provide room for a worker to enter and shut off the wastewater supply to the wet pumping station. The pipe will enter the lift station 2 meters below the surface. The second section will house two pumps – the second acting as a backup to ensure the system continues

Figure 2. Collection system in the Samara District.

to function properly should the primary pump fail. According to Costa Rican standards, a maximum of two pumps can operate at one time. The active pump will have 15 meters of total head. It will kick on when the water reaches a depth of 2.5 meters and will kick off when the water reaches 0.5 meters. This section will be 4.57 meters in diameter and 5 meters deep. Wastewater will flow into the second section at a rate of 436 gpm and will be pumped out at 1,200 gpm. The third section will contain the gas release. This section will be 1.22 meters in diameter and 2 meters deep. A control panel will be placed at the surface near the second section. The lift station wall will be 6 inches thick. In accordance with the Costa Rican standards, a generator that produces 48 kW with a base tank that can run for 90 hours is required for this lift station.

The east lift station is located off Route 160, slightly west of Calle Santo Domingo Road. On the southwest corner of the intersection, a parking lot will be built. The lift station will be in the northwest corner of the parking lot. This lift station will be the same in design as the west station besides the number of pumps. The east station's pumps will pump against 12.5 meters of head and operate when the water in the second section reaches a depth of 2.5 meters and will kick off when the water gets down to a depth of 1 meter. Wastewater is expected to flow into the lift station at a rate of 243 gpm. This lift station will have two pumps inside the second section, the second will act as a backup. The pipe enters the lift station at the same elevation as the west station. Due to the decrease in number of pumps a smaller generator will be used.

A third lift station will be required at the location of the WRRF to move the wastewater up to the grade of the facility. Here, the station design is the same as the previous lift stations except the pump and dimensions. This pump will be pumping with 15 meters of total head at a rate of 1,800 gpm. The diameter of this lift station will be increased to 6 meters wide with a depth of 5 meters.

Inverted siphons are required at the two river crossings along Route 160. River elevations were assumed to be between 0 and 5 meters with siphons designed to cross the rivers at -5 meters elevation. Each siphon conforms to Wisconsin NR110 requirements, consisting of two barrels and a minimum velocity of 3 ft/s. The east siphon consists of two 4 inch barrels and a minimum velocity of 3.3 ft/s and max of 4.5 ft/s. The west siphon consists of two 6 inch barrels and a minimum velocity of 3.75 ft/s and a maximum of 7 ft/s. These siphons will be constructed using deep excavations with shoring and directionally drilled under the river.

This project also requires the decommissioning of approximately 750 septic systems. All existing sewage in the tanks must be disposed of and the tanks dug up. New laterals will run from each home into the sewer main. Some homes will require a pump to get the sewage to the main based on the home location.

TREATMENT DESIGN

The treatment facilities were designed to operate for both high and low flow values of 1.65 MGD and 0.65 MGD calculated from population data. GWS provided typical influent values for biochemical oxygen demand (BOD) and total suspended solids (TSS) concentrations, of 280 mg/L and 220 mg/L. A nitrogen concentration of 60 mg/L was assumed based on typical values for untreated domestic wastewater provided in *Metcalf & Eddy, 5th edition*. A fecal coliform concentration of 1x106 CFU/100 mL was also assumed, for a medium strength wastewater flow.

The influent will flow through a coarse bar screen to remove debris. The design parameters for the screen were based on an Environmental Protection Agency (EPA) fact sheet for screening and grit removal. Approach velocity to the bar screen was assumed to be 0.76 m/sec. The bar screen has a width of 0.31 meters and a height of 0.47 meters with bars placed at

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a 30-degree angle and a spacing of 3.8 centimeters. The debris will be manually removed and transported to a dumpster to be disposed of in the nearest landfill.

