Asset Management, Room 201-202
Wednesday, August 31st, 2022, 8:30 AM
Kevin Flis, Xylem
Optimizing Lead Service Line Replacement with Machine Learning

Abstract: Background A combination of aging infrastructure, public health crises, and updated legislation have led to an increased interest in both water utility professionals and consumers as to the material of the service lines to the end user. The Lead and Copper Rule has been updated to require utilities compile an inventory of all service lines in the distribution system and generate a replacement plan to remove LSLs where they exist. As records of service line materials are often undigitized, incomplete, and difficult to obtain on a system-wide scale, utilities are looking for tools to fill that gap. Methodology By leveraging partial records of service line materials already compiled by the utility, machine learning (ML) methods allow us to estimate the likelihood of lead for each of the other service lines whose status is unknown. The methodology developed combines real estate data, demographic data, spatial data, and can include other engineering features as inputs to the algorithm. This algorithm uses ML, so the tool is continuously improving and increasing the accuracy and confidence of the predictions the more data it consumes. The lead probabilities can then be used to rank the unknown service lines to best inform the utility on their replacement plan and significantly increase the amount of interventions that lead to the removal of lead pipes from service. Findings In three (3) test cases, the ML algorithm was able to outperform traditional age-based sampling approaches when asked to validate the performance on a test data set. Status The output of the ML tool allows utilities to generate an informed replacement plan that will focus on the most adversely impacted areas first and will shine a light on those previously unknown conditions. This replacement program can also be supplemented with ongoing meter replacement programs to optimize both meter and service line replacement to reduce utility intervention and mobilization costs. With the development of publicly accessible inventory's, this tool not only optimizes replacement but provides transparency to the end user to the probability that there is a LSL present.

What Will Attendee Learn: The audience will learn how using data analytics can generate probability of lead estimates for service lines where the material record is unknown. Furthermore, the audience will learn how this useful information can be leveraged to improve lead service line (LSL) replacement programs.

Speaker Bio: With a Bachelor of Science degree in Chemical Engineering from Iowa State University and over 14 years of experience in water and wastewater, Kevin Flis has been integral in building outcome driven solutions for utilities. The focus area for these solutions has most recently been digitally-enabled solutions. With his current attention on digital solutions, Kevin is working with utilities to improve water equity, improve lead service line replacements, and enhance machine reliability.

Asset Management, Room 201-202
Wednesday, August 31st, 2022, 9:00 AM
Joe DeLuca, EBA Engineering
Enhancing asset management workflows with out-of-the-box GIS web applications

Abstract: With limited budgets, small water or wastewater authorities are now choosing to implement GIS to support their field operations for inventory updates and inspection tracking. Not only does GIS enable organizations to view their utility systems remotely using a web viewer, but it also helps them easily plan and track work progress without implementing a major software package that requires significant IT support. This presentation details Esri's ArcGIS Online web and mobile applications implemented at the City of Cumberland, MD, that can be configured "out-of-the-box" and bundled to support routine field operations. Cumberland, MD, located in Allegany County provides water, sewer, and stormwater services in support of their 20,000+ residents and several nearby jurisdictions. The presentation will include a review of the applications and how they were used as a package to support improved operational inventory, inspections, and maintenance workflows. These applications have provided significant efficiencies, enhanced communication, and improved record management while offering user-friendly interfaces, seamless integration between applications, and quickly recognized benefits.

What Will Attendee Learn: Attendees will learn about options for small agencies to be able to meet their asset management need using a combination of out of the box Esri technologies. This could help them save costs associated with implementing and maintaining large asset management software packages.

Speaker Bio: Joe DeLuca, GISP is a Project Manager for EBA Engineering, Inc., and is based in Lancaster, PA. Since graduating from the University of Maryland Baltimore County, Mr. DeLuca has worked in the mid-Atlantic area on GIS and asset management projects with a focus on water and wastewater assets.

Asset Management, Room 201-202
Wednesday, August 31st, 2022, 9:30 AM
Monique Mirabeau, DC Water
Asset Management – Building Information Management (BIM) 16th & Alaska Pump Station Pilot

Abstract: DC Water uses ESRI GIS for linear assets to provide a visual interactive interface for managing water and sewer pipes, valves, manholes, hydrants and other assets in the transmission, distribution, and collections networks. The existing connectivity between ArcGIS and Maximo provides access to asset information through a visual interface. In comparison, information datasets for vertical assets (pumping stations and storage facilities) in the form of record drawings from original construction, past upgrade projects, Standard Operating Procedures (SOPs), Operations & Maintenance (O&M) manuals, service manuals, operating information, maintenance records are not integrated. This information is currently located in multiple systems such as Oracle Primavera Contract Manager, Livelink, SharePoint, WASAWIDE, Maximo, Wonderware, SharePoint and print copies. Without a digital system that integrates these multiple data sources into a visually interactive user interface, it is challenging for DC Water operations staff to cross reference the assets as-built information with its operational and maintenance information. As a result, the Department of Pumping and Sewer Operations (DPSO) is evaluating Building Information Modeling (BIM) as a tool for single point of access of as-built, operation and maintenance information, and for improving asset management for the vertical facilities by creating a single source of truth for operational information. DPSO also aims to leverage this tool for pursuing its goal of meeting the ISO 55000 Asset Management standards and principles. The objective of this pilot is to evaluate the use of BIM model as an asset management tool. This approach was taken as DPSO would be the end users of the BIM models developed for water and sewer vertical assets, and the minimum requirements of the model would be dictated by DPSO's needs. However, BIM solutions are applicable for Design and Construction phases of the project, and it was recognized that the implementation of BIM will require enterprise level coordination as the Design and Construction groups may have requirements above and beyond the asset management needs during their respective phases of the project life cycle. Similarly, Facilities Department will be the end users of non-process related buildings. The information obtained during the pilot will be used to create a roadmap for implementing BIM as a foundational component for asset management for DPSO and will serve as a starting point for enterprise level discussions about using an integrated environment to help digitally manage assets in a more seamless, connected, and effective way.

What Will Attendee Learn: Attendees will learn about DC Water's approach to have an integrated environment to help digitally manage assets in a more seamless, connected, and effective way.

Speaker Bio: Monique Mirabeau is a Program Manager - Contract Management in DC Water's Department of Pumping and Sewer Operations. She has over 12 years of expertise with planning, design, construction and project management experience in potable water, wastewater and stormwater infrastructure. Monique's education includes BS in Chemical Engineering.

Asset Management, Room 201-202
Wednesday, August 31st, 2022, 1:00 PM
golnaz khorsha, PhD, Baltimore City Department of Public Works
Findings and Lessons Learned from a comprehensive Visual and Sounding and Electromagnetic Survey of a Large Transmission Main

Abstract: In 2017, Baltimore City in partnership with Pure Technologies conducted proactive condition assessment of a 1.7 mile 48-in pre-stressed concrete cylinder pipe known as Towson East Transmission main via Pure's SmartBall and PipeDiver technology. One leak was identified and addressed, and electromagnetic survey (EM) identified three pipes in critical condition. Continuity testing confirmed significant distress in the form of outer concrete coating and wire-break damage on two of the highlighted pipes. One of the repaired pipes was connected from one end to a concrete encasement, and it appears that uneven settling of the encasement and the cantilevered pipe could have resulted in circumferential cracks in the outer concrete cylinder of the pipes as well as numerous broken wires. Monte Carlo simulation was completed by Pure to produce a degradation analysis and re-inspection timeline of 2 – 4 years. In 2021, visual and sounding in combination with PipDiver EM survey was completed, which identified four additional pipes in critical condition. Additionally, during repairs, minor infiltration from circumferential cracks on a different pipe was identified, and further investigation revealed that the steel cylinder was also compromised. Mechanism of failure is likely due to the shear stress caused by cantilever bending moments resulting from uneven settling of bedding support as this pipe was connected at one end to a concrete encasement and showed no EM anomaly. In total seven distressed pipes were repaired via carbon fiber. Acoustic fiber optic (AFO) cable was installed by Pure Technology to offer continuous monitoring of the pipeline due to higher than average distress. Nevertheless, special attention has to be paid to pipes placed immediately next to concrete encasement. Visual and sounding and better characterization of cracks should complement AFO and EM survey to mitigate risks of failure.

What Will Attendee Learn: Benefits of combining visual and sounding inspection to mitigate risks associated with PCCP failure

Speaker Bio: Golnaz , has a fundamental in chemical engineering and has dedicated her academic career to environmental engineering. She has a masters' degree in environmental engineering with a focus on reduction of sanitary sewer overflows, and a PhD in environmental engineering, focusing in reduction of nitrogen in stormwater runoff. She has been with Baltimore City DPW since 2017 and oversees the proactive water distribution system large transmission main inspections.

Asset Management, Room 201-202
Wednesday, August 31st, 2022, 1:30 PM
Mark Lanham, WSSC Water
Corrosion and Aging Water/Wastewater Infrastructure

Abstract: As water and wastewater utilities face the dual challenges of aging infrastructure and shrinking budgets, efficient use of resources and prioritization of system maintenance becomes increasingly important. Buried piping and appurtenances comprise a large proportion of these utilities' critical assets but cannot be easily inspected to assess their condition and future reliability. Investing up front to mitigate corrosion has proven to be cost effective. But what about existing assets? How does asset deterioration affect performance? What matters most when prioritizing investments on buried piping and appurtenances? How important is the surrounding medium (backfill versus native soil, concrete, or flowable fill) when determining corrosivity? How does the service of the asset (waste or potable water and pressure or gravity) change the assessment? What unique considerations do different materials and rehab of existing assets require? What is the cost (and difficulty) of repairs to address different conditions of deterioration? This presentation will address these questions and provide clear guidance for considering corrosion for prioritization investment.

What Will Attendee Learn: How to consider corrosion when prioritizing investments on buried pipelines. Key factors related to a pipe's material, environment, and service in guidelines and how they've been applied.

Speaker Bio: Mark Lanham is a Senior Corrosion Engineer with WSSC. He has over thirteen years of experience working in the field of corrosion with a focus on water/waste water cathodic protection systems. He is an AMPP certified corrosion technician and coating inspector. He also serves as treasurer of the local AMPP chapter. He has presented at the national corrosion conference. He also holds a BS in Biology from McDaniel College. As well as an MS of Environmental Mgmt and an MS of Business Admin from UMD.

Asset Management, Room 201-202
Wednesday, August 31st, 2022, 2:00 PM
Jennifer Steffens, Suez Smart and Environmental Solutions
Aligning Capital Investments to Maximize Customer Level of Service

Abstract: Howard County is an affluent suburb of Baltimore and Washington DC located in the state of Maryland. The county is home to Columbia, a major planned community of approximately 100,000 founded in 1967. Since many water mains are now more than 50 years old, the County is focusing on developing cost-effective projects to safely extend water main life or ensure optimal replacement using engineering, technology, data collection, and analytic techniques. A critical aspect is prioritizing the selection of water main replacement projects such that customer level of service is maximized. Industry best practice for the selection of pipe replacement projects includes engineers' estimates of factors related to pipe likelihood and consequence of failure, adjacent utility projects, political and customer inputs along with several other subjective factors. However, combining all these inputs into a repeatable, defensible approach is both challenging and resource intensive, and these efforts typically lack any validation of quantifiable improvement to system performance or level of service. This can lead to a loss of confidence in the results by stakeholders, sub-optimal choices for pipe replacements, and the wrong pipes getting replaced. A major shift towards optimal pipe replacement includes holistically quantifying the likelihood of failure and monetizing the consequence of failure across the entire distribution system in a way that ensures the pipes replaced will indeed be the best choices. The County opted for this smarter approach developed by Suez Smart & Environmental Solutions (SES) which included likelihood of failure calculated using a machine learning algorithm created by SES that uses the County's pipe break records for over 10 years. A carefully managed random forest algorithm for break prediction was able to successfully forecast the top breaks correctly more than 80% of the time. For a smarter approach to calculating consequence of failure, a novel approach included monetary quantification of social impacts due to service interruption arising from water main breaks. The number of customers affected from any individual water main break was calculated using an advanced, iterative hydraulic criticality approach and then the estimated dollar impact for each customer type was computed, as outlined in Water Research Foundation Project #4451. Finally, the County's emergency response time and pipe isolation time were used to estimate the total water outage time allowing customer outage hours to be used as the basis for determining the final estimated monetary impact of service interruption. This leap forward in effectiveness using holistic monetized risk modeling gave the County a robust and defensible way to prioritize water main replacement for water mains smaller than 30-inches. In a critical Phase 2 of the project, the risk results will be further packaged as projects, allowing staff to optimize many inputs such as road repaving schedules, project budgeting and traffic considerations.

What Will Attendee Learn: Participants in this session will learn about new, more effective methods for choosing mains to replace. Methods that are easier to defend, easier to repeat, and that improve level of service for ratepayers.

Speaker Bio: Jennifer Steffens is a professional engineer with over 15 years of experience in the water industry. She currently serves as a Director with Suez's Smart & Environmental Solutions.

Asset Management, Room 201-202
Wednesday, August 31st, 2022, 3:30 PM
Mike Bernard, Specific Energy
Don't get caught with your pumps down… Using analytics to improve pump performance.

Abstract: Much has been written about the potential for plugging solids handling pumps in both wastewater and raw water pumping applications. The use of VFDs on pumps offers both improved process control and potentially reduce energy expenditures. Unfortunately, operating these pumps at reduced speeds may also lead to increased incidents of partial plugging. Most SCADA systems focus on alarming, or even potentially reversing the rotational direction of the pump if pre-determined current setpoints are exceeded. Unfortunately, these systems do not provide much insight into the overall performance of the system. Data analytics of individual pump performance provides a more holistic approach to the life cycle asset management and operation of these critical assets. This presentation will demonstrate how analytics can be used in real time by operators, managers, and engineers collaboratively to ensure that systems are operated, maintained and even designed properly for the given service. A simple dashboard which analyzes all of the data generated by station instrumentation allows operators to ensure that pumps operate within their preferred operating range despite changing conditions. Monthly summary report cards allow managers to proactively plan for the refurbishment or replacement of worn equipment before that equipment leads to unplanned outages. Simple access to raw or analyzed data allows engineers to design supplemental or replacement pumps to better fit the actual conditions of service and potentially identify changes in those conditions that may indicate issues with upstream or downstream piping. The City of Chattanooga implemented this analytics platform on their largest wastewater pumping station, the Citico Pump Station. This station was scheduled for a major refurbishment of the pumps and electrical components, and the City desired a comprehensive analysis of the pump sizing and current forcemain hydraulics to determine if a change should be made to the pump sizing. The analytics platform provided this information, but also indicated that there was a significant amount of deterioration of the impellers of two of the four pumps. It also indicated significantly more headloss in the forcemain system. These two factors essentially reduced the real firm capacity of the station from its design of 120 MGD to an actual 102MGD. Additionally, the analytics platform indicated that plugging occurs in the pumps at reduced speeds, and that periodic pump scouring can reduce the overall energy expenditure by anywhere from 15-50% depending upon the severity of the plugging. Similar phenomena have been seen at other wastewater pumping stations as well as raw water pumping stations for water treatment plants. Almost every water and wastewater pumping system in the world today has some level of instrumentation generating data. Unfortunately, most of this data is not being properly analyzed to give the insights needed to run these systems optimally. This presentation will demonstrate how a powerful analytics platform can provide those insights, reduce energy expenditures, extend the useful life of equipment, and protect the environment by reducing unplanned outages.

What Will Attendee Learn: Attendees will learn that analytics can help them prevent disaster by predicting when critical pumping systems are operating incorrectly due to solids deposition, wear and tear, or other issues.

Speaker Bio: Mike Bernard is VP of BD at Specific Energy. He spent 24 years as a design consultant and principal at an engineering firm in Nashville where he was involved with innovative design projects in both water and wastewater involving advanced technologies. He came to Specific Energy because he believes that this technology has the potential to help operators operate better, managers manage better, and engineers engineer better systems.

Asset Management, Room 201-202
Wednesday, August 31st, 2022, 4:00 PM
Nicole Clarke, Tank Industry Consultants
AWWA Standards and Manuals Supporting Water Storage Tank Inspection and Cleaning

Abstract: History: Water-storage tank owners and operators are keenly aware of the need to properly maintain these critical components of their water system infrastructure, and for decades have looked to the American Water Works Association (AWWA) for guidance on the inspection and cleaning of tanks. The first AWWA tank inspection standard was AWWA D101-53, Standard for Inspecting and Repairing Steel Water Tanks, Standpipes, Reservoirs, and Elevated Tanks, for Water Storage. In 1998, AWWA Manual M42, Steel Water-Storage Tanks, was published as a guidance document. An addition to the arsenal of information available to tank owners concerning the inspection and cleaning of water-storage tanks is the handbook Steel Water Storage Tanks: Design, Construction, Maintenance, and Repair published in 2010 by McGraw Hill in conjunction with AWWA. Inspection Recommendations: AWWA recommendations, past and present, call for water-storage tanks to be professionally inspected at intervals not more that every 5 years. Tank Cleaning: Prior to conducting the field evaluation, it is recommended that the sediment, mud, and debris be removed from the tank. For a drained evaluation, once the tank is drained, the lower surface of the interior of the tank should be cleaned. Following the evaluation of the tank interior surfaces, the tank should be disinfected in accordance with AWWA Standard C652 Disinfection of Water-Storage Facilities, latest version. These washouts and disinfection can be performed by the tank owner's personnel or by the inspection company. When the tank owner elects to have the tank evaluated with water in the tank, a specially designed ROV (remotely operated vehicle) or divers can be used to clean out the sediment in the base of the tank. Water-Storage Tank Inspections: The dry evaluation is the most thorough evaluation since all the tank surfaces, including the bottom plates, are visible. Underwater evaluations of tank interiors are an alternative when tanks cannot be drained, or the owner does not want to drain the tank. During the field evaluation, the inspection technicians access the tank surfaces of the interior wet, interior dry (if applicable) and the exterior to identify sanitary, safety, or structural deficiencies. Coating samples should be taken and tested for the presence of regulated heavy-metal pigment. Following the field evaluation of the tank, all data collected should be used to prepare an engineering report of the conditions found. The findings of the inspection report should be presented in such a manner that the condition of the tank is evident regardless of the reader's background including photographs to further document the condition of the items observed. Looking to the New AWWA D101: The new AWWA D101 has been many years in the making. Practices and technology have evolved greatly since the standard was published in 1953, so a complete rewrite is in order. The new standard doesn't just apply to water-storage tanks, but also to related structures such as Aldrich units, clarifiers, clearwells, filter beds, and hydropneumatic tanks along with the more traditional styles of tank construction including bolted and welded steel structures.

What Will Attendee Learn: The attendee will learn specifics of AWWA Standards and Manuals to further understand the necessity of inspection and cleaning to provide the best possible care and maintenance of their tank assets.

Speaker Bio: As Business Development Manager of Tank Industry Consultants' Eastern Region, Nicole Clarke serves as client liaison in the development and execution of tank rehabilitation and new tank

projects throughout the eastern portion of the US. Since joining TIC in 2009, Nicole has been involved in tank evaluation, rehabilitation, and new tank projects for many clients. Nicole is a graduate of Clarion University of Pennsylvania and involved in the structural coatings industry for 19 years.

Asset Management, Room 201-202
Wednesday, August 31st, 2022, 4:30 PM
Laura Khouvilay, Carollo Engineers
The Goal Posts Keep Moving! Lessons Learned from Recent Water Main Inspections

Abstract: The American Water Works Association (AWWA) M77 Condition Assessment of Water Mains states that "Water main condition assessment currently ranks among the most important subjects to water utilities…" (AWWA, 2019). WSSC Water has a rigorous condition assessment and monitoring program for its large diameter prestressed concrete cylinder pipe. And though it initiated a condition assessment program for its distribution mains in 2013, challenges have hindered fully integrating those results into their water main renewal decision-making process which is primarily driven by the desktop analyses of break frequency, pipe material, pipe age, and soil corrosivity. To advance its water main condition assessment program (Program) to focus on both distribution and transmission metallic pipe, WSSC Water sought to identify cost-effective, proven, and innovative condition assessment tools and data management processes that increase confidence in pipeline replacement decisions. During the Program Development Phase, WSSC Water updated their metallic water main prioritization approach for condition assessment, developed a Water Main Condition Assessment Technology and Tool Matrix, and identified potential inspection projects for the first cycle of inspections. Using this prioritization approach, over 220 miles of distribution and transmission mains were identified for condition assessment. From this, a short-list of water transmission and distribution mains were paired with specific condition assessment technologies for the first year of the program. The inspection technology selected for each alignment considered accessibility, the resolution to be expected in assessment results, and cost. This presentation will review the results and lessons learned from the planning and execution of the three inspection projects ultimately conducted during this first cycle. PICA Hydrasnake and Hydromax USA p-CAT tools were used to inspect approximately 5 miles of distribution system pipes, and Xylem Pure Technologies PipeDiver was used to inspect 2.2 miles of a 30-inch and 26-inch transmission pipe. Revisions to the prioritization approach based on this first cycle of inspections will also be presented.

What Will Attendee Learn: This presentation will review the results and lessons learned from the planning and execution of three inspection projects of metallic transmission and distribution mains.

Speaker Bio: Laura Khouvilay has 15 years of experience in the water and wastewater industry. She is a leading expert on water distribution systems including hydraulic modeling, operations optimization, condition assessment, asset management, and master planning. She currently serves as program manager for the WSSC Water, Condition Assessment of Buried Water Assets, Metallic Pipe.

Asset Management, Room 201-202
Thursday, September 1st, 2022, 8:30 AM
Gage Muckleroy, GHD Inc.
Biosolids Facilities Planning - Using Asset Management and Adaptive Pathways Planning for Milwaukee MSD

Abstract: The Milwaukee Metropolitan Sewerage District (MMSD of District) is a regional water reclamation and flood management agency serving 1.1 million people. MMSD has two biosolids facilities: Jones Island Water Reclamation Facility (JIWRF) and South Shore Water Reclamation Facility (SSWRF). At these facilities, MMSD produces a commercially available fertilizer called Milorganite. The Biosolids Advanced Facilities Plan (AFP) focuses on the 2045 planning horizon and addresses three major questions: 1. What is the best way to produce Milorganite now and in the future? 2. What drivers influence the long-term viability of Milorganite? 3. How can the District adapt to changing drivers? Traditional Asset Management (AM) strategies were used in conjunction with Adaptive Pathways Planning (APP) to address these major questions. Perhaps the most important aspect of a successful Business Case is to ensure the decisions made align with the predefined organizational goals and required Levels of Service (LOS). The analysis included: • Present and Future Loadings Analysis • Technology Screening • Capital Expenditure (CAPEX) and Operational Expenditure (OPEX) Analysis • Risk Assessment (including Risk Reduction effectiveness) APP (different from Adaptive Planning) is a recently developed practical planning approach, designed to assist with planning for uncertain futures. By contrast, Adaptive Planning alone is designed to measure the success of the plan and make changes as the plan is implemented (reactive approach). The goal of APP is to be proactive adding flexibility and resilience into strategic and facilities planning based on the principle that significant uncertainty exists in the future, and therefore decision-makers benefit from focusing on what triggers and signals influence decisions to move forward along a recommended path, or instead indicate when there is a need to change course. Technology Screening included: 1. Thickening 2. Digestion 3. Digestion Alternatives 4. Dewatering 5. Drying and Post-Digestion 6. Side Stream Treatment 7. Other The following alternatives were evaluated: • Baseline: 'Business-as-usual' alternative with upgrades and rehabilitation projects to address capacity constraints and physical mortality concerns. • Alternative 1: Production of Milorganite at both JIWRF and SSWRF • Alternative 2: Production of Milorganite at JIWRF and production of a Class A dried product made from digested sludge at SSWRF • Alternative 3: Production of Milorganite at JIWRF and production of biochar made from dried digested sludge at SSWRF This multifaceted approach included the following: • Risk assessment • Life Cycle Cost Analysis Additional criteria were included in the alternatives analysis, including: • Beneficial Reuse of Biosolids • Greenhouse Gas Emissions • Total Energy Consumption • Renewable Energy Production • Biosolids PFAS Regulations • Ability to Mitigate Against Short-Term Risk of Extended Dryer System Shutdown A key feature of this approach is the representation of the APP on a diagram, called the "APP Map". This map illustrates potential pathways, their corresponding timelines, and methods to switch between options or implement new strategies as the future unfolds. This includes the identification of thresholds (turning points) at which an option is no longer feasible, as well as defining triggers (decision) points for when a decision must be made.

What Will Attendee Learn: 1. How can we use an Asset Management Framework to successfully strengthen a Biosolids Advanced Facilities Plan Business Case? 2. How can advanced planning techniques such as Adaptive Pathways Planning to add flexibility and robustness to the decision-making process?

Speaker Bio: Gage has more than 30 years of engineering and asset management consulting experience focused on infrastructure, including water, wastewater and stormwater. He is one of the technical leads for GHD's US water market including Integrated Water and Asset Management. Gage was also the lead instructor for the University of Wisconsin's annual Advanced Asset Management 3 day course (2014 – 2019) and is the lead instructor for Virginia Tech's Advanced Asset Management

Asset Management, Room 201-202
Thursday, September 1st, 2022, 9:00 AM
Kevin Flis, Xylem
Ensuring Critical Asset Optimization and Uptime using Artificial Intelligence

Abstract: Water treatment, distribution and collection are complex systems, with many components, often in inaccessible or isolated locations. Keeping these systems operating efficiently and reliably without breakdowns is a daily challenge for operators. Evolving maintenance practices have improved asset management effectiveness in recent years and now advanced sensing and artificial intelligence (AI) backed machine learning technology can provide operators with real time insights into asset performance and advanced warning of potential problems, before damage is caused or system performance is compromised. These new developments will help operators to optimize service delivery, meet compliance obligations, reduce operating costs and maximize the lifetime of, often aging, assets. This presentation aims to educate the audience on how partnerships generating AI-driven solutions enhance machine health and asset management, resulting in optimized electrical machine reliability and reduced costs, particularly energy. Compact smart edge devices read electrical signals from assets together with other local data and perform thousands of informed calculations per second, before transmitting resulting KPI's to the Cloud for further processing. Operators can view asset performance insights via the secure web portal and alerts can be sent directly to operators if urgent intervention is required. This tool enhances existing asset management programs and provides increased uptime of critical assets, allowing maintenance teams to provide informed predictive maintenance. Tailored reports mean that operators receive insights relevant to their individual needs, so that they get the right outcome at the right time. The web portal is designed to be intuitive, providing at-a-glance insights. The system is also inter-operable with existing software applications that are already in wide use in the water industry. An industry standard API means that the insights generated by the system can be easily shared with platforms such as CMMS or SCADA, so staff can see existing data and new insights together in the same applications that they are already familiar with. Much is written about the far-reaching potential of artificial intelligence, but here is a practical example of its use in providing real tangible benefits to water utilities and their customers.

What Will Attendee Learn: The audience will learn how partnerships generating artificial intelligence-driven solutions enhance machine health and asset management, resulting in optimized electrical machine reliability and reduced costs, particularly energy.

Speaker Bio: With a Bachelor of Science degree in Chemical Engineering from Iowa State University and over 14 years of experience in water and wastewater, Kevin Flis has been integral in building outcome driven solutions for utilities. With his current attention on digital solutions, Kevin is working with utilities to improve water equity, develop data driven decision making for asset management, and improve lead service line replacements.

Asset Management, Room 201-202
Thursday, September 1st, 2022, 9:30 AM
Russell Vrhovac, Duncan Parnell Inc.
Utilizing mobile, battery-operated cellular data recorders with a map-centric approach to municipal water and sanitary sewer system monitoring.

Abstract: This presentation will discuss Spotsylvania County's use of Trimble Unity to help monitor its municipal water distribution and sanitary sewer collection systems. Trimble Unity is the nerve center of Trimble's Telog monitoring solutions that includes a GIS-centric, desktop and mobile, Asset Management and task-order system, while also allowing the user the ability to integrate existing Asset Management and GIS-centric systems. This platform allows the user to monitor pressure, flow, level, rainfall, etc. within their utility network by introducing ruggedized battery-powered recorders for permanent or temporary installations. Unity has the ability to compare and analyze sensor information geographically or individually allowing users to proactively identify issues that may be occurring using historized datasets, or be notified immediately should sensors trigger user programmed alarm settings, so that the proper response can occur quickly. Spotsylvania County has been a user of Telog monitoring solutions for many years, but is seeing an increasing benefit with recent improvements to a mapping-centric approach to sensor management and ability to install sensors quickly and easily without the need for external power. The County is leveraging this system by several means. They are co-locating alongside SCADA solutions as a check on existing sensor accuracy, using recorded data for water and sewer model calibration with a limited number of sensors that can be re-allocated as needed without large-scale efforts by operations staff, and increasing response time and accuracy during emergency events. The County is continuing expansion of their fleet of Telog data recorders and sensors to monitor pressure, flow, and rain level, as well as to port existing monitoring equipment data to the Trimble Unity system. With the growth of their system, the need to monitor is also growing, as is the importance of utilizing an integrated map-centric approach to monitoring solutions management and data retrieval.

What Will Attendee Learn: Attendees will learn about alternative technology for remote monitoring solutions and how it integrates with Enterprise GIS architecture and how it can be utilized to maximize the users monitoring-capabilities with minimal hardware and mobile technology.

Speaker Bio: Russell Vrhovac is a GISP and works as a Technical Sales Representative for Duncan Parnell selling Trimble Mapping and Remote Monitoring Technologies. Russell has worked in the Utility Engineering, GIS Asset Management and Mapping fields for the past 20 years.

Asset Management, Room 201-202
Friday, September 2nd, 2022, 9:00 AM
Osai Robinson, Black and Veatch
Minimizing Risk during SmartBall Leak Detection Inspections

Abstract: As water infrastructure ages, condition assessment projects become more prevalent and utilities are challenged with maximizing the efficiency of these projects. The pre-planning activities to facilitate a SmartBall leak detection inspection are critical to ensuring adequate data is collected and risk is minimized. There are several risks associated with SmartBall inspections that could result in poor data collection or loss of the tool within the distribution system. This presentation will discuss the pre-planning activities that occurred to facilitate the SmartBall leak detection inspection of one of the Town of Gilbert's most critical water pipelines.

What Will Attendee Learn: Attendees will learn the pre-planning steps required to facilitate a successful SmartBall leak detection inspection.

Speaker Bio: Osai is a condition assessment engineer with Black & Veatch based in Phoenix AZ. Osai has 9 years of experience in condition assessment of water infrastructure and design of water pipelines. He has completed several condition assessments projects in California and Arizona which has given him a strong understanding of how to plan and execute successful pipeline inspections.

Asset Management, Room 201-202
Friday, September 2nd, 2022, 9:30 AM
Timothy King, CDM Smith
WSSC Water Consolidated Laboratory – "Easily visualize your building assets using a digital twin"

Abstract: WSSC Water's Consolidated Laboratory is MDE-certified. During the past 20 years, the laboratory has experienced an increase in analytical workload. More than 500,000 water quality tests are performed annually, and this number is expected to increase by more than a third over the next 20 years. To meet expected demands and increase operational efficiency, WSSC Water's objective was to renovate and expand the existing lab to keep all current and future testing in house. Approaching two decades of service, internal renovations and physical expansions were needed to adequately respond to the changing operational and regulatory demands. The result is a proposed 20,000 SF expansion that will accommodate the lab to the year 2045. Part of the lab design process included identifying and cataloguing each built element of the proposed addition, referred to as an asset, to develop an asset registry. This registry would enable WSSC to run the laboratory at peak efficiency by listing all the information available for each asset. Details such as dimensions, model number, manufacturer, installation date, and warranty are gathered and linked to the asset for easy reference in the future when the laboratory begins to age and assets need repair. The process of developing the registry consisted of manually cross referencing the design documents with the digital spreadsheet to list all the assets. The registry is a vital library of information that runs parallel but separate from the 3D building information model that was developed by CDM Smith designers during the design phase. New advances in building information technology are beginning to bridge the gap between the building information model and asset management. The tedious manual collection and entry of data into a spreadsheet is now replaced by 3D digital models of the built structure known in the industry as digital twins. The digital twin revolutionizes the process of asset management by providing a visual representation of the building that can be dissected and scrutinized by designers and facilities managers to gauge the building's performance and its maintenance status. The presentation will focus on the design team's implementation of the latest digital twin technology to merge the asset management and design processes into one coherent system. The presenters will also narrate the collaboration between laboratory designers and Autodesk to develop their proprietary digital twin software, Tandem.

What Will Attendee Learn: The learning objectives for this presentation include: Describe the current and future consolidated laboratory challenges and needs Describe the process of identifying and organizing the lab expansion assets for use in WSSC's asset management platform Introduce the digital twin application (Tandem) which helps visualize each asset as it is organized in WSSC's Computer Maintenance Management System (CMMS) platform Describe the future objectives and value of a digital twin

Speaker Bio: Amado Carsky, WSSC Water Division Manager Production Asset Manager Amado is a licensed engineer in the state of Maryland and a PMP. He graduated with a Bachelor of Science in Civil and Environmental Engineering from University of Maryland, College Park, and has a Graduate Certificate in Water Engineering and Management from University of Colorado, Boulder. For the past ten years he has served as a Project Manager and Asset Strategy Manager with WSSC Water

Engineering Ethics, Room 217
Wednesday, August 31st, 2022, 9:00 AM
Raanan Webb, BlueConduit
Overcoming data inequities to improve outcomes

Abstract: Data bias in infrastructure poses a significant challenge for utilities attempting to leverage data science and artificial intelligence systems to inform decision-making. When the underlying data in a predictive model is not representative of the population or problem it is trying to solve, it carries the risk of furthering underlying inequities. We will discuss strategies to overcome bias through targeted data collection efforts, and statistical tools to "debias" existing data to the degree possible without extra (and potentially expensive) data collection. We will use examples from our work in lead service line inventories across the United States, but our results generalize well beyond this scope. Data bias can have significant implications for a utility. A robust estimate of the number of lead service lines is an important part of budgeting and compliance—e.g., will your LSLR program require $50 million or $100 million in funding? If 10% of the labeled service lines are lead, you might assume that 10% of all the service lines are lead. But this assumption may be substantially incorrect if labels were collected non-randomly. Further, data bias leads to poor prioritization for lead replacement programs. For example, if a utility has more data from higher income neighborhoods, they may end up focusing lead removal efforts in those areas, even if lower income neighborhoods actually have more lead. There are many ways that non-random data makes its way into service line inventories. For example, service line data might be collected through a program whose participants are more educated or more likely to be homeowners. Neighborhoods that have had more water infrastructure work done will have more complete records; historically, infrastructure dollars have not always been spent equitably across regions. Service area acquisitions may also create a situation where record quality varies widely within a utility. Since data bias is common in service line inventories, what can utilities do about it? Being aware of how biased data can affect decisions is the first step. Next, we will discuss strategies to overcome bias through targeted data collection efforts. Finally, we have developed a set of statistical tools to "debias" existing data to the degree possible without collecting more labels. We will use examples from water utilities across the US to demonstrate the problem of data bias and our approach to addressing it. There are ways to mitigate biased data. Some are more costly than others, but all are less costly than the consequences of using biased data for decision-making.

What Will Attendee Learn: Understand potential sources of bias in existing data and what to do about it.

Speaker Bio: Jared Webb is BlueConduit's Chief Data Scientist. His responsibilities include processing and analyzing data customer data, managing relationships with technical service partners, and producing output of Machine Learning results. Jared received his Undergraduate/Masters in applied mathematics from Brigham Young University, where he focused on the mathematical foundations of machine learning models.

Engineering Ethics, Room 217
Friday, September 2nd, 2022, 9:00 AM
Clifton McCann, Thompson Hine LLP
Ethical Considerations in Intellectual Property

Abstract: Patents and trade secrets can reward innovators and foster innovation, but can also unfairly stifle competition. This presentation will examine ethical issues in IP and outline best practices for recognizing improvements that warrant IP protection, protecting and fairly exploiting legitimate IP rights, respecting legitimate IP rights of others, and crediting inventors for their contributions.