The influent will then move into a rectangular primary clarifier. The clarifier was designed using *Wisconsin Code NR 110.18*. One rectangular clarifier is needed for beginning of design life and two clarifiers are needed for end of design life. For redundancy purposes there will be a third tank for maintenance and downtime of the other two tanks. The clarifiers measure 2.45 meters deep by 21.3 meters long by 9.14 meters wide. Surface area of each clarifier is 390 m^2 and a total weir length is 61 meters. The residence time was calculated to be 3.66 hours with BOD removal of 45% and TSS removal of 63%. A chain and scraper system was selected to clean the clarifiers. Settled solids will then be pumped using a two-horsepower sludge pump, that runs 1.33 hours a day, to a thickening station.

The effluent primary clarifier will move into a free water surface wetland (FWS). A free water surface wetland is a man-made wetland that has standing water at all times of the year. The influent flows through the cells of the wetland like a plug flow reactor and is treated by natural processes and vegetation. The team began wetland design by determining detention time required using a corrected BOD rate constant and estimated influent and effluent BOD concentrations. Detention time was set at two days. An average depth of 0.23 meters and a plant based void ratio of 0.65 were assumed based on known values from Crites and Tchobanoglous. The organic loading rate and total surface area were then calculated to be 102 lbs. The FWS will use a clay and native soil liner, more groundwater data evaluation is needed to determine if a plastic membrane liner is necessary.

Parameter	Permit Limit	Effluent Concentration	Unit
BOD	50	40	mg/L
TSS	50	25	mg/L
N	50	39	mg/L
Fecal Coliform	1000*	200	CFU/100 mL

Table 1. Permit Limits and Effluent Characteristics.

Effluent from the FWS flows into a chlorination tank. A fecal coliform treatment standard was not provided by GWS, however, in order to protect residents and tourists during recreational contact, the team decided to add this treatment. A chlorine dose of 12 mg/L for treatment was determined using data in Metcalf & Eddy with an effluent standard of 200 CFU/100 mL. Fecal coliform limits in Costa Rica were found to be 1000 CFU/100 mL for water to be reused in agricultural applications from data provided by GWS. However, because the effluent from the facility would be discharged into the river, it was determined that it was best to treat the water to a higher standard so as not to have a negative impact on human and environmental health. The tank was designed with *Wisconsin code NR110.23* disinfection standards, which required a minimum length to width ratio of 40:1 and detention time of 60 minutes at average design flow. Flow was converted into m^3/hour and divided by a depth of 5 meters to determine the surface area, from this a width of 1 meter and length of 60 meters was chosen for the tank to ensure proper contact time. Dechlorination was not designed for this system, as lab tests would be required to determine chlorine residuals. If residuals are found to be high, a dechlorination system would need to be added.

Effluent requirements provided in the problem statement by GWS require that effluent concentrations fall below 50 mg/L for BOD, TSS, and total nitrogen. Effluent characteristics can be seen in Table 1.

Figure 3. Recommended treatment alternative and site location.

The sludge transported from the primary clarifier is pumped up through the center of a gravity thickening system. This system uses particle settling to obtain an increased percent of solids and thus volume reduction. Using values provided by Metcalf & Eddy, the percent solids of the sludge was estimated to be 3%. The goal was to create a sludge with 10% solids. At this percentage, the sludge volume is reduced significantly and becomes easier to handle and less expensive to dispose of. The sludge will be pumped out of the thickening system and placed in a container large enough to store the sludge for up to seven days. Solids concentration and loading rate of the system values were used to calculate the diameter of the tank, 3.5 meters, with a 3 meter depth. After the sludge is pumped to the storage container, it will be transported to a hauling truck via sludge pump. To avoid odors and vector attraction the container should be covered. A cost analysis was performed to determine the optimal size of truck and whether it should be rented or owned. Owning a larger truck was found to be the most cost-effective option. Further investigation is necessary to determine where the sludge will be disposed of but for the purpose of the cost estimate, it was assumed that a landfill would be used. If the high water content sludge cannot be landfilled, further dewatering will be necessary.

Alternative two uses the same bar screen, primary clarifiers, and chlorination systems as described in the first alternative, with the substitution of a trickling filter for the FWS after the primary clarifiers that feeds into a secondary clarifier, before chlorination. This alternative also uses sludge thickening before disposal, but the dimensions are slightly larger due to the addition of secondary clarifier sludge. Alternative three uses the same bar screen, primary clarifiers, and chlorination systems described in alternatives one and two, as well as the same trickling filter and secondary clarifier as alternative two. However, this alternative does not utilize sludge thickening before disposal.

RECOMMENDATION

The team recommends implementing treatment alternative one at site one, as seen in Figure 3. This location was the closest to the communities and would therefore require less total pipe length for the collection system and less road excavation and repaving. The utilization of the FWS in this design was a large contributor to this decision, as the current owner of the land at location one would like to develop it as a wetland. The FWS allows that to be done, while also treating to effluent standards, easing the land acquisition process.

COLLECTION SYSTEM COSTS

Capital costs for the collection system consist of pricing and estimation of over 42,000 meters of piping and 320 manholes. Lift station construction costs are also included with the prices of the pumps needed. Road construction

	Site 1	Site 2	Site 3
Capital	$3,100,000	$3,500,000	$3,900,000
Annual O&M	$100,000	$100,000	$100,000
NPV	$4,917,000	$5,317,000	$5,617,000

	Site 1	Site 2	Site 3
Capital	CRC 1,866,200,000	CRC 2,107,000,000	CRC 2,347,800,000
Annual O&M	CRC 1,866,200,000	CRC 60,200,000	CRC 60,200,000
NPV	CRC 2,960,000,000	CRC 3,201,000,000	CRC 3,375,000,000

Table 2. Collection System Cost Summary for Sites One to Three.

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> **Capital costs for the collection system consist of pricing and estimation of over 42,000 meters of piping and 320 manholes.**

costs include repaving the roads and refilling the trenches. Also included is the dewatering cost, directional drilling, erosion control, fencing for the perimeter of the lift station and backup generators for lift stations. The total capital cost was estimated at just over $3,000,000.

Operations and maintenance (O&M) will consist of periodic sewer line cleaning, lift station basket emptying, and electrical costs. The pumps that were chosen for the system were added to the model which produced a total of 88.3 kWh per day consumption, at an electrical rate of $0.25 per kWh, this results in a total cost of $82,000 per year.

Each home will be responsible for the cost to connect to the system. This includes connection, lateral construction, septic tank clean-up and removal, and any additional pumping costs. These quantities were either provided or estimated and the total came out to be $2,300,000, approximately $3,000 per home. All costs were analyzed as a net present value with a 1.5% discount rate over the design rate.

The costs seen in the table above do not include the cost of septic decommission and lateral tie-in, as GWS stated these costs may be passed on to the homeowners or be covered by grants. It was found that the average cost per home for sewage tie-in was $300 (180,600 cólones). These costs include the labor rates and costs of piping, as well as the cost to remove or fill in the septic tanks.

FACILITY COSTS

Capital cost for the bar screen includes concrete walls for the channel, steel for the screen itself, and time for excavation. O&M costs will include removal of solids and labor for the cleaning. The primary clarifier capital cost includes cost of concrete for three tanks, excavation for the tanks, the cost of two sludge pumps, one for operation and another for backup at an estimated cost of $1,400 for both (Absolute Water Pumps, AMT). The cost of the clarifiers also includes the cost of a chain and scraper system for each tank, estimated to be $30,000 total (Alibaba). O&M costs include labor for pump maintenance, assumed to be five hours per week for ensuring proper performance, and power required to run the 0.55 kW pump per year.

The cost estimations for the FWS were guided by EPA estimations and

extrapolated to fit the system. The assumed land cost per acre is $5,000. The capital cost without a plastic liner is $610,000 and the O&M is $100,000 per year.

Chlorination capital costs include cost of concrete and construction of the tank, a sodium hypochlorite storage tank, and the distribution system (EPA Disinfection, 2003). O&M will include labor for the calibration of equipment, cleaning of system components every six months, and annual valve inspection (EPA Disinfection, 2003). There are no O&M costs associated with effluent discharge, only capital costs for piping to the outfall.

Capital cost for sludge thickening and disposal includes the thickening system, storage, and two sludge pumps, totaling $257,000. For each pump required an additional pump will be purchased for redundancy. O&M, averaging $245,000 per year, requires regular maintenance checks on the thickening system.