What Will Attendee Learn: Attendees will get answers to the following questions: What kind of innovations advance water treatment technology and warrant IP rights?; How and to what extent can IP be legitimately exploited?; What steps should be taken to respect others' IP rights?; Who within an organization should be named as an inventor?

Speaker Bio: Clifton McCann is an experienced patent attorney and partner at Thompson Hine in Washington, DC, with experience in competition ethics concerning intellectual property. Leadership roles in the IP community have included Chair of the Patent, Trademark, and Copyright Section of the Bar Association of Washington D.C. and Chair of the American Bar Association's Committee on Intellectual Property Litigation. He heads his firm's Water Technology practice group.

Stormwater, Room 217
Wednesday, August 31st, 2022, 8:30 AM
Danielle Hankins, RK&K
MS4 TMDL Program Management: Case studies in Planning to Implementation for Project Portfolios

Abstract: "Program Management is the process of managing programs mapped to business objectives that improve organizational performance." As local government agencies and municipalities strive to comply with Chesapeake Bay TMDL requirements they often find themselves struggling to understand the rules, locate funding opportunities and prioritize projects to get their programs moving. Some hit the ground running, starting as quickly as they can to get MS4 credit in the ground, while others spend time planning projects and securing funding before getting started with the design process. At RK&K we have worked with clients on all areas of the program implementation spectrum. If time allows the logical place to start the planning process is looking wholistically at watershed assessments. These assessments document the results of desktop analysis and field site searches to identify problem areas and project opportunities yielding potential MS4 credits. In order to begin to prioritize the project opportunities or tease out the cream of the crop or low hanging fruit, additional information is sometimes needed. This starts with an internal understanding of how a municipality operates. We have worked collaboratively with multiple agencies and municipalities to not only tease out those gem projects the yield efficient "bang for the buck" but also provide a justifiable backbone to support administratively sound and fiscally responsible decision making for their programs. By running potential projects through a Priority Matrix, or weighted ranking system for viable proposed BMP opportunities, we are able to generate a ranking system that can be used to generate the next round of MS4 projects. The Priority Matrix can be successfully tailored to fit your individual municipalities needs with respect to ranking categories and the individual weight and rank can be adjusted based on current operations, interests, and funding. Some sample ranking categories include credit type, BMP type, IA Credit potential, BMP ownership, Cost per credit, utilities, natural resources and permitting, community support and right-of-way, the number of proposed BMPS and the presence a field visit or feasibility study. The categories can then be further broken down by additional ranking options and assigned numeric values and weights. Once the Priority Matrix tool is nailed down, the available projects are run through to identify a weighted score for each BMP opportunity. A priority list of projects can then be generated and evaluated to begin further planning, design and implementation measures for the MS4 program. The Priority Matrix tool is not only customizable to fit your needs, but also provides a justifiable means to operate your MS4 TMDL Program effectively and cost efficiently.

What Will Attendee Learn: This presentation showcases a Priority Matrix tool that is customizable to meet your municipalities needs to organize an MS4 TMDL Project portfolio. The tool supports administratively sound and fiscally responsible decision making in any organization.

Speaker Bio: Danielle Hankins is a Project Manager at RK&K in the environmental, water resources department with 18+ years of experience in program management and design for various state, county and municipal civil engineering projects. She has completed planning, all phases of design development including contract documents and construction, MS4 permit planning, management and execution and staff training and process documentation for various clients.

Stormwater, Room 217
Wednesday, August 31st, 2022, 1:00 PM
Nirali Desai, Arcadis US Inc.
Innovative Methods to Select and Implement Green Stormwater Infrastructure Improvements within large watershed areas – A case study in DC's Watershed

Abstract: Many communities across the nation are implementing green stormwater infrastructure (GSI) programs to enhance community resilience and address regulatory requirements of their Municipal Separated Storm Sewer System (MS4) Permits and special conditions such as the Chesapeake Bay TMDL nutrient and sediment reductions. The District Department of Transportation (DDOT) and the Department of Energy and Environment (DOEE) have identified four sub-watersheds located within the Anacostia watershed to be retrofitted with GSI as part of the long-term stormwater management solution to improve the water quality and overall conditions of the affected tributaries. This presentation will summarize various aspects of one planning and design project implementing over 40 individual GSI practices within these sub-watersheds. This presentation will describe an innovative GIS-based screening tool was developed using open source and utility GIS data together with system prioritization criteria to identify the optimal locations for GSI systems and opportunities for impervious area removal. The large analysis area necessitated the use of this type of tool to help rank and prioritize potential locations for GSI implementation without having to manually analyze each location. Selection criteria included numerical rankings for street slopes, utility conflicts, parking impacts, street classifications, drainage areas, and tree coverage factors. This presentation will demonstrate how this challenge was overcome by using a GIS-based screening tool to screen, score and rank sites based on design and regulatory contributing factors. GSI designs included bioretention, permeable pavement parking lanes, permeable pavement green alleys, expanded green spaces, and other impervious area removal practices. Project implementation focused on a treatment train approach, combining multiple GSI practices in series together with impervious area reductions to optimize overall benefit and performance.

What Will Attendee Learn: Learn about a GIS-based screening tool used to identify the most ideal locations in a significantly large watershed area for GSI retrofit projects within the public ROW to maximize stormwater treatment. Demonstrate different types of GSI practices suitable in the urban environment; their limitations and challenges; and operation, inspection, and maintenance concerns and solutions.

Speaker Bio: Ms. Desai is a professional engineer and has over 15 years of experience in the design of green stormwater infrastructure, stormwater management, MS4 program, and site/civil design. She has worked on projects for public and private clients.

Stormwater, Room 217
Wednesday, August 31st, 2022, 1:30 PM
Chenyuwei Guan, Gannett Fleming
Extreme Makeover, Sediment Basins Edition: Conversion to Submerged Gravel Wetlands at Fullerton

Abstract: The presentation will include discussions of the benefits in converting sediment basins to stormwater management (SWM) facilities. Considerations during construction phase will also be discussed. The submerged gravel wetlands utilized at the Fullerton Reservoirs will be used as one of the examples to elaborate in detail on the topic. The purpose of the Fullerton Reservoirs project is to provide an additional 62-million-gallon finished water storage for the City of Baltimore regional water utility. The Fullerton Reservoirs project is located in Rosedale, MD, and consists of three closed concrete tanks with a combined volume of 62 million gallons. Two large scale sediment basins with a total storage of nearly 180,000 cubic feet were proposed on-site to capture sediment from surface runoff during construction. Both basins had nearly 20 acres of drainage area each and were located at the north and south sides of the site. The majority of Environmental Site Design facilities have restrictions for maximum Drainage Area (DA). However, a larger DA is required for submerged gravel wetlands to provide enough water for all plants to thrive and to ensure peak performance for pollutants removal. Considering the existing site conditions, four SWM facilities were proposed to treat all runoff water from the site, including a bio-swale, a grass swale, and two submerged gravel wetlands. At the end of the construction, once the site was fully and permanently stabilized, the two sediment basins were converted to submerged gravel wetlands. The conversion of temporary sediment basins is very beneficial to this project. It can salvage the materials built within the basin, reduce total disturbance area, and lower the construction cost. A few significant elements need to be considered during the conversion process to support the performance of the constructed wetland. Subgrade preparation is crucial for geo-membrane installation, which plays an important role in retaining water within the wetlands. The subgrade must be inspected before liner installation to make sure no gravel or sharp objects are present that can damage the geo-membrane. The geo-membrane also needs to be well welded during installation. The clay core trench needs to be filled and compacted after removing outfall pipes and risers used for the sediment basins. With water ponding against the basin embankment, difficulties can arise during clay core trench compaction. The invert elevation of the 90° bend inside the flow control structure is important to control the ponding depth within the wetlands. Flooding the wetlands is recommended prior to wetland planting, especially if planting is scheduled during summer without precipitation within seven days.

What Will Attendee Learn: The presentation will include discussions of the benefits in converting sediment basins to stormwater management (SWM) facilities. Considerations during construction phase will also be discussed. The submerged gravel wetlands utilized at the Fullerton Reservoirs will be used as one of the examples to elaborate in detail on the topic.

Speaker Bio: Chenyuwei (Brenda) Guan is a civil designer at Gannett Fleming with 5 years of experience. She is specialized in civil site design, SWM and ESC design, and permitting. Bachelor in Science in Environmental Engineering from Shanghai Maritime University and Master in Science in Civil and Environmental Engineering from University of Pittsburgh. During free time, she enjoys collecting house plants, trying different breweries and food, and learning new sports.

Stormwater, Room 217
Wednesday, August 31st, 2022, 2:00 PM
Kristianne Sandoval, RK&K
Glenmont Forest Green Streets: The Challenges and Success of Stormwater Retrofits in the Urban Environment

Abstract: The Glenmont Forest Green Streets project included construction of rain gardens, bioretention cells, and Filterra (i.e., tree box) units in the public right-of-way throughout the Glenmont Forest and Wheaton Hills neighborhoods. The goal of the project was to provide water quality treatment and reduction of stormwater runoff volume. Our task was to identify all ESD/LID restoration opportunities, evaluate options and alternatives, design, and implement best management practices to the MEP within the public right of way (ROW) for the 237-acre study area within the watershed of Josephs Branch Tributary of Rock Creek. The project was initiated by the Montgomery County Department of Environmental Protection to help meet the County's MS4 permit and TMDL requirements. The project site is located in an area of Montgomery County that was built in the 1950s without any stormwater quality or quantity management, and with minimal storm drain system infrastructure. The final design includes facilities at 58 locations within the public right-of-way between the existing curb and sidewalk, or curb and private property line. Some facilities are located with-in curb extensions that provide traffic calming benefits in addition to the stormwater treatment benefits. The design process included preliminary site assessment composed of desktop analysis and field investigations to identify potential retrofit locations. Design constraints included limiting the proposed work to within the right-of-way, offset requirements from existing underground infrastructure (water, sewer, gas, and electric), limitations due to geologic conditions (infiltration capacity and high groundwater), and requirements for preservation of natural resources (i.e., tree preservation) and private property (i.e., homeowner fences, walkways, and landscaping). Public support and design acceptance was critical for this project, thus public outreach was integral to the design process. Outreach conducted by the design team included public meetings (live and virtual) as well as a field-based day long workshop. The work to construct these facilities includes removal of curb and gutter, installation of curb inlets, excavation and grading, underdrain and other pipe installation, new curb and concrete edging installation, Filterra tree box installation, and landscape plantings. Minimizing the impacts to adjacent homeowners during construction was a key component of the construction process and required ongoing coordination from the construction team (contractor, RK&K, and the County). The final constructed design will benefit the community through improvement of stormwater quality treatment and enhancement of neighborhood aesthetics.

What Will Attendee Learn: The challenges of implementing stormwater water quality treatment facilities in the urban environment. Highlights of lessons learned during design and construction and overview of project success.

Speaker Bio: Kristianne Sandoval is a water resources engineer at RK&K. She has been working on LID SWM practice design in the Mid-Atlantic region for the last 8 years, with a focus on projects completed for water quality improvement and retrofits in developed environments for MS4 permit compliance. She has experience in watershed assessments and design of SWM facilities including bioretention, bioswales, pond retrofits, permeable pavement, and proprietary SWM practices.

Stormwater, Room 217
Wednesday, August 31st, 2022, 3:30 PM
Dishon Kimani, Morgan State University
The Application of Geographic Information Systems (GIS) in Storm Water Management.

Abstract: Managing storm water requires adequate information about the affected areas and the factors contributing to the high surface runoff. This defines the importance of identifying the areas prone to high risk of damage by the storm water. Implementing best management practices (BMP) requires sufficient insights into several factors, including the history of the precipitation in the area and the difference in the effects. Information about the facilities and the area's topography is also essential in informing the interventions. The Geographic Information Systems (GIS) role is to provide sufficient data and information regarding the target site. GIS helps map the flooding history of the area, which is Baltimore, Maryland. The GIS further helps in describing the precipitation patterns. This is achieved through the inverse distance weighting (IDW) approach. The cell values for the parts without the sample points are determined through the linear-weighted combination. The catastrophe method will also be applied to map the areas prone to the floods' hazards. The GIS application is to enable the effective gathering, management, and analysis of the data and critical information in storm water management programs. The selection of the GIS is based on how it replaces the manual data entry and the paperwork. Besides, GIS allows for efficient analysis and visualisation of data to better understand the areas of focus in allocating the resources to achieve the sustainability objectives and regulatory requirements. In the study to assess the socio-economic impacts of flooding in Baltimore City, Maryland, one of the objectives is to evaluate the changing precipitation patterns and the storm water flooding in the last three decades. The role of GIS in this regard is to determine the changes in land use between the years 1980 and 2010. The data is obtained from the National Oceanic and Atmospheric Administration (NOAA), a government website and portal. Other data sources include the Digital Globe, aerial photographs, and hardcopy maps. The Digital Globe provides information about the imperviousness of the soils in the target area and the distribution of the impervious surfaces. For interventions, this information is applied in various ways, including mapping the terrain elevation and identifying the areas prone to risk.

What Will Attendee Learn: Attendee(s) Will learn how arcGIS is a critical tool in identifying areas that hot spots and vulnerable to storm water effects.

Speaker Bio: I am a doctoral Student in civil engineering (environmental Option).

Stormwater, Room 217
Wednesday, August 31st, 2022, 4:00 PM
Dishon Kimani, Morgan State University
The Role of Community-Enabled Lifecycle Analysis of Storm Water Infrastructure Costs (CLASIC)

Abstract: Addressing storm water effects requires a consideration of various factors, including the infrastructure. In Baltimore, Maryland, the effects of the flooding are significant, and the mitigation measures involve various factors, including the gaps and inconsistencies in the current management practices. In assessing the socio-economic impacts of flooding in Baltimore city, Maryland, one of the objectives is to assess the socio-economic impacts of the storm water flooding on the vulnerable population. This is accompanied by the intervention strategies, and among the consideration areas is infrastructure. The importance of CLASIC tool, mainly used for screening, is to support the implementation of storm water infrastructure. The CLASIC tool uses the life cycle cost (LCC) framework to promote implementing storm water infrastructure practices, including the green and grey strategies. The CLASIC tool further integrates the Multiple-Criteria Decision Analysis (MCDA) that considers the co-importance of the green infrastructure. The tool is used by various stakeholders interested in regulating storm water, including operators and managers of storm water-related systems. These include the cities, utilities, municipalities, counties, academics, and consultants. In this project, the CLASIC tool will be interfaced with the GIS and further include the relationship with national databases to allow for uploading data. In this project, the CLASIC tool is applied to assess the benefits of storm water management practices and the infrastructure benefits. This information is used in the decision-making process about storm water management. The CLASIC tool further increases the confidence in distinguishing the costs and benefits of the storm water infrastructure alternatives. The analysis is centred on the design, costs, and performance data sets. Through the CLASIC tool, the current storm water management practices will be assessed and areas of improvement identified. The CLASIC tool is related to other approaches, including the Long-term Hydrological Impact Analysis (L-THIA) to estimate the runoff changes and assess the nonpoint source pollution. The relationship between these tools, including the GIS, enhances the decision-making process regarding storm water management and the specific areas of consideration.

What Will Attendee Learn: The attendee will learn the benefits of CLASIC as a recommendation tool in managing the effects of storm water.

Speaker Bio: I am a Doctoral Student in Civil engineering (environmental Option).

Stormwater, Room 217
Wednesday, August 31st, 2022, 4:30 PM
Vanessa Nedrick, Remington & Vernick Engineers (RVE)
Challenges and Lessons Learned in Developing a Stormwater Fee

Abstract: As Municipal Separate Storm Sewer System (MS4) Permit Regulations tighten, and states focus on non-compliance, municipalities and storm water authorities face tough financial decisions on how to fund Best Management Practices (BMPs) to meet pollutant reduction goals. Grant and loan programs are available to assist with funding, but these grant programs are very competitive and not guaranteed yet work still needs to be done to meet Pollutant Reduction Plan (PRP) and/or Total Maximum Daily Load (TMDL) goals. Developing a dedicated funding source to support rehabilitation of aging stormwater infrastructure, improve stormwater management, and to implement BMPs is one way to ensure that municipalities/authorities can afford to make capital improvements. Implementing a stormwater fee based on the impervious surface areas of parcels guarantees that all parcels pay their fair share with respect to contributing to stormwater runoff. The revenue generated goes solely to funding stormwater management projects. The myth is that a stormwater fee is a "rain tax". This is not true. A fee can only be used for what it is designated for. Tax revenue can be applied wherever a governing body sees fit to use it. A stormwater fee holds accountable large parcels like schools and churches, that are typically tax exempt and major contributors to stormwater runoff, to pay their fair share. Tax exempt entities are not exempt from paying a stormwater fee. Developing a stormwater fee must be a well thought out and logical process. It must be defendable if challenged. It requires buy-in from the community and governing body or bodies, identification of stormwater capital improvement projects, operation and staffing needs, a GIS system, an ordinance/rules and regulations, and a process or policy to issue credits or reduce fees. This paper/presentation will discuss the challenges and lessons learned in assisting a municipal authority with developing its stormwater fee.

What Will Attendee Learn: The attendee will learn the process of developing a stormwater fee and how to mitigate challenges from the public.

Speaker Bio: Vanessa Nedrick, P.E., MSEM, is a Principal and Regional Manager with RVE. She manages the firm's water and wastewater projects in PA and oversees all aspects of the Bucks County office. Ms. Nedrick has 26 years of engineering experience including expertise in water and sanitary sewer design as well as inflow and infiltration studies, removal and reduction. She has an MS in Engineering Management and a BS in Civil Engineering from Drexel University and is a licensed PE.

Sustainability/Resiliency, Room 205/206
Thursday, September 1st, 2022, 11:00 AM
Velmurugan Subramanian, Atkins
Preparing the Wastewater Treatment Facilities Operations for Extreme Weather Events

Abstract: Wastewater infrastructure plays a critical role in urban communities, providing for the safe and efficient conveyance and treatment of sewage to protect human health and the environment. Majority of the wastewater treatment plants are generally located in low elevations to facilitate the conveyance of wastewater flows to the plant by gravity to minimize the number of pumping stations and the cost of wastewater treatment. Due to its location, wastewater treatment plants are more vulnerable to the extreme weather events such as floods, sea level rise and hurricanes. These extreme weather events could increase or decrease the wastewater flows to the plant, increase or decrease the pollutant concentration and increase or decrease the wastewater temperature depending on the type and severity of the events whether it is high precipitation and flooding or drought conditions or snow melt. During these events, the performance of the wastewater treatment plants can deteriorate or fail completely when it is stressed beyond the design or operation conditions, consequently impacting the human health and environment. The objective of this paper is to focus on the operational strategies that could be implemented at the wastewater treatment plants to face the challenges of extreme weather events to be more reliable and resilient wastewater treatment system. During the extreme weather events, the operational failure and deterioration of effluent quality can occur due to high influent flows or pollutant concentrations. Some typical reasons for plant performance degradations are (NYCDEC 2000): loss of biomass from the aeration tanks and secondary clarifiers, overloading of the aeration system from high biochemical oxygen demand (BOD) loadings caused by solids washout, electrical overload of mechanical surface aerators, and decreased BOD removal efficiency due to shortened hydraulic retention time in the aeration tanks. The objective of this presentation is to illustrate how the operational strategies such as blending of the partially treated effluent with biologically treated effluent, increased aeration, increased chemical use, increased return sludge recirculation, controlling sludge retention time (SRT), use of unused or redundant tanks for aeration can be utilized to handle the increased influents flows and pollutant loads during the high precipitation (rainfall) associated with the extreme weather events.

What Will Attendee Learn: The purpose of this presentation is to provide the operational strategies to handle the increased influents flows and pollutant loads during the high precipitation (rainfall) associated with the extreme weather events.

Speaker Bio: Vel Subramanian is a project director for Atkins for its Water and Wastewater Infrastructure Division at Alexandria office, VA. He holds a MS degree in Environmental Engineering from the University of Oklahoma at Norman and a PhD degree in Environmental Engineering from Oklahoma State University at Stillwater. Dr. Subramanian has over 30 years of experience in water and wastewater engineering.

Sustainability/Resiliency, Room 205/206
Thursday, September 1st, 2022, 11:30 AM
Tanja Rauch-Williams, Carollo Engineers
Machine-Learning Aeration Control for Energy Efficient Secondary Treatment

Abstract: Suboxic nitrogen removal (SNR) refers to the operation of activated sludge processes at redox conditions at or below consistent dissolved oxygen (DO) concentrations of less than 0.7 mg O2/L. SNR has successfully been in operation in oxidation ditches and in warm climates such as Florida. SNR operation in plug flow BNR facilities, particularly in colder climates, has been more challenging as it requires maintaining steady DO concentrations throughout the length of the aeration basins for operators to successfully acclimate the activated sludge biology (i.e., nitrifiers) to low DO concentrations over time. This is difficult given the diurnal dynamics of influent flows and loads. This paper will present findings and results of a DOE-funded project (FOA 2336-1581), which aims to 1) assess enhanced process control of aeration, real-time solids residence time (SRT) control, and other operational parameters as tools to maintain reliable nitrification under suboxic full-scale operation and 2) bring SNR technology to broad commercialization and application at US BNR facilities, in order to reduce electrical demands. Pilot- and full-scale demonstration testing is being conducted at Hampton Roads Sanitation District (HRSD) and Los Angeles County Sanitation District (LACSD). Suboxic process operation for ammonia, nitrogen, and phosphorus removal combined with accurate, reliable Model Predictive Aeration Control (MPAC), machine learning, and high-efficiency blower technology has the potential to decrease energy use for current secondary treatment by more than 50% and increase energy recovery by diverting additional organic carbon from secondary treatment to anaerobic digestion.

What Will Attendee Learn: The attendees will learn how the suboxic process operation for ammonia, nitrogen, and phosphorus removal combined with accurate, reliable Model Predictive Aeration Control (MPAC), machine learning, and high-efficiency blower technology has the potential to decrease energy use for current secondary treatment by more than 50% and how it can increase energy recovery by diverting additional organic carbon from secondary treatment to anaerobic digestion.

Speaker Bio: Dr. Tanja Rauch-Williams serves as Carollo's Wastewater National Wastewater Process and Innovation Lead and is an associate vice president. She has over 20 years of experience in the water and wastewater engineering fields specializing in wastewater process performance optimization and process modeling, water reuse, nutrient removal, resource recovery, and soil-aquifer treatment.

Sustainability/Resiliency, Room 205/206
Thursday, September 1st, 2022, 12:00 PM
Stephen Bourne, Atkins
Resilience through simulation: using digital twins to prepare for climate change

Abstract: The nation's water infrastructure is facing intensifying storms, increasing temperatures, and rising sea levels. Becoming resilient to these climate stressors requires clear and quantified estimates of how vulnerable infrastructure assets are and how proposed actions will increase resilience to future shocks. This presentation will focus on recent infrastructure resilience studies conducted with Atkins' City Simulator to answer these questions. City Simulator is a GIS-based tool that creates a digital twin of a city, county, state, or region and evolves it over the next 30 to 40 years to quantify future climate change impacts and find ways to mitigate and adapt. The first case study focuses on how extreme rainfall will change moving from present day to mid-century in Fairfax, VA. The impetus for the study was the Noman Cole Wastewater Treatment Plant in southern Fairfax and concerns that it may flood if future floods in the nearby Pohick Creek increase. As a FEMA-classified critical facility, the plant is required to avoid the 0.2% (500-year) floodplains. Atkins used the rainfall forecasting algorithms within City Simulator to blend projections of rain from global climate models and local historical rainfall into an ensemble forecast of daily rainfall at the plant. Design storm levels were then estimated from the forecast for the 500-year 24-hour and 100-year 24-hour storm each decade from present day to 2100. The analysis showed a projected increase in median storms levels of approximately 22%. The second case study focuses on the 190-mile stretch of US74 from Wilmington to Charlotte NC. Given its role as an important conveyance of people and goods connecting I-95 and major urban centers, the NC Department of Transportation (NCDOT) recently teamed with Atkins to assess future vulnerabilities and explore adaptation and mitigation options. A full digital twin of the 3,800 sq mi. corridor was developed that included over 7,000 bridges, culverts, and pipes, and the full road network. A rainfall projection similar to the one developed for Fairfax was developed as well as projections of temperature and sea level. The tool leveraged results from over 400 existing riverine, pluvial, and coastal flood models to quickly estimate flood levels at each of these assets during simulation. Agent-based, the digital twin included avatars for the 1.1M buffer residents, plus agents moving into and out of the area along other highways. The population was simulated using the infrastructure and being disrupted when the infrastructure was damaged and disabled due to future flood, heat waves, storm surge, and coastal flooding from sea level rise. The primary study questions being analyzed are the locations and severity of flooding in the transportation system into the future, the cost of maintaining the system under future conditions, the impact to corridor residents, the impact to freight being moved through the corridor, and the impacts to disadvantaged communities (minorities and poverty-stricken census block groups) vs other population in the corridor. Results to-date will be presented.

What Will Attendee Learn: 1. Learn how future rainfall projections can be developed. 2. Learn how integrated agent-based simulation of a major transportation corridor from 2020-2060 can be used to measure corridor resilience. 3. Learn how economically disadvantaged population communities may be impacted by future conditions in the corridor.

Speaker Bio: Stephen Bourne is an engineer, climate scientist, project director and Fellow at Atkins. Mr. Bourne has twenty years experience in developing decision support systems to help with shared-vision

planning. Mr. Bourne's latest work is the Atkins Simulator Suite, which includes City Simulator and SeaPort Simulator, two tools that use simulation to better understand climate change impacts and how to get the best return on investment with mitigation and adaptation approaches.

Sustainability/Resiliency, Room 205/206
Thursday, September 1st, 2022, 2:00 PM
Alison Barton, EA Engineering, Science, and Technology, Inc., PBC.
Offsetting the Grid and Providing Backup Power to Maintain Critical Operations for the Frederick County WWTP

Abstract: The 15MGD Ballenger-Mckinney Wastewater Treatment Plant (WWTP) in Frederick County (the County) serves more than 25,000 residences and businesses county-wide. In 2021, a 1.3 megawatt photovoltaic solar array system with eight 130 kW lithium ion batteries was brought online to offset electrical utility usage at the WWTP and provide backup power. The solar installation took advantage of five acres of unused land adjacent to the WWTP, offsetting 17% of the plant's power requirements. The battery storage provides emergency power in the event of a complete power outage, using eight Tesla PowerPack batteries and PLC programming for optimized load shedding to ensure up to 4 hours of critical equipment operations to prevent sewer overflows. The WWTP has historically experienced unplanned outages, which requires raw influent to either be rerouted to storage, if available, or in a worst-case scenario, discharged directly into the Monocacy River to prevent sewage backups at the plant headworks. To date, less than a year from commissioning, the battery energy storage system has already successfully come online during an unplanned outage from the power utility, allowing critical equipment to continue operating during the outage. Planning, design, and construction of this project was executed in partnership between the County and the Northeast Maryland Waste Disposal Authority (the Authority), supported by EA Engineering, Science and Technology, Inc., PBC funded primarily by Maryland Department of the Environment's Energy-Water Infrastructure grant. This presentation will highlight pertinent details and lessons learned start to finish of grant application, RFP preparation, bidder selection, construction, start-up, and operational considerations.

What Will Attendee Learn: Attendees will learn about Frederick County's process for commissioning a solar and battery energy storage system at their wastewater treatment plant including funding, challenges, design constraints, and project successes.

Speaker Bio: Ms. Alison Barton is a civil engineer with 7 years of experience in environmental engineering. Ms. Barton received her Undergraduate degree in Civil Engineering from The University of Texas at Austin, and her Master's degree in Environmental Engineering from Johns Hopkins University. She has spent the majority of her career addressing Maryland local government needs across a wide array of subjects including water and wastewater utilities, asset management, and shoreline restoration.

Sustainability/Resiliency, Room 205/206
Thursday, September 1st, 2022, 2:30 PM
Paula Sanjines, Jacobs

Mapping Thermal Energy Exchange Potential from Urban Colorado and Suburban Maryland Collection Systems

Abstract: As corporations, municipalities, and governments look to reduce their carbon footprint in response to low-carbon targets, high energy costs, and fossil fuel taxes, renewable energy sources become more attractive. Wastewater is a reliable source of low carbon, renewable thermal energy that can be used to heat and cool buildings. Like geothermal, sewer thermal leverages a consistent temperature for thermal exchange using a heat exchanger and heat pump. Residential and commercial building heating and cooling loads are a significant portion of total building energy usage. According to the U.S. Energy Information Administration (EIA) residential and commercial building survey data, approximately 51 percent of residential energy use is for heating and cooling. While consumption of energy in the commercial sector differs by use, heating alone typically accounts for 25 percent of total energy use. Wastewater thermal exchange technology offers a way for building owners to leverage potential energy within local systems to provide low-carbon heating, cooling, and hot water. Additionally, utility managers can benefit during cooler months by shedding excess heat from treated effluent. While European and Canadian markets have been utilizing sewer heat exchange technology at building and district scales for decades, changes in environmental and carbon policy are making this technology more attractive to the U.S. market. Recent legislation passed in Maryland expands the definition of renewable energy sources to include thermal energy extracted from wastewater. Decarbonization targets in several localities, including the state of Colorado, incentivize investment in available low-carbon technologies for reducing building energy consumption. Furthermore, more stringent effluent temperature discharge criteria in states such as Colorado provide an additional motivation for removing excess heat from the sewage stream. Utility managers who understand the thermal energy potential within their collection and treatment systems are well-positioned to support this trend and leverage environmental benefits. The quantification of thermal capacity within a utility's collection and treatment system provides a starting point for more detailed investigations and implementation. A sewer thermal master plan includes quantifying and mapping available thermal energy to provide utility managers with a clear understanding of where resources lie within their systems. A brief technology overview of sewer thermal systems will be provided along with discussion of two case studies for sewer thermal resources planning. The City and County of Denver (CCD) collects and treats about 130 million gallons of wastewater per day. Compelled by local GHG reduction targets and effluent temperatures limitations, CCD initiated a study to quantify and map potential thermal energy within their collection system. Several potential implementation sites will also be discussed. WSSC Water (WSSC) provides water and wastewater services to nearly 500,000 customers in Prince George's and Montgomery Counties of Maryland. WSSC has greenhouse gas (GHG) reduction targets and identified sewer thermal exchange as a GHG reduction strategy. As part of WSSC's Climate Change Vulnerability Assessment, Adaptation, and Mitigation Planning (CCVAAMP) project, the sewer thermal assessment included quantifying and mapping available sewer thermal resources, demands, and identifying potential piloting locations.

What Will Attendee Learn: Attendees will better understand various available sewer thermal exchange technologies and applicability at various scales within a municipal sewer collection and treatment system as well as the role of master planning in preparing utility managers for sewer thermal resource management.

Speaker Bio: Paula Sanjines is a senior technologist for Jacobs Engineering at their Silver Spring, MD office. Ms. Sanjines has over 24 years of experience in the planning, design, construction and operation of wastewater treatment systems. She has a BS in Chemical Engineering and an MS in Environmental Engineering from Stanford University and is a registered professional engineer in MD, VA, NY and DC.

Sustainability/Resiliency, Room 205/206
Thursday, September 1st, 2022, 3:00 PM
Robert Wierzbicki, PC Construction
Award winning efficiency - CHP for the Piscataway Bioenergy Project

Abstract: WSSC's Piscataway BioEnergy project will eliminate the use of lime, significantly reduce the amount of biosolids requiring disposal and achieve a Class A biosolid which is viewed as safer by the general public leading to greater acceptance of beneficial use of biosolids such as fertilizer, soil amendment, or soil conditioner. The project will also produce renewable natural gas (RNG) as a pipeline-quality fuel that is fully interchangeable with natural gas. The infrastructure to convert biogas to RNG and deliver it to the end user allows WSSC to be recognized as a RIN producer as part of EPA's Renewable Fuel Standard Program that will produce revenue (RIN Credits) estimated at nearly $5M per year. Another aspect of the project is the installation of a Combined Heat and Power system consisting of three 1.5MW engines which will provide backup power to the facility as well as lowering the sites typical power demand. The design of the system integrates the reciprocating engines with other aspects of the facility such as raising steam required for the Thermal Hydrolysis Process from recovered exhaust gas in composite boilers, provision of medium temperature hot water for use at the facility and for preheating of one of the biological treatment processes which greatly benefits from warmer conditions. This integration was done in such a way that the overall energy efficiency of the combined heat and power plant will achieve 65% efficiency and as such was able to win the award of not one but two grants valued at over $2.5M from the State of Maryland's Energy Administration and from the local electric utility, SMECO. This paper will describe the approach to energy efficiency in the CHP system, the grants and awards that were applied for and the modifications and improvements to the design which were undertaken to allow the facility to win these prestigious awards for extremely high energy efficiency.

What Will Attendee Learn: Describes the energy efficiency measures associated with the Piscataway BioEnergy project combined heat and power which were able to win not one but two energy efficiency grants.

Speaker Bio: Robert has spent his career focused on the water industry. During this 40-year period he has served in numerous roles from Design Engineer to President of his own construction company. Robert is currently assigned to the $271M WSSC Piscataway Bio-Energy Project as Project Director for PC Construction. Robert leads the Progressive Design-Builder team working with the Owner, their Program Manager and design engineers to deliver the project successfully utilizing a full collaborative approach.

Sustainability/Resiliency, Room 205/206
Thursday, September 1st, 2022, 4:00 PM
Tamara Battle, Morgan State University

From Floyd to Florence: Impacts of Extreme Hurricane Events on the Tar-Pamlico River Basin, North Carolina

Abstract: Extreme water-related weather events, such as hurricanes, droughts, and excessive rainfall, affect all areas of the economy and environment. During such events, emergency managers, water resource managers, and public administrators are responsible for effective decision making to minimize the loss of life and property. As climate change potentially increases the frequency, duration, and intensity of precipitation and drought events, the need for improved water and watershed management strategies is escalated. An assessment of two landfalling hurricanes over North Carolina (NC) provides examples of risks introduced by inadequate watershed and stormwater management practices. Both events produced record amounts of rainfall over areas where watershed capacities and drainage systems were not prepared to manage the stress of excess water, and government officials and emergency managers lacked experience needed to cope with the magnitude of rainwater. The research assesses impacts of land use/land cover on inland flooding during extreme precipitation events and analysis of socio-economic impacts resulting from watershed management strategies. The study area centers on the Tar-Pamlico River Basin, with an emphasis on the flooding effects of Hurricanes Floyd (1999) and Florence (2018) in the city of Rocky Mount, NC. The study explores the urban hydrologic cycle, and changes in land use and inland flooding. Gridded multi-sensor precipitation estimates (MPE) from the National Weather Service (NWS), NASA's Global Precipitation Measurement Satellite data, NWS National River Forecast Center data, U.S. Geological Survey rain gauge and streamflow networks, and data from NWS Weather Forecast Offices are used to identify the spatial extent and duration of hurricane-induced flooding. Using ArcGIS, this information is combined with data from the U.S. Census Bureau and the Federal Emergency Management Agency (FEMA) to estimate the impacts on communities within the study area. The results from this study will analyze watershed measures in relation to decision support and emergency response, to determine improvements that can lead to better water management strategies.

What Will Attendee Learn: Land-use and socio-economic impacts of Hurricanes Floyd and Florence on the city of Rocky Mount, NC. This will include lessons learned to prepare for similar extreme precipitation events in the future, for other areas within the U.S.

Speaker Bio: Tamara Battle is an atmospheric and environmental scientist, and a doctoral candidate in the Environmental Engineering program at Morgan State University. Her education includes a B.S. in Environmental Science, Medgar Evers College, CUNY (Brooklyn, NY); M.A. in Geology, The City College of New York, CUNY (New York, NY); and M.S. in Atmospheric Sciences, Howard University (Washington, DC). In her spare time, Tamara enjoys tutoring K-12 students in physics, chemistry, math and astronomy.