	Design 1	Design 2	Design 3
Capital	$1,000,000	$870,000	$620,000
Annual O&M	$380,000	$390,000	$770,000
NPV	$6,520,000	$6,730,000	$13,900

	Design 1	Design 2	Design 3
Capital	CRC 602,000,000	CRC 524,000,000	CRC 373,000,000
Annual O&M	CRC 229,000,000	CRC 235,000,000	CRC 464,000,000
NPV	CRC 3,925,000,000	CRC 4,052,000,000	CRC 8,368,000,000

Table 3. Treatment Design Cost Summary for All Alternatives.

This includes checking choke points for clogging, build up in pumps and piping, and observing odor and vector conditions in the area. The sludge will need to be moved from the storage unit to a landfill using a hauling truck. The closest landfill found was 235 km away in San Jose. The cost estimate includes this distance, but it is recommended to use a closer facility, if available.

Note: *References can be found in the full report.* CS

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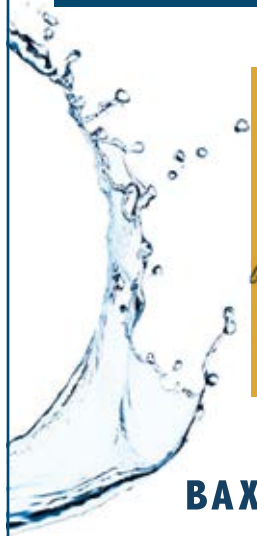

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The Midwest Student Design Competition is intended to promote 'real world and hands on' design experience for students interested in pursuing an education and/or career in water/wastewater engineering and sciences field. This year, the Midwest Student Design Competition on **Monday, April 11, 2022** in Madison, Wisconsin at the Monona Terrace Convention Center. This 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 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

Register Online at *www.cswea.org/student-yps/design-competition*

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All students & professors will receive complimentary registration to the CSWEA 27th Annual Education Seminar on April 12, 2022.

Here is a list of schools who have previously competed in the MSDC:

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

Montezuma, Costa Rica

GLOBAL WATER STEWARDSHIP

PROJECT UNDERSTANDING

- Location: Montezuma, Costa Rica.
- Population: 1,015 (Year 2021)
  [*Source – (ASADA Montezuma, 2021)*]
- Number of Water Services: 317 (Year 2021)
  [*Source – (ASADA Montezuma, 2021)*]
- Water Usage: [*Source – (ASADA Montezuma, 2021)*]
  - Residential – 13 m^3 monthly average.
    ***3.2 inhabitants per household.*
  - Commercial – 120 m^3 monthly average.
- Annual Average Precipitation: 2500 mm
  [*Source – www.climate-data.org*]
- Average Temperature: 26 Degrees Celsius
  [*Source – www.climate-data.org*]
- Typical **Influent** Characteristics;
  Parameter
  - BOD_5 = 280 mg/L
  - COD = 550 mg/L
  - TSS = 220 mg/L
  - Total Nitrogen = 50 mg/L
  - Total Phosphorous = 20 mg/L
- Required **Effluent** Characteristics; [*defined in the "Reglamento de Vertido y Reuso de Aguas Residuales (RVRAR)"*]
  Parameter:
  - BOD_5 = 50 mg/L
  - COD = 150 mg/L
  - TSS = 50 mg/L
  - Total Nitrogen= 40 mg/L
  - Total Phosphorous = 10 mg/L
  - Fecal Coliform = 1000 MPN/100mL
- Geologic Characteristics;
  Typical geologic characteristics such as groundwater level, average apparent density, average porosity, average hydraulic conductivity, etc. are not provided due to Montezuma being a coastal community. Coastal areas tend to present difficulties in the implementation of sanitary sewage solutions, mainly due to the fact that they have a very superficial phreatic level, so it is necessary to analyze the optimal solution for the collection of wastewater. It is also important to consider the level of complexity for its construction and operation, as well as the costs of operation and maintenance, knowing that ASADA Montezuma will be in charge of the administration of the future system. For the sake of the preliminary design of the collection system and centralized wastewater treatment facility, the design team should assume that excavators will encounter oceanic rock before groundwater. **On average, oceanic rock will be encountered anywhere from 1-2m below ground elevation.** Note that it is infeasible to assume that mechanical equipment will be readily available to penetrate oceanic rock and the design team should plan for this during the design of their collection system. Due to this factor, two potential lift station sites are available for the design of the collection system. For the soil sitting above the oceanic rock, it is primarily compromised of clay, sand and silt. A topographic survey file is provided in the Google Drive.

Montezuma Beach – Montezuma, Costa Rica.

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.

Figure 1: Satellite View of Community Extents for Montezuma.

Figure 2: Maps View of Community Extents for Montezuma.

The community of choice for this year's problem statement is Montezuma, Costa Rica. This community belongs to the Cobano district, in the Puntarenas canton, which is located in Puntarenas province of the Nicoya Peninsula. The community is mostly known for its palm-lined main beach, Playa Montezuma, where numerous sea turtle eggs are nested and is also characterized as a tourist destination hotspot that plays an important source of economic income for the area. Montezuma is among the five most visited tourist destinations by local and international tourist, and it is also the second most visited town in the peninsular zone of Puntarenas. Montezuma is located 70 kilometers from Nicoya, Costa Rica (an economic and administrative hub of the region) and 110 kilometers West of San Jose.

The planning area covers approximately 0.11 km^2 and is shown in *Figure 1* and *Figure 2*. This area is mainly residential with a heavy dependence on tourism (hotels, restaurants, and shops). The region hosts roughly 100,000 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. Montezuma's electrical grid consists of 220-volt power with a combination of single phase and three phase. Note that unexpected power outages occur regularly. For the Montezuma design, assume that three-phase power will be readily available.

The residential population is relatively steady with no plans for major developments, or significant residential growth. However, as tourism grows in the region, more businesses and residents may move in. Assume a residential population growth of no more than 1.3% per year, and tourism growth of no more than 2% growth per year. Use your best engineering judgement regarding projections.

> Recent studies suggest that there is evidence of malfunctioning septic tanks due to negligence of routine maintenance, which causes contamination by septic tank effluents that do not infiltrate the ground but are washed away by runoff.

Almost every home and business located within the Montezuma is connected to a private septic tank, with the exception of two hotels that treat their wastewater via package plants that are house on the hotel grounds. In a few cases, some homes discharge wastewater directly to nearby streams that ultimately discharge into the ocean. Recent studies suggest that there is evidence of malfunctioning septic tanks due to negligence of routine maintenance, 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, the Municipality of Nicoya, AyA, and the local ASADA, all of which advocate for a centralized wastewater treatment system and public collection system.

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, Playa Montezuma (beach), is a known sea turtle nesting beach 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, Montezuma has one potential site that is set to be donated to the local ASADA for a future wastewater treatment site. The potential government owned site is approximately 3,000 m^2 and is densely populated with trees. Topo data of the potential government owned site is available in the Google Drive, contained in the same file that contains topo data for the

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Figure 3: Map displaying potential treatment site along with two potential lift station sites.

Figure 4: Close-up map displaying potential treatment site along with two potential lift station sites.

community extents. 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 Montezuma community while also considering cost to acquire new land. See *Figure 3* and *Figure 4* for the donated site location along with the location(s) of two potential lift station sites. Photos of the donated site and potential lift station site(s) are provided in the Google Drive.

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 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, however most teams will use typical U.S standards for the basis of their design (i.e. NR110, 10 state standard, etc.). The collection system should be designed so that the piping size will allow for toilet paper to be flushed.

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

- Wastewater production can be estimated assuming 80% of water consumed/person will be sent to the sanitary system.
- 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: *www.drive.google.com/drive/folders/1Xwsy9xxuQVyEiV7egoAUywSIlSZvC-LL*

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, and with seasonal rainfall variability considered.
2. Seasonal variability of flows due to tourism should also be considered.
3. Treatment facilities should be designed to be able to treat to the desired effluent limits as described in this document.
4. Due to the socioeconomic status of the community, user fees must be lower than 5,000 Colones (Costa Rican currency), per month.
5. The location of the treatment facility must 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. Finally, the treatment site may be proposed outside of the community extents shown in *Figure 1* and *Figure 2*.