Sustainability/Resiliency, Room 205/206
Thursday, September 1st, 2022, 4:30 PM
Sara Greenberg, GHD
Adapting Collection System Infrastructure to Changing Flood Vulnerabilities - Eastern Seaboard Case Studies

Abstract: Wastewater infrastructure serves as a vital environmental line of defense against wastewater contamination of groundwater and coastal embayments. With more intense and frequent storm events compounded by rising sea levels, many communities are facing an increased flood risk to critical wastewater infrastructure. This presentation will discuss multiple flood resilience strategies for collection system infrastructure along complex coastal estuarine shorelines, open ocean, tidally influenced coastal pond and inland river flood plains. The presentation will also focus on how these communities are incorporating accommodations for projected changes in storm intensity and frequency into flood resilience evaluation, design and construction. A brief description of case studies is summarized below. Town of Wareham (complex coastal estuarine shorelines) - The Town of Wareham is a coastal community with over 54 miles of coastline. Hydraulic constrictions caused by the complex coastal estuarine system results in high anticipated flood levels, up to 21 feet above mean sea level. The Town recently completed a 'Risk and Vulnerability Assessment', which provided them with a valuable tool to quantify the anticipated costs borne to the Town and its citizens if any vulnerable pump station failed during a 100-year storm event. The assessment allowed the Town to prioritize its many competing coastal resilience wastewater infrastructure needs. Building on these findings, the Town is proceeding with the design of coastal resilience mitigation measures for the three highest priority pump stations which all serve critical infrastructure (a hospital, fire department and police department). Coastal resilience measures incorporated into the design include the use of flood planks, structural reinforcement of existing structures, sealing potential water entry points and installation of emergency bypass connections. Town of Oak Bluffs (infrastructure exposed to the open ocean) -The Town of Oak Bluffs is a coastal community on the island of Martha's Vineyard. Its three vulnerable stations serve over 90% of the Town's sewered population, including many residences and the Town's commercial district. The Town recently implemented flood resiliency measures through the installation of a new emergency generator on a raised platform and relocation of critical pump station equipment outside of the flood zone. Town of Chatham (tidally influenced coastal pond) - The Town of Chatham is a coastal community on Cape Cod. One of the Town's wet pit/dry pit pumping stations (Mill Pond) is located at the base of a tidally influenced coastal pond. During the Mill Pond Pumping Station Upgrade design, multiple flood protection measures were incorporated including the establishment of a design flood elevation for the project which incorporates anticipated effects of sea level rise, installation of hydrophilic water stops and a flood proof entry door with stop blocks to provide flood mitigation measures. Town of Uxbridge (inland river flood plain) – The Town of Uxbridge is an inland community in Central Massachusetts. Recent changes in the Blackstone River floodplain maps and recent storm events have indicated that the Town's largest pump station is now vulnerable to the 100 year flood storm. During a recent construction project the Town incorporated multiple flood resiliency retrofits.

What Will Attendee Learn: Multiple strategies to increase the flood resilience of vulnerable wastewater infrastructure.

Speaker Bio: For over six years, Sara Greenberg has been an engineer for GHD focusing primarily on designing, managing, and overseeing a variety of wastewater treatment system projects including: treatment facility design; pumping station and collection system condition assessment; and infrastructure management. Sara Greenberg has a M.Eng from the Massachusetts Institute of Technology and enjoys exploring coastal Massachusetts with her German Shepherd pup in her free time!

Sustainability/Resiliency, Room 205/206
Thursday, September 1st, 2022, 5:00 PM
Glenn Bottomley, WSP, USA Inc.
Resilient Stormwater Pump Station Systems in Virginia Beach

Abstract: The frequency and severity of storms in the Virginia Beach area has increased significantly. Of the 18 coastal storms of record in Virginia Beach, 12 have occurred in the last 25 years. During one 6-week period in 2016, Virginia Beach experienced 35-inches of rainfall from three storms, or more than two-thirds of the average annual rainfall. Extreme weather, increased precipitation, sea level rise, land subsidence, and land development have greatly increased flooding impacts. Flooding conditions are often more damaging to older developments that are designed to lesser rainfall and tailwater criteria and often have constrained outfalls. The resultant recurrent flooding is a significant safety and quality of life concern. Due to low-lying coastal terrain, a "berm, pond and pump" solution is often required. The City has envisioned needing more pump stations in the future to protect its residents and has been establishing consistent requirements for pump station facilities. The requirements promote uniform pump station facilities which are a complex and significant infrastructure investment and promote uniform routine maintenance activities, storm preparedness and response activities during challenging storm events. The planning and design of a resilient stormwater pump station system project with an automated tide gate, backflow prevention and interconnected pump stations will be presented. The project is in the eastern Shore Drive area and is in close proximity to the Chesapeake Bay which is a volatile and dynamic coastal environment subject to tropical storms, Nor'easters, and heavy summer thunderstorms. The proposed system allows for the normal ebb and flood of tidal flow throughout the watershed and provides bypass pumping for 100% of the rainfall runoff around the tide gate when closed. Additionally, pre-storm canal drawdown by the pumps will provide storage volume for peak attenuation to provide an adequate level of service for the watershed and the principal urban arterial roadway. Tide gate closures will be automatically actuated by water level sensors but can be controlled remotely. Gate closure logic can employ predictive forecasting to prevent unnecessary pumping or to activate pre-storm drawdown based on anticipated climatic conditions. The resilient stormwater pump station system will protect the community against natural disasters and enhance the ability to recover from disasters.

What Will Attendee Learn: The attendee will learn about the planning and design of a flood protection project utiling automated tide gates, pump station bypass and pre-storm volume drawdown in a tidal environment The pre-storm volme drawdown provides storage that attenuates peak discharges to meet the required level of service.

Speaker Bio: Glenn Bottomley is a Professional Engineer with WSP in Virginia Beach and the Virginia Water Business Lead and the National Flood Protection Lead for WSP's Resiliency Practice. He has a diverse background in planning and construction for flood protection projects. He obtained his BS from Old Dominion University. Project accomplishments include the North Beach Stormwater Pump Station and Ocean Outfall, Virginia Beach Stormwater Pump Station Design Guidelines and 2001 VDOT Drainage Manual.

Sustainability/Resiliency, Room 205/206
Friday, September 2nd, 2022, 9:00 AM
Kelsey Kenel, HDR
The Journey to Silver: Envision Sustainability Award at the Little Patuxent Water Reclamation Plant

Abstract: The purpose of this abstract is to share how Envision principles can increase project sustainability and how they were used for Howard County's Biosolids Improvements Project to achieve Envision Silver. The Envision rating system is used for projects that aim to achieve a higher level of sustainability while addressing a full range of environmental, social, and economic impacts during design, construction, and operation. The rating system, which utilizes Quality of Life, Leadership, Resource Allocation, Natural World, and Climate and Risk categories, can help assess and increase sustainability throughout a project. The Biosolids Improvements Project was Maryland's first Envision award and included upgrading the existing biosolids lime stabilization process with anaerobic digestion and direct heat drying to achieve very high standards and allow for a more versatile product suitable for a variety of beneficial uses. The project also added other advanced systems to improve the plant's nutrient removal. During project planning, the County expressed interest in project sustainability. Envision was employed to benefit the community, demonstrate project accountability, and achieve key sustainability goals. When the Envision process began, the project was predicted to achieve Envision Bronze. The project team was able to increase the level of sustainability at various project phases to ultimately achieve Envision Silver. Pursuing Envision impacted the project construction process and influenced the project to be more sustainable. This presentation will provide insight into the long-term Envision process and lessons learned that can help other utilities increase sustainability through Envision values at each step of a project.

What Will Attendee Learn: Attendees will learn about the Envision process and the team's lessons learned that can help other utilities looking to pursue Envision. The presentation will also provide insight into how utilities can increase sustainability through Envision values at each step of a project

Speaker Bio: Kelsey is a water/wastewater engineer at HDR in their Northern Virginia office. She has been at HDR since 2016 and works on a variety of water/wastewater projects. One of Kelsey's first projects at HDR was working on Envision for the Howard County Biosolids Improvements Project, which she is very excited to discuss today.

Sustainability/Resiliency, Room 205/206
Friday, September 2nd, 2022, 9:30 AM
Timothy King, CDM Smith
WSSC Water Consolidated Laboratory – "How to Deliver a Sustainable Water Quality Lab"

Abstract: WSSC Water's Consolidated Laboratory is an MDE-certified laboratory constructed in 2000 to meet the demand of that time. Over the past 20 years, the Laboratory has experienced an increase in analytical workload, number of employees, number of instruments, and additional functions. More than 500,000 water quality tests are performed annually and expected to increase by more than a third over the next 20 years. WSSC Water wants to keep all current and future testing in-house. To meet the expected demands and increase operational efficiency, WSSC Water is upgrading the existing Consolidated Laboratory facility into a sustainable, world-class facility. Approaching two decades of service, the laboratory needs internal renovations and a physical expansion to adequately respond to current and future operational and regulatory demands. Through a highly collaborative design process, the design team was able to develop a program of space needs and functional requirements to achieve project goals and ensure safe testing practices. The program requirements include: LEED Silver Certification Electric vehicle charging stations High-efficiency HVAC and lighting systems HVAC and building wellness considerations in response to COVID-19 Environmentally responsive materials and finishes Operational improvements (lean lab study) to the existing laboratory New 6,000 square foot laboratory expansion New 13,000 square foot office and laboratory support expansion

What Will Attendee Learn: The learning objectives for this presentation include: Describe the process of planning a sustainable laboratory Introduce the operations improvements study (lean lab) that formed the basis for existing laboratory modifications and expansion Describe the existing laboratory support system challenges around acid neutralization, RO/DI water, laboratory gases, exhaust air, compressed air and vacuum Describe the new expansion and sustainability features

Speaker Bio: Jegnaw G Essatu, WSSC Water, Section Manager for Laboratory Division He has a BS in Chemistry/Mathematics from WVU, an MS in Environmental Engineering and Science from Johns Hopkins, and a graduate level certificate in Water Engineering and Management from the University of Colorado. He is working on his PhD at Capital University, completing research focused on the detection of contaminants in drinking water and source water using enhanced methodology during a hazardous spill.

Sustainability/Resiliency, Room 205/206
Friday, September 2nd, 2022, 10:15 AM
Alan Parent, PC Construction
CMAR and early contractor involvement puts critical infrastructure project on path to success

Abstract: In 2007 the City of Atlanta was in critical need of emergency water storage and their existing supply was in jeopardy of failure due to aging infrastructure. Their concept – to mine a five-mile tunnel under the City from an abandoned rock quarry to the Chattahoochee River – would supply a new 2.4-billion-gallon reservoir. Successful completion would provide 30 days of emergency water storage and ensure access to clean, safe drinking water for the next 100 years. Construction manager at-risk (CMAR) was chosen as the delivery method due to the immense complexity of the project, budget concerns and the desire to collaborate early with a construction partner. The City's Department of Watershed Management had never delivered a project using the CMAR process but knew that proactive collaboration would be key to ensuring a successful outcome. What followed brought together a truly collaborative team of engineers, owners, contractors, suppliers, and trade contractors to produce 12 guaranteed maximum price proposals, five years of complex construction at multiple sites, zero recordable injuries and a new water supply program that was delivered on time and below budget. Learn how CMAR played a key role in that success.

What Will Attendee Learn: This abstract reviews how the construction management at-risk (CMAR) delivery method was used successfully to implement an extremely complex project with success. Learn how the Atlanta Water Supply Program project embraced the CMAR process and the key strategies that resulted in positive outcomes.

Speaker Bio: Alan Parent has spent his 25 year construction career in the water sector working for PC Construction. In that time he lead the firms Estimating and Business Development services on projects throughout the eastern United States specializing in mid to large scale water infrastructure. In his current role as Director of Business Development he works with municipalities, engineers and trade partners to engage in meaningful relationships that bring value to future water and wastewater projects.

Sustainability/Resiliency, Room 205/206
Friday, September 2nd, 2022, 10:45 AM
Jeff Pelletier, Atkins

Building Back a Resilient and Sustainable Wastewater System Using Emergency Management Funding to Maximize the Benefit-Cost Ratio

Abstract: In August 2017, Hurricane Harvey made landfall and stalled over southeastern Texas for one week, dropping more than 60 inches of rainfall in some areas. This resulted in catastrophic flooding throughout the City of Houston, including several of the City's thirty-nine (39) wastewater treatment plants, resulting in hundreds of millions of dollars in damages, as well as environmental and public health impacts for weeks after the hurricane. To mitigate the damages to wastewater facilities induced by Hurricane Harvey and increase the resilience of the wastewater system against future flood events, the City of Houston, Houston Public Works (HPW) sought financial assistance offered through the Federal Emergency Management Agency's (FEMA) Public Assistance funding program. To secure this funding, HPW procured four consultant teams to provide planning, preliminary engineering and FEMA funding application assistance. The general concept to provide greater future resilience was to eliminate the flood prone WWTPs and convey the consolidated flows to a more resilient WWTP in the area, which would be expanded to accommodate the additional flows. Additionally, flooded lift stations were also consolidated, where possible, making the system not only more resilient against flooding, but also reducing O&M costs and greenhouse gas emissions. To develop a consistent approach in developing the preliminary engineering reports (PERs) and FEMA funding applications, expert focus groups, referred to as Tiger teams were formed. The Tiger teams were led by industry experts in the areas of hydraulic modeling, tunneling, wastewater treatment and FEMA funding. These Tiger teams worked with the four consultant teams to develop defensible methodologies to be used for this project. A methodology was developed to project future wastewater flows 50 years into the future to meet Texas Commission on Environmental Quality (TCEQ) requirements. In addition, since the flow consolidation and conveyance alternatives included tunnels, a methodology was developed to project the 100-year future flows to ensure the tunnels have sufficient capacity throughout anticipated service life. The future flow projections also allow the City to plan for future treatment plant capacity expansions. Additionally, a methodology was developed to optimize alternatives to consolidate flows from the flooded WWTPs and convey those flows to the expanded WWTP. This methodology optimizes the management of peak wet weather flows into the expanded WWTPs. Peak flow management strategies (i.e., storage) could be applied upstream at the flooded WWTP, or downstream, just prior to entering the expanded WWTP. The optimization identified the least-cost combination of peak flow treatment capacity and storage facilities in each of the project areas. The cost effectiveness of the proposed solutions had to meet the criteria of FEMA's benefit-cost analysis (BCA) methodology. To meet the BCA criteria, WWTP consolidation and expansion alternatives were developed and the costs estimated. The FEMA team quantified the benefits for each alternative. This was an iterative process until an acceptable benefit-cost ratio was obtained. The PERs and FEMA funding applications were submitted to FEMA in February 2021.

What Will Attendee Learn: The attendee will learn the approach used by a water utility to make a defensible case to secure federal funding needed to build back a wastewater system damaged during Hurricane Harvey, increasing future sustainability and resilience of the system to flood events.

Speaker Bio: Jeff Pelletier has 32 years of water resources planning experience and is a licensed professional engineer in several states. He has been the planning manager on regulatory-driven projects and programs, where he has provided technical oversight and project/program management. He served as the Atkins' hydraulic modeling Tiger team lead during the Disaster Mitigation for Wastewater Facilities Induced by Hurricane Harvey project.

Sustainability/Resiliency, Room 205/206
Friday, September 2nd, 2022, 11:15 AM
Ashton Rogers, GHD
Why the KISS Principle is the Right Solution for Flood Protection at Leonardtown WWTP

Abstract: With the continued effectives of climate change associated to shifts in temperatures and weather patterns, weather related disasters are ever more frequent. In particular, flooding has become more frequent, flash floods related to high intensity storms and the associated damage are now familiar occurrences. Unfortunately, gravity fed facilities such as wastewater treatment plants (WWTP) and sanitary sewer pump stations are located at the "bottom of the hill" often within flood zones. This presentation will go over the initial approaches taken by the Town on Leonardtown, MD to protect the critical infrastructure within their WWTP to prevent or reduce the risk of complete loss of the asset during a flood event. The motivation behind the project came after a storm event, equivalent to less than the 100-yr storm resulted in flood levels that exceed the 100-yr storm flood limits. During this storm, the flood levels came to within inches of completely inundating the WWTP. For a relatively small municipality like Town of Leonardtown, loss of a WWTP could be catastrophic to its community and cripple its plans for capital improvement and future growth. The project design approach was to develop a "Flood Impact Study" on the WWTP which would update the current FEMA flood models with up-to-date topography and existing conditions to confirm and/or revise the current FEMA 100-yr base flood elevation (BFE). The revised HEC-RAS model results indicated that across the modeled cross sections the 100-yr BFE was on average 1.91 feet higher than the recognized FEMA flood elevations as presented in the current FEMA Flood Insurance Rate Maps (FIRM). Using the updated BFE, the objective was to identify critical infrastructure that was at risk of flooding and needed additional flood protection. The study presented four alternatives for flood risk mitigation which included Alternative 1; dredging of a sandbar at the confluence of Town Run (a stream adjacent to the WWTP) and Breton Bay, Alternative 2; build a floodwall around the WWTP and a dewatering pump station, Alternative 3; floodproofing of critical infrastructure and Alternative 4; a stream restoration of Town Run. Considering cost, level of protection, and schedule a recommendation to proceed with alternative 3 was presented to the Town Counsel. The purpose of this presentation is to bring awareness to flood risk and how the risk can be mitigated here and now. Depending on the site, Flood mitigation may not be as expensive as one might expect. If the owner is able to project critical infrastructure the WWTP could be protected from complete failure and loss of the treatment processes. The loss of a WWTP could result in devastating impacts to environment and communities, they should be protected!

What Will Attendee Learn: The presentation will show attendees that the current 100-yr flood elevations do not necessarily reflect an acceptable level of flood protection. With a few relatively expensive measures we and effectively provided additional flood protection to your WWTP that could save plant from complete loss.

Speaker Bio: Ashton has over 15 years' experience in site design, land development, water resources, stormwater management, environmental site design, erosion and sediment control design and project permitting procedures. He has been successful in the management, development and engineering of site development plans from conception through plan approval and construction. He's experienced in a

wide range of site civil design with an emphasis in site layout, utility supply, and stormwater management.

System Operations/Maintenance, Room 201-202
Thursday, September 1st, 2022, 11:00 AM
Andrew Fuller, Black & Veatch
Corrosion Test Stations: Repair and Usage

Abstract: As water and wastewater utilities face the dual challenges of aging infrastructure and shrinking budgets, cost-effective corrosion solutions are increasingly important. Buried assets make up a large portion of a utilities' critical assets but cannot be easily inspected to assess their condition and future reliability. Test stations are points that allow these buried assets to be inspected, electrically. Test stations are commonly used to inspect buried or submerged assets, especially with cathodic protection. With as little as a voltmeter a technician can collect important condition data at a test station. Depending on the setup of the test station, readings can provide information on whether an asset is: corroding, protected, or passivated. When test stations are associated with a cathodic protection system can assess whether it is functioning properly and its remaining life. All these results, and even complex scenarios like stray current or AC interference, can be determined using tests requiring only a voltmeter. Since these tests are often recommended to be performed on a regular basis and one utility can have hundreds of test points consistent testing is important. This presentation will cover all the components of a test station: the terminal board, wires, associated equipment, and the container. It will also bring an example to demonstrate the different components and tests that can be performed. An example form for recording test station inspection in a water utility will be presented and used to guide the demonstration.

What Will Attendee Learn: Why do water utilities have corrosion test stations. How can they be identified, repaired, and tested. Live demo with a sample using an example collection form.

Speaker Bio: Andrew is a registered PE and Cathodic Protection Specialist with Black & Veatch. As the corrosion practice lead he focuses on how asset deterioration can inform investment decisions.

System Operations/Maintenance, Room 201-202
Thursday, September 1st, 2022, 11:30 AM
Jeremy Hise, Hazen and Sawyer
Water Quality Hurdles - Case Study in Balancing Fire Protection with Water Quality for Nitrification Control

Abstract: The City of Hagerstown uses chloramination for secondary disinfection. The City treats water from the Potomac River at their RC Willson WTP with that water being pumped from far west in their distribution system (Town of Williamsport) all the way east across the City of Hagerstown and extending to the Town of Smithsburg. Maintaining water quality throughout the distribution system, particularly in areas far away from where the water was originally treated has been very challenging. Indications of system nitrification in 2021 began to occur well in advance of when it normally does, which led the City to investigate ways to help identify the source of nitrification and ways to mitigate future nitrification. This project involved assessing many different alternatives for improved nitrification control, including the following which will be presented – the below alternatives were assessed both by way of desktop analysis and through field implementation: • Use of the hydraulic model to assess operating strategies, including taking tanks offline to reduce water age, • Modifying tank and pump operating ranges to keep water fresh in the distribution system, • Controlling the direction of water through strategic valve opening and closing, • Assessing the potential need for breakpoint chlorination in portions of the distribution system where nitrification cannot be controlled simply through changes in operating strategies, • Adjusting the time when tanks in the distribution system are filling and drawing, and • Increased monitoring to assess nearly real time changes in water quality. Efforts included the following: The City's water quality monitoring and response plan was adjusted accordingly following field implementation and assessment. The monitoring program adjustments and recommended control measures will be presented, including: 1. Gather additional disinfectant residual information in trouble areas. 2. Implement control actions, based on the below hierarchy: a. Option #1 – Increase turnover in tanks and within the system (pipe storage) b. Option #2 – Localized Flushing – manual and automatic c. Option #3 – Tank Emptying/Cleaning/Disinfection d. Option #4 – Uni-Directional Flushing (UDF) – utilize the hydraulic model to help prepare flushing strategies e. Option #5 – Free Chlorine Burn with UDF f. Option #6 – Booster Chloramination (i.e. analytical equipment + chemical feed system (ammonia + sodium hypo) g. Option #7 – Advanced treatment and switch secondary disinfectant

What Will Attendee Learn: Water quality monitoring strategies to identify nitrification potential within the water distribution system. Nitrification control options to consider for implementation.

Speaker Bio: Mr. Hise is a Senior Associate at Hazen and Sawyer, working from their Baltimore Office. He has an undergraduate degree from Virginia Tech and a graduate degree from Johns Hopkins University. With over 19 years of experience, Mr. Hise has led the study and design of a number of large Maryland, Virginia, and Pennsylvania water facility projects. His expertise lies largely in water treatment, water quality, and water storage/reservoirs/impoundments.

System Operations/Maintenance, Room 201-202
Thursday, September 1st, 2022, 12:00 PM
Anjuman Islam, Washington D.C. Water and Sewer Authority
Impact of Covid-19 Pandemic Years in Maintaining Water Quality throughout the Washington D.C. Distribution System

Abstract: In the Washington D.C., water distribution system comprises of 1,300 miles of water mains; ~53% of which is made up of old unlined cast iron (UCI). Corrosion of these mains cause discoloration in water. There are areas within the district where chlorine, the disinfectant added to ensure safety of the water, depletes due to high water age and/or low water usages. Corrosion of the UCI mains also consumes chlorine depleting disinfection capability of the water. The loss of disinfectant and discoloration of water result in increased number of water quality complaints. DC Water is replacing portions of the UCI mains each year but to replace hundreds of miles would take years. As a temporary measure, DCWater conducts routine hydrant flushing to maintain water quality in these Water Quality Problem Areas (WQPA). DCWater has set a target level for chlorine (1 mg/L) and iron (0.05 mg/L) and flush hydrants until the target levels are achieved (max flush time 45 mins). Hydrant flushing also helps in reducing water age for areas with low water usage or dead-end mains by bringing in fresh water with good chlorine levels in the WQPAs. We have looked at the 2019, 2020 and 2021 flushing and testing data to compare flushing needs before, during and after the pandemic. The data was collected by measuring chlorine and iron before and after hydrant flushing. In 2019, 53% of the cases, WQPA hydrants failed to meet the chlorine target; however, after flushing it was reduced to ~10%. In 2020, 55% of the hydrants did not meet the chlorine target before flushing while after flushing, only 13% were below the chlorine target. To provide similar water quality, DCWater needed to conduct ~3.5 times more flushing events in 2020 than in 2019 (303 hydrants in 2019 versus 1044 in 2020 meeting pre-flush chlorine target), which is most likely because of less water usage due to offices, schools, and business closures during Covid-19 pandemic. Although in 2021, a lot of businesses were back to service, a big number of federal buildings, churches and schools etc. remained full or partially closed. Thus, in 2021 as well, DC Water needed to conduct twice as many as flushing events (661) than that in 2019 (303). The iron data analysis also showed similar impact of Covid-19 pandemic. In 2019, 2020 and 20221, number of instances where pre-flush iron levels of higher than the target were 247, 609 and 495, respectively. In addressing discolored water issues, DC Water had to double its flushing activities in 2020 and 2021 from the year 2019 to eliminate stagnated rusty water from mains. It was a great accomplishment that despite of all the challenges in the pandemic year of 2020, DCWater was successful in maintaining its target water quality by initiating more flushing events and testing. In the final presentation, comparison of water usage data around WQPAs will be presented along with the customer complaints, water quality testing and flushing requirements data to maintain target water quality.

What Will Attendee Learn: How DC Water maintained water quality despite of all the challenges in the pandemic year of 2020. In the final presentation, comparison of water usage data around water quality problem areas will be presented along with the customer complaints, water quality testing and flushing requirements data to maintain target water quality.

Speaker Bio: Earned her MS and Ph.D. from UMass Amherst in Civil & Environment Engineering. She is now working as the Manager, Water Quality at DC Water. Dr. Islam worked on a wide variety of

research projects such as effectiveness of different treatment techniques in treating dirking water, waste water and complex industrial waste water. She also worked on residential water filtration system and premise plumbing issues. She is a part of DC's Legionaries Disease Outbreak Response protocol development team.

System Operations/Maintenance, Room 201-202
Thursday, September 1st, 2022, 2:00 PM
Badana Mohamadi, HDR Engineering
Screening Failure at an Aging Wastewater Pump Station – Expedited Design and Construction for Emergency Repairs

Abstract: Constructed in 1977, the 37 MGD Accotink pump station is Fairfax County's largest and most critical wastewater pump station in their collection system. Recent assessments confirmed that the station has aging infrastructure and outdated equipment that needs replacement. The station also has a need to increase capacity for future flows. The County plans to rehabilitate the pump station and increase its capacity to 45 MGD. The station rehabilitation is currently in the early stages of design. In March 2021, the station experienced an unexpected failure with its mechanical bar screen, which screens the flow of debris ahead of the pumps. This failure forced flow to an adjacent bypass channel with a manual bar screen which subsequently failed due to overloading, creating a second blockage. While the blockages allowed some flow to pass through to the pumps, the pump station capacity was significantly reduced, and an overflow seemed imminent. The failed mechanical screen was an older type of catenary bar screen that was installed during the initial construction of the pump station. This exact screen is not manufactured anymore, and there was limited familiarity with its configuration and operation. The County quickly assembled a strategic team of highly skilled contractors, operators, project managers, and engineers to collaborate and assess the failure, identify root causes, and develop a repair plan. Due the threat of an overflow, an expedited design and construction were imperative. The repair plan consisted of four phases that were prioritized based on safety, material availability, and production capacity: Phase 1 – The catenary screen was rigged to prevent a collapse and to stabilize the area for further assessment and partial capacity operation. Phase 2 – Replacement parts were not available for the catenary screen due to the age of the equipment. Therefore, components were reverse engineered and custom fabricated. Phase 3 – The existing manual bar screen was removed, and the area was prepared for a replacement screen installation. Phase 4 – Installation of the replacement manual bar screen. Design documents were quickly prepared. An assembly of site photos, available record drawings and Bluebeam markups were used to convey design concepts and information, which helped expedite the process. Due to the urgency of the situation, there was not much time for extensive reviews, so there was an added level of pressure to get a workable design at the first attempt. The emergency repair work required entry into operating influent channels. Operators were able to pump the system down to lower the wet well during nighttime hours to allow contractors to enter the channel and anchor components. Further proactive thinking by the team identified other improvements that could be implemented while contractors were onsite, and the channels levels were lowered to improve the reliability of the system until holistic upgrades could be implemented. This session will highlight the owner-engineer-contractor collaboration, expedited design, and decision-making approach, and provide an overview issue resolution. The presentation will serve as a guide for future emergency planning and repair situations.

What Will Attendee Learn: This session will highlight the owner-engineer-contractor collaboration, expedited design, decision-making approach, and provide an overview issue resolution for this emergency event. The presentation will serve as a guide for future emergency planning and repair situations.

Speaker Bio: Water/Wastewater EIT at HDR. BS in Civil Engineering from George Mason University. Career in consulting engineering largely involved in wastewater collection system and pump station projects in the mid-Atlantic region.

System Operations/Maintenance, Room 201-202
Thursday, September 1st, 2022, 2:30 PM
Christine deBarbadillo, Black & Veatch
Planning, Design, and Data Management Considerations for Plant Optimization

Abstract: As Utilities transition to meet new regulations, adjust to workforce changes, and manage capital investments and operating costs, there is an opportunity to focus on facility optimization through all phases of a project. Each phase of facility planning, design, operations, maintenance, asset management, and data management is impacted by the others. In a fully optimized plan, all components are integrated and complementary toward successful long-term operation. Process Selection - Treatment strategies that reduce consumption of resources such as energy and chemicals provide a foundational optimization opportunity. But it is essential to focus on the impacts that mechanical and electrical design choices have on O&M efficiency for the life of the facility. For example, there are many control strategies that can reduce process aeration needs. However, if blowers sized for the future are operating at an inefficient point on the curve for much of the design life of the facility, they not only erode the potential energy savings, but impact the ability to create the right process conditions for new technologies such as deammonification (anammox), resulting in an inability to achieve the benefits of the new technology. Finding the right balance between incorporating new processes and tools into planning and design with a focus on operation, asset management, and technical skillsets needed for the life of the facility is essential. Design – Although many designers are already mindful of how designs affect future maintenance, the true costs and challenges of maintenance are often not realized until well after commissioning, and feedback does not always reach the design and planning teams. We can enhance designs by closing this loop and incorporating Failure Modes and Effects Analysis (FMEA) and Hazard and Operability Review (HAZOP) considerations as design decisions are being made. These facilitated and systematic analyses support engaged cross-disciplinary discussion about safety, operation, and maintenance issues in addition to providing documentation of issues identified and resolution. Data Management and Analytics – Technology advancements have provided more data than ever, but if we don't manage, analyze, and visualize it to help inform decisions, there is little benefit. Data management platforms that collect plant SCADA, LIMS, and CMMS data can be developed with automated reports and dashboards for monitoring of key performance indicators and other parameters desired by different groups within the organization. This avoids the traditional need to download data manually from different databases to spreadsheet software to be used in calculations and analyzed. Continued development of asset management or process digital twins with modeling and predictive analyses can provide insights to equipment heath and performance, helping prioritize efforts to greatest benefit. Further, the ability to analyze very large datasets efficiently can provide insights to the operation that may not be visible from traditional analyses. This presentation focuses on case examples from Winston-Salem, NC; DC Water; Raleigh, NC; Medina, OH; and Kansas City Water showing the effectiveness of balancing process selection; operations and maintenance driven design approaches using HAZOP and FMEA; and optimization using data management and analytics in creating an optimized facility.

What Will Attendee Learn: This presentation will discuss and provide examples of how integrating process selection; O&M driven design approaches using HAZOP and FMEA; and data management and analytics help create an optimized facility.

Speaker Bio: Chris deBarbadillo has over 30 years of experience in the water resource recovery field, including process engineering, operations, and research, with a focus on whole-plant operations and nutrient removal to low levels. She currently serves as Plant Optimization Practice Leader for Black & Veatch.

System Operations/Maintenance, Room 201-202
Thursday, September 1st, 2022, 3:00 PM
Ned Talbot, Ramboll
Nutrient Management within a Bubble Permit

Abstract: Spotsylvania County, VA currently owns and operates two wastewater treatment plants, the 9.4-MGD Massaponax WWTP and the 4.0-MGD FMC Wastewater Treatment Plant. The VPDES permit for the Massaponax plant requires it to treat to 4.0-mg/L TN and 0.3 mg/L TP average monthly. The FMC plant VPDES permit includes an ammonia limit of 4.3 mg/L monthly average / 5.3 mg/L weekly average during summer months, and a TP limit of 2.0 mg/L. However, both plants are regulated by a general permit that imposes annual nutrient load caps on both plants equivalent to 4.0 mg/L TN and 0.3 mg/L TP. Massaponax is designed to meet this, but FMC is not. The County's bubble permit allows the two plants to share their annual nutrient allocations for purposes of meeting the general permit since both plants are located in the Rappahannock River Basin with the same delivery factor. This presentation will explore the strategies the County has used to manage nutrients within their basin. The first strategy involves flow management. The County has the ability, via pumping stations, to control the percentage of sewershed flow that is directed to each plant. The impact on overall performance will be evaluated. The second strategy, which has been recently employed, is the addition of supplemental carbon at Massaponax to optimize nitrogen removal performance. The plant has operated under ENR limits for a decade without the need for supplemental carbon. However, in recent years additional flow to FMC has required the County to optimize performance at Massaponax to manage the overall nutrient load being discharged. This has benefited the County by buying time for upgrades to be made at FMC or consolidation and expansion to occur at Massaponax while minimizing their reliance on nutrient credits. The performance improvements made with the addition of carbon at Massaponax will be examined. Process modeling results will be presented which were used to estimate performance before and after carbon was added to pick a starting chemical and dose. The physical implementation of carbon use will be discussed, including the dosing strategy and the details of the process control utilized. Daily sampling results and overall performance will be presented. Wet weather management is also a key for the County. Massaponax had a process train out of service for many months recently while structural repairs were completed which limited the process tankage available. The effect on performance will be evaluated during this period. Finally, future wasteload management will be discussed. An expansion of the Massaponax plant to 13.4-MGD is currently being bid and will be under construction in 2022. Management of nutrients during construction will be discussed, as basins will need to be taken out of service to implement improvements. Future nutrient management with flow consolidated at Massaponax will be presented. This involves new diurnal flow/load equalization integral to a new process train as well as the addition of a stand-alone "hybrid" peak flow equalization tank. Process modeling will be presented that will evaluate how diurnal peak load shaving will optimize the process performance.

What Will Attendee Learn: Prove that flow management and addition of supplemental carbon are two strategies that can allow a plant that is designed for ENR make up for the performance of a plant that is not designed for ENR level treatment when operating under a bubble permit. Once consolidated, a single plant can further be optimized with peak load shaving.

Speaker Bio: Mr. Talbot has more than 20 years of experience in municipal water and wastewater engineering. As a Project Manager at Ramboll, he focuses on managing the design and construction of nutrient removal wastewater facilities in the Chesapeake Bay watershed. Mr. Talbot graduated from the Georgia Institute of Technology with a BS in Mechanical Engineering and the Johns Hopkins University with a MS in Environmental Engineering. He is a registered Professional Engineer in the Maryland and DC.

System Operations/Maintenance, Room 201-202
Thursday, September 1st, 2022, 4:00 PM
Tim Donaldson, VTScada by Trihedral Engineering

Practical Ways to Keep Your SCADA System Secure An Overview of Cyber-Security Standards, Best Practices, and Technologies

Abstract: Cyber-security breaches of computer systems are becoming more and more common, and each of these breaches result in massive issues with the safety, privacy, and confidentiality of companies, financial institutions, and ultimately our personal information. Less often, but perhaps more critical and definitely more concerning to our industry, we are seeing municipalities being affected, either by ransom-ware, general hacking, or specific process disruptions. These infiltrations cause massive loss of data, carry financial implications, and potentially threaten our customers' health and life-safety. This session will provide brief overview of the situation, some relevant background, and industry standards for cyber-security. We will then reinforce operational best practices with a live demo, introduce some architectural security designs, and talk about remote connectivity scenarios. Some of the topics discussed will be: General thoughts around cyber-security breaches Industry standards which provide guidance Username / Password / Privilege schemes Security procedures for accessing or leaving a SCADA system Operational Realms & Controls Remote connection security Secure backups, redundancy, version and event logging System design considerations and infiltration mitigation

What Will Attendee Learn: Beat Practices for securing their SCADA system

Speaker Bio: Tim Donaldson –Tim brings over 25 years of industrial automation experience as well as an intimate understanding of the needs of this market. He has held account manager positions for major software vendors who develop SCADA, HMI software for the water and wastewater industry. Recently Tim has focused on helping water and wastewater installations with cyber-security, operational security, and remote access security.

System Operations/Maintenance, Room 201-202
Thursday, September 1st, 2022, 4:30 PM
Andrew Chastain-Howley, Black & Veatch

Smart Operations and Maintenance: Human versus AI-based Monitoring in Water and Wastewater Treatment Plants

Abstract: Managing the operations and maintenance of water and wastewater treatment plants is complex, challenging, and still requires a specialized human expertise. However, staff often spend much of their time on basic tasks and analyses that consume their day and don't allow them to apply their true knowledge to the critical operations and maintenance needs. Large improvements can be gained through automation of such tasks. During this presentation, we will discuss some of the automation, data management and artificial intelligence (AI) techniques available to alleviate those repetitive tasks. This in turn can provide enhanced visualization, prediction and enable operators and maintenance staff to concentrate on running the plants more effectively and significantly reducing the risk of failure. This presentation will utilize data and dashboards from active, real-life utility wastewater plants and water facilities in the Eastern US. The case examples will articulate the benefits and the issues with utilizing AI in 2022 and how it can help, but not yet supersede human involvement across the whole plant. This will include: • Dataset integration for treatment plant monitoring and optimization • Simplification and automation of inputs and outputs • Efficiencies gained by active alerting on flow dynamics and vibration • Monitoring of regulatory requirements with automated systems The discussion will link all of the above with process improvements visualized through machine learning and managed by a combination of artificial and human monitoring.

What Will Attendee Learn: This presentation will articulate the benefits and the issues with utilizing Artificial intelligence (AI) in 2022 and how it can help, but not yet supersede human involvement across water and wastewater treatment plants.

Speaker Bio: Andrew Chastain-Howley directs data analytics and solution development for water and wastewater systems within Black & Veatch. He has 30 years' experience in the fields of asset management including treatment systems. His professional background includes work in the Middle East, Europe, Australia, and North America, for numerous government agencies, and private concerns.

System Operations/Maintenance, Room 201-202
Thursday, September 1st, 2022, 5:00 PM
Joe DeLuca, EBA Engineering
Utilizing GIS to eliminate confusion and automate the customer notification process

Abstract: When a boil water notice needs to be sent out, is your agency able to quickly and accurately identify the customers to be notified? Do you have an automated process to compile a list of the effect customers, complete with contact information? Do you need a system that is easy to maintain and enables you track and analyze current and historic events that disrupt services? This presentation will show how the York Water Company (York Water) uses a GIS web-application to accurately identify customers effected by an event, automatically compile the data in the format needed to send out the notifications, and options for communicating the information to the public. During the presentation we will detail the data, software, automated processes, and web application utilized to create a user-friendly, easy to maintain, web-based customer notification system. We will review the benefits realized from the application to help give attendees a better understanding of the technologies available to help streamline critical workflow processes.

What Will Attendee Learn: Attendees will learn about GIS technologies available to better communicate, track, and analyze service interruption events, helping them to accurately identify effected customers and quickly communicate the information to everyone effected.

Speaker Bio: Joe DeLuca, GISP is a Project Manager for EBA Engineering, Inc., and is based in Lancaster, PA. Since graduating from the University of Maryland Baltimore County, Mr. DeLuca has worked in the mid-Atlantic area on GIS and asset management projects with a focus on water and wastewater

Utility Management, Room 203-204
Wednesday, August 31st, 2022, 8:30 AM
Sean Snow, GHD
Addressing Water Supply Challenges - Aquifer Recharge in Hillsborough County Florida

Abstract: Hillsborough County is located on the west side of Florida. Home to about 1.5 million people, with Tampa as its largest city. Hillsborough County borders Tampa Bay, a large shallow estuary connected to the Gulf of Mexico. The Tampa Bay Estuary has a salinity ranging from 20,000 to 35,000 parts per million and an average depth of 11 feet. Hillsborough County Public Utilities Department (HCPUD) derives a significant portion of its 49 million gallons per day of potable water from the Floridian Aquifer. Historical increases in groundwater withdrawals coupled with climate change has resulted in significant saltwater intrusion from Tampa Bay into the Floridian Aquifer in the coastal areas of Hillsborough County. In 2009, HCPUD started investigating the potential use of its high-level disinfection reclaimed water to mitigate the saltwater intrusion and support a long-term, sustainable solution to water management challenges in the HCPUD service area. As a result of this investigation, Hillsborough County developed a reclaimed water direct aquifer recharge pilot project along the coastal portion of the county in a non-drinking water portion of the aquifer. The positive results of the pilot project led to six wells being permitted with two currently in operation. This paper discusses: regulatory hurdles; the County's approach to pumping highly treated reclaimed water into a saltwater zone separating the saline water under the Tampa Bay Estuary from the freshwater aquifer zone; and the results of these efforts to impound fresh water several miles away.

What Will Attendee Learn: How Hillsborough County (FL) is protecting their fresh water supply using reclaimed water for aquifer recharge.

Speaker Bio: Sean Snow has over six years of experience in water resources engineering including process engineering/project management, pipeline/pump station design, stormwater design/inspection, wastewater, groundwater injection/recharge wells, facility demolition, permitting, construction oversight, and environmental monitoring/inspection services. Sean has provided engineering design/management for projects throughout the east coast of North America and has spent the last three years in Tampa, FL.

Utility Management, Room 203-204
Wednesday, August 31st, 2022, 9:00 AM
George Heiner, Anne Arundel County, MD
Advanced Water Treatment for Managed Aquifer Recharge in Anne Arundel County, MD

Abstract: With increasing water scarcity, drought, climate change and stringent nutrient regulations, water reclamation facilities (WRFs) are seeking water reuse solutions. Direct or indirect potable reuse can improve water resiliency and provide one water solutions for future water supply needs of the community. To improve long-term water supply resiliency and water quality in the Chesapeake Bay, the Anne Arundel County, Maryland Our wAAter Program is evaluating multiple management strategies to reduce nutrients and provide enhanced water supply options to the region. One piece of this strategy is to evaluate the feasibility of performing indirect potable reuse by adding advanced water treatment (AWT) processes to an existing County WRF. The AWT would further treat wastewater effluent to national drinking water and potable reuse water quality standards with the intent of performing managed aquifer recharge (MAR). HDR is currently working with the County to provide design and optimization of their proposed AWT pilot for MAR. The County's MAR will be the first study of its kind in Maryland; it includes injecting treated and conditioned water (which supports compatibility with the aquifer geochemistry) into the local Upper Patapsco, Lower Patapsco, and Patuxent aquifers to reduce nutrient discharges to the Chesapeake Bay while striving to improve the water supply sustainability. In the Summer of 2020, the County completed an eight-week sampling program at the Patuxent WRF. The sampling program monitored water quality parameters to characterize AWT treatment requirements needed to address the U.S. EPA's Safe Drinking Water Act (SDWA) standards, pathogen removal goals, aquifer compatibility, and constituents of emerging concern (CECs). These parameters included inorganic compounds, organic compounds, disinfection byproducts, radionuclides, biological/microbial contaminants, emerging contaminants, and other water quality parameters. The intent of the sampling plan was to inform selection of an AWT pilot appropriate for treating WRF effluent and meeting treatment goals. Historically, states like California that have paved the way for potable reuse have mandated membrane-based advanced treatment, which utilizes high-pressure membranes such as reverse osmosis membranes. More recently a carbon-based approach which utilizes ozone, biofiltration, and granular activated carbon, has gained recognition as a safe and less costly alternative with the added advantage of creating less waste streams (such as membrane concentrate) which can require additional treatment for in-land systems. Results from this sampling program favored a carbon-based approach, and the County is currently in the process of procuring a pilot with coagulation, flocculation, sedimentation, ozone, biofiltration, GAC, and UV disinfection which will be installed at Patuxent WRF. This presentation will share water quality results from the WRF sampling plan, strategies for selecting an appropriate treatment train, and development of the County's piloting test plan for 2022. Attendees will benefit from learning how development of a pilot test plan early in the procurement process can assist with robust pilot monitoring and risk mitigation.

What Will Attendee Learn: Participants will be able to: ● Learn about drivers for potable reuse and managed aquifer recharge in Maryland ● Understand key water quality constituents of interest in managed aquifer recharge ● Conduct WRF effluent monitoring to inform design of pilot AWT ● Learn how to approach pilot development and evaluate treatment processes based on WRF effluent water quality.

Speaker Bio: George is an engineering manager of utility design for the Anne Arundel County Department of Public Works.

Utility Management, Room 203-204
Wednesday, August 31st, 2022, 9:30 AM
Phoebe Aron, Hazen and Sawyer
Planning for the Future – Identifying Future Raw Water Sources and Assessing Treatment Needs

Abstract: The Berkeley County Public Service Water District (Berkeley Water) operates the Bunker Hill Water Treatment Plant (WTP) that serves approximately 30,000 residents in Berkeley County, West Virginia. The treatment plant is currently undergoing a major upgrade, including switching from direct filtration treatment to membrane filtration treatment and increasing the treatment capacity from 2.8 to 6.0 MGD. These upgrades will help Berkeley Water meet increasing regional demand and increase the reliability of the water supply and treatment process. However, the current raw water source, a groundwater spring located near the Bunker Hill treatment plant, cannot consistently supply enough water to meet the new anticipated maximum treatment capacity. As a result, Berkeley Water is exploring additional raw water supplies that can be used in the future. This presentation will explore a new raw water source that is located near the Bunker Hill WTP. This new water supply would be sourced from an active quarry that produces approximately 2 MGD. Currently, water from the quarry is pumped into a nearby creek and is not used by Berkeley Water. Water from the quarry was pumped to the Bunker Hill WTP in 2002 when drought conditions caused the plant's primary water source to go dry, but this was only permitted as an emergency supply. Moving forward, the quarry water is a possible a new raw water source that can help the Bunker Hill WTP plant meet its updated treatment capacity and continue to serve residents of Berkeley County. This presentation will outline the monitoring, treatment, and permitting considerations needed to connect and blend quarry water with the existing water source. The presentation will include information on source water development per the West Virginia Public Water System Design Standards (64CSR77), a source water protection plan, and a water quality monitoring program. In addition, we will discuss any pre-treatment, including chemical requirements and associated doses and contact times, that should be considered before quarry water passes through the new membrane filtration system. This presentation will cover the operational, financial, regulatory, and hydrologic analysis associated with the new raw water source and recommendations to connect the Bunker Hill WTP with a new, reliable source of water.

What Will Attendee Learn: Presenting at Tricon 2022 will be an extremely valuable experience as an early career professional. I will learn about the work my colleagues are doing and have important networking opportunities to meet others who are working in this field.

Speaker Bio: Phoebe Aron is a Principal Scientist at Hazen and Sawyer in Baltimore, Maryland. She has more than 10 years of experience conducting applied research to monitor water quality and manage water resources in the United States and abroad. Phoebe holds a PhD and MS in climate science and hydrology from the University of Michigan and completed a post-doctoral research fellowship in climate modeling before joining Hazen in 2021.

Utility Management, Room 203-204
Wednesday, August 31st, 2022, 1:00 PM
Raanan Gurewitsch, BlueConduit

Artificial Intelligence Applied: Reducing Lead Exposure Promotes Environmental Justice in Toledo, Ohio

Abstract: Recent events in Flint, Michigan, Newark, New Jersey, and Washington D.C. highlight the disproportionate impact of lead exposure on low-income families, children, and minority populations. In Toledo, thirteen ZIP codes within two miles of the downtown area have been categorized as high-risk for lead poisoning, with the result that children living in these ZIP code areas receive blood lead screenings. Lead service lines are the primary source of lead in drinking water, and so lead service line (LSL) replacement programs are critical for public health and environmental justice. Toledo is using artificial intelligence to identify replacement priorities in a way that balances risk and justice. In Toledo, approximately 30,000 LSLs need to be replaced, at a rate of 1,000 per year, and this 30-year project is estimated to cost $60 million. While a city may have some data of where its LSLs are located, some have found during their LSL replacement programs that historical records are inaccurate, and valuable time and money was invested only to discover the lines were already copper service lines. The high degree of uncertainty around LSL location means a city could spend millions of dollars trying to find LSLs, thus increasing the cost of the project and the burden on the taxpayer to complete the program, not to say increasing the days of lead exposure for the vulnerable. The City of Toledo recently received a US EPA grant to use machine learning to improve their LSL replacement program and complement that with an education program to reduce lead exposure. Toledo chose BlueConduit, developers of a model used in Flint and fifty other towns nationwide. Toledo will proceed more efficiently with their LSL replacement program by prioritizing homes for replacement based on a statistical model derived from historical records and a representative set of houses with verified LSLs. At the same time, Freshwater Future, in partnership with the City, will use targeted education campaigns to educate residents with a high likelihood of having a LSL how to best protect their families from lead exposure as they wait for the LSL to be replaced. This presentation will show how the statistical model has been used in Toledo to identify and prioritize houses that need LSL replacement and how it interacts with community education efforts.

What Will Attendee Learn: See how artificial intelligence can be applied to address environmental justice and save resources on infrastructure projects.

Speaker Bio: Raanan Gurewitsch is BlueConduit's Senior Product Manager. He helps guide all aspects of product development, from design and user research, to software engineering and data science, to strategic partnerships and product marketing. Raanan received his baccalaureate degree in information science and economics from the University of Pittsburgh, where he focused on applications of machine learning and geoinformatics to issues of public health and public sector innovation.

Utility Management, Room 203-204
Wednesday, August 31st, 2022, 1:30 PM
Mohammed Rahman, Baltimore City DPW

BALTIMORE CITY'S INTEGRATED PLANNING FRAMEWORK IN CAPITAL IMPROVEMENT PROGRAM AND EQUITY LENS

Abstract: Baltimore City was the first Municipality to adapt the Integrated planning framework guidance released by EPA in 2012. Since its inception, City has continuously improved the approach by improving the project qualifications process in the Capital improvement program from Triple bottom approach to Quadruple bottom approach. In 2018 the City has passed an Equity assessment ordinance to develop a plan and codify action and implementation of equity in all processes within the City. The department of Public works were the first agency to adapt equity in the Integrated planning framework. In 2020, City introduced an equity lens for project prioritization as part of the integrated panning framework. Equity lens is a tool used to improve planning, decision-making and resource allocation leading to more racially equitable policies and programs. Improved prioritization is achieved by conducting equity assessments of existing and proposed projects and policies. Baltimore's IPF process assists in strategically prioritizing projects and in developing a comprehensive utility budget. The IPF process is a cyclical process that can be consistently duplicated year after year The Integrated planning framework addresses Project Implementation, Economic, Social and Environmental (including regulatory) impacts. The framework has been expanded to storm water, wastewater and water projects. All projects compete in each enterprise (water, wastewater and storm water) and the process is applicable to facilities and utilities projects. The goal of this presentation is to introduce the Equity lens in the IPF process to the utility partners so they can improve their project prioritization process.

What Will Attendee Learn: Introduce the equity lens

Speaker Bio: Mohammed is the CTO in Baltimore city

Utility Management, Room 203-204
Wednesday, August 31st, 2022, 2:00 PM
Kevin Flis, Xylem
A Clearer Lens to Drive Water Equity in the Community

Abstract: Background Water equity has become a consistent theme among utilities to strive to deliver equal levels of service to all their constituents. However, there is typically no clear insight into which areas of the community require focused investment to achieve this level of equity. Moreover, once steps are taken by the utility, there is a lack of visibility into how these investments are quantifiably improving equity in the community. Taking into account the 3 pillars of water equity as defined by the US Water Alliance, a unique approach applies a demographic lens to water and wastewater utility data to provide visibility into equitable service delivery. Methodology This Water Equity Lens helps water and wastewater utilities visualize, geospatially, their progress towards equity goals through the assessment of various water service and program indicators, developed in alignment with the US Water Alliance Framework for Water Equity Pillars for Access, Benefit, and Resilience, and informed by the utility's own data sources. By indexing this water service data with demographic data, the tool generates insights, such as recognition of trends and correlations, to help the utility client prioritize and focus efforts for greatest impact. The map visualizations and analytical insights are supported by dashboard functions enabling the utility to gain a greater understanding of drivers of observed disparities. Altogether, this tool ultimately empowers the utility to make, and reflect on the impact of, equity-informed investment decisions. Status Three (3) utilities have agreed to participate to share their data and provide feedback on a final dashboard for the water equity lens. Data collection for these utilities began in late 2021 and it is our intent to share results of this program during the conference in August. Initial feedback is that the tool will really provide more data-driven decision making for the utility in understanding where there may be under-served areas of the community, how to inform their capital planning to incorporate water equity as one of the central tenants of this planning process, and share with the community and advocacy groups the progress the utility is making in achieving more equitable levels or service throughout the utility service area.

What Will Attendee Learn: The audience will learn how incorporating utility data with Census tract data can create a quantifiable and spatially explicit view of the service levels in the community and how this lens can assist the utility with a more informed decision making process in achieving equitable water service delivery.

Speaker Bio: With a Bachelor of Science degree in Chemical Engineering from Iowa State University and over 14 years of experience in water and wastewater, Kevin Flis has been integral in building outcome driven solutions for utilities. His most recent focus area has been digitally-enabled solutions. With his current attention on digital solutions, Kevin is working with utilities to improve water equity, improve lead service line replacements, and enhance machine reliability.

Utility Management, Room 203-204
Wednesday, August 31st, 2022, 3:30 PM
Aaron Henderson, Arcadis

Resilience Funding, Financing, and Implementation Strategies: The Usual Suspects and Non-Traditional Opportunities

Abstract: The landscape of funding opportunities is evolving. With the potential for private, federal, state, and local partners, there are multiple opportunities to invest in pre-disaster and post-disaster hazard mitigation and resilience. Although these funding resources exist, many organizations are reluctant to expand outside of their current revenue streams to fund resilience-based projects because the world of grants and loans is perceived as daunting or too competitive. Furthermore, organizations may think their projects do not meet specific scope requirements and instead rely on more traditional funding and financing methods. This presentation will shift that perspective and provide insight into current funding and financing resources, including non-traditional funding opportunities, to implement projects at varying scales. This is a great time for the water and wastewater industry to take advantage of funding and financing resources such as FEMA's Building Resilient Infrastructure and Communities grant program, the restructured funding opportunities under HUD's Community Development Block Grant Disaster Recovery program, State Revolving Fund loans, and the Infrastructure Investment and Jobs Act, better known as the infrastructure bill. Participants will walk away with a better understanding of the mission, availability, eligibility, and frequency of a variety of grant programs, and ideas for implementing other creative financing mechanisms to fund projects. The presentation will use real-world examples to demonstrate the major requirements of many federal grant applications and the factors that make resilience projects most competitive to funding and loan gatekeepers. It will also demonstrate how projects can fit into what would generally be considered non-traditional funding sources and how they can pair with creative financing mechanisms to not only fund projects but impart additional benefits to communities. Additionally, we will provide a portfolio of successfully funded projects with a variety of scopes and scales, focuses, and lifelines to discuss why these projects were deemed effective, how these projects were properly targeted to individual grant sources, and how each project was tailored to appropriately match the individual eligibility requirements. All too often we see that many organizations rely on grant funding opportunities to complete smaller scale projects under the impression that large scale community projects cannot be funded through a grant resource. Moreover, we have often seen organizations place certain projects on hold under the impression that these projects are not within the "guidelines" required of a specific grant opportunity. Using case studies, this presentation will exemplify how fundable resilience can take many forms, be defined in unique ways to different entities, and cover many areas of risk and hazards.

What Will Attendee Learn: Participants will walk away with a better understanding of the mission, availability, eligibility, and frequency of a variety of grant programs, and ideas for implementing other creative financing mechanisms to fund projects. The presentation will use real-world examples to demonstrate the major requirements of many federal grant applications and the factors that make resilience projects most competitive to funding and loan gatekeepers.

Speaker Bio: Aaron Henderson, CFM, LEED GA has over 9 years of professional experience in urban and coastal risk and vulnerability assessments, resilience grant pursuit and management, data analytics and

benefit cost analysis. During his time within the grant development space, he has led or contributed to mitigation and post-disaster projects totaling approximately $4 billion in grant funding from a variety of local, state, and federal agencies.

Utility Management, Room 203-204
Wednesday, August 31st, 2022, 4:00 PM
David Goldwater, Stantec
A Case Study for Funding Water Infrastructure Projects

Abstract: The Infrastructure Investment and Jobs Act (IIJA) was signed into law on November, 15 2021 providing $55 Billion for water infrastructure. This funding is needed to stimulate the economy, creating jobs, and help counteract rapidly rising construction project costs. Additionally, this historic funding from the Federal Government is a step to close the funding gap in water, wastewater and stormwater infrastructure. The IIJA provides $15 Billion for lead pipe removal, $12 Billion for the Drinking Water State Revolving Fund, $11.73 Billion for the Clean Water State Revolving Fund, $4 Billion for Drinking Water Emerging Contaminants with a focus on PFAS & PFOA, $1 Billion for Clean Water Emerging Contaminants as well as several other major funding initiatives. These Federal investments through the State SRF programs can take the form of either low-interest loans, a mix of loans and grant (aka loan total loan forgiveness), or 100% grants. This paper presents a case study of the Morris Forman Biosolids Processing Solution (BPS) which was conceived prior to the COVID-19 pandemic with WIFIA funding and a budget of $190M. Project costs have escalated significantly during the pandemic years, requiring assessment of how the higher costs could be funded or whether scope would/could be reduced. A critical, multi-benefit project with advanced biosolids and energy generation elements, the BPS has the potential to tap into diverse sources of capital. The paper will describe how the various funding aspects were considered including how the IIJA provisions were considered in the context of an existing WIFIA grant. The paper will expand to provide generic information relevant to water utilities hoping to obtain funding from the IIJA.

What Will Attendee Learn: Presentation will summarize how the Infrastructure Investment and Jobs Act (IIJA) can fund water infrastructure projects and define the major sources of funds in the IIJA and how it interacts with other major funding sources such as WIFIA.

Speaker Bio: David is recognized as an industry leader with successful experience in various aspects of the U.S. infrastructure supply chain, bringing nearly 25 years of experience in the infrastructure consulting, construction, and technology industries, as well as political affairs, environmental affairs, and consumer advocacy.

Utility Management, Room 203-204
Wednesday, August 31st, 2022, 4:30 PM
Monty Simon, Johnson, Mirmiran and Thompson,
What's It Worth to You? An Analysis of WSSC Water's Water Treatment Residuals

Abstract: As regulations become more stringent regarding disposal and land application of water/wastewater treatment residuals, Utilities are faced with the challenge of managing these materials. Many Utilities do not have the infrastructure for long-term storage or efficient transportation of residual materials and must rely upon third-party Subcontractors for hauling and disposal. These Third-Party Subcontractors play an integral role to the successful operation of the Utilities' solids handing programs. Unfortunately, the current economic climate has led to a shortage of qualified hauling Subcontractors, and resulted in a less competitive bidding environment, and unanticipated escalation. These factors, in addition to cost restrictive contracts, leaves Utilities at a disadvantage while trying to develop cost-effective business plans to manage water/wastewater treatment residuals. In many cases the Utilities are penalized for the variability of materials generated from their treatment processes.WSSC Water's Potomac Water Filtration Plant (WFP) is impacted by similar contractual constraints. On average the Potomac WFP generates 70 wet tons per day of water treatment residuals. The source water for this plant is the Potomac River. Since the river water quality is weather and flow dependent, the daily volume of residuals generated at the Potomac WFP can fluctuate widely. The daily production volumes can range from less than 50 wet tons per day to more than 200 wet tons per day. JMT was tasked to perform an engineering analysis of the Potomac WFP's current solids residual generation and future generation as it is impacted by the Consent Decree to develop a Post Dewatered Processing (PDP) Facility. This facility would enable WSSC Water to process and temporarily store water treatment residuals with the goal of producing a predictable and consistent volume of processed residuals daily.JMT will conduct an assessment of the current Plant processes, historic hauling data, and Consent Decree requirements to determine a project baseline water treatment residual value. This baseline value will be used to identify potential technologies and appurtenances to dry the water treatment residuals. A conceptual PDP Facility at the Piscataway WRRF Bioenergy Facility will be generated and serve as the basis of a Life Cycle Cost Analysis (LCCA). The LCCA will provide comparative evaluation between construction of a PDP Facility at the Piscataway WRRF Bioenergy Facility and the projected contractual surcharge hauling expenditures. The PDP Facility will be modular in nature and expandable to accommodate biosolids generated from the Piscataway WRRF.

What Will Attendee Learn: The presentation will provide a summary of lessons learned and potential strategies to manage water and wastewater treatment residuals in a cost-effective manner. The content will be useful to Utilities as they will gain insight to contractual pitfalls, blending/drying technologies, and potential evaluation strategies to utilize while composing their treatment residual master plans.

Speaker Bio: Mr. Simon has 11 years of experience in the heavy mechanical, civil, electrical, and process control fields. He has extensive water and wastewater experience working as both a contractor, designer, and construction manager. He has served as a project manager on facilities renovation, design, and new construction projects. He has experience in various project delivery methods including traditional Design-Bid-Build and Construction Manager at Risk.

Utility Management, Room 203-204
Thursday, September 1st, 2022, 8:30 AM
Miranda Santucci, Jacobs
Renewable Power and Microgrid Assessment for a Water Reclamation Facility in Anne Arundel County

Abstract: As water and wastewater utilities manage rising energy costs, local greenhouse gas reduction targets, and resiliency goals, understanding the feasibility of developing renewable energy is a growing interest. Maryland law provides local governments with a unique means of achieving energy cost savings through use of aggregate net metering. To assess potential energy cost savings and resiliency benefits, Anne Arundel County initiated the Broadneck WRF Renewable Power Study to investigate the potential wind and solar resources at the site and understand feasibility of renewable microgrid implementation. The feasibility of developing renewable power generation at the Broadneck WRF site included quantifying wind and solar resources at the site, identifying local constraints, and identifying and investigating various challenges to implementation. While implementation challenges are numerable, significant wind and solar resources offer the County potential cost savings at Broadneck WRF and, potentially, other County facilities. Cost analyses for several alternatives that met the constraints of the site were developed to understand long-term payback. The presentation will also discuss estimated greenhouse gas reduction and potential revenue from Renewable Energy Credits (RECs) and the impact this had on financial analyses. The Broadneck WRF site was also evaluated to understand feasibility of implementation of a renewable energy microgrid. Viability of such a system is highly dependent on goals of the system (reducing the cost of traditional backup power, etc.) as well as characteristics of the facility. The existing electrical system configuration, nature of building loads, and amount and condition of existing backup power were considered. While the conclusion for Broadneck WRF was that a renewable microgrid was not recommended based on economics, the approach provides a framework for similar assessments that the County will undertake in the future. Based on the results of this study, Anne Arundel County is assessing next steps at the Broadneck WRF site. The presentation is offered as a case study that will touch on relevant considerations for utility managers with an interested in taking advantage of available renewable energy resources, reducing energy costs, and assessing feasibility of using a renewable microgrid.

What Will Attendee Learn: Attendees will better understand considerations for feasibility of renewable power at a water reclamation facility as well as for high-level feasibility of renewable microgrid implementation.

Speaker Bio: Miranda Santucci is an engineer and project manager for Jacobs Engineering at their Silver Spring, MD office. Ms. Santucci has over 11 years of experience in the wastewater and water infrastructure planning, analysis, and design. She has a BS in Biological Resources Engineering from the University of Maryland and is a registered professional engineer in Maryland.

Utility Management, Room 203-204
Thursday, September 1st, 2022, 9:00 AM
Kanu Shah, Shah and Associates, Inc.

Can Backup Generator Installations at Wastewater Treatment Facilities Generate Revenue? - A Case Study

Abstract: Many Wastewater utilities install emergency backup diesel generators to provide second independent power source when the wastewater treatment facilities receive electrical power from either one or two feeders from only one electrical substation to prevent untreated sewage flow into the rivers or streams during loss of power from only one substation. Maryland Department of Environment Engineering and Capital Project Program recommends using the "Ten - State Standard" for emergency power supply to wastewater facilities. The standard requires all wastewater facilities to provide two independent power sources to the facilities during loss of power from one of the power sources. Maryland Public Service Commission encourages owners of on-site generators to participate in PJM's (regional transmission organization – RTO – for Maryland) demand response program. In the past, some wastewater utilities were using emergency backup diesel generators to provide not only backup to the wastewater facilities but also to generate revenue by implementing peak load demand shaving and participating in the capacity market of the RTO. This paper presents a case study of economic viability of generating revenue by implementing air quality and interconnection requirements into the planned backup generators at the WSSC's Western Branch Wastewater Resource Recovery Facility (WRRF) to provide second independent power source required by the MDE. It includes (i) load demand analysis, (ii) a generator size and engine type, (iii) opportunities to earn revenues for operating emergency backup generators, (iv) regulatory requirements, and (v) cost/benefit analysis. The cost /benefit analysis for implementing peak load demand shaving and interconnection with the local electric utility for participation in RTO's Capacity Market includes net present worth value, rate of return and payback period. Sensitivity analysis is presented to determine impact of deviations of key variables – price of diesel oil, number of hours of generator operation, price adder for Tier 4 engines, RTO's auction clearing price and discount rates - on the present worth value and rate of return. The paper concludes that because of significantly increased capital, operational, and maintenance costs of implementation of air quality and interconnection requirements at the Western Branch WRRF revenue generating options – peak load demand shaving and participation in the RTO's capacity market - are not economically viable. Even though this paper has provided a case study of a Wastewater facility in the State of Maryland, methodology used, and regulatory requirements presented in this paper can be used by any water/ wastewater utility and industrial facility using or planning to use backup generators to provide power to the critical facilities/processes during loss of normal power from the electric utility in the United States of America.

What Will Attendee Learn: Engineering and economic considerations related to installation of backup generators for generating revenue by implementing MDE's air quality requirements, interconnection requirements of local utilities, and public convenience and necessity certificate exemption requirements from the MD Public Service Commission.

Speaker Bio: Kanu R Shah, PhD P.E. founded Shah and Associates, Inc. in 1977. He has published more than 45 technical papers in Electrical Power Systems and received first paper prize award on a technical

paper related to grounding transformer applications and associated protection systems. He currently working as a Principal-In-Charge on number of major electrical facility upgrades for WSSC, City of Baltimore, City of Richmond, City of Philadelphia, to name a few.

Utility Management, Room 203-204
Thursday, September 1st, 2022, 9:30 AM
Stephanie Spalding, HDR
Engaging the Team – Collaborative Risk Development and Tracking

Abstract: Developing a project risk register is a key component to initiating many large programs. It typically involves several days of in-person workshops where members of the project team build consensus on risk identification, risk severity, risk impacts and how best to mitigate those risks with the common goal of maximizing the program success and minimizing both cost and schedule uncertainties. When the Arlington County WPCP Biosolids Upgrade Program kicked off in January 2021, social distancing and travel limitations eliminated the possibility of collaborating in the traditional manner. As with many ways of executing projects over the course of the past two years, new means of collaboration were created out of necessity. Through a series of virtual workshops and real-time online data collection, the project team elicited participation and contributions from workshop attendees at all levels of Arlington staff to develop the preliminary risk register and collaboratively rank the relative severity of each project risk. We worked together to develop mitigation strategies and determine the mitigated risk severity and impact. With the project risk register in hand, we wanted to develop a new approach to keeping it easily accessible to all, thereby ensuring that it stays current and in the forefront as alternative are evaluated and decisions are made. A Risk Dashboard was developed in BI to graphically display active risks and identify the risk severity, category and risk owner at a glance. The Risk Dashboard, posted to the project Teams' Collaboration Site allows for easy filtering of risks by severity, owner and activity, ensuring that all can keep current on the project risks. This presentation will review the innovative approach of collaboratively developing the project Risk Register in the virtual environment, and will share the features of the user-friendly online tool for tracking and mitigating risks by all parties. This risk approach meets the goals of maximizing the program success and minimizing both cost and schedule uncertainties.

What Will Attendee Learn: Project risk management is a best practice for any project. Developing an approach for real-time risk tracking, accessible to all project team members, ensures that project risks are regularly evaluated and addressed throughout the project phases. This project's online Risk Dashboard tool provides that accessibility and ease of review.

Speaker Bio: Stephanie Spalding is the East Region Biosolids lead for HDR HDR and specializes in biosolids pretreatment and advanced anaerobic digestion, including equipment evaluations and complicated retrofits into existing facilities. She is a registered PE in Virginia, is a certified Envision Sustainability Professional and has a BSE in Civil/Environmental Engineering from Duke University and a Master's in Environmental Engineering from Old Dominion University.

Utility Management, Room 203-204
Thursday, September 1st, 2022, 11:00 AM
Jay Sakai, 4Tenets Consulting, LLC

Harnessing the Power of Data: Using Key Performance Indicators and Benchmarks to Optimize Your Operations

Abstract: Today's utility managers are increasingly challenged to "do more with less" and still demonstrate that their operations are efficient and cost-effective. Performance and benchmarking have become an integral part of the budgeting process, so managers need to leverage the value of their operations data to demonstrate they are performing at optimal levels. Fortunately, harnessing the power of analytics can be accomplished without a significant investment in new systems, technology, or people. Contrary to popular belief, any organization can become "data-driven" with simple, off-the-shelf tools, a willingness to go where the data takes you, and managers that are committed to asking the right questions. Key insights about the state of your utility's operations can be found in any data set – whether it's locked in a legacy work order system, sitting in a spreadsheet on someone's computer, or captured in the cloud. This presentation will examine how one utility – Fairfax County's Wastewater Collection Division – identified a discrete set of strategic and operational performance measures to benchmark critical maintenance and customer service operations. This presentation will provide the audience with a clear understanding of how key performance indicators can be identified from the myriad of data sources within the agency, how performance benchmarks are developed, and how an organization can engage operations managers in the performance management process.

What Will Attendee Learn: This presentation will decsribe the process and approach that Fairfax County's Wastewater Collection Division used to identify key strategic and operational performance indicators (KPI's) for the organization. These indicators will be used to assess operational performance, optimize the utilization of resources, and identify opportunities for service delivery improvements.

Speaker Bio: Jay Sakai is a consultant with 4Tenets Consulting LLC, a firm that specializes in operations management and performance measurement within the water and wastewater industry. He is a registered professional engineer with over 30 years of experience in water resource management field. He has worked with some of the largest utilities in the region on numerous performance and benchmarking projects. Mr. Sakai has a B.S. in Civil Engineering and a M.S. in Business from Johns Hopkins University.

Utility Management, Room 203-204
Thursday, September 1st, 2022, 11:30 AM
Andrew Burton, Carollo Engineers
Visualization techniques to improve workforce efficiency

Abstract: Water utilities are increasingly collecting and recording data through the use of faster computers, new sensor equipment, and increased data storage space. Using the available data to improve workforce efficiency is the reasonable next step. There are many data analysis software packages in the market. Some are easier to use, while others provide faster processing. The most commonly used include Microsoft Power BI, Tableau®, and ESRI™ Story Maps. Data centralization and consistency is key to making the dashboards valuable to utilities. If the data is reliable and up to date, it can then be used as a trustworthy source for decision making by operators, managers, and finance staff. Knowing the user and purpose of the data visualization tools helps narrow down the specific metrics to report and how to report them. For example, to improve operational efficiency for pump operators, data such as flow and pressure of the pump versus the operating point could be converted to the pump's operational efficiency versus its optimal efficiency point. From there, the operator could change operational strategy to increase the pump's efficiency during normal operations, directly translating to savings in energy costs. Sample data dashboards can be used to communicate results from a planning effort to the project team. Both MS Power BI and ESRI® Story Maps prove to be useful in their own way to facilitate future decision making. This presentation will discuss the types of data most useful for water utilities (including several case studies), the best data visualization tools including pros and cons, and provide examples to improve workforce efficiency among different departments and functions.