Potential site 1 for lift station.

Potential site 2 for lift Station.

Potential government-owned site.

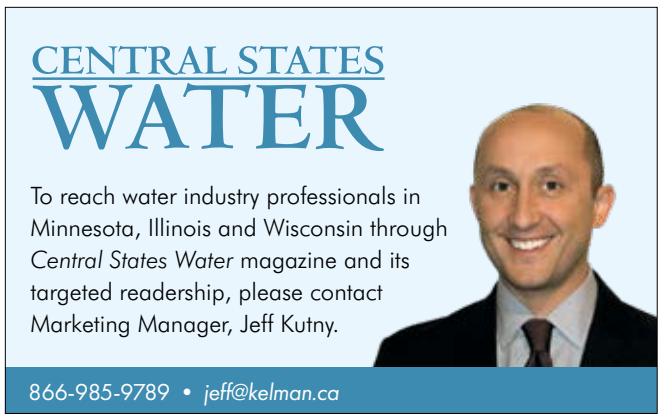
DESIGN OBJECTIVES AND CONSTRAINTS

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. All equipment must have a level of redundancy to maintain treatment if equipment fails or is under repair.
4. The solution must utilize a minimum of space and energy.
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.

"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.

10. It is recommended that the teams design for the year 2041 (20 years). Provide justification with any variances.
11. Use best engineering judgement 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 proposed treatment plant sites.
    b. Designate one of those three proposed sites as the **recommended** site location.
    c. Three alternate treatment processes.
    d. Designate one of those three proposed treatment processes as the recommended treatment process.
    e. Cleary state the capital cost estimate for full construction of the WWTF and accompanying collection system.
    f. Cleary state the monthly user fees that the community should charge residents that will be a funding source for general O&M of the WWTF and collection system. CS



WEFTEC Highlights

WEFTEC was held on October 16-20, 2021. Here are some key highlights for our members!

Lynn Broaddus (WEF Immediate Past President) presenting Chris Anderson (Environmental, Health, Safety Manager at Bongards' Creameries) with the WEF Industrial Water Quality Achievement Award.

Chris Lefebvre (right) poses with Steve Harrison (left) after receiving the Bobby Williams Competitive Spirit Award.

Liz Heise, PE (Global Water Stewardship Chair) presenting alongside GWS leaders Mohammed Haque, Eider Alvarez-Puras, Micah Pitner, and Joe Lapastora at the WEFTEC Global Center. This presentation introduced GWS's history, goals, methods, and some of their current work to provide sustainable solutions to water quality issues in Costa Rica.

The Pumpers (One of CSWEA's two Ops teams) achieve second place in the process control event.

Chris LeFebvre receives the Bobby Williams Competitive Spirit Award at the WEFTEC Operations Challenge awards reception. In photo (left to right) John Bennett, Brenna Durkin, Steve Motley, Chris, and Jeff Sobe.

The Shovelers (One of CSWEA's two Ops teams) achieve second place in the laboratory event at WEFTEC.

A CSWEA Ops team member showcases the generous sponsors that helped make the Ops Challenge possible.

The Shovellers compete at WEFTEC.

Fans of CSWEA's Ops teams watch as the competition heats up.

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MIDWEST STUDENT DESIGN COMPETITION
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Online Event

MAY 17

CSWEA 95TH ANNUAL MEETING
Monona Terrace, Madison, WI

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

New Treatment Plant Allows Sought-After Southside to Keep Growing

Growth, progress, prosperity. There's no shortage of it in North Alabama, which has seen its population grow by 30,000 over the last five years, and is projected to rise by a further 24,500 by 2027. Jobs are also on the up, having increased by almost 50,000 in the past five years – with a projected growth of 33,000 more jobs, also in the next five years.

In Etowah County, Alabama's smallest yet most densely populated county, vibrant Southside (population 8,000 – about an hour northwest of Birmingham), is its fastest-growing city – but this prestigious position held by the place described as the "loveliest village on the River Coosa", has been faced with the recent possibility of being overtaken by other fast-rising locations in the state.