What Will Attendee Learn: Provide strategies and techniques to present data to help inform and drive decision making.

Speaker Bio: Andrew Burton is a senior analyst with Carollo's Utility Advisory Services and Strategic Management Group. He has over 10 years of combined experience in the fields of management consulting and research. His expertise includes asset register and hierarchy development, risk analyses, renewal modeling, GIS, and data visualization. Andy's combination of experience in asset management, analytics, and planning helps to apply innovative solutions to unique challenges.

Utility Management, Room 203-204
Thursday, September 1st, 2022, 12:00 PM
LaShema Burrell, DC Water
Proactive Maintenance Planning using Robotics, AI and Neural Networks

Abstract: Using advanced robotic technology Artificial Intelligence and Neural networks, an aggressive inspection program was developed to transform DC Water's collection system assessment. The selection criteria included: customer complaints, SSO occurrences, previous pipes inspected, heavy cleanings, creek crossings, etc. All of which, proposing DC Water to inspect 770 miles of small diameter sewer mains in 7 years. By developing and executing the Local Small Sewer Inspection and Maintenance Program, DC Water was able to: obtain baseline condition of the small local sewers, determine the remaining useful life, develop a proactive maintenance plan, and address emergency repairs in a timely fashion. Using an intricate selection methodology, the sewer assets selected were ranked and scored according to system wide operational and maintenance needs. The methodology for prioritizing sewer inspection areas is as follows: First, the collection system was grouped into sewer-subsheds of uniform total length. Next, relevant operational and maintenance criteria was identified. Then, a weight was assigned to each criterion. Finally, each group was then compared with each other to create inspection groups or priority rankings, ordered by a prioritization score. Inspections were conducted using Redzone's Robotic Solo autonomous platform, which proved cost-effective. This has allowed for timely repair before asset failure. The inspections also informed the proactive maintenance plan by prescribing the appropriate maintenance activity, for example, heavy cleaning, chemical root control, and FROG programs. The program's data management, consisted of Wipro's pipe anomaly detection software Pipe Sleuth for data validation (QA/QC) and several other cloud-based services for storage and data processing, all of which permitted the review and approval of sewer inspections into DC Water's video system of record Ravnur.

What Will Attendee Learn: With the development of the Local Small Sewer Inspection and Maintenance Program attendees will learn how DC Water properly prioritized and inspected assets, assess the data captured, coordinated repair and maintenance activities, then combined efforts with all stakeholders to build a proactive maintenance management plan.

Speaker Bio: Mrs. LaShema Burrell is a 15 year career professional working as an Asset Management Supervisor for DC Water. A graduate from Old Dominion University, with a career of successfully managing strategic programs, overseeing and inspecting projects, along with creating workflow processes. She is NASSCO certified, with a shared patent in "Machine Learned Pipe Anomaly Detection Program".

Utility Management, Room 203-204
Friday, September 2nd, 2022, 9:00 AM
Michael McWhirter, Stantec
Lessons Learned: Managing Large Scale Progressive Design Build Water Projects

Abstract: Four progressive design build (PDB) projects are currently ongoing following selection of a design build contractor: The $220M St Paul Regional Water Supply McCarrons WTP softening and ozone upgrade; WSSC's $271M Piscataway BioEnergy project, Louisville MSD's $200M+ Morris Forman Biosolids Processing Solution and Los Angeles Water and Power $480M San Fernando Groundwater project. They represent a cross section of the growth in PDB in our sector. We'll present background of each project including a broad scope outline, the procurement process, major stakeholders and a status update which in September 2022 will range from 30% design to commissioning depending on the project. With background established we'll present lessons learned. For procurement we'll highlight variations including the use of "blind evaluations", different interview approaches and structures for commercial terms. Lessons learned from the early options analysis stage will include approaches to formal and informal partnering and decision making methodologies for consensus and decision ranking. In stage 1 design and GMP development approaches to incorporation of risk into contingency definition will be shown along with coordination between design finalization and GMP negotiation. In construction the ways that the collaborative delivery approach has been used to mitigate the impacts of the COVID-19 pandemic will be shown along side how commissioning and startup planning occurs in the collaborative delivery model. Through the contrasts and comparisons between these four significant contemporary water PDB projects the audience will learn a variety of flexible approaches to assist with planning their own collaborative delivery project.

What Will Attendee Learn: A sharing of lessons learned from four large water progressive design build projects ongoing in the US water sector currently highlighting lessons in procurement, collaboration, design and construction phases.

Speaker Bio: Michael has had extensive involvement in alternative delivery projects having worked on design bid build, design build, construction management at risk, and alliance project set ups in a variety of roles ranging from Owners Advisor, to design professional, to risk manager, to design-build contractor design lead.

Utility Management, Room 203-204
Friday, September 2nd, 2022, 9:30 AM
Beth Blair, Black & Veatch

CMAR Delivery Enhances Design of New Raw Wastewater Pump Station at the Noman M. Cole Jr. Pollution Control Plant

Abstract: Fairfax County faced a challenge to upgrade their influent pumping capacity into the Noman M. Cole Jr. Pollution Control Plant (NMCPCP) to 210 mgd, while maintaining pumping capacity during construction. The County decided early in the project to use the Construction Manager At Risk (CMAR) delivery method to incorporate constructability input early in the design process. The team of Fairfax County, Black & Veatch and Clark Construction strived for a design that could be built efficiently with minimum impact to the existing operation, including considering space for temporary parking withing the construction sequencing. Clark has provided continuous constructability input throughout the design, which has been beneficial to find potential constructability issues at early stages. Likewise, continuous communication with Fairfax County has been essential to better understand operation constraints. This presentation will show instances where the benefits of having a CMAR enhanced the project. For example, because Clark Construction Group was involved at early stages, they were able to participate in the decision process between rehabilitation of the existing pump stations or construction of a new pump station. A critical part of the design that benefited from constructability input were the modifications to the existing Accotink sewer connection to the screening building. These modifications are needed because the new pump station would be built where the existing Accotink lines are installed. The NMCPCP is being able to accelerate the construction of improvements to the B3 Equalization Tanks because of the CMAR delivery method, enabling bid packages to be put together ahead of the new odor control system.

What Will Attendee Learn: Clients can understand the benefits of CMAR on overall project quality, cost and schedule. For engineers, they will learn how it helps with real time constructability input, quality control and stronger partnering during construction.

Speaker Bio: Beth serves as an Engineering Manager at Black & Veatch. With over 18 years of experience, her focus has been on facility upgrades at wastewater treatment plants, especially related to ENR, biosolids and rehabilitation. Beth is a registered PE in Maryland and Virginia. She has an undergraduate degree from Marquette University and a graduate degree from Johns Hopkins University.

Utility Management, Room 203-204
Friday, September 2nd, 2022, 10:15 AM
Jason Carter, Arcadis, Inc.
The Innovation Journey at WSSC Water - Mapping Out Success!

Abstract: The Washington Suburban Sanitary Commission (WSSC Water) has developed and began executing a five-year roadmap for empowering a culture of innovation. This roadmap helps align innovation priorities, resources, people and metrics with the utility's most critical challenges and opportunities. Using the lessons learned from WSSC Water's experience in developing this tool, other utilities can begin their own journey toward an environment for innovation leading to more sustainable organizations. To build on this success over the last 100 years, WSSC Water's recently developed Office of Innovation & Research (OIR) launched the Five-Year Roadmap for Innovation Program Development. This effort grew from a series of workshops and interviews with WSSC Water leadership to broaden departmental engagement in innovation activities and to further formalize their innovation program. During these workshops, WSSC Water leadership used the WRF 4642 Utility Innovation Framework to benchmark their current innovation environment and maturity level. They also discussed legacy innovation programs, including successes and possible challenges to future utility-wide innovation efforts. As a conclusion to these workshops, WSSC Water used industry examples to collaboratively build a vision for the future of innovation at their utility. Based on this vision, program building blocks and candidate performance measures were developed to help them track progress toward these aspirations. WSSC Water began making this vision a reality by establishing buy-in from executive leadership and key organizational divisions. As a next step, WSSC Water built an organizational structure designed to effectively support organization-wide innovation, including the development of the OIR Team within the Office of the Strategy and Innovation. Finally, through a second series of collaborative work sessions, WSSC Water assembled innovation program action items in the Five-Year Roadmap to guide implementation of processes, metrics, and growth of the innovation program. As part of this roadmap, WSSC Water has identified specific idea management infrastructure, engagement, data and funding necessary to support success. The OIR has begun implementing the program building blocks outlined in the roadmap including establishing a cross functional collaboration framework with the Office of Asset Management, conducting a long-term planning exercise through scenario planning to frame near-term investments, and revamping the idea evaluation process. As a part of this presentation, we will describe the necessary competencies for building and launching a fit-for-purpose innovation roadmap as well as lessons learned from putting this roadmap into action. Specific critical steps will be described in detail including leveraging ideas and processes already in action within the organization to build momentum, assessing partnerships for impact, developing a robust idea pipeline and empowering staff engagement in idea development as well as adoption. In addition, we will share insights gained since the original launch of the innovation program in 2014 and the numerous ideas evaluated. In combination with executive advocacy and a facilitating structure, the Five-Year Roadmap will position WSSC Water to broaden engagement to the entire organization.

What Will Attendee Learn: Participants will gather the necessary competencies for building and launching a fit-for-purpose innovation roadmap as well as lessons learned from putting this roadmap into action. Specific critical steps will be described in detail including leveraging ideas and processes already in action within the organization to build momentum, assessing partnerships for impact,

developing a robust idea pipeline and empowering staff engagement in idea development as well as adoption.

Speaker Bio: Jason Carter serves as Strategy, Innovation & Business Transformation Lead for Arcadis North America. He has worked globally with utilities studying emerging issues and developing best practices in fields such as strategic planning, operational optimization, treatment technology development and utility management. Previously as Arcadis' Delivery & Innovation Leader, he led innovation investments across water, infrastructure, and environmental business lines.

Utility Management, Room 203-204
Friday, September 2nd, 2022, 10:45 AM
Adi Karisik, Jacobs Engineering
Cybersecurity Infrastructure: A Must for Water Utilities of the 21st Century

Abstract: With the advent of Internet-of-Things (IoT) technologies and the integration of Information and Operational (IT and OT) environments, a clear trend of increasing cyber threats is emerging. The consequence of a cyber breach to a water organization can include major public health risks, production disruption, water quality impacts, unintended discharge with negative environmental consequences, equipment failure, and interruption of service to customers. Water agency leaders need mature methods for cyber risk evaluation and a cybersecurity program strategy to secure their water networks. In this presentation, we will provide an overview of state of OT cybersecurity, and some trends and issues we have observed in water sector, referencing real life examples. Protecting assets requires a holistic security approach that addresses internal and external threats, uses multiple layers of defense and utilized diverse technologies for threat detection. The paper will highlight the following key approaches of water cybersecurity strategy planning: • Boundary protection is not enough. All network assets (human and machine) must be identified and just because an element exists on the network, doesn't mean that it should gain automatic access to all resources. Network monitoring software with Threat Intelligence feeds should continuously monitor the network for suspicious activity. • A robust governance framework and a collaborative effort between cybersecurity teams, and asset strategy, planning, investment, and risk teams provides insights into the CapEx and OpEx trade-offs in the cybersecurity programs, enabling sustainable investment and timely technology adoption. • People are a critical aspect of cybersecurity. Collaborative teams should be drawn from both the IT and OT staff, and receive ample training. • When attackers violate the network, having a threat defense to react and minimize the impact of the attack is critical. This presentation will take the audience through key steps to do so.

What Will Attendee Learn: Attendees will learn about the current state of cybersecurity including trends and emerging threats and will also learn about key approaches to cybersecurity strategy planning for the water sector.

Speaker Bio: Adi Karisik serves as Jacobs Global Technology Leader for Operational Technology. He has over 20 years of domestic and international experience in Operational Technology program management, strategy, operations, cybersecurity and intelligence, ICS, classified operations, and operational technology. Adi has also managed and directed various size teams in IT/OT/IoT Cybersecurity programs and has consulted with different types and sizes of organizations on their cybersecurity needs.

Utility Management, Room 203-204
Friday, September 2nd, 2022, 11:15 AM
Mohammed Rahman, Baltimore City DPW

S-O-S, PLEASE, SOMEBODY HELP ME: BALTIMORE CITY'S SEWAGE-ONSITE-SUPPORT PILOT PROGRAM HELPING RESIDENTS ON BASEMENT BACKUPS

Abstract: The Sewage Onsite Support Program (SOS Program) was launched by the Mayor of Baltimore City on March 23, 2021, as a pilot program to assist residents by providing direct cleaning and disinfection services at no cost. To qualify under the SOS program, the residents (homeowner or tenants) must have been impacted by sewage backup caused by a capacity-related wet weather event. The services are provided by 3rd party professional cleaning vendors hired by the Department of Public Works (DPW) under this program. Residents are eligible for the SOS Program if their sewage backup was caused by a capacity related wet-weather event. The SOS Program helps promote health of residents by professionally removing potentially harmful sewage and also simplifies matters for the homeowner since the homeowner will not have to contact private insurance and pay a deductible to clean-up sewage backups. The payments made under the SOS Program are from the operating funds of the wastewater enterprise fund. The SOS Program provides direct assistance by dispatching professional 3rd party contractors to clean and disinfect the affected property thereby preventing the residents from out-of-pocket expenses for the cleanup. The cleanup service is provided and paid for by the City of Baltimore. To get help with a sewage backup via the SOS Program, residents need to call 311 to report the sewage backup. Once a call is received, DPW will send an inspector to determine the cause of the sewage backup. The inspector will determine whether or not the sewage backup qualifies for the SOS Program. Upon confirmation of eligibility, cleaning services are offered by DPW. This cleaning services involves disinfection and cleaning, disposal and removal of soiled property, deodorization, dehumidifying, and drying. The SOS program staff also reviews the rain data and the hydraulic model information to qualify the resident under the SOS Program. This presentation will discuss the implementation of Sewage onsite support Program and various tools used under the program to qualify the residents in real time utilizing the rain sensor data, Hydraulic Model and Utility investigation information. The presentation will also showcase the dashboard developed for the program to track the progress of the cleanup jobs and also to track the contractor's performance. The goal of this presentation is to showcase improvement of efficiency of SOS program by utilizing dashboards and data analytics thereby improving the services provided to the resident.

What Will Attendee Learn: The goal of this presentation is to showcase improvement of efficiency of SOS program by utilizing dashboards and data analytics thereby improving the services provided to the resident.

Speaker Bio: Mohammed works as a Chief Technical officer for the Bureau of Water and Wastewater and has a Masters Degree in engineering.

Wastewater Collection Systems, Room 217
Thursday, September 1st, 2022, 8:30 AM
Burak Kaynak, DC Water
Rehabilitating a century-old sewer in an environmentally sensitive area with permissions from multiple agencies in Washington, D.C.

Abstract: The District of Columbia Water and Sewer Authority (DC Water) must repair the century-old sewers located in an environmentally sensitive area. The sewers are located on lands managed by US National Park Service (NPS) and in a District-owned urban forest. The land is part of Rock Creek Park – a true gem in our nation's capital. The existing sewers were constructed with clay pipe and brick manholes in 1907 and 1908. A 2011 CCTV assessment showed structural deficiencies and infiltration. An Environmental Assessment (EA), Wetland and Floodplain Statement of Findings (SOF), and the Finding of No Significant Impact (FONSI) were prepared per National Environmental Policy Act (NEPA). The SOF and EA considered alternatives that were evaluated to characterize impacts to wildlife, vegetation, wetland, floodplain, and other resources. During the permit process there were several failures. Emergency repairs were made to stop dry weather overflows, wet weather damage, and exfiltration. Each time the emergency repairs were completed, the permit process started back where it had left off with the sewer still in need of a permanent solution. Now that the permitting process is complete, the sewer system will be rehabilitated using CIPP. Rehabilitation requires four Heavy Equipment (HE) vehicular access paths inside the Park. The HE paths are constrained by a narrow limit of disturbance that impacts means and methods for larger construction vehicles and equipment. Walk-in paths will also support walk-behind equipment such as wheelbarrows. Stream improvements are required near exposed sewer assets. The asset in these areas have a high risk of structural damage and deformation, as well as groundwater and stormwater infiltration. In conjunction with the asset protection measures, banks will be stabilized from scouring to protect the currently exposed sewers. Because the project is located in a very active community, we undertook significant community outreach efforts. Several community meetings were held, often attracting more than 100 residents. The neighborhood includes an Embassy, a museum, condominium and apartment buildings, and numerous high-value single-family residences. The traditional low-bid procurement was replaced with QBS. DC Water evaluated technical proposals from contractors and selected contractors with experience and qualifications matching the project needs. The project also includes an incentive for saving trees. In July of 2021, DC Water issued a supplementary specification in addition to its "Sewer Lining CIPP" specification. DC Water added requirements for air emissions of styrene odor.

What Will Attendee Learn: Lessons learned about: Coordination/Permitting from multiple agencies, Quality-based procurement, Incentive strategies, Community outreach efforts, design in environmentally sensitive and difficult terrain, and many more.

Speaker Bio: Burak Kaynak is a Licensed Civil Engineer and Project Management Professional, has a master's degree in Civil Engineering, has over 9 years of engineering experience across the water and sewer industry. He has managed numerous projects from planning to design, as well as bidding and construction. Projects include water piping replacement and rehabilitation, sewer rehabilitation, and stormwater hydrology.

Wastewater Collection Systems, Room 217
Thursday, September 1st, 2022, 9:00 AM
Angela Cornish, Baltimore City
Flexibility Drives Micro-tunneling Success

Abstract: The High Level Sewershed is a critical link in Baltimore City's sewer collection system, despite covering less than 10% of the City's area, conveying sewage flow from the west side of the City and parts of Baltimore County to the Back River WWTP. Several of the City's other Sewersheds discharge into the High-Level Interceptor along the way. Multiple engineered SSOs were found in the Sewershed during the study phase that required elimination per the City's Consent Decree, with three remaining to date. The overflows are located at the northern end of the Sewershed, an area that has flat topography, meaning that the existing collection system was built with minimal slopes. The undersized pipes frequently surcharged and activated the SSOs. Sanitary Contract 940 was initiated by the City to eliminate two of these overflows by designing and constructing an underground storage tank near Towanda Park. Once the City determined to convey and store flows at the Back River WWTP, it was decided that the project would be changed to pipe upsizing to increase the capacity of the collection system. Multiple scenarios were studied, including parallel relief, stacked pipe configuration with the new pipe installed above the existing pipe, and a new alignment. Due to site constraints, it was determined a new alignment installed by micro-tunneling was the best choice. After a 3-year design process, award of the project to the Contractor was delayed by one year due to a bid protest. Construction began in November 2019, four months before the COVID-19 pandemic affected the US. The construction phase has navigated COVID related shutdowns, supply chain issues, material price escalation, consent decree extensions, and difficult geology during tunneling operations. By leaning on the various experiences of the design team, the Contractor, and City project staff, a flexible team-oriented approach, meeting the needs of all parties, was employed to great success. This presentation will discuss the multiple design choices and challenges that were overcome during the design phase, including ensuring that the project would receive adequate bidding competition while being open to alternative proposals from the Contractor that would save the project time and/or money. In addition, solutions found through workshops during construction requiring compromises for each issue will be discussed.

What Will Attendee Learn: The multiple design and construction challenges encounter and the innovative solutions made to overcome projected and unforeseen conditions in an attempt to bring project in on time and under budget.

Speaker Bio: Construction Project Supervisor for City of Baltimore, with over 25 years, experience in the Department of Public Works

Wastewater Collection Systems, Room 217
Thursday, September 1st, 2022, 9:30 AM
Angela Cornish, Baltimore City, DPW, Office of Engineering and Construction
Urban Stream and Sewer Improvements in Parallel…A Challenging Project

Abstract: Chinquapin Run Stream, located in north-central Baltimore, is comprised of numerous tributaries and storm drain outfalls that converge through private properties, public park areas, and college campus to a confluence with Herring Run. Sanitary Contract 910 consisted of 2-miles of stream stabilization and restoration work in parallel with utility upgrades in an urban environment with varying rock elevations that presented a challenging yet rewarding project. This complex Consent Decree project upsized and relocated gravity sewers (8" to 30" diameters) located both within and along low points of Chinquapin Run Stream. Installation primarily entailed open-cut excavation. Pipe bursting was also utilized to avoid private property along with two tunneling operations (micro-tunneling and auger boring) which were used to safely cross beneath major City roadways that had to remain open during construction. One of the key construction issues was installation of planned in-stream rock structures throughout the two-miles of stream restoration which were affected by varying bedrock elevations. Bedrock was exposed throughout the different reaches (areas) of the stream baseflow, but many areas had bedrock which was obscured by stream channel material and the incised stream banks. This required extensive monitoring, updated bedrock surveys and flexible approaches from both the designer and inspection staff to quickly address changes required to move the project forward. Consideration was given to the possible need for structure changes such as moving structures upstream or downstream, identifying if footers could be installed per the construction detail or if the footers would be using the bedrock instead. Conditions had changed between the initial design and construction phase. Banks were found to be eroded, bridge wingwalls were undermined, third-party utilities had become aerial across the stream. In one sewer segment, an 18' tall stream slope had sloughed off directly adjacent to an apartment building and was no longer stable enough for installation of new sewer pipe nor was there room for access. Rather than expensive and complex installation of sheet piles, which was further limited by bedrock, the City coordinated with contractor, engineer, and Maryland Department of the Environment, to redesign the area to make it safe and constructible. Additionally, progress for sewer construction was impacted by removal of rock for both sewer and stream work. Various rock removal methods were utilized with varying degrees of success. Geotechnical experts were engaged throughout the project to determine the feasibility of approaches proposed by the contractor. At completion, the stream was stabilized, incised channels were mediated, bank erosion issues affecting both public and private properties were alleviated, and fish passages restored. The sewer upsizing eliminated modeled sanitary sewer overflows, replaced aging infrastructure, and moved at-risk sewer assets out of the floodplain. This project was one of the largest municipal urban stream restoration projects in the state of Maryland and required unique strategies during the construction phase to complete.

What Will Attendee Learn: The attendees will learn of the measures taken to overcome the obstacles of rebuilding 2 miles of urban stream while installing an adjacent 30" sanitary sewer line.

Speaker Bio: Angela Cornish is a Construction Project Supervisor with 25 years experience with the Baltimore City Department of Public Works, Office of Engineering and Construction

Wastewater Collection Systems, Room 217
Thursday, September 1st, 2022, 11:00 AM
Paul Lee, Wallace Montgomery & Associates, LLP
Baffled?! Solving Pump Air Binding with Out of Box Thinking Process

Abstract: Marley SPS is an above grade, brick mortar, pump station located at Norman Ave, Glen Burnie, Anne Arundel County near Marley Creek. It is equipped with four, 250 Hp, variable speed pumps and associated equipment. The rated capacity of each pump is 4.92 MGD (3420 gpm @143 feet TDH (Total Dynamic Head)). The pump station design flow rate is 14.76 MGD. The pump station was originally constructed and put into service in the late 1950s. The wet well was expanded in the 1970s. During expansion the wetwell, a common wall separates the original and new wet well. Both wet wells are connected with 2 - 4 foot wide by 9 foot high openings in the common wall. The pump suction bells are located in the original wet well. However the wet well influent was relocated to a new wet well. In 2013 the station was upgraded again to increase station capacity which included pump, piping, influent channel grinder, mechanical and electrical upgrades. During start-up when of newly added 16.5 MGD grinder is turned on, air binding on Pump No.4 was observed and triggered multiple alarms. This issue reduced the station capacity and did not allow to rotate the pumps in sequence thus causing wear and tear. Earlier design evaluations, by a consultant retained by the County, to eliminate the air lock on Pump No.4 focused on three alternatives with recommended alternative of installing concrete baffle. Several questions were raised such as: Will concrete baffle work? Where this would be installed? How would be sized and positioned? What criteria will be used to understand flow behavior and pattern? Will Computational Fluid Dynamic and Hydraulic Modeling be cost effective? How to install baffle while maintaining continuous Sewer Flow Marley SPS? How to set bypass pumping and for how long to minimize the cost? How to overcome installing precast concrete baffle circumventing the existing upper and lower level grating and I-beam supports? Will replacement of the unsafe aluminum grating with reinforced fiberglass plastic grating accomplish both objectives? This presentation will discuss the design approach/strategies that Wallace Montgomery implemented to resolve air binding issue at Pump No.4 and its outcomes. Below are steps taken during the design phase: 1. Developed a lightweight, wood frame and plexiglass portable baffle to use in the wet well under flow conditions to evaluate effectiveness and positioning. 2. Recommended and design a lightweight stainless steel, non-corrosive, structural and adjustable baffle for the final installation. 3. Evaluated site constraints to ensure heavy equipment and crane(s) can be positioned to access and lower baffle in place. 4. Designed bypass system with redundant pumping independent of possible coordination with emergency generator project as timing was unknown. 5. Evaluated Pump #4 performance after the installation of the baffle and adjust baffle as needed. No air locking and full capacity restored when the 16.5 MGD grinder was in operation. Mission Accomplished!

What Will Attendee Learn: How to resolve air locking of sewer pumps and thinking outside of the box using in-field experimentation to help refine design.

Speaker Bio: Paul H. Lee, P.E., P.Eng. is Professional Engineer with Wallace Montgomery & Associates, LLP with over 34 years of international experience in the water/wastewater industry having serve on both the public (city engineer) side and consulting side. He has a B.A.Sc. in Civil Engineering degree from the University of British Columbia.

Wastewater Collection Systems, Room 217
Thursday, September 1st, 2022, 11:30 AM
Richard Pope, Hazen and Sawyer
Collection System Odor Abatement for Anne Arundel County

Abstract: Hazen and Sawyer (Hazen) was by Anne Arundel County to assess three main sewer service areas in Anne Arundel County, MD for odorous and corrosive conditions. Hazen engineers conducted a data review, several site visits, and a monitoring and sampling campaign to identify the nature of odorous locations. During the site visits, Hazen assessed the existing condition of manholes and pump stations and conducted a two-week monitoring and sampling campaign to determine the severity of odorous compound concentrations. For each of the odorous locations described, complete liquid- and vapor- phase speciation of odorous compounds was performed. From the data review, three main collection areas of Anne Arundel County's sewer system were identified: 1 - A large (pop. ~2000) coastal neighborhood, with several bars and restaurants, which is served by four low pressure grinder pumps and two, small format wet well pump stations that share a force main. 2 - The primary force main which conveys wastewater from over 40,000 residents in and around Anne Arundel County to Broadneck Water reclamation facility. Odor complaints follow the force main for approximately five miles of sewer and have resulted in odors off gassing through residential house vents. This collection system includes many types of pump stations including numerous grinder pump wet wells, which were previously implicated. 3 - A small (pop. ~400) coastal neighborhood where odor complaints center on a single manhole located at an intersection which hosts high foot traffic. Local wastewater is conveyed via three small-format wet wells which lack space for chemical dosing schemes. This investigation presented unique challenges that accompany highly distributed sewer service areas in coastal lowland topographic regions with dense residential populations. Initial data review relied heavily on comparison of geographic elements and collection system assets. Several different diagrams of the County's collection system were related to high-level, maps which were plotted in GIS to portray gravity sewers, force mains, and pump stations. This approach expedited the identification process by reducing the number of investigational site visits. Once several odor hotspots were deduced, field visits were conducted to confirm hypotheses. Continuous sampling of H2S gas concentrations in sewer headspace and wastewater and air-grab samples were collected during the field visits to fully describe odorous conditions. Then, in collaboration with County personnel, several paths for odor treatment were selected for piloting. We will discuss in detail the technologies selected to pilot, the results of the pilot and the long-term solutions for odor control mitigation at these locations.

What Will Attendee Learn: The attendee will learn how to assess, address, and identify the source of odor control issues in residential sewer systems through sampling, monitoring, modeling, and pilot testing of odor control technologies.

Speaker Bio: Dick is a registered PE and Board Certified Environmental Engineer with 43 years of experience. He has worked at over 250 facilities in 35 states and 10 countries and is recognized nationally and internationally as an odor control expert. Dick manages Hazen & Sawyer's corporate-wide odor services, which include field investigations, odor dispersion modeling, odor control planning, technology selection, conceptual design, system start-up/troubleshooting, community outreach, and expert testimony.

Wastewater Collection Systems, Room 217
Thursday, September 1st, 2022, 12:00 PM
Tim Hartwell, Hartwell Engineering
Sustainable Energy Solutions for Wastewater Pumping Stations in Anne Arundel County, Maryland

Abstract: Anne Arundel County Maryland has over 260 sewage pump stations with the majority of these using diesel powered standby generators for emergency power requirements. As an alternate to this source of emergency power a feasibility study was performed to provide an evaluation for sustainable energy alternatives for emergency power at various Sewage Pumping Station (SPS) sites. This study evaluated the use of battery storage and renewable energy at SPSs in the County. The primary component of the study focused on a battery backup system similar to, but not limited to, Powerpack batteries designed by TESLA Corporation and renewal energy such as solar, to maintain the power for the batteries. The study addressed various components of the battery storage system and developed comparisons to standard diesel powered generators. The study provided review data of the targeted sewage pump stations to determine the feasibility to provide battery storage and solar energy at these sites versus standby generation. As this type of energy evaluation is relatively new to the wastewater industry specifically at smaller facilities such as sewage pumping station, the investigation included review of numerous other studies concerning the use of sustainable energy, battery energy storage systems (BESS) and alternative power sources to supplement the BESS. Manufacturer's data from several battery, solar, and other manufacturers were reviewed and used for references during the study. Additionally, specific requirements pertaining to small capacity versus larger capacity stations was evaluated to determine feasibility of the various sizes of wastewater pumping stations throughout the county. The presentation for this feasibility study will provide the attendees with the results of the study for these facilities at Anne Arundel County, including the capital and life cycle cost comparisons, the findings for physical installation of the equipment at a sewage pump station, the battery available power and recharge requirements. discussions with the state for replacement of the diesel generators with sustainable energy battery systems, comparisons of pump station capacities regarding feasibility of sustainable energy systems, and intangibles such as social and neighborhood impacts.

What Will Attendee Learn: Attendees will learn about the feasibility of implementation of sustainable energy systems in wastewater pumping stations as an alternative to standby generators. Comparisons of generators to sustainable energy system costs, physical sizes, power requirements, pump station capacity, and social impacts will be discussed.

Speaker Bio: Tim L. Hartwell, P.E. has 35 years of experience in electrical and control system design in the water and wastewater industry throughout Maryland and the mid-Atlantic region. Many of these years have been working with Anne Arundel County Department of Public Works on sewage pump stations, wastewater treatment plants, water treatment plants, and various electrical and control system projects.

Wastewater Collection Systems, Room 217
Thursday, September 1st, 2022, 2:00 PM
Brian Plymale, Department of Public Works, City of Rockville
Using Transmissive Acoustics to Prioritize Sewer Cleaning and Reduce SSOs in Rockville, MD

Abstract: Effectively deploying resources daily to reduce sanitary sewer overflows (SSOs) is a tricky challenge. If cleaning resources are deployed to pipes that are functioning properly, then time and money are wasted. But if a blocked pipe is overlooked, SSOs may occur. For the average utility, determining where the 10-35% of pipe segments with blockage conditions are located within their network is challenging. Prior to integrating acoustic technology, the City of Rockville in Maryland, like most utilities, used a time-based (or basin-by-basin) approach to service its 150 miles of sanitary lines. This resulted in cleaning many pipes that did not need the investment. Furthermore, blockages in the system were being missed, resulting in 25 sanitary sewer overflows in 2014. In 2015, City of Rockville implemented acoustic inspection technology and transitioned to a condition-based maintenance approach. The technology, called the Sewer Line Rapid Assessment Tool, or SL-RAT, uses sound waves to quickly assess for blockages. The SL-RAT can provide an assessment in three minutes or less, meaning a two-person crew can inspect 10-20,000 ft/day. Since the SL-RAT is a very fast and low-cost assessment tool, Rockville could inspect one to two miles per day, with the goal of acoustically inspecting their entire system biannually. By using the SL-RAT, Rockville addressed two objectives. First, acoustic inspections allowed Rockville to understand where problem segments are and address them preventatively before they caused SSOs. By 2019, Rockville reduced SSOs drastically from 25 occurrences in 2014 to only 6 occurrences in 2019. Secondly, Rockville utilized the SL-RAT to quickly reinspect pipes after cleaning to validate cleaning efforts and allocate additional resources as necessary. One of the many significant benefits of this SSO reduction was to reduce annual insurance payouts attributed to residential sewer back-ups from approximately $100,000 per year to $0 currently. This presentation will discuss Rockville's implementation process of acoustic technology, focusing on practical application and benefits. The standard operating procedure Rockville developed and their integration of data through an ArcGIS system will be discussed. Furthermore, limitations of the technology will be reviewed to give a comprehensive understanding of the technology's application.

What Will Attendee Learn: This presentation will discuss how the City of Rockville implemented acoustic inspection to enable a condition-based approach to collection system maintenance. Rockville's implementation process and results will be shared to demonstrate how the technology works, how it should be integrated, and what limitations to consider.

Speaker Bio: Brian is the Operations & Maintenance Assistant Superintendent for the City of Rockville. He has served as Assistant Superintendent for the past 15 years and has over 28 years of experience in Public Works. Prior to this role, Brian developed experiences in various positions including carpentry, mechanics, farming, landscaping and excavating. Brian grew up in Poolesville, Maryland and enjoys spending time with his wife, two children, and four beautiful grandchildren.

Wastewater Collection Systems, Room 217
Thursday, September 1st, 2022, 2:30 PM
Jennifer Steffens, Suez Smart and Environmental Solutions
How to Find the Sweet Spot for Sewer Cleaning Frequency

Abstract: This presentation will summarize the work that has been done on a novel predictive cleaning technique intended to determine the condition of sewers to optimize cleaning activities. All wastewater utilities must perform cleaning to maintain sewer assets in good working condition. Cleaning too frequently results in inefficient use of resources and may contribute to pipe degradation, potentially accelerating structural failure. Cleaning too infrequently can result in buildup of FOG and other deposits over time, potentially resulting in overflows. Utility managers have made great progress in determining cleaning frequencies based on experience of cleaning crews, and by studying CCTV and other inspection data to find "hot spots" which are at higher risk of developing obstructions. Typical approaches of increasing or decreasing cleaning frequencies based on amount of sediment removed, or nearby overflow events are sound, but the data is immense, and utility managers require tools to speed this process and make it accurate and repeatable. For this need, Suez has developed a novel approach using machine learning (ML). This approach promises both 1) cost savings over time-based preventive cleaning, because tasks are performed only when warranted, and 2) risk reduction since maintenance activities can be targeted to risk-prone area before issues occur. Suez has developed this predictive cleaning technique with the support and data from three utilities located in Spain, France, and USA. The presentation will discuss these projects, the technique, data required, integration and correction of the data, and discussion of the impact of the results.

What Will Attendee Learn: Upon completion, participants will have a basic understanding of the data required to run machine learning tools on their sewer cleaning data, and what some of the issues can be. Upon completion, participants will be able to reduce sewer cleaning frequencies without increasing risk of blockages.

Speaker Bio: Jennifer Steffens is a professional engineer with over 15 years of experience in the water industry. She currently serves as Director for SUEZ's Smart & Environmental Solutions in North America.