Growth naturally brings the need for new infrastructure. Southside's old sewage lagoon system, despite decades of excellent management, had finally reached its capacity. All that growth, progress, and prosperity – but a potential halt on building more homes and attracting more business to the area – without a new wastewater treatment system.

"Everything was perfectly in order with our treatment levels," said David Fry, Assistant Superintendent for Southside Water Works and Sewer Board, "But we'd reached the point where there was a moratorium on the lagoon, so to keep Southside on track, the City knew it had to invest in a treatment system that would future-proof the wellbeing and continued success of Southside."

CDG, Inc. (which operates across the whole of Alabama) was brought in to work with the City of Southside to find the best solution. Bordered by the Coosa River in the foothills of the southern Appalachian Mountains, the area is blessed with wildlife, as well as top-quality boating and fishing. So, not surprisingly, it is very well monitored by Alabama's Department of Environmental Management.

Scott Trott, P.E., Chief Strategy Officer at CDG, commented: "As always, we wanted to do much more than just collaborate; we wanted to build a unified team with trust, so we brainstormed long and hard with Brandon Sewell (Superintendent) and Fry at the Water Works and Sewer Board to explore all the options."

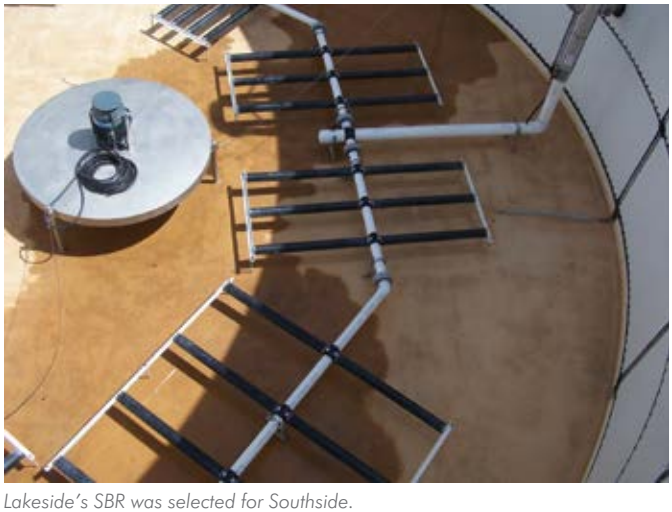
He added: "This included seeing how or if the lagoons could be improved, but they just can't economically and reliably meet today's environmental needs. Some poorly maintained lagoons have well-documented issues of unwanted odors, bacterial spread, and nitrogen/phosphorous overload, but the Southside Board and its predecessors had always managed the lagoon system very professionally and successfully."

Ultimately, an SBR (sequencing batch reactor) was chosen; one that was very robust – simple to operate – and could be easily scaled up for future needs. A site was identified, and after the equipment opportunities went out to bid, an SBR from Lakeside Equipment Corporation was chosen from its long-established agent in Alabama, The Eshelman Company.

Scott Trott continued: "Bringing the team together, including Aaron Schmidt at Schmidt Environmental Construction, Inc., we started mapping out the project with a detailed analysis so that we all knew where we were, understood what our success would look like, and how every move we made was in that right direction."

Designed as a cost-effective biological treatment process, Lakeside's SBR benefits from a fully automated system that treats raw wastewater flow in a single basin using timed-based phases to fill, mix, aerate, settle, decant, and waste sludge. It incorporates diffused aeration with mixers to provide optimum mixing and aeration for high oxygen transfer. An innovative decanter minimizes decanting intervals, while extending the biological process time. The resultant clear water discharges without foam or floating scum.

CDG, Inc., provided the forward-thinking design for Southside.



Lakeside's SBR was selected for Southside.

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The Eshelman Company sourced most of the equipment.

The new facility is easily scalable for the future.

'LONG-LASTING AND EFFECTIVE'

Ed Moore from The Eshelman Company said: "For me, the choice of CDG, Inc. and such a long-lasting and effective Lakeside SBR underlines the City of Southside's desire to do things properly. The old lagoon system was hampering the growth and prosperity of the city, so it was exciting to see Scott Trott's forward-thinking design for what was clearly going to be a very well-thought-out, scalable new plant that would keep Southside one step ahead of the rest for many years to come."

The new site was laid out so that capacity – peak flow of one million gallons per day – could easily be doubled by building new tanks. Initially, it would only be running at around 150,000 to 175,000 gallons per day on average – or up 300,000 gallons per day, depending on the time of year. The site required a fair degree of earth moving for it to be raised – with ample groundwater to contend with – but according to contractor, Aaron Schmidt, this proved a straightforward challenge as the team quickly gelled together.

"Most of the equipment was sourced by The Eshelman Company," said Aaron, "So being able to call upon Ed Moore's knowledge and experience was a big help. Lakeside was also always quick to respond to any questions during the 10 months of construction."

It would be interesting to know just how seamless – or otherwise – it was when Southside's first water system was constructed when the City was incorporated in 1957. Now, more than six decades on for its first dedicated wastewater treatment plant, CDG, Inc., through Scott Trott's design, took great care not to overbuild the new facility, putting a constant review process in place with certified personnel to see the layout from the customer's viewpoint; carefully considering heights, spaces, and repeat activities – all to make the treatment plant operator's job easier – without unnecessary obstacles.

'TOTAL SUPPORT THROUGHOUT'

CDG's Scott Trott continued: "With designs that aren't overly complicated for the sake of it, Lakeside clearly understands the needs of operators, so this, together with being excellent communicators, made everything much easier and enjoyable to work on. Some companies only work well when the sun is shining, so to speak, but as always, you soon find out who you are really working with when you hit a few stumbling blocks – and I can safely say that Jim Aitkenhead and his colleagues at Lakeside were with us from start to finish – total support throughout, taking huge pride in the job. There have been no problems with the SBR. It is very reliable and effective."

Based on a 35-year cost analysis with key component assets forecast for a minimum of 25 years, the Lakeside SBR comprises five key stages in its process:

MIX-FILL: Raw wastewater is introduced into the basin where it is mixed with the mixed liquor suspended solids. This phase is anoxic and can be adjusted to anaerobic for phosphorus release.

REACT-FILL: Aeration is added as the basin is fed with raw wastewater to create aerobic conditions for BOD and ammonia removal. This phase can alternate between aerobic and anoxic conditions for nutrient removal.

REACT: Raw wastewater flow is stopped from entering the basin. Aeration and mixing are controlled to provide final treatment.

SETTLE: Aeration and mixing are stopped to allow separation of liquid and solids.

DECANT AND SLUDGE WASTING: Clear effluent is removed from the surface by the decanter. Near the end of decanting cycle, a set amount of settled sludge is wasted from the system.

Sewell, continued: "From managing chlorine levels at the lagoon, there is obviously far more to a full treatment plant, but that said, the SBR is very easy to operate, with the back-up of the SCADA system, and the team always ready with help, if required. The Lakeside SBR was the right solution for us. It works really well."

Moore added: "Southside now has a delightful plant to walk around. It has a really good vibe and feel. Considering it has such a high level of design and such rugged equipment, the final cost of $4.3 million is an outstanding achievement by all concerned, especially because the new facility is so easily scalable for the future. This is a great example of a long-lasting investment for the wastewater industry."

'CRUCIAL TO THE CONTINUING SUCCESS AND GROWTH OF THE CITY'

Fry concluded: "The final effluent from the SBR looks just like drinking water, which is pretty remarkable when you see where it has come from. Overall, the plant is very maintenance-friendly.

"Maybe it sounds strange to some people, but the new plant is a great environment to work in – and Southside is a great place to live. This new treatment plant is crucial to the continued success and growth of the City. Now that there is all this new capacity, Southside can welcome the building of more new homes and investments from new business." CS

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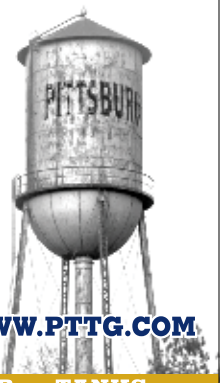

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