Wastewater Collection Systems, Room 217
Thursday, September 1st, 2022, 3:00 PM
Paul Sayan, WSP
Six Years of SL-RAT Data and What has Baltimore County Learned?

Abstract: In 2015 Baltimore County (County) implemented the Sewer Line Rapid Assessment Tool (SL-RAT) program to identify and prioritize sewer maintenance work. Prior to implementing the SL-RAT program, the County, like most utility owners, cleaned all sewers on a fixed frequency as mandated by the County's Consent Decree. However, beginning in 2015, the County transitioned to a data-centric sewer operation and maintenance program (O&M), starting with the SL-RAT program. Since program implementation, the County cleans, on average, 1 out of 10 pipe and reduced the number of dry-weather sanitary sewer overflows by approximately 33 percent. The SL-RAT program's success has made equipment and staff resources available for other operational and maintenance activities and reduced the County's reliance on contractor resources. With 6 years of SL-RAT data, the County is taking the next step to improve its data-centric O&M program by integrating SL-RAT degradation analysis with the County's existing O&M risk model to predict/prioritize future maintenance work. The risk model is used to identify and prioritize maintenance work and, as currently envisioned, the SL-RAT data analysis would determine the maintenance work frequency. This presentation will discuss (1) an overview of the County's current SL-RAT program, (2) findings of the County's SL-RAT data analysis and (3) possible alternatives for integrating the County's risk model and SL-RAT analysis.

What Will Attendee Learn: Attendees will learn how acoustic data/data analysis can be used to develop a data-based sewer cleaning program and how the data can be incorporated into an asset management program.

Speaker Bio: Paul is an associate vice president with WSP. He has over 25 years experience collaborating with various utility owners across the country to manage capital and operational improvement programs, improving business practices and assisting owners with resource management. Paul holds a bachelors degree in civil engineering from the California State University at Long Beach and a masters degree in environmental engineering from the Johns Hopkins University and is a licensed engineer in MD and CA.

Wastewater Collection Systems, Room 217
Thursday, September 1st, 2022, 4:00 PM
William Elledge, DC Water
Large Diameter Pipe and Tunnel Rehabilitation Challenges on the Potomac Interceptor

Abstract: The Potomac Interceptor (PI) is a major asset within the DC Water sewer system which conveys sewer from Dulles International Airport, Loudoun and Fairfax Counties in Virginia and Montgomery County in Maryland to the Blue Plains Advanced Wastewater Treatment Plant in DC. Constructed along the Potomac River in 1963 as Reinforced Concrete Pipe (RCP) and rock tunnels, the asset has no redundancies. This project focuses on addressing severely deteriorated segments of the PI adjacent to Manhole 31 located in the Great Falls area of Fairfax County, Virginia. The deteriorated pipe segment is 78-inches in diameter and ranges 35 to 90 feet in depth consisting of RCP and rock tunnel. Given the challenging nature of the project, involving significant depths into rock, deteriorated pipe walls, relentless high-velocity sewage flows of 55 mgd ADF to 98 mgd Peak, and in an environmentally sensitive parkland, DC Water focused on risk mitigation. One of the major risk concerns revolved around the excavation down to the deep pipeline, while avoiding potential failure or collapse due to its deteriorated stage. This required "out-of-the-box" approaches to accurately locate the deep asset, assess its condition, and develop a constructible solution for rehabilitation. An added challenge was that the 1963 record drawings were inaccurate in depicting the actual pipe to tunnel transition point and alignment of the pipe. This caused the Design-Build Team to verify the deep construction using innovative internal pipe surveys and external geotechnical and geophysical investigations. By mapping the alignment internally using LiDAR coupled with external borings, rock cores, and electrical resistivity imaging, team was able to locate the alignment, pipe to tunnel transition point and assess the severity of the pipe. Interpreting the data allowed the Team to identify and list risks in the Risk Register, then work to mitigate the risks throughout the rehabilitation design. The proposed design implements an "in-the-dry" design solution that avoids costs and risks due to bypass pumping. To prevent the risk of collapse during construction, a temporary 72-inch steel casing pipe will be slip lined through the most severely corroded pipe segment. The rehabilitation project is due to begin construction in Spring 2022.

What Will Attendee Learn: Challenges faced during the design phase of a large diameter deep sewer rehabilitation and how risks were mitigated through progressive design-build.

Speaker Bio: William Elledge is the Senior Manager of Design at DC Water. William's career has focused on water and sewer pipelines since 1998 with responsibility for delivering projects up to 180-miles long, 22 feet in diameter, and 2000 cfs. He has delivered projects in eight states (including the District of Columbia), three countries, and two Native American Nations. At DC Water, he is responsible for design of all projects in the linear water and sewer capital program.

Wastewater Collection Systems, Room 217
Thursday, September 1st, 2022, 4:30 PM
Kyle Stewart, DC Water
Box-Tunneling Saves the Day from Utility Congestion

Abstract: Working in a small historic city with old and abandoned infrastructure, one of the many challenges you will face when performing construction work, particularly excavation, is utility congestion. Many times, other utilities or infrastructure will be in conflict with the utility you are trying to repair. Calling Miss Utility for markings is a good way to identify those utilities that will be within the vicinity of your excavation. This allows for some pre-excavation planning, however, there are times when you encounter unmarked utilities that may, or may not, be abandoned. When the utilities are above and in the way of the utility you are trying to repair, you'll have to get creative with your repair approach. Such was the case at 529 14th St NW, where there was no direct access to a broken 10" lateral servicing the National Press Building due to several utilities in the way and little spacing between them. The lateral was 19 feet deep, meaning that with all the utilities in the way and little spacing between them, traditional excavation and shoring would have been very challenging. It would require a large and extensive excavation with expanded length and width. DC Water first reached out to the owners of the utilities in conflict to see if they can be moved to allow easy access for excavation. After being unsuccessful with contacting some of the owners and getting others to temporarily relocate their utility, DC Water directed its contractor, Spiniello Companies, to hand-excavate and expose the utilities. During excavation, we uncovered even more unmarked utilities, again, with little spacing between them. DC Water backfilled the excavation knowing that it will be difficult to excavate deeper and practically no avenue to shore. The next approach was to excavate adjacent to the initial hole and then dig towards the broken lateral. Again, we encountered more utilities. Ultimately, DC Water decided to backfill the second excavation. Knowing that performing traditional excavation would require a large footprint on a busy arterial roadway, and a complicated shoring system, DC Water decided to look for other alternatives. One of those options, box-tunneling, became attractive because the broken lateral terminated at a manhole about 10 feet from where the break was. DC Water's other contractor, Anchor Construction, box-tunneled from inside the manhole using hand tools, shoring along the way, until they reached the broken pipe. We were able to make the repair to the sewer lateral, rebuild the manhole wall, and fill the tunnel with flowable fill. This time and cost saving approach required no restoration. Since all work was performed through the manhole, the work zone was small and the impact to traffic was minimal. Box tunneling truly saved the day.

What Will Attendee Learn: The audience will learn about a creative approach, box-tunneling, used to solve a challenging construction problem associated with not being able to excavate due to utility congestion.

Speaker Bio: Mr Stewart has over 15 years of construction experience with both water and sewer utilities. He assists with managing four emergency contracts totaling around $50M. Mr. Stewart has served DC Water in a variety of roles since 2006.

Wastewater Collection Systems, Room 217
Thursday, September 1st, 2022, 5:00 PM
Mohammed Rahman, Baltimore City DPW

BALTIMORE CITY DEPARTMENT OF PUBLIC WORKS ACCELARATED DESIGN PROJECT DELIVERY METHOD

Abstract: Baltimore City Department of Public Works is under a Federal Modified Consent Decree (MCD) for improvement of Sanitary Sewers in the Baltimore City, with Environmental Protection Agency, Department of Justice and Maryland Department of Environment. Under the MCD, Baltimore City is required to improve the sanitary system by reducing the Inflow and infiltration (I&I) in High I&I basins through comprehensive rehabilitation to remove rainfall dependent I&I and reclaim the lost capacity in the affected sewers. Between 2023 and 2030 the City anticipates completing comprehensive sewer and manhole rehabilitation in 76 high I/I basins and approximately 72 miles of conveyance system upgrade projects. Baltimore City has developed a Accelerated design project delivery method to complete the projects earlier and shortening the design/construction time which will (1) support the City to meet the MCD Deadline; (2) optimize resource allocation and (3) optimize cost distribution and affordability. Accelerated design (AD) is a project delivery method where repair/rehabilitation recommendations made by design engineers are immediately assigned to construction contractors, thereby eliminating the time and cost related to design work. Accelerated Design is appropriate for Trenchless rehabilitation technologies like cured-in-place pipe (CIPP) work since the work can be completed without disturbing existing infrastructure and/or ground conditions. In typical AD applications, the utility owner awards multiple construction on-call contractors, who are assigned work following the utility's typical on-call work assignment process. The Accelerated Design approach will eliminate design work for the utility projects, thereby fast-tracking selected I/I rehabilitation projects by approximately 12-24 months. The goal of this presentation is to discuss about the Accelerated design project delivery method, project selection and project implementation in this delivery method. This presentation will also showcase how City has saved time by fast tracking the projects by utilizing this alternate delivery method.

What Will Attendee Learn: The goal of this presentation is to discuss about the Accelerated design project delivery method, project selection and project implementation in this delivery method. This presentation will also showcase how City has saved time by fast tracking the projects by utilizing this alternate delivery method.

Speaker Bio: Mohammed works as a Chief Technical officer for the Bureau of Water and Wastewater and has a Masters Degree in engineering.

Wastewater Collection Systems, Room 217
Friday, September 2nd, 2022, 10:15 AM
Bisrat Abebe, DC Water

Awakening the Sleeping Giant…Inspection of DC Water's 66-inch/96-inch Anacostia Force Main Gravity Sewer

Abstract: The Anacostia Force Main Gravity Sewer (AFMGS) is a 66-inch to 96-inch reinforced concrete pipe (RCP) which originally spanned approximately 6 miles. The pipeline begins at the WSSC Water-owned Anacostia Wastewater Pumping Station II (AWPS II) and ends at the DC Water-owned Barry Road Screen Chamber, intersecting various properties including National Parks Service, District Department of Transportation (DDOT), and Chessie Seaboard Consolidated Transportation (CSX). Construction of the pipeline occurred in the 1950s over the course of five contracts and was decommissioned in the 1990s when the flow was redirected to the Anacostia Force Main (AFM). This left no redundancy for the AFM, which carries one-third of WSSC Water's total flow. In 2021, DC Water inspected the AFMGS. Main objectives for the inspection were to: (1) assess the current condition of the pipeline, and (2) evaluate cost benefit alternatives to reactivate the pipeline to provide redundancy to the AFM. The inspection of the AFMGS was split into two contracts, where inspection schedules for both contracts were synchronized so the pipeline could be inspected under one tool mobilization and inspection efficiency. As with any project, significant effort was spent during the planning phase to understand not only what AFMGS access ports could be used for pipeline tool insertion, but also the continuity of the pipeline itself. As the DC Metro area continues to grow, as does the DDOT infrastructure projects for the expansion of major roadways and the rebuilding of the 11th Street Bridge. This in tune resulted in different portions of the AFMGS alignment being either bulkheaded and flowable filled and/or removed from the ground prompting strategic locations for tool insertions, which considered the modification and retrofit of existing manholes to accommodate pipeline tool dimensions, asset alignment, addressing permitting requirements for various agencies along the corridor, and maximizing the inspection footage for each run. Data analysis is currently being performed to propose potential rehabilitation alternatives for the reinstatement of the AFMGS. This presentation will include an overview of the planning efforts and condition assessment results, applicable rehabilitation recommendations, and lessons learned during the inspection planning and execution phases.

What Will Attendee Learn: The attendees will learn the value of a programmatic pipe condition assessment approach for the management and rehabilitation of a critical large sewer, and lessons learned during the inspection of large sewers.

Speaker Bio: Mr. Abebe has over 15 years of experience in the water / wastewater industry. Mr. Abebe is the DC Water Condition Assessment Program Manager in the Department of Engineering and Technical Services, Planning Branch.

Wastewater Collection Systems, Room 217
Friday, September 2nd, 2022, 10:45 AM
Michael Trail, Gannett Fleming

In the Thick of Things: Measuring In Situ Drywell Can Thickness to Guide Rehab and Replacement Investments

Abstract: Asset Management is a key topic for all municipalities. Planning when an asset will reach the end of its useful life is always difficult. With the continued belt-tightening of budgets for Public Works agencies across the mid-Atlantic region, municipalities need to find efficient ways to evaluate subsurface assets to determine when repairs or replacement are necessary so that funds can be budgeted accordingly. Sewage Pumping Stations are a significant part of any municipality's sanitary sewer system. Anne Arundel County hired Gannett Fleming to perform a study to evaluate the steel drywell shell thickness of the County's 101 sewage pump stations to assess the level of corrosion or deterioration. We will present the details of the Non-Destructive Test methods and the data collection program of collecting steel wall thickness data and comparing results to physical measurements and to as-builts. By the end of the presentation, attendees will have an understanding of non-destructive testing measurements as they relate to determining the percentage of steel wall thickness remaining in sewer pumping station drywells, in addition to lessons learned.

What Will Attendee Learn: Using non-destructive testing to accurately determine the remaining thicknesses of steel drywells in order to budget and plan for future replacement of the asset.

Speaker Bio: Mike Trail, is a CCM at Gannett Fleming with more than 35 years of engineering and construction experience in the water/wastewater industry. Mike enjoyed a 30-year career at WSSC Water, where he spent his final 12 years in the role of Construction Manager for more than 325 miles of water and sewer projects, ranging in size from 4-inch to 102-inch.

Wastewater Collection Systems, Room 217
Friday, September 2nd, 2022, 11:15 AM
Eric Harold, Carollo Engineers
Intermuncipal Coordination to Manage Strategic Regional Asset Potomac Interceptor (PI) Flow Analysis

Abstract: The Metropolitan Washington region is home to two of the nation's largest utilities, several of the fastest growing counties in the nation, and some of the nation's oldest infrastructure. Managing wastewater in the region is done through a complex web of pipes and pump stations conveying flows from one jurisdiction to another and governed by intermunicipal agreements that equitably allocate capital and operations costs among various utilities. This presentation will describe the collective approach to manage flows on one major intermunicipal interceptor system. The Potomac Interceptor (PI) starts near the Dulles Airport and conveys wastewater from portions of Loudoun County and Fairfax County (Virginia), Montgomery County (Maryland), and the District of Columbia to DC Water's Potomac Pumping Station. From there, wastewater is pumped to the Blue Plains Advanced Wastewater Treatment Plant. With service commencing in 1963, the PI now conveys approximately 60 million gallons per day (MGD) by gravity. The 2012 Blue Plains Intermunicipal Agreement (IMA) governs shared conveyance of wastewater through the PI along with the treatment of these flows at Blue Plains among the PI Users (District of Columbia, DC Water, Fairfax County, Montgomery County, Prince George's County, and WSSC Water). This agreement documents the allocation of flow capacity and peak flow limitations at specific locations along the PI. Ongoing growth within the various jurisdictions along with aging infrastructure that has resulted in excess flows entering the PI have pushed many of the jurisdictions close to their IMA limitations. As Fairfax County, Loudoun County, and Montgomery County continue to see pockets of growth and densification in areas directly contributing to the PI, managing flows within existing IMA levels becomes more challenging. This presentation will describe the consensus-driven approach taken by the jurisdictions contributing flow to the PI and the Metropolitan Washington Council of Governments, which manages the Blue Plains IMA, to address the following challenges: (1) Uncertainty with Projected Future Flows: Projecting future population and employment is challenging due to the dynamic nature of development and the advancement of water conservation technologies that have the potential to minimize wastewater flow generation. This project used an approach that accounts for these uncertainties and provided a range of potential flow scenarios to evaluate the PI.; (2) Balancing Capacity Needs with Infrastructure Renewal: The PI, constructed in the 1960s, is now over 60 years old, and is experiencing decay in many places. This project balanced these critical infrastructure renewal needs with the long-term capacity requirements.; (3) System Constraints: The PI traverses through neighborhoods, national and regional park systems, along the Potomac River, and near dense urban areas. Any potential alternatives to alleviate capacity constraints requires significant multi-jurisdictional coordination, permitting and easement coordination, and stakeholder engagement. The alternative evaluation approach allowed the PI Users to assess the potential capacity improvement alternatives using not only capital cost but other factors that assess the ability to work within complex system constraints.

What Will Attendee Learn: This presentation will describe the collective approach to manage flows on a major intermunicipal interceptor system. The attendees will learn how collaboration with multiple

partners reduces uncertainties in critical flow projections, and how potential improvements can be balanced within complex system constraints.

Speaker Bio: Eric Harold, an Associate Vice President with Carollo Engineers, has nearly 30 years experience in strategic planning, asset management, and wastewater collection system management planning. He has a Bachelor's of Science in Civil Engineering from the University of Cincinnati, and a Masters of Public Policy from George Mason University. He is a registered Professional Engineer in Virginia, Maryland, DC and North Carolina; and is a Board Certified Environmental Engineer.

Wastewater Treatment and Solids Processing, Room 215
Wednesday, August 31st, 2022, 8:30 AM
Mark Rasor, Lemna Environmental Technologies, Inc.
Modeling for Success: Upgrading Lagoon Based Treatment Systems to Meet More Stringent Limits for BOD, TSS and Nutrient Removal.

Abstract: Wastewater treatment process design modeling software, which models biological, chemical, and physical treatment processes, can be used to optimize the design, performance and reliability of lagoon-based treatment systems. Lemna Environmental Technologies (LET) employs a dynamic wastewater treatment process simulation model, to analyze performance of existing facilities and the expected performance of proposed facilities. The modelling software is widely used in the wastewater community to investigate the impact of various changes in loadings and temperatures and allows LET to thoroughly verify process design and performance especially with regards to BOD, TSS and ammonia removal. Using historical DMR data from an installation base of over 300 facilities, LET created a unique software model of its LemTec Biological Treatment Process, which utilizes a combination of aerated and settling lagoon cells for biochemical oxygen demand (BOD) and total suspended solids (TSS) removal, and the Lemna Polishing Reactor (LPR) for nitrification. By calibrating the model through the analysis of historical operating data, the model can be used as an accurate predictor of process performance. The model may be manipulated to reflect the size, configuration, loading, aeration and effluent requirements for current or future facilities and is especially useful in predicting and troubleshooting nutrient removal.

What Will Attendee Learn: 1. How new technologies and advancements in lagoon designs are helping existing communities increase treatment capacity, reduce footprint and improve BOD and TSS removal 2. How nutrient removal options that can be incorporated into a simple lagoon process for NH3, TN and TP removal 3. Examples of small municipalities that have successfully upgraded their lagoon systems to meet current and future effluent

Speaker Bio: Mark Rasor has over 25 years in the application, design, sales and operation of aeration systems including coarse, fine and ultra-fine bubble devices in various configurations. He has additional extensive experience in conventional and extended aeration activated sludge as well as lagoons, sludge thickening, digestion and other ancillary applications.

Wastewater Treatment and Solids Processing, Room 215
Wednesday, August 31st, 2022, 9:00 AM
Thor Young, GHD
Primary settling tank capacity and performance assessment at AlexRenew

Abstract: Alexandria Renew Enterprises (AlexRenew) WWRF was constructed in 1952 and has undergone several upgrades and expansions over the years. The facility is currently rated for an average daily design flow of 54 MGD. Recognizing that many of the system components have reached their useful life or are experiencing periodic operation and maintenance issues, AlexRenew commissioned an evaluation in 2020 of the preliminary and primary treatment systems at the plant to improve performance, operability, maintainability, and redundancy. A key part of this effort was an assessment of capacity and performance of the existing primary settling tanks. Eight (8) rectangular primary settling tanks provide treatment for raw sewage that has received preliminary treatment for removal of screenings and grit. In addition, the primary settling tanks also treat some in-plant recycle flows including backwash water from the tertiary filter system. With internal recycles, the primary settling tanks will need to treat a peak wet weather flow of 125 MGD. The primary objective of treatment in the primary settling tanks is to remove settleable solids and associated organic matter to reduce the concentrations of total suspended solids (TSS), 5-day biochemical oxygen demand (BOD5) and organic nitrogen in the wastewater. These reductions in concentration are necessary to avoid overloading downstream advanced wastewater treatment systems. The assessment of primary treatment capacity and performance included three components: 1) analysis of historical performance data; 2) full-scale stress testing to simulate performance at the anticipated peak flow; and 3) computational fluid dynamic (CFD) modeling to assess the distribution of flow by the primary influent flow channels. This presentation will review the methodology and results of each portion of the assessment. The assessment provided AlexRenew with confidence that existing primary settling tanks can accommodate anticipated peak flow while maintaining performance to protect downstream secondary and advanced treatment processes and meeting the utility's goals for sustainability, resiliency, and environmental stewardship. With this assessment complete, AlexRenew is embarking on a program to renew and replace aged system components and implement additional upgrades to improve operations and maintenance and enhance overall reliability of the system.

What Will Attendee Learn: This presentation will present a method of how to assess the capacity and performance of primary settling tanks.

Speaker Bio: Thor Young has been with GHD since 1990 and currently serves as the North American Wastewater Treatment and Recycling Lead. He is a registered Professional Engineer in Maryland and a Board Certified Environmental Engineer.

Wastewater Treatment and Solids Processing, Room 215
Wednesday, August 31st, 2022, 9:30 AM
Manuel de los Santos, Aqua-Aerobic Systems, Inc.

Case Studies of Secondary Biological Treatment Systems Meeting Full Enhanced Nutrient Removal Limits

Abstract: The demand for lower levels of nutrients in treatment plant discharges is growing across the country. Plants in colder climates are not exempt of the requirement. In fact, low Total Nitrogen and Total Phosphorus limits are currently required in plants around the Chesapeake Bay Watershed. This presentation studies the flexibility that a True Batch Sequencing Batch Reactor (SBR) provides to meet those requirements. The discussion will include the general principles of biological phosphorus and total nitrogen removal and how it occurs in the SBR system. The ability of the SBR technology to create alternating anoxic and aerobic conditions during the treatment cycle allows for conversion of organic nitrogen and ammonia nitrogen to nitrate/nitrite and finally to nitrogen gas. At the same time, it allows the system to more quickly get into the anaerobic state necessary for biological Phosphorus release. Case studies will be presented of installations that have taken advantage of this technology in the area, and are successfully achieving aggressive total nitrogen and total phosphorus limits, out of the biological process.

What Will Attendee Learn: The goal of this presentation is to give the listener a better idea of how biological nutrient removal occurs, what factors affect successful nutrient removal, and the variables that can be manipulated to help achieve a consistent effluent out of the secondary process. Examples of SBR plants achieving the effluent will be used as illustration on how this can be achieved.

Speaker Bio: Manuel possesses a M.S. degree in Sanitary and Environmental Engineering from the Universidad de Cantabria, Spain. He also has a B.S. degree in Civil Engineering from Santo Domingo, Dominican Republic. Manuel has worked in the wastewater treatment industry in application engineering for over 20 years with skills in design, application and technical support for biological processes and membranes. He also possesses two years of consulting engineering experience in the construction field.

Wastewater Treatment and Solids Processing, Room 215
Wednesday, August 31st, 2022, 1:00 PM
Joe Tardio, Aqua-Aerobic Systems, Inc.
Achieving Enhanced Nutrient Removal with AquaNereda® Aerobic Granular Sludge

Abstract: Aerobic Granular Sludge (AGS) technology operates on an optimized batch cycle structure that creates the proper conditions to develop and maintain granules: large, dense microbial aggregates displaying as particles greater than 200 microns in diameter that perform biological nutrient removal and display exemplary settleability relative to conventional activated sludge (CAS). The layered microbial community of these granules enables simultaneous nitrification/denitrification and enhanced biological phosphorus removal to occur within the granular biomass. This technology therefore eliminates the need for clarifiers, carrier media, and return sludge pumping stations, as well as selectors or separate compartments for plants looking to achieve BNR. The enhanced settling properties allow the system to operate at a high MLSS in excess of 8 g/L without a loss in aeration efficiency due to the granular nature of the sludge. The AGS process can therefore provide a significant reduction in footprint requirements and energy demand compared to a conventional technology. The AGS process has been implemented successfully for the past 15 years with over 90 plants either in operation or under construction globally. Introduced to the North American market in 2017, there are now over 10 plants operating or under construction in the United States. This session will demonstrate the ENR achieved by several plants and explain the treatment principles and applications of the technology.

What Will Attendee Learn: A fundamental understanding of AGS technology, applications and treatment capabilities.

Speaker Bio: Joe has domestic and international experience in the water and wastewater treatment industry and is a published author of technical papers in AWWA/AMTA and WEF proceedings. He has been active in the W/WW industry since 2006. Joe holds a Bachelor's Degree in Biological Sciences and Chemistry from the University of Delaware and a Master's Degree in Environmental & Waste Management from Stony Brook University.

Wastewater Treatment and Solids Processing, Room 215
Wednesday, August 31st, 2022, 1:30 PM
Sebastian Smoot, HDR
Is it possible to remove PFAS from Biosolids? A review of different PFAS removal technologies

Abstract: Wastewater secondary sludge and biosolids have shown to be routes for PFAS emission to the environment. Class A and class B biosolids have both been used for land application and can help to enrich soils and prove to be a great source of fertilizer. PFAS precursors from biosolids have shown to be transformed into PFAS compounds even after 6 months of land application (WRF, 2021). Treatment techniques for removal of PFAS in biosolids have been evolving, but the results are not widely available and have not been compared to each other. The objectives of this study were to compare different PFAS removal technologies in biosolids in terms of their development and implementation, and further summarize the lessons learnt from different case studies employing these technologies. Out of the technologies reviewed, incineration, pyrolysis and gasification have been studied in greater detail due to their widespread use and show potential for PFAS reduction. Other technologies such as supercritical water oxidation, vitrification, and hydrothermal liquefaction are still being developed and have no full-scale implementations. Case studies for each of these technologies and lessons learnt from bench or pilot-scale and full-scale installations will be presented in further detail. These case studies for PFAS removal from biosolids can improve existing knowledge and database for WRRFs trying to remove PFAS. In depth understanding of each technology, advantages, disadvantages and difficulties in implementing each technology can be crucial for future treatment optimization and modifications.

What Will Attendee Learn: In response to growing concerns about the presence and fate of PFAS in biosolids, this presentation provides a review of several biosolids treatment technologies such as incineration, pyrolysis,, and supercritical water oxidation that may be capable to remove PFAS. The results of recent laboratory and pilot studies will be reviewed to provide information on the readiness, effectiveness, advantages, and disadvantages of each technology.

Speaker Bio: Sebastian is a process engineer at HDR focusing on nutrient removal and biosolids. He loves his home state of Maryland and spreads Old Bay seasoning on his avocado toast. His cutting-edge work has been presented at WEFTEC for eight of the past nine years. He frequently reminds friends and neighbors that flushable wipes are not really flushable and encourages you to do the same. He obtained a Master of Engineering and Public Policy from the University of Maryland.

Wastewater Treatment and Solids Processing, Room 215
Wednesday, August 31st, 2022, 2:00 PM
Laura Simmers, PC Construction
Mitigating the impacts of Volatile Market Conditions through Progressive Design-Build

Abstract: Covid 19, extreme inflation and staffing shortages have ravaged our industry over the past 18 months. The team currently building the Bio-Energy facility for WSSC Water has mitigated all of these through the benefits of Progressive Design-Build (PDB). Learn how a collaborative team of builders, designers and owner staff have come together to offset overheated market conditions, labor shortages and price volatility within the current budget. The $270 million Bio-Energy facility at the Piscataway WRRF for WSSC Water began construction in late 2019 just months before the COVID pandemic struck the US. The team was forced to quickly take decisive action to keep the project on course. We will share with you how this highly technical project is now on track to finish on time and on budget. Re-prioritizing submittals to release early procurement, onsite material storage, 100% paperless document sharing, drone documentation, utilization of alternative construction materials, minimizing labor-intensive construction methods and the onsite presence of the design team to encourage collaboration and innovative problem-solving are just a few examples of tools implemented to navigate the unsteady waters since 2019.

What Will Attendee Learn: This abstract reviews how the progressive design-build process allowed a collaborative team to keep a highly technical construction project on course during the 2020/2021 market instability. Tools and strategies will be shared that observers can take with them to their next project.

Speaker Bio: Laura Simmers has spent the past six years at PC Construction working on water and wastewater projects, with a primary focus on progressive design-build projects. She is currently working on the delivery of the WSSC Water Bio-Energy project. In her role there she is working with the Owner, Program Manager and PC's design-build team to support collaborative team efforts that will lead to successful project delivery.

Wastewater Treatment and Solids Processing, Room 215
Wednesday, August 31st, 2022, 3:30 PM
Pusker Regmi, Brown and Caldwell
A full-scale demonstration of ABAC results in energy and carbon-efficient BNR via SND and post denitrification with internally stored carbon

Abstract: Many BNR facilities incur excessive energy and chemical costs to meet stringent nutrient limits. Therefore, there is a strong desire to reduce the operating costs of BNR systems while fully utilizing existing infrastructure. To this end, the main research objectives of this study at the 26 mgd Seneca Water Resource Recovery Facility (WRRF) were to: 1) Maximize influent carbon utilization for N and P removal rather than aerobic oxidation 2) Integrate biological P removal and simultaneous nitrification and denitrification (SND) for energy and carbon-efficient complete nutrient removal). The Seneca WRRF employs a 4-stage Bardenpho process, secondary clarifiers, and filters to meet stringent nutrient limits (< TN of 4 mgN/L, TP of 0.27 mgP/L). One of the five process trains was converted in Spring 2021 to a test train which involved the following changes:1) Internal mixed liquor recycle (IMLR) reduced from 400% to 200% of the influent flow; 2) Ammonia-based aeration control (ABAC) control to maintain controlled dissolved oxygen (DO) levels in all aerated zones, including reaeration zone (Ammonia setpoint of 1.5 mg/L at the end of the aerobic zone; minimum DO setpoint of 0.2, maximum DO setpoint of 1.5 mg/L) 3) Methanol addition discontinued in the post-anoxic zone; and 4) Decreasing the size of post-anoxic zone volume from 17% to 9% of the reactor basin. These changes resulted in excellent effluent quality without the use of supplemental chemicals. Based on weekly profiles, the average test train effluent ammonia was less than 0.2 mgN/L, TIN was 1.9 mgN/L, and orthophosphate was less than 0.2 mgP/L. SND and post-anoxic denitrification were responsible for enhanced nitrogen removal in the test train. A high degree of P uptake occurred even at low DO conditions, resulting in very low effluent P. The low DO operation (~0.3 mg/L) achieved by ABAC resulted in SND and significant aeration savings compared to the other trains operated at higher constant DO (~1.5 mg/L). The test train removed > 4 mgN/L via denitrification in the post-anoxic zones without supplemental carbon and achieved similar effluent nitrate concentrations compared to the other trains, which do require supplemental carbon. The specific denitrification rate (SDNR) tests indicated that the low DO conditions resulted in rates much higher than the denitrification attributed to endogenous respiration. Therefore, more efficient utilization of internally stored carbon may have resulted in more carbon availability for post-denitrification at low DO conditions. The Seneca WRRF's ABAC operation achieved very impressive effluent total inorganic nitrogen (TIN) < 2 mgN/L and orthophosphate < 0.2 mgP/L without supplemental carbon and metal salts addition, and other WRRFs can apply the same concepts.

What Will Attendee Learn: Attendees will learn how a conventional BNR process can be optimized with simple process modifications to achieve efficient nutrient removal resulting lower chemical and energy consumption.

Speaker Bio: Dr. Pusker Regmi, Senior Process Engineer and wastewater treatment innovation leader at Brown and Caldwell in Washington D.C. area. He invented AvN for efficient nutrient removal, which is now paving the way for a new wave of compact and carbon-efficient technologies such as partial denitrification anammox (PdNA). Pusker is the author of over 50 publications in peer-reviewed journals

and conferences proceedings. He is currently a vice-chair of the WEF research and innovation symposium.

Wastewater Treatment and Solids Processing, Room 215
Wednesday, August 31st, 2022, 4:00 PM
Liie Hill, Jacobs Engineering
Rehabilitation of Biosolids Drying System to Regain Capacity

Abstract: Wilmington Wastewater Treatment Plant in Wilmington, Delaware is a combined sewer plant with a capacity of 340 MGD that serves the City of Wilmington and New Castle County, DE. A conventional secondary treatment plant manages its biosolids with anaerobic digestion, thickening, dewatering, and indirect heat drying. In July 2020 Operations Management International, a subsidiary of Jacobs, assumed operations of this facility. The focus of this presentation is the Renewable Energy Biosolids Facility (REBF) where indirect heat drying equipment, including the dryer, hot oil boiler, odor and dust control equipment, and storage and loading equipment, is located. Upon assuming operational responsibilities, Jacobs completed a condition assessment and overhaul of several equipment, after which the facility was re-commissioned. This presentation will give a quick overview of the REBF, describe the initial condition of the assets, the work done to date to improve the conditions and operability, and present recent operational data and outcomes as well as lessons learned.

What Will Attendee Learn: Process and equipment for producing Class A biosolids with indirect heat dryer - major mechanical components, system rehabilitation and operations optimization

Speaker Bio: Liie is a civil engineer with 15 years of experience including utility operations, permitting, resource planning, design, construction, and commissioning. She's working as a project engineer with Jacobs Engineering in Wilmington Wastewater Treatment Plant in Delaware. Liie is registered engineer and water operator. Liie was a chapter president for the New Mexico chapter of AWWA and is currently residing in Philadelphia with her two dogs.

Wastewater Treatment and Solids Processing, Room 215
Wednesday, August 31st, 2022, 4:30 PM
Jonathan Liberzon, Tomorrow Water

Cooking Without Gas: Reducing sludge management costs using THP (Thermal Hydrolysis Process) in plants without anaerobic digestion

Abstract: Since 2019, 4.1M wet tons of sludge cake were produced annually at WRRFs in South Korea. Following the elimination of ocean dumping as a disposal strategy in 2006, sludge management costs have climbed significantly. As of 2018, sludge disposal reached an average of $120 USD/wet ton (MOE & KECO, 2021). In 2019, only 67 out of 4,216 Korean WRRFs larger than 500 m3/d (132,000 gpd) included anaerobic digesters (MOE, 2020). Since digestor projects cannot be deployed quickly or cheaply enough to keep up with rising disposal costs, alternative sludge reduction processes are being sought by public agencies. This presentation describes pilot and full-scale demonstrations of the concept of combined Thermal Hydrolysis Process (THP) and dewatering intended for use at WRRFs without anaerobic digestion. Optimal operating setpoints, downstream dewatering performance and economic impacts were identified. Pilot testing demonstrated that dewaterability of municipal THP sludge increases with certain increase in THP temperatures. THP and a plate-and-frame dewatering press was able to achieve sludge cake dryness over 50% in both pilot and full-scale installations. Sludge cakes above 50% DS are easier to process in thermal dryers, due to the avoidance of the 'sticky phase'. At higher temperatures, the marginal benefit in dewaterability was outweighed by energy cost.

What Will Attendee Learn: How THP, paired with the right dewatering, can serve as a cost-effective strategy for reducing sludge volumes and disposal challenges, even for WRRFs without anaerobic digestors

Speaker Bio: Jon is VP at Tomorrow Water, a CA firm that develops advanced water, ww and solids treatment technologies. Prior to joining TW, Jon consulted for ind'l and multinationals including the World Bank, and served as director of water tech at Algal Scientific. He focuses on biological ww treatment but also he has experience with drinking water and agri dev in least developed countries (LDCs). He holds a Masters from the Technion – Israel Inst. of Technology, and a Bachelors from the U. of Michigan

Wastewater Treatment and Solids Processing, Room 215
Thursday, September 1st, 2022, 8:30 AM
Kelly Baxter, Mott MacDonald
Degreasing the Pipes: Effectively Processing FOG at the Central WPCF

Abstract: The Ocean County Utility Authority (OCUA) is looking to improve handling of fats, oils, and grease (FOG) at its Central Water Pollution Control Facility (WPCF). The facility currently has a combined septage receiving/FOG station which handles hauled septage and FOG waste, as well as handling scum produced internally at the treatment plant. The existing facility is frequently overloaded, limiting acceptance of hauled waste and impacting overall performance of the treatment plant. OCUA sought to expand their capacity to accept hauled waste by constructing a dedicated FOG receiving facility, which would supplement the existing facility and accept hauled-in FOG only. The new facility is designed to process up to 30,000 gallons per day (gpd) of trucked-in FOG as a standalone process at the Central WPCF. A new building will be provided to house the FOG handling equipment. A FOG receiving station will be provided to meter, screen, and de-grit the incoming FOG. From there, the FOG will be pumped into one of three heated, 10,000 gallon storage tanks. The tanks will be continuously mixed and heated to prevent material stratification until it is ready for thickening in one of two concentrators. The final thickened FOG will be blended with lime to thicken the material to concentrations suitable for landfill disposal. In the future, OCUA plans to co-digest the stored FOG with primary and waste activated sludge in their anaerobic digesters. This will boost gas production in the digesters and increase renewable energy production from the plant's co-generation system. Key features of the new FOG facilities include a robust two stage drum screen, rotary lobe pumps, and schedule 80 CPVC piping to keep the FOG moving throughout the facility without clogging. The storage tanks will be heated with a jacketed heating system and pumped mixing will provide recirculation within each tank. Hot water flushing connections will be provided throughout the piping network and outside at the receiving area to allow for easier cleaning and maintenance of the system. The building will also be provided with a foam sprinkler system for fire protection due to the high quantity of FOG being stored and has been designed to be compliant with all NFPA 820 code requirements. All equipment systems within the facility will be covered and odor control will be provided by an activated carbon odor control system to keep the facility interior as operator-friendly as possible. The new FOG facility will solve a number of ongoing operational problems at the Central WPCF due to the accumulation FOG in the liquid and solids treatment processes. Proper management of FOG will improve performance and simplify operations, as well as prepare the OCUA for future beneficial use of the FOG to conserve energy, which are key goals of the project.

What Will Attendee Learn: Attendee will learn challenges associated with bulk FOG conveyance and storage and how this client has overcome those challenges. Attendee will also learn how OCUA plans to beneficially use FOG at the Central WPCF.

Speaker Bio: Kelly Baxter is a Principal Project Manager at Mott MacDonald. She have been with Mott MacDonald for 4 years and in the industry for 18 years. Her specialty is wastewater treatment plant design, including nutrient removal, energy efficiency, and resource recovery. She has a bachelors degree in environmental engineering from the University of Delaware, and a masters degree from Johns Hopkins University.

Wastewater Treatment and Solids Processing, Room 215
Thursday, September 1st, 2022, 9:00 AM
Micah Blate, Hazen and Sawyer
Collaborative, Trigger-Based Biosolids Masterplan for Seven-Facility Municipality in the Chesapeake Bay Watershed

Abstract: The Anne Arundel County Department of Public Works (AACo) owns and operates seven (7) Water Reclamation Facilities (WRF): Annapolis, Broadneck, Broadwater, Cox Creek, Maryland City, Patuxent, and Piney Orchard WRFs. The plants range in size from approximately 1 million gallons per day (MGD) to 15 MGD. AACo currently maintains a contract with a single full-service provider (FSP) to manage the entirety of the county's biosolids. Approximately 1⁄3 of the county's operating budget is allocated to third-party solids processing. In the face of current regulatory trends, diminishing end-use outlets, and emerging biosolids treatment technologies, a new, holistic approach to managing the County's biosolids is being developed in collaboration between County staff and Hazen and Sawyer. This approach would designate one location as the regional biosolids processing facility (at either Cox Creek WRF, Patuxent WRF, Broadneck WRF, or Millersville Landfill), with the option of standalone facilities that process their own solids (at Cox Creek, Broadwater, and Annapolis WRFs). An end-use market study and regulatory assessment was conducted to build a comprehensive market assessment that would help to drive the end use biosolids technology selection. Afterward, the project team developed a set of screening criteria and associated weights through a series of stakeholder engagement workshops. The weighted criteria were subsequently utilized to rank and score biosolids management technologies against one another, and four were shortlisted for further analysis: mesophilic anaerobic digestion (MAD), MAD with thermal drying, thermal hydrolysis pre-treatment (THP) with MAD, and pyrolysis. Autothermal Thermophilic Aerobic Digestion (ATAD) was shortlisted as an option for a satellite facility at Broadwater, and composting was shortlisted for Annapolis. Hazen generated 64 scenarios of possible regional facilities, standalone facilities, and biosolids management options for each. Due to the complexity and sheer volume of alternatives, a newly created multifacility planning (MFP) tool was utilized to model each scenario and shortlist ten of them for further analysis. This tool can generate process flow diagrams (PFDs) within and between treatment plants, and track biosolids to their final location. It takes into account capital costs, O&M costs, hauling costs, tipping fees, effluent ammonia content, CO2 emissions, energy recovery, and $/DT. Its most beneficial feature is its ability to simultaneously compare these life cycle costs between all 64 scenarios. From the shortlisted 10 alternatives, the County will select one to move forward with and implement into the masterplan. By this time, a regional facility and technology will be chosen, as well as a standalone facility, if any. Hazen will then hand over to the County a Regional Biosolids and Energy Management Tool (BEMT) that they can use to model changing variables in their system. The County will able to use this tool to track and manage biosolids treatment capacity and costs, understand impacts from upstream conditions and segregated waste streams, and project future conditions to make informed operations decisions.

What Will Attendee Learn: The attendee will learn about innovate technologies and biosolids management strategies to effectively process biosolids and utilize the end product beneficially.

Speaker Bio: Micah is an associate for Hazen & Sawyer and a licensed PE with 10 years of experience. Micah serves as Hazen's interim NE Region Biosolids Lead. He received a Bachelor's in Civil Engineering,

a Master's in Environmental Engineering, and is currently pursuing a PhD in Environmental Engineering at Drexel University. He has assisted utilities throughout the US and Canada with process modeling, process upset, optimization, planning, feasibility, and design of wastewater and biosolids facilities.

Wastewater Treatment and Solids Processing, Room 215
Thursday, September 1st, 2022, 9:30 AM
Jonathan Liberzon, Tomorrow Water
Two-Stage Partial-Nitritation/Anammox Process Demonstrates Stable and Efficient Treatment of High-Strength Industrial Digestate

Abstract: The presentation will feature data from two and a half years of pilot testing which demonstrate performance of a two-stage deammonification configuration in treating high-strength reject streams from industrial codigestion. In order to minimize inhibition by free ammonia (FA), the volumetric exchange rate of the air-lift granulation reactor for partial nitritation (PN-AGR) was limited to 40-50% for each reaction cycle. The PN-AGR was operated between 137 mg-NH3/L (at the start of the react cycle) and 7.8 mg-NH3/L (at the end of the react cycle), and the moving-bed biofilm reactor for Anammox (A-MBBR) was kept at a temperature of 35°C and pH of 7.5. Accordingly, average FA concentrations in the A-MBBR were limited to 6.6 mg-NH3/L, preventing inhibition. The two-stage AMX® process, consisting of the PN-AGR followed by the A-MBBR, achieved significantly higher NLR (average 1.42 kg N/m3d) and NRR (average 1.26 kg N/m3d) than common single-stage PN/A processes, despite high influent concentrations of nitrogen, solids, salinity and COD. This process also achieved COD, SS and TN removal efficiencies of 82%, 89% and 89%, respectively, without pretreatment or dilution for over two years, under fluctuating influent quality. This supports the use of a two-stage deammonification process for treatment of high-strength reject streams from industrial codigestion.

What Will Attendee Learn: To differentiate between single-stage and two-stage anammox systems, and understand the benefits and drawbacks of these two configurations with respect to (specifically) industrial facilities. The impact of process upsets on anammox treatment and understand how two-stage configurations can mitigate the effects of COD excursions, solids slugs and ammonia variability.

Speaker Bio: Jon is VP at Tomorrow Water, a CA firm that develops advanced water, ww and solids treatment technologies. Prior to joining TW, Jon consulted for ind'l and multinationals including the World Bank, and served as director of water tech at Algal Scientific. He focuses on biological ww treatment but also he has experience with drinking water and agri dev in least developed countries (LDCs). He holds a Masters from the Technion – Israel Inst. of Technology, and a Bachelors from the U. of Michigan

Wastewater Treatment and Solids Processing, Room 215
Thursday, September 1st, 2022, 11:00 AM
Corey McCarthy, American Contracting & Environmental Services, Inc.
Cleanest Effluent in the State?

Abstract: Eastern Correctional Institution (ECI) WWTP Expansion and Upgrade The Maryland Environmental Service (MES) operates the ECI WWTP located in Westover, Maryland. The Maryland Department of Environment (MDE) issued a revised discharge permit which imposed extremely strict nitrogen and phosphorus limits. Further, the permit required combining the waste stream from the onsite reverse osmosis drinking water purification system with the WWTP effluent in a single discharge point to the Manokin River which was still subject to the total nutrient loading limits. These new permit conditions required a complete upgrade of the existing advanced wastewater treatment facility, which was already situated on a very limited footprint. MDE set fixed loading limits (lbs/day) for each of these nutrients in the new discharge permit, while requiring the waste streams from the adjacent drinking water purification system be combined with the WWTP effluent. The result is that the nutrient concentrations needed to be reduced well beyond the ENR level (1.26 mg/l TN; 0.13 mg/l TP). There is documented performance at the reduced nutrient levels for either nitrogen or phosphorus, but no facilities which were reaching both levels simultaneously. The design team developed a treatment process sequence to allow operators to focus on driving each nutrient concentration down to the lowest levels possible, while maintaining flexibility in seasonal operation. The design team applied several existing technologies to produce treated effluent which may be the cleanest in the nation. The primary biological treatment utilized a four-stage Bardenpho process with membrane filtration which is capable of meeting ENR levels and is frequently the only nutrient removal process required. However, to meet the extremely low nitrogen levels required, post-denitrification filters were installed. A separate ballasted flocculation system was installed to allow separate phosphorus removal as well as additional organic nitrogen removal. These processes were followed by ultraviolet disinfection and post-aeration to ensure full permit compliance The ECI facility is further complicated by being restricted to a very small linear area bounded on one side by a prison, and the other by a roadway. MES selected CMAR as the preferred method. The major advantage of the CMAR approach is that the owner secures a guaranteed maximum price early in the project and the owner, engineer, and contractor are all able to work collaboratively through the final design, permitting, and construction. During construction, constant communication through progress meetings, weekly calls, site visits, etc. facilitated a true sense of teamwork moving to a common goal. In addition, over 540 shop drawings and 123 RFIs were processed to ensure project requirements were met. The project was constructed on time (728 calendar days) with no increase in budget from the Guaranteed Maximum Price ($24M) established by the CMAR team. As a result of the project, the new treatment process has an expanded capacity just under 1.0 MGD and is consistently producing effluent with less than 1.0 mg/l total nitrogen and 0.15 mg/l total phosphorus. Construction Costs: $24.4M Design Team Total Fees: $2.5M Construction Schedule: NTP–June 17, 2019 | Substantial Completion–May 13, 2021

What Will Attendee Learn: Methods to treat wastewater effluent with extreme nutrient limits / collaboration from a Construction Manager at Risk (CMAR) project delivery method.

Speaker Bio: Tyrus Hunter is a Business Development Executive for American Contracting & Environmental Services, Inc. (ACE).

Wastewater Treatment and Solids Processing, Room 215
Thursday, September 1st, 2022, 11:30 AM
Kristi Perri, PE, Brown and Caldwell

Upgrades to Aeration System at 64 MGD Facility to Optimize Process Aeration Control and Reduce Process Airflow

Abstract: A 64 MGD WWMF is currently being upgraded utilizing progressive design-build delivery where the project includes 10 construction packages to construct improvements to 28 aeration tanks (ATs), 3 blower facilities, and 16 secondary clarifiers. The AT upgrades were completed in 4 construction packages. The ATs are grouped into 6 banks that have varying widths, elevations, and influent and effluent configurations; however, all operate with the A/O process. The 3 largest ATs included fine bubble diffuser systems from 4 different manufacturers installed as part of an evaluation process and the remaining 25 aeration tanks included EPDM tube diffusers. The existing process aeration control system included two dissolved oxygen (DO) probes and a single airflow meter and control valve for each AT. The AT upgrades include replacing the existing diffuser grids, aeration piping, process instrumentation, airflow meters, and control valves. Prior to completing the AT upgrade designs, a demonstration study was conducted in 3 ATs to provide a side-by-side performance comparison of aeration control valves and process control strategies that included cascading airflow and DO control and ammonia-based aeration control (ABAC). Ultimately, high performance butterfly valves were selected for the upgrades. Cascading airflow and DO control were also selected with the ability to easily expand the controls to include ABAC. The new diffuser grids were lowered six inches to improve oxygen transfer efficiency. Diffuser blanks were also included to provide the ability to add diffusers when flows and loads increase. The five grids in each AT were tapered and grouped into three aeration control zones where each control zone includes a dedicated DO probe, airflow meter, and control valve. New process aeration piping was provided from the existing main aeration header through each of the ATs. The project also includes upgrades or replacement of the 3 blower buildings and associated blowers. The new system will include eight new single-stage centrifugal blowers and associated electrical and controls equipment. Process modeling was completed to estimate the aeration requirements under varying current and potential future load conditions. The diffuser system, aeration piping, and blowers were installed to provide current process aeration requirements as well as sufficient capacity to expand the plant to 76 MGD. This presentation will include a discussion of the process aeration system upgrades, the sequencing requirements and construction constraints, the new process control system, and a summary of the AT process aeration requirements before and after the aeration system upgrade. About half of the ATs have been upgraded providing the opportunity to directly compare the aeration requirements between the existing and upgraded ATs. This analysis of aeration savings will be presented. A summary of the on-going upgrades to the blower system will also be included.

What Will Attendee Learn: This presentation will include a discussion of the process aeration system upgrades, the sequencing requirements and construction constraints, the new process control system, and a summary of the AT process aeration requirements before and after the aeration system upgrade. This analysis of aeration savings will be presented and the benefits to the improving the process aeration control system.

Speaker Bio: Kristi Perri is currently a Senior Engineer with Brown and Caldwell. She received her bachelor's degree in civil engineering and master's degree in environmental engineering from Virginia Tech. She has over 23 years of wastewater experience including nutrient removal evaluations, membrane bioreactor evaluations and design, biological process modeling, performance evaluations, facility planning, pilot testing, and preliminary and final design of wastewater treatment facilities.

Wastewater Treatment and Solids Processing, Room 215
Thursday, September 1st, 2022, 12:00 PM
Gregory Knight, Black & Veatch
Thermal Hydrolysis (THP) – Commissioning Experiences and Considerations

Abstract: Commissioning of THP facilities presents some challenges that must be overcome for a successful operating facility. For digester startup, because thermally hydrolyzed sludge is sterile, seed sludge must be utilized. Options for seeding include raw sludge, transition from conventional digestion, and importing of conventional digested sludge or Class A sludge from another advanced digestion facility. Seed material can be liquid, or cake which will require re-wetting at the receiving site. Considerations include regulatory requirements for achieving a Class A product, alkalinity needs, and transition from conventional digestion microbiology to a more ammonia tolerant population. While cooling of hydrolyzed sludge is needed for steady state operation, start-up planning needs to consider initial digester heating. Various approaches have been used including steam injection and heat exchangers. Further, many utilities with THP facilities have installed sidestream processes for treatment of dewatering centrate. The recalcitrant nature of these return liquors presents a unique set of challenges for startup of sidestream processes. Based on over 20 years experience of planning and execution of commissioning at multiple facilities, this paper will provide an overview of commissioning experiences, considerations and lessons learned.

What Will Attendee Learn: Attendees will gain an understanding of requirements, considerations and potential pitfalls of commissioning of THP facilities.

Speaker Bio: Greg is an experienced Process Engineer with 20 years history in the water industry. As well as working as an Engineer for Black & Veatch for the last 14 years specializing in wastewater and biosolids, his previous roles have included Plant Manager of a large potable water treatment plant in the UK and 3 years Voluntary Work in Ghana with Voluntary Service Overseas (the UK equivalent of 'Peace Corps').

Wastewater Treatment and Solids Processing, Room 215
Thursday, September 1st, 2022, 2:00 PM
Joshua Fox, Herbert, Rowland & Grubic, Inc.
Ballasted Flocculation and Clarification for Ultra-low Total Phosphorus Reduction

Abstract: Ballasted Flocculation and Clarification for Ultra-low Total Phosphorus Reduction will review the design, construction, and operation of a ballasted flocculation and clarification tertiary treatment system to achieve total phosphorus effluent limits less than 0.1 mg/L to comply with the Goose Creek TMDL. The West Goshen Sewer Authority commissioned the design, public bidding, and construction of the tertiary treatment system to comply with a negotiated settlement with EPA for over 98% reduction in total phosphorus. This presentation will review a few of the unique design challenges associated with a ballasted flocculation and clarification system based on lessons learned from previous installations in Massachusetts; however, the presentation will focus on comparison between the pilot data and the first six months of full-scale operating data and what changes were made by the operations staff to optimize the system to meet the stringent total phosphorus limits.

What Will Attendee Learn: Critical design and operational considerations when using a ballasted flocculation and clarification system for TP or TSS reduction Evaluation of pilot vs. full-scale data

Speaker Bio: Josh Fox is the Water & Wastewater Practice Area Leader for HRG (an ENR Mid-Atlantic Firm of the Year in 2021). He was over 15 years of experience in water & wastewater design and project management. He graduated with a civil engineering technology degree from the Pennsylvania College of Technology and his MBA from Norwich University. Josh also serves as a Major in the Pennsylvania Army National Guard where he is a Division Staff Officer and the Operations Officer for the Homeland Response Force

Wastewater Treatment and Solids Processing, Room 215
Thursday, September 1st, 2022, 2:30 PM
Ersin Kasirga, Stantec
Augmenting Anaerobic Digestion Performance with Recuperative Thickening in Dubai

Abstract: The Al Warsan STP is located about 25 km from the city center in Dubai, United Arab Emirates. The plant was originally commissioned in 1989 and it was expanded in the year 2000 for 68.7 MGD average flow. Liquid treatment includes pre-treatment, pre-aeration, primary clarifiers, high rate activated sludge, trickling filters, filtration and disinfection. Solids treatment consists of sludge consolidation, mesophilic anaerobic digestion, centrifuge dewatering and open solar drying. Currently, the plant is receiving 94 MGD average flow and the facilities are severely overloaded. There are five egg-shaped digesters at the plant; each having a capacity of 2.4 MG. Average solids loading to the digesters is 0.22 lbs/cuft d and the solids retention time (SRT) is about 16 days, half of the design average SRT of 32 days. Volatile solids reduction (VSR) is about 49%. Current average and specific gas productions are 1,322 scfm and 14 cuft/lbs VSR respectively. Open solar drying operations cause odour complaints from the neighbouring residential areas. The goals of this study are to augment the digesters performance through recuperative thickening, increase the solids loading that can be applied to the digesters, elevate the gas production, bring the SRT to its design value and ensure stable process performance hence minimize biosolids quantities, reduce overall polymer consumption and reduce the odour potential of the biosolids while generating power for use on the site. A mathematical model was developed to determine the recuperative thickening return rate that will achieve 30 days SRT in the anaerobic digestion system at average solids loading and 15 days when one digester is offline for maintenance. A mass balance across the digesters was completed using the plant data to determine the solids loading and the VSR which was used for model calibration. Both mass balance and Van Kleeck equations were used to determine the VSR in the digesters. The modelling indicated that the desired 30 day SRT could be achieved with about 40% recuperative thickening rate corresponding to a return flow of 290,620 gpd at 7% dry solids. VSR and biogas production were estimated 63% and 1,652 scfm respectively. This corresponds to 14% higher VSR and 25% increase in biogas production. Rotary drum thickeners were selected for thickening digested sludge due to less shearing effect. With increased biogas production, electricity could be produced with a combined heat and power (CHP) plant using gas engine driven generators utilizing waste heat recovery. In line with Dubai's sustainability goals, recuperative thickening could be used to augment the overloaded anaerobic digestion system, providing process stability and generate about 7 MW power with 25% increase in biogas production. Digesters SRT could be brought to the design value with reduced quantity of biosolids to be applied to solar drying operations with significantly less odour potential.

What Will Attendee Learn: Performance of overloaded anaerobic digesters can be improved through recuperative thickening with increased solids retention time and stable process performance reducing biosolids odor potential and overall polymer consumption. Based on Torpey process, implementation of recuperative thickening can provide major savings avoiding the need for new digestion tanks.

Speaker Bio: Ersin has 32 years of diverse experience in process design of wastewater facilities, biosolids management, emerging and innovative wastewater technologies, pilot plants and plant operations. He developed sustainable solutions for green and brown field water and wastewater

treatment plants ranging between 525 MGD and 1 MGD. In a recent overseas assignment, he served as process engineer for upgrading the Al Warsan STP in Dubai, United Arab Emirates.

Wastewater Treatment and Solids Processing, Room 215
Thursday, September 1st, 2022, 3:00 PM
Steven Clark, GHD
Upgrade and Rehabilitation of Two Headworks Facilities in Southern Delaware

Abstract: GHD is currently serving as Engineer for the upgrade and rehabilitation of preliminary treatment facilities at two wastewater treatment plants in southern Delaware. The two facilities and upgrades differ significantly, but share numerous concerns, issues, and challenges that would also be common to most other wastewater treatment plants. This paper presents the two upgrades and the similar and contrasting challenges, with a particular focus on sequencing considerations, maintenance of plant operations during construction, structural rehabilitation, ventilation, odors, and reliability. The first structure discussed in this paper is the Headworks at the South Coastal Regional Wastewater Facilities, which is owned and operated by Sussex County, Delaware. The Headworks is a reinforced concrete structure, with ground level grit processing rooms and elevated receival chamber, screening channels and grit removal tanks. The upgrade includes construction of a new screening channel, conversion of an existing channel to a bypass channel, connections to additional equalization storages, concrete rehabilitation, ventilation improvements, consolidation of twelve influent force mains into two, flow metering, and new electrical equipment, controls, instrumentation, and the integration of additional ancillary devices on existing screening and grit removal equipment. The second structure discussed in this paper is the Preliminary Treatment Facility at the Rehoboth Beach Wastewater Treatment Plant, which is owned and operated by the City of Rehoboth Beach, Delaware. This structure is similar in that it has a lower-level grit processing room and upper-level channels but differs in that there is also a masonry superstructure on the upper level. This upgrade originally included new screening, grit removal, electrical, instrumentation, and controls equipment but has been expanded to include significant reconstruction and rehabilitation of concrete structural elements after it was observed during a planned bypass that the extent of degradation could be more economically addressed by demolition and reconstruction. Both structures were assessed during planned bypass events and found to have significant degrees of deterioration that were likely the result of high hydrogen sulfide concentrations, and the subsequent formation and impacts of sulfuric acid. In both cases it was observed that ventilation of the structures had been inadequate for an extended period. This situation is common in headworks structures, and especially prevalent in covered channels and other enclosed spaces where hydrogen sulfide can accumulate without continuous and strong ventilation, which may not be desirable due to odor concerns, high electrical cost, or simply may not be functioning as originally intended. Steps are being taken to improve ventilation and schedule regular inspections and preventative maintenance.

What Will Attendee Learn: Attendee will learn about different approaches and evaluation criteria for headworks upgrades with a focus on sequencing considerations, maintenance of plant operations during construction, structural rehabilitation, ventilation, odors, and reliability.

Speaker Bio: Steven Clark is a licensed Professional Engineer who graduated with a Bachelor of Civil and Environmental Engineering from the University of Wollongong, Australia in 2004, and has worked with GHD for the 17 years since entirely focused on the planning, design, and construction of water and wastewater infrastructure. The first 9 years of Steven's career with GHD were spent in Sydney, Australia, and the most recent 8 years based in Maryland with projects primarily in Delaware and Maryland.

Wastewater Treatment and Solids Processing, Room 215
Thursday, September 1st, 2022, 4:00 PM
Michael Busch, Anua
Using multiple treatment stages to provide more thorough odor control and reduction in operating costs

Abstract: There are many technologies currently available to treat nuisance odors emitted from the wastewater treatment process. Although each technology type has proven strengths, many also have weaknesses that can cause excessive and unexpected operating and maintenance costs and continued odor complaints. By combining multiple technologies in the same treatment system, a wider range of odors can be effectively treated. This also reduces operating and maintenance costs, and greatly reduces the chance of ongoing odor complaints. This presentation will compare technologies, their pros and cons, when it makes sense to use multiple treatment stages, and the potential benefits. Detailed side-by-side comparisons on capital costs and operating costs will be reviewed as well.

What Will Attendee Learn: How to provide better odor control for the customers while reducing their yearly O&M costs.

Speaker Bio: Michael Busch is currently the Business Development and Technical Manager for Anua. He has 20+ years in the odor control and air emission industry, working for leading equipment manufacturers designing and supplying activated carbon systems, chemical scrubbers, and biological odor control processes.

Wastewater Treatment and Solids Processing, Room 215
Thursday, September 1st, 2022, 4:30 PM
Raj Chavan, Atkins, North America
Sludge Densification: Emerging and Efficient Way to Look at Biological Nutrient Removal Treatment

Abstract: Currently there are over 14,500 Water Resource Recovery Facilities (WRRFs) in the United States, with ~35% of them having some type of nutrient limits in place. These WRRFs account for about 1% of overall power demand and 2% of total greenhouse gas emissions (GHG) in the United States and contribute for 10 to 15% of the overall nutrient load to surface rivers in the United States. The evolution of densification technologies toward more compact and energy efficient nutrient removal processes has been impacted by a number of factors. Existing facilities that require capacity expansion or biomass densification for higher treatability within the same footprint are being subjected to more stringent requirements relating to nutrient removal prior to surface water discharge. Densification of activated sludge has received recent widespread interest as a means for achieving process intensification and nutrient removal at WRRFs. At the core of the technology are the aerobic sludge granules where the biological processes occur. There is considerable interest in the prospect of producing granular sludge in continuous (or traditional) activated sludge processes (CAS) or densification of biomass by moving activated sludge flocs to a denser aggregate of biomass as a highly effective technique of intensification. This presentation will provide fundamental understanding of densification by presenting insights and practical issues. The topics that will be discussed include. What methods can be used to generate and retain densified granules? What are the mechanisms that allow biological flocs to densify? What role do physical selectors play in the densification of biological flocs? What are some viable ways for managing biological flocs that have become densified? What physical selection design parameters affect the retention of densified biological flocs? identifying operational solutions for customizing the flocs and granules required to meet performance and capacity targets? The audience will have a basic understanding of densification concept and their importance in achieving efficient wastewater treatment at the end of the presentation. The presentation will also include some case studies related to design and operations of densification processes.

What Will Attendee Learn: The audience will have a basic grasp of the densification concept (what factors you must examine in order to achieve intensification within your existing processes; how it can be added to your existing system or expand your facility) and its significance in attaining efficient and cost-effective wastewater treatment.

Speaker Bio: Raj Chavan, Ph.D, PE, PMP; VP, Director for Technical Solutions, Atkins, Henderson, NV: His main areas of expertise include planning/design of wastewater facilities, especially nutrient. Raj has also been involved in several bench-, pilot-, & full-scale studies including functionality testing on the various water & wastewater treatment trends. In addition, he has been involved in several research projects including climate change impact, nutrient removal, DBP formation and precursors, etc.

Wastewater Treatment and Solids Processing, Room 215
Thursday, September 1st, 2022, 5:00 PM
Yong Kim, UGSI Solutions, Inc.
Coagulants and Polymers – Fundamentals of Clarification and Dewatering

Abstract: Since the chemistry of coagulant and flocculant is very different each other, the mechanism of coagulation and flocculation is also fundamentally different. Various topics regarding coagulation and flocculation are discussed from the perspectives of engineers and operators. That includes a summary of available chemicals, preparation before application, injection methods, and typical dosages for wide range of processes. Three types of polymers are discussed regrading physical form, molecular weight, charge density, and size distribution. Proper way of handling and storage of dry or emulsion polymer is reviewed as well as the shelf-life of neat polymer and diluted polymer solution. The use of solution viscosity will be discussed as a reliable measure of the efficiency of polymer solution. Quality of dilution water has serious impact on the efficiency of polymer solution. Hardness representing a major portion of the ionic strength of dilution water plays an important role in polymer activation. Considering the increasing trend of utilizing reclaimed water for polymer makeup at many wastewater treatment plants, chlorine level of dilution water must be checked and maintained below 4 mg/L. When reclaimed water is used, aging of polymer solution must be carefully evaluated. Chlorine, suspended solids, and dissolved ions included in reclaimed water are reacting with polymer and resulting in degraded polymer solution during aging. Preparing efficient polymer solution is one of several key components for successful solid-liquid separation. Due to its unique property of polymer, polymer make-down requires an established scientific understanding. The benefit of utilizing two-stage mixing and sufficient residence time in emulsion polymer system is found to improve the efficiency of polymer solution at Neshaminy WTP near Philadelphia. The plant operates at the capacity of 15 MGD to serve about 40,000 population. Two mixing chambers were evaluated side-by-side in dewatering alum-carbon sludge with two belt filter presses running simultaneously. It was striking to observe that an upgraded mixing chamber could reduce polymer usage by 30% and process 11% more sludge without any sacrifice of cake solids. Dry polymer system design requires two-stage mixing too. Also, non-uniform mixing energy distribution in dry polymer mixing tank is detrimental to polymer solution because a considerable amount of polymer chains are chopped and broken. It is known that mixing intensity distribution is closely related to the ratio of impeller to tank diameter: a larger and longer impeller generates more uniform mixing intensity within the mix tank, which is ideal for polymer mixing. Dry polymer system developed based on this principle was installed at the Fairfield-Suisun Sewer District, CA. The plant realized 42% polymer savings and 18% increase of sludge throughput after one year operation of new dry polymer system.

What Will Attendee Learn: Attendees will learn the efficient way of polymer makeup to maximize the polymer value in dewatering with technical review, experimental data and case studies.

Speaker Bio: Dr. Yong Kim is Technical Director at UGSI Solutions, Inc., Vineland, NJ. His technical interest includes fluid mixing and turbulence, surface chemistry, solid-liquid separation, and water/wastewater disinfection. He was previously employed by USFilter and Siemens Water Technologies. As a PhD chemical engineer, he has authored a book entitled “Coagulants and Flocculants: Theory and Practice,” and published over 40 technical papers with seven (7) US patents issued to his credit.

Wastewater Treatment and Solids Processing, Room 215
Friday, September 2nd, 2022, 9:00 AM
Chengyan Zhang, Stantec
Business Case Analysis for Biogas Utilization at Morris Forman WWTP

Abstract: Many wastewater treatment plants (WWTPs) with anaerobic digesters are exploring options of biogas beneficial use. Effective management and utilization of biogas can help WWTPs reduce energy consumption, save on operational cost or generate revenue, and reduce GHG emissions. There are different options for biogas utilization, from using biogas for existing equipment such as dryers and boilers, to producing renewable natural gas for gas pipeline injection and obtaining incentives, to use a combined heat and power (CHP) system to produce electricity. Many WWTP owners often ask how to decide which biogas utilization option is best for them. The Morris Forman Biosolids Processing Solution (BPS) Project provides a perfect example! Morris Forman WWTP is located in Louisville Kentucky. On average it processes 130 dry ton per day (DTPD) of solids and produces 895 SCFM of biogas. The BPS project, through design-build, will implement THP to the biosolids handling process. As part of the project, the design-build team works with Louisville MSD evaluate two main options of biogas use, CHP and RNG. Additionally the DB team and MSD evaluate whether to bring high strength waste (HSW) to the WWTP to increase biogas production, within the capacity of the existing digesters. Evaluation criteria are developed, including lifecycle cost, non-cost O&M considerations, non-cost risk factors such as footprint and emission/permitting requirement, and other non-cost considerations such as sustainability and reputation. The presentation will showcase the final selection of biogas use by Louisville MSD along with analyses that assist with the decision. This presentation will provide a practical and useful example for other WWTPs that are deciding how to use biogas.

What Will Attendee Learn: A presentation showcasing a WWTP's selection of biogas utilization, including options explored and factors considered.

Speaker Bio: Chengyan specializes in development and implementation of strategic infrastructure investment strategies. Chengyan has helped utilities and municipalities in North America, Australia, and Asia in capital programs prioritization, business case development, risk and resilience planning, and enterprise strategic planning. She is particularly skilled at helping decision makers utilize various analytical tools to evaluate various investment and prioritization strategies under different scenarios.

Wastewater Treatment and Solids Processing, Room 215
Friday, September 2nd, 2022, 9:30 AM
Bryan Lennon, City of Wilmington
Alternate Delivery of a Combined Heat/Power System – How to stay away from hot water!

Abstract: The Wilmington Wastewater Treatment Facility in Wilmington, Delaware is a combined sewer plant with a capacity of 340 MGD that serves the City of Wilmington and New Castle County, DE. Over 10,000 dry tons/year of biosolids are produced that require disposal. A 4 MW combined heat/power system was proposed to reduce operating costs, and included an indirect thermal dryer for biosolids. This presentation focuses on the delivery of the project through an Energy Services Contract (ESCO) in a design-build-operate alternate delivery approach. The system was constructed from 2012-2016, commissioned in 2016, and operated from 2016 through 2020 by the DBO contractor. In July 2020, the City transitioned operations and maintenance to Jacobs from the DBO contractor. This presentation will discuss the contracting approach, benefits and pitfalls during construction and commissioning, and lessons learned from 4 years of operation in the DBO ESCO contract. Also discussed is how the lessons learned influenced the approach for the new operation and maintenance contract awarded in July 2020 by the City to Jacobs.

What Will Attendee Learn: Understanding of pros and cons of alternate delivery and how contracting and performance guarantees can impact ability for long-term operations and maintenance to be successful and meet the project's intent for long-term savings/payback.

Speaker Bio: Bryan is the Assistant Water Division Director for the City of Wilmington Department of Public Works. Mr. Lennon holds a Bachelors of Civil Engineering (1992) and a Masters of Environmental Engineering (1995) from the University of Delaware. He has 23 years of experience in the field of water and wastewater engineering, and has worked in both the public and private sector of the water and wastewater industry.

Wastewater Treatment and Solids Processing, Room 215
Friday, September 2nd, 2022, 10:15 AM
Tyler Hewitt, Atkins, North America
Biosolids Management Strategy: A Shifting Paradigm - (A Step towards Zero-Waste)

Abstract: Many billions of dollars are currently being invested in resource removal and recovery from wastewater, contributing to a circular economy, to improve the health of water bodies through increasingly stringent discharge limits around the world. However, wastewater serves as reservoirs and enablers for a variety of additional resource recovery choices, with the crucial issues being: What are those possibilities, and how close are they to practical reality in this rapidly expanding market? It's also crucial to understand how Circular Economy initiatives can help achieve sustainability goals in coming years. The objective of this paper is to provide two different biosolids management approach or strategies that were evaluated for different entities in two different continents. The summary of these approach or strategies are provided in this abstract and details will be included in the presentation. Study 1: Thames Water Utilities Limited (TMUL) Bioresources Recovery Evaluation TMUL, the UK's largest water and wastewater services company, is on the forefront of being adapting circular economy by proactively exploring possible resource recovery from biosolids. TMUL looks at biosolids as bioresources and to further explore value of this waste, Atkins was being hired by TMUL to conduct a Bioresources Review and Market Study to help them define their future bioresources solids business model. Eighteen prospective bioresources were evaluated, ranging from well-known end products like ammonia and BiomethaneX to products derived from more novel and embryonic processes like YEnzymes and Volatile Fatty Acids. A bioresource compatibility research was also carried out to better understand the interdependency between product recovery and strategic decision-making. The results of the study highlighted several key bioresources that require immediate attention in the UK. There were several other factors that were evaluated and will be discussed in detail in the paper. Study 2: NEOM Biosolids Strategy for New Greenfield City NEOM is a bold and audacious project in the northwest of Saudi Arabia. It's a project aimed at assisting in the resolution of some of the world's current concerns, such as unbridled urbanization and climate change. At a time when the world needs fresh ideas and innovative solutions, NEOM will be a destination and a home for those who want to be a part of creating a new paradigm of sustainable ecosystems. The project aim was to provide a robust, dynamic and industry leading Biosolids strategy to pave a roadmap for effective Biosolids management over the next decade. The optimal Biosolids strategy for NEOM is focussed upon bioresource production, maximising the potential for resource extraction from Biosolids. The comprehensive 10-year road map, featuring key processes, systems and people gives NEOM an all-encompassing direction incorporating decision points and KPIs to determine when and if the strategy need to adapt. Overall Summary: The insights and tactics that are described in both the studies could be adopted on a global scale to maximize the value of waste. Biosolids are not a waste stream, but rather a rich trove of resources, according to the findings which supports numerous studies going around the world.

What Will Attendee Learn: The insights and tactics that are described in both the studies could be adopted on a global scale to maximize the value of waste. Biosolids are not a waste stream, but rather a rich trove of resources, according to the findings which supports numerous studies going around the world.

Speaker Bio: Tyler Hewitt has over 24 years of experience serving water/wastewater industry. Tyler serves as Atkins' US Water Market Leader & liaison to their global bioresources practice. He played an integral role in the implementation of the City of Atlanta's Resources Management Plan, including CIP, ESCO contracts & operational improvements to foster beneficial reuse of residuals. Tyler sits on the Board of Directors for the Southeast Biosolids Association and NACWA's biosolids committee.

Wastewater Treatment and Solids Processing, Room 215
Friday, September 2nd, 2022, 10:45 AM
Aaron Thomas, Hazen and Sawyer
Headworks Facilities Improvements at the Patapsco WWTP

Abstract: Improvements to the preliminary treatment facilities at the City of Baltimore 73 MGD Patapsco WWTP are in the final design stage. This is a joint venture project with WRA and Hazen for upgrades to the existing grit facility and the design of a new screening facility. The aerated grit facility was constructed in the early 1990's with biofilters as a means of mitigating the H2S in the facility. The H2S problem at Patapsco WWTP is exacerbated by the approximately 5-mile long force main influent to the grit facility that cultivates H2S gas. The original design contained biofilters to treat the H2S and when they reached the end of their useful life the H2S corroded most of the equipment, severely impeding the grit removal process. The JV team and the City considered several options for mitigating the H2S issue and ultimately decided to remove the CMU walls and rehab the roof to provide a canopy type structure and maximize the cross ventilation. Design considerations for the grit facility included the following: building analysis and design for lateral structural stability after removing the block walls, code compliance considerations (original design was not code compliant), computational fluid model to maximize the grit removal hydraulics, and addressing O&M issues with the current design. The Patapsco WWTP facility is unusual in that the screen facility is located downstream of the grit removal facility. This project includes the design of a new screening facility located upstream of the grit facility. Locating the screen facility upstream of the existing grit facility will require addressing the H2S concerns at the new screen facility as the influent force main will be daylighting in the new screen facility. Design considerations for the new screen facility included: H2S mitigation, two-stage screen design (fine and coarse) to maximize material removal for protection of the downstream treatment processes, screen, compactor, and blower manufacturer selections, building architecture and structural design, influent and effluent conduit design, and hydraulic impacts of the new screen facility on upstream conveyance system. This presentation will include a brief project background, design development, selection of major equipment and various project challenges.

What Will Attendee Learn: The attendee will learn about a unique way of redesigning an existing facility to solve an extreme operational problem while maintaining the operation of the facility during construction. The attendee will also learn about the design of a new screening facility while maintain plant operations.

Speaker Bio: Aaron Thomas is a Senior Associate at Hazen and Sawyer with 24 years of experience in planning and design of water and wastewater treatment and conveyance facilities. He is a veteran of the United States Navy and holds an undergraduate degree in Civil Engineering from North Carolina A&T and a Master's degree in Environmental Engineering from Johns Hopkins University.

Wastewater Treatment and Solids Processing, Room 215
Friday, September 2nd, 2022, 11:15 AM
Dian Zhang, Stantec
Sidestream Design with Whole Plant in Mind

Abstract: The Morris Forman Water Quality Treatment Center (MFWQTC) which treats approximately 120 MGD dry weather flow is undertaking a major solids handling system upgrade to implement thermal hydrolysis pretreatment prior to the existing mesophilic anaerobic digestion. This upgrade also includes sidestream nitrogen removal since the plant operates a high-purity oxygen activated sludge with an average SRT of 2 days in mainstream, thus has limited capacity to handle the increases in ammonia loadings from the returned thermal hydrolysis and anaerobic digestion centrate. The existing operational and site conditions lead to several unique aspects related to sidestream planning and design. First, the plant is not configured and not stringently regulated for nitrogen removal, which makes a large variety of sidestream processes, including loading equalization, biological nitrogen removal, and physio-chemical ammonia recovery, viable alternatives to be evaluated. Second, the plant is located on a very constrained site which requires a robust and reliable design to retrofit existing facilities such as two 30-ft tall bio-roughing towers. Third, MFWQTC receives industrial loads from local bourbon distilleries, which are of higher strength and more variation than domestic wastewater loads. This paper provides insights for taking a whole plant consideration in the planning and design of the sidestream process and for solving the aforementioned unique challenges. The systematic approach on design criteria determination, the whole plant process model, and the highly detailed 3D visualization developed to facilitate the planning and design will be presented in this paper.

What Will Attendee Learn: Insights for taking a whole plant consideration in the planning and design of the sidestream process through a case study of an ongoing DB project at a 120 MGD plant.

Speaker Bio: Dian is a wastewater and bisolids process engineer at Stantec. He holds a PhD from Virginia Tech and authored more than a dozen peer-reviewed papers related to biosolids management. Key experiences include pilot studies, design, and business case evaluations for anaerobic digestion, thermal hydrolysis pretreatment, biosolids dewatering, and energy recovery.

Wastewater Treatment and Solids Processing, Room 201-202
Friday, September 2nd, 2022, 10:15 AM
Pusker Regmi, Brown and Caldwell
Continuous flow aerobic granulation: Revisiting biological aggregates for process intensification

Abstract: Continuous flow aerobic granulation (CF-AGS) has emerged as a prominent process intensification approach for unlocking treatment capacity, lowering capital and operating cost, and improving effluent quality. Consequently, biological and physical selectors for the generation and management of aerobic granules, and densified biological flocs are being researched. This study focuses on the interaction of biological (to promote the growth of densified biological aggregates) and physical selectors (to provide selective pressure for the formation and retention of biological aggregates) to achieve process intensification marked by higher settling rates, lower effluent turbidity, and favorable BNR kinetics. A goal of biological selection is to promote storage-product accumulating heterotrophic bacteria growth, which seems to be the key to sludge densification and ultimately, AGS formation. These bacteria condense excess organic substrate as internal storage products and produce EPS. Storage-product accumulating heterotrophic bacteria have a competitive advantage over ordinary heterotrophic bacteria that promote bacteria feast and famine. During feast conditions, storage-product accumulating heterotrophic bacteria consumes an organic substrate at a rate that is greater than that of their growth; hence, bacteria can condense excess organic substrate as internal storage products that can be hydrolyzed during famine conditions. Specific denitrification rate results, with no external carbon addition, from mixed liquor samples at different biological selector F/M conditions expressing higher denitrification rates for the samples exposed to higher feast conditions indicating higher storage-product. Furthermore, physical selection occurs through devices such as rotary-drum screens, hydrocyclones, and surface wasting devices that are, typically, incorporated with waste solids strategies. It is well understood that washing out smaller and lighter flocculent particles can be favorable for AGS formation. Biological and physical selector-driven CF-AGS uncouples the growth of nitrifiers and PAOs as well as denitrifying PAOs (dPAOs) (similar SRT requirements as nitrifiers) from the SRT of the flocculent fraction. Consequently, CF-AGS offers the much-needed SRT safety factor for continuous flow BNR processes. In addition, the dPAO activity in the granules could result in carbon efficiency for nutrient removal. It was also demonstrated the presence of 40% higher nitrifier activity in the underflow (containing 70% granules) of the hydrocyclone compared to the waste-activated sludge overflow (containing 35% granules). This paper will also provide a summary of research from several plants that have employed physical selectors in conventional BNR configuration with anaerobic/anoxic selectors.

What Will Attendee Learn: The presentation will provide practical considerations and lessons learned for achieving continuous flow granulation in conventional BNR systems

Speaker Bio: Dr. Pusker Regmi, Senior Process Engineer and wastewater treatment innovation leader at Brown and Caldwell in Washington D.C. area. He invented AvN for efficient nutrient removal, which is now paving the way for a new wave of compact and carbon-efficient technologies such as partial denitrification anammox (PdNA). Pusker is the author of over 50 publications in peer-reviewed journals and conferences proceedings. He is currently a vice-chair of the WEF research and innovation symposium.

Wastewater Treatment and Solids Processing, Room 201-202
Friday, September 2nd, 2022, 10:45 AM
Andrew Freitas, Greeley and Hansen
Lessons Learned: It Pays to Pause

Abstract: Using "lessons learned", the Metropolitan Water Reclamation District of Greater Chicago (MWRD) was able to drastically reduce the capital and annual operating and maintenance costs at the Stickney Water Reclamation Plant (SWRP). This presentation will provide an overview of the original design, the reevaluation using "lessons learned", and the realized reduction in overall project costs. The SWRP is the largest of the seven water reclamation plants owned and operated by the MWRD with a total secondary treatment capacity of 1,440 MGD. A preliminary design for replacement of the 80-year old Imhoff Tanks included demolition of Imhoff Batteries A and B and construction of new 160-foot diameter Preliminary Settling Tanks (PSTs) and an Aerated Grit Facility (AGF). However, in order to maintain full plant operation and manage project risk, the Imhoff Replacement Project was initially split into four contracts. Design of the SWRP project began as construction of a similar project at MWRD's Calumet WRP (CWRP) approached completion. The PSTs and AGF design for the SWRP project were of similar size and design to that of CWRP. After being placed into service at CWRP, the new PSTs achieved higher than expected solids removal rates, allowing MWRD to reduce the number of PSTs in service. Construction of the first contract at SWRP started in 2009, with design of the second and third contracts planned for 2010. However, design of contracts two and three was put on hold due to economic instability. This ultimately proved advantageous, permitting completion of alternatives investigations of the original design based on the lessons learned from the CWRP project. The originally designed AGF included an enclosed building housing eight (8) aerated grit tanks with travelling bridges, associated piping, pumps, classifiers, and ancillary equipment. Alternative grit removal technologies were evaluated to identify space savings. By combining shaftless screw conveyors with the previously recommended grit and air lift pumps, the enclosed building was reduced in size by nearly a third, subsequently reducing the associated heat, ventilation, light, and odor control costs. Additionally, hydraulic analysis determined only five of the eight tanks were required at plant peak flow. Final redesign included six grit tanks. Using data from CWRP, MWRD developed a process model for the SWRP that determined only nine PSTs were required instead of the original eighteen. In addition, the new PSTs increased sludge gas production and reduced greenhouse gas emissions and odors through mechanical sludge collection and conveyance to gravity thickeners and then anaerobic digestion. These upgrades have provided a nearly 80% increase in biogas production, supporting MWRD's goal of being energy neutral by 2023. By reevaluating the project, MWRD was able to reduce the total capital costs of contracts two and three while eliminating the fourth contract completely, saving approximately $160 million in total capital costs. Additionally, the reduction in size of the AGF resulted in annual savings of $300,000 in operating costs.

What Will Attendee Learn: Using "lessons learned", the Metropolitan Water Reclamation District of Greater Chicago (MWRD) was able to drastically reduce the capital and annual operating and maintenance costs at the Stickney Water Reclamation Plant (SWRP). This presentation will provide an overview of the original design, the reevaluation using "lessons learned", and the realized reduction in overall project costs.

Speaker Bio: Process engineer with seven years of progressive experience in facility planning, design, management, and construction services of water and wastewater treatment projects. Experience on projects at over a dozen water and wastewater plants within the DC Metropolitan region. Specialized in process design, with significant focus on pumping and process treatment as well as coordination of support disciplines and unit processes.

Wastewater Treatment and Solids Processing, Room 201-202
Friday, September 2nd, 2022, 11:15 AM
Kelvin George, GHD
Transitioning A Large Wastewater Treatment Facility from Local Control to Plant-wide SCADA System

Abstract: A 20 mgd (peak of 50 mgd) wastewater treatment plant (WWTP) serving a large municipal county in the mid-Atlantic region has been operating individual processes using local manual controls, and in some cases local automatic controls such as PLCs and other solid-state controllers. Liquid treatment process includes headworks pumping, screening and grit removal, primary and secondary clarification, biological treatment, final clarification, filtration, UV disinfection and post aeration. Solids treatment includes thickening, aerobic digestion, dewatering and lime stabilization. The plant went through a series of upgrades over many decades, but they never took a wholistic approach to SCADA controls and power distribution system. Each project included what was necessary for that project. The County wished to upgrade the overall plant control scheme to a centralized control scenario (i.e., plant-wide SCADA system). Design includes a distributed PLC control system with local workstations (HMIs) to be networked via an existing plant-wide fiber optic loop, with connections to the various PLC/HMI nodes and an existing on-site HMI application (Wonderware) server that is currently serving off-site water facilities. Field instrumentation upgrades are included in the design. Anticipated benefits of transitioning to plant-wide automation include 1) centralized monitoring and control of processes from Control Room, 2) allowing process monitoring and control from various locations within the plant, 3) efficient recording and manipulation of plant data, and 4) standardization of hardware and I/O configuration. County also wished to replace a portion of the electrical power distribution system, including motor control centers, double ended medium voltage switchgear, as well as modify the medium voltage underground distribution system. Anticipated benefits include 1) replacement of old MCC and switchgear components that have become difficult to maintain due to lack of spare parts, and 2) more reliable, resilient power distribution system with flexibility for future expansion. Significant challenges included 1) Sequencing of construction, 2) “before” and “after” testing of treatment systems, 3) transforming plant operational and maintenance staffing capabilities into design requirements, 4) incorporating redundancy in the underground MV power distribution feeder infrastructure, 5) identifying types of field instrumentation that will be functional, robust and easily maintained, and 6) coordinating the design with seven (7) ongoing plant upgrade design and construction projects. A series of site visit surveys were conducted to gain as much information as possible about existing conditions. Subsequently, a series of planned workshops were conducted with plant personnel to discuss the automation of unit processes, desired I/O and process parameters to be monitored, and requirements for maintaining operations of critical treatment processes. Workshops also included discussions on types of treatment processes that could be shut down and for what durations, with identification of bypass pumping and temporary power requirements, limitations on working hours around critical processes, and involvement of plant staff during construction and startup. Draining of the large aeration basins to allow for replacement of instrumentation, VFDs and electrical control equipment was a major part of the discussions, since each of the five (5) aeration basins hold 2 MG of mixed liquor.

What Will Attendee Learn: Challenges and benefits associated with switching from local controls to central SCADA system as well as challenges associated with doing a major electrical upgrade at a major WWTP.

Speaker Bio: Kelvin graduated with a BS in Civil Engineering and a MS in Environmental Engineering from the City College of New York. He is a professional engineer in MD and DE and a board certified environmental engineer. Kelvin has over 23 years experience in the planning, design and construction of water and wastewater treatment facilities. He is a project director and principal with GHD.

Water System Infrastructure, Room 205/206
Wednesday, August 31st, 2022, 8:30 AM
James Parkes, Schnabel Engineering
What Could Go Wrong? Lessons Learned from Trenchless Water/Wastewater Installations

Abstract: Trenchless construction methods are used frequently for installation of water and wastewater pipelines for areas where open cut is not feasible, such as crossings of railroads, major roadways, and bodies of water. These installations often deal with difficult ground conditions and nearby or overlying infrastructure. Even when general guidelines for project planning and design are followed, such as performing geotechnical borings or including minimum equipment capabilities in project specifications, issues can still arise during construction. This presentation will review several recent trenchless projects in the Mid-Atlantic that have experienced construction issues, including obstructions and rock, unstable soils or sinkholes, and other installation issues. A general overview of the trenchless methods used, including microtunneling and pilot tube auger boring, and regional geology will be presented, along with potential risks and construction considerations of these methods. Lessons learned from these projects for consideration in future trenchless projects will be presented.

What Will Attendee Learn: Potential geologic risks, construction considerations, and lessons learned regarding trenchless pipe installations for water and wastewater projects.

Speaker Bio: James Parkes is the technical tunneling director with Schnabel Engineering, responsible for oversight of technical aspects of their commercial tunneling and trenchless projects. He graduated summa cum laude with BS and MS degrees from Virginia Tech and has worked on a variety of small and large diameter water and wastewater tunnel projects throughout the Mid-Atlantic and US.

Water System Infrastructure, Room 205/206
Wednesday, August 31st, 2022, 9:00 AM
Sarah Busch, Carollo Engineers

Impact of Flow Rate and Water Age on Opportunistic Pathogen Growth: Implications for Water Conservation, Fixture Design, and Policy

Abstract: Water conservation efforts have led to a decrease of flow rates in buildings, increasing water retention time (WRT) and sometimes opportunistic pathogens (OPs) growth. A novel experiment with replicated distal pipes operated at commonly used flow rates was designed to evaluate the effects of water age, flush frequency, flow rate, pipe diameter, water temperature, disinfectant residual presence, and microbial regrowth in hot and cold pipes. In cold water, total bacterial regrowth was a function of water age, plateauing after approximately 6 days at cell counts 20 times higher than influent water with minimal disinfectants. In warm (40 °C) water, most regrowth occurred in the heater tank, reducing the relative growth in the pipes. When cold water with ~1 mg/L chloramine was present, cold-water total bacteria regrowth plateaued after about 2 days WRT with cell counts 14 times higher than influent water, but regrowth still occurred in the heater tank. With 1 mg/L chloramine and elevated heater temperature (60 °C), regrowth in the tank was suppressed and cell counts in the pipes increased 82 times above cold-water influent levels at 7.5 days WRT. Legionella spp. and Mycobacterium spp. demonstrated opposite responses to flow rate with chloramine minimization. The highest levels of Legionella spp. (1.7 log higher than influent) were present when flow velocity was >2 feet per second (fps), but the highest levels of Mycobacterium spp. (1.5 log higher than influent) were observed at the lowest flow velocity (0.33 fps). This study highlights the tradeoffs between water conservation and water quality.

What Will Attendee Learn: The purpose of this presentation is to provide a deeper understanding of distribution system factors impacting opportunistic growth in indoor plumbing systems, such as water temperature, disinfection residual, and water age.

Speaker Bio: Sarah Busch is a staff engineer and licensed Envision Sustainability Professional (ENV SP) with knowledge on the drinking water process specifically in terms of the growth of opportunistic pathogens (e.g., Legionella) in premise plumbing systems. Ms. Busch has conducted several bench and pilot scale experiments focused on collecting physiochemical and microbial information to gain a deeper understanding of the impact of increased water age has on microbial growth in green building pipe systems.

Water System Infrastructure, Room 205/206
Wednesday, August 31st, 2022, 9:30 AM
Alireza Parhami, DC Water
Lessons Learned from Implementation of DC Water Digital Twin

Abstract: DC Water serves more than 700,000 residents and 21.3 million annual visitors in the District of Columbia with retail water and wastewater (sewer) service. With a total service area of approximately 725 square miles, DC Water also treats wastewater for approximately 1.6 million people including neighboring jurisdictions in Maryland and Virginia. On average DC Water delivers 92 MGD of drinking water through 1,300 miles of interconnected pipes, four pumping stations, five reservoirs, three water tanks, 43,860 valves, and 9,510 fire hydrants. DC Water also operates 1,900 miles of sanitary and combined sewers, 160 flow meters, 9 wastewater pumping stations, 16 stormwater pumping stations, and treats on average 292 MGD of wastewater at the Blue Plains Advanced Wastewater Treatment Plant located along the Potomac River. To operate and maintain this vast and complex network of water and wastewater infrastructure, DC Water utilizes an array of digital systems including SCADA, CMMS, AMR, GIS, an array of IoT sensors and Hydraulic Models. While these systems serve operational, engineering, and customer service functions, the data from these systems tend to serve specific needs and objectives; and stored in separate databases. In 2020, DC Water began a journey to implement a Water Infrastructure Digital Twin that would enable DC Water with greater operational insights and enables employee across the enterprise with clear and near real-time system operational actionable insight. In this presentation, DC Water will demonstrate the implementation steps from a utility perspective and will cover challenges and considerations faced during the successful implementation of such Digital Twin. This ranged from data security, digital integration of data across various platforms as well as required internal stakeholders' participation and support. DC Water will also share the following use cases achieved using the implemented Water Infrastructure Digital Twin such as sensor anomaly detection using machine learning, pump operational performance dashboards, perpetual simulations using a "heartbeat" real time network model, ad hoc operational event simulation capabilities that allow operators to test various operational scenarios in near real time including pipe breaks, pump station shutdowns, and fire flow events. Future operational use cases may include an automated monthly non-revenue water audit.

What Will Attendee Learn: In this presentation, DC Water will demonstrate the implementation steps from a utility perspective and will cover challenges and considerations faced during the successful implementation of such Digital Twin.

Speaker Bio: Alireza has over 18 years of experience in Infrastructure Planning, Hydraulic Modeling, and Asset Management both in the private and public sectors. Mr. Parhami is leading DC Water's implementation of Water Distribution and Sewer Collection System Digital Twins and Hydraulic Modeling at DC Water. He is a registered Professional Engineer in the District of Columbia, Maryland, and Texas. He will be presenting on DC Water's experience and perspective on the implementation of Water Distribution Digital Twin.

Water System Infrastructure, Room 205/206
Wednesday, August 31st, 2022, 1:00 PM
Kate Naughton, Hazen and Sawyer
Dam Design Value Engineering Approaches – Applying the Latest Science to Address Spillway Capacity

Abstract: The Edgemont Reservoir was originally constructed in the early 1900's as part of the water supply system for Washington County. The last significant rehabilitation to the dam was in the mid 1990's, which included a major spillway and intake upgrade along with grouting in the right abutment. Since 2006, the City of Hagerstown (City) has been closely evaluating and monitoring the dam embankment and spillway. Due to continued seepage concerns and following recent coordination with the MDE Dam Safety Program, the City decided to move forward with detailed investigation, engineering, and construction to resolve the ongoing embankment seepage and spillway structural issues. While the investigation and design is underway, the City is maintaining the reservoir in a dry condition, which reduces seepage and minimizes the potential for spillway activation. During the investigation and engineering phase of the project, Hazen and Sawyer (Hazen) prepared a preliminary analysis of the dam's existing hydraulic capacity, which concluded that the existing spillway cannot safely pass the PMP. As a result, Hazen recommended that the existing spillway be replaced with a higher capacity spillway to improve the safety of the structure and bring it into compliance with current MDE requirements. As part of the Edgemont Reservoir Rehabilitation project, and in an effort to identify potential project cost savings associated with the spillway design, Hazen and Sawyer (Hazen) developed a Design Storm Evaluation Report, which compared various approaches to determining the necessary spillway capacity. This presentation will present the findings of this PMP evaluation with an emphasis on the Virginia, Pennsylvania, and Maryland PMP studies and their applicability to the project site. The dam is a Category I structure and is, therefore, required by The Code of Maryland Regulations (COMAR) to safely pass the Probable Maximum Precipitation (PMP). It was determined from this evaluation that the storm capable of producing the largest inflow to the reservoir is the 72-hour duration PMP developed using Hydrometeorological Report No. 51, Probable Maximum Precipitation Estimates - United States East of the 105th Meridian (HMR-51) and Hydrometeorological Report No. 52, Application of Probable Maximum Precipitation Estimates – United States East of the 105th Meridian (HMR-52). Given the magnitude of rehabilitation necessary to pass the PMP and potential increases in construction costs, the City, MDE, and Hazen have been working collaboratively to reach an agreement on design constraints for the dam improvements, which will be presented. One such design decision was that the 6-hour duration PMP, as opposed to a 72-hour duration PMP, is an appropriate design storm for the dam given the short time of concentration for the reservoir's drainage basin. Furthermore, additional PMP analyses based on the recent state-specific Virginia and Pennsylvania PMP studies, as well as the ongoing Maryland PMP study, could result in a sizeable reduction in the peak inflow of the design storm. Hazen evaluated the 6-hour duration HMR-51/52 distribution PMP, the 6-hour TR-20/TR-60 distribution PMP, the updated Virginia PMP, the recently-released Pennsylvania PMP, and the ongoing Maryland PMF for the Edgemont Reservoir.

What Will Attendee Learn: How to evaluate the hydraulic capacity of a dam spillway and alternative data available to aid in evaluating the needed capacity. This newly available data can lead to potential project cost savings.

Speaker Bio: Kate Naughton is a Principal Engineer at Hazen and Sawyer, working from their Baltimore Office. With over 8 years of experience, she has led the study and design of a number of dam projects in Maryland and Pennsylvania. In addition to project duties, she is responsible for providing oversight on technical study/design implementation and mentorship to younger staff.

Water System Infrastructure, Room 205/206
Wednesday, August 31st, 2022, 1:30 PM
Nick Lewis, Gannett Fleming
1 Million Gallons of Drinking Water Storage Replacement for the Town of Middletown

Abstract: In 2017, the Town of Middletown (Town) was through chasing leaks and making repairs to the two ground impoundment storage reservoirs that provided water to the 5,000 residents of the town. In fairness, the existing reservoirs provided excellent value considering the embankment was originally constructed back in the 1890s. Nevertheless, the Town had decided to perform an evaluation and design for the replacement of the reservoirs with enclosed storage. Constructed and online since early 2021, the Town's storage is now provided by a split-cell AWWA D-115 concrete tank that sits partially buried in the footprint of the old embankment. This presentation will delve into the capacity storage analysis for the Town, storage tank technology evaluation, and the eventual use of 3D modeling and virtual reality for as-builting of the design to bring this 19th century reservoir into the 21st. The first step in replacing the reservoirs was to determine how much storage was to be provided. The impoundment reservoirs were oversized; however, reducing the storage capacity was a tricky proposition considering the Town had experienced an extreme drought in their recent history. Ultimately, the Town settled on one million gallons worth of storage to be provided onsite. With the sizing in place, the next step was to determine the technology to be used for tank construction. Considering the flexible geometry, and limited onsite construction time employed by tendon-prestressed concrete, the team was able to provide a divided cell "pill-shaped" tank that fit perfectly into the footprint of the larger embankment reservoir. Factory pre-casting the concrete members and panels allowed for a limited construction footprint. This meant that the smaller of the two reservoirs could stay in service while the new tank was built, alleviating community concerns about drinking water availability during construction. The tendon-prestressed technology also allowed for a dry storage appendix to the tank, which now serves as a split-level pipe gallery and control room. To as-built the construction, the design team opted for a 3D platform, using Revit. By creating a 3D model of the tank and control room, the Town can use the model as the base for future upgrades and expansions. The software also allowed the team to pull the model into a virtual reality platform, using Prospect. With VR technology, the model will benefit the entire project lifecycle as it provides a stage to work with operators for training opportunities to see exact locations of equipment and get their virtual hands on things like valve actuators and controls.

What Will Attendee Learn: Using a successful project as a case study, attendees will learn the process used for storage capacity analysis, pros and cons of different drinking water ground storage tanks on the market, and applications for 3D modeling and virtual reality for water process design.

Speaker Bio: Nick Lewis is an Associate in water group of Gannett Fleming's Baltimore office. For the past 10 years Nick has provided design assistance for a wide variety of projects and was the lead design engineer for the Middletown Storage Tank Replacement project. Nick is a registered professional engineer and has served on the board for the Chesapeake section of AWWA for the past 5 years as distribution committee chair and trustee.

Water System Infrastructure, Room 205/206
Wednesday, August 31st, 2022, 2:00 PM
Jeremy Hise, Hazen and Sawyer
Dam Removals - Maryland Lessons Learned and Future Applications

Abstract: The Bloede Dam, up until it's recent removal, was located in the oldest and most visited State Park in Maryland. The 34-foot-high and 220-foot-wide dam was constructed in 1907 to provide electric power but was out of commission by 1927 due to sedimentation. The dam until its removal remained a public hazard and an obstacle to migrating fish. Upon its removal the Patapsco River was returned to a natural, free-flowing river. This presentation will outline the lessons learned through the life cycle of this important regional project: planning phase to engineering and through construction. These lessons can be applied to future projects in Maryland and beyond with over 80,000 outdated dams remaining throughout the country. More and more of these outdated dams are being considered for removal to meet conservation goals and improve public safety. A discussion on how the lessons learned from the Bloede Dam project are being applied to the ongoing Albright Power Station Dam Removal Evaluation project will also be covered. A clear understanding of the following, as highlighted by the Bloede Dam Removal project, are critical for project success. This project can serve as a template for how similarly complex projects can achieve success. • Stream/river hydraulics and response to rainfall events both prior to, during, and subsequent to dam removal – the Patapsco River is an extremely flashy river. • Subsurface understanding and dam removal technique – this project required extensive rock removal through controlled blasting that would not adversely impact nearby utilities. • Construction access - the flashy nature of the river caused issues throughout construction. The Contractor had to remove and protect the equipment and work areas every time a weather event was forecast. • Sediment characterization and mode of transport - a critical element to make the project financially feasible, was the passive release of 300,000 cubic yards of impounded sediment. This approach required sediment transport and nutrient analysis studies and detailed dam breach planning. • Utility impacts - after further site investigation, it was determined that the sewer infrastructure constructed behind the dam in the 1960's and 1970's by Baltimore and Howard counties, would be at high risk once the dam was removed. • Stream stabilization - large concrete secant pile walls were required to provide long term protection for the new sewer infrastructure once the dam was removed. • Collaboration between all levels of government, non-governmental organizations, the private sector, and the local community – permitting a significant impounded sediment release was a significant project challenge and required close collaboration with permitting agencies.

What Will Attendee Learn: Challenges associated with dam removal projects. Necessary data and analyses to properly plan for and execute a dam removal project.

Speaker Bio: Mr. Hise is a Senior Associate at Hazen and Sawyer, working from their Baltimore Office. He has an undergraduate degree from Virginia Tech and a graduate degree from Johns Hopkins University. With over 18 years of experience, Mr. Hise has led the study and design of a number of large Maryland, Virginia, and Pennsylvania water facility projects. His expertise lies largely in water treatment, quality, and storage.

Water System Infrastructure, Room 205/206
Wednesday, August 31st, 2022, 3:30 PM
Mark Zito, Trinnex
Mining for Lead: Lead and Copper Rule Revision Inventory

Abstract: The Environmental Protection Agency (EPA) is revising the Lead and Copper Rule (LCR) to better protect children and communities from the risks associated with exposure to lead in drinking water. While lead was banned in 1986, the EPA estimates 6- to 10 million lead service lines are in use across the U.S, representing about 7 percent of all households. The EPA estimates the average cost to replace a line is $4,700, ranging from $1,200 to $12,300 per line for a total of $28 - $47 billion. Many utilities lack a comprehensive inventory of the service lines, including the material. While this data typically exists, it is often not collated in a digital system that is searchable and mapped to an individual address. The revisions to the LCR require an inventory of all water system-owned and customer-owned lead service lines. Systems serving more than 50,000 people must make the inventory available online, while smaller systems need to make the inventory publicly available upon request. This presentation will focus on strategies to develop the inventory using available sources such as GIS data, distribution system record data, lateral cards, work orders, plumbing codes, and meter replacement programs, to name a few. While unknown material is acceptable in the submission, the property owner must be notified annually, and it will count towards replacement targets if the trigger level is exceeded. Reducing the number of unknowns is advantageous to both the utility and the public. In addition to desktop studies, materials verification may also be needed to confirm the material in the ground using methods such as test-pits and inspecting connections entering homes. With the initial inventory due in three years, now is the time for utilities to begin the process of building the inventory and to start developing a program.

What Will Attendee Learn: Attendees will learn the service line inventory compliance requirements for the Lead and Copper Revision Rule and best practices for developing the inventory.

Speaker Bio: Mark Zito is a Product Leader at Trinnex, a wholly-owned subsidiary of CDM Smith, with 15 years of experience working with utilities. He holds a Masters in Geographic Information Technology from Northeastern University and Bachelors in Geography from THE Ohio State University. His focus is on using geospatial data analytics to discover insights and make smarter, faster and more informed decisions.

Water System Infrastructure, Room 205/206
Wednesday, August 31st, 2022, 4:00 PM
Laura Khouvilay, Carollo Engineers
Trigger-Based Distribution System Master Planning

Abstract: Development of master planning and capital improvement plans have rapidly evolved in the last decade. The traditional approach of updating master plans every few years has become obsolete. Utilities require dynamic tools that can help them quickly adjust their long-term plans as a result of rapid changes in system needs. Changes in growth patterns, redevelopment, water conservation efforts, reduced funding, system aging, climate change effects and public perception are just some of the sources for these rapid changes. This presentation will provide examples of the successful use of hydraulic models to identify trigger points to recommended improvements. This trigger-based approach allows utilities flexibility in constructing infrastructure when it is needed, which maximizes the benefits realized from the capital expenditures; provides ability to adjust timing and capacity in the event of changes in demands; and allows utilities to see the results from improvements more quickly by identifying projects that can be constructed in a reasonable timeframe. For Charleston Water System (CWS), the system demand is projected to exceed the WTP's firm capacity soon. The hydraulic model was utilized to identify trigger points and develop implementation phases for two scenarios that address WTP capacity and improve redundancy. This approach enabled CWS to move forward with near-term capital improvements while clearly defining when a supply augmentation alternative must be selected. For Dallas Water Utilities (DWU), the trigger-based approach was particularly beneficial in the phasing of improvements for a large magnitude project that includes a new 30-miles of 96 in. to 120 in. water transmission main, a 100 mgd pump station, and 20 MG of storage.

What Will Attendee Learn: This presentation will provide examples of the successful use of hydraulic models to develop trigger-based master plans and capital improvement plans to provide utilities flexibility in the timing and capacity of constructing infrastructure and to maximize their benefits realized from capital expenditures.

Speaker Bio: Laura is a leading expert in water distribution system modeling, optimization, advanced analytics, asset management, and master planning. She is proficient with all the major modeling applications including WaterGEMS, InfoWater Pro, and EPANET. Laura and her team have developed and calibrated hydraulic models for some of the largest distribution systems in the country including Washington Suburban Sanitary Commission, Dallas Water Utilities, and Charleston Water System.

Water System Infrastructure, Room 205/206
Wednesday, August 31st, 2022, 4:30 PM
Brian Aylaian, Mott MacDonald
Rehabilitation Innovation and Historic Preservation at the City of Baltimore's 40 MGD Guilford Water Pumping Station

Abstract: Purpose: The purpose of this presentation is to present the City's successful approach to the rehabilitation of the 40 MGD Guilford Water Pumping Station. The project's main goals were to increase station pumping capacity, modernize the station to present day standards, convert the disinfection scheme from chlorine gas to sodium hypochlorite, address pump suction piping deficiencies, restore the unique historic character of the station building to its former glory and add energy efficient building ventilation and cooling. Introduction: The station is located due north of the City center and serves the third zone by filling Towson Reservoir and its respective customers. It was originally built in the late 1890's and has undergone several modifications over the years. The old pump station was equipped with two 10 MGD pumps (A & D) and two 25 MGD pumps (B & C). The station historically experienced cavitation problems with the smaller 10 MGD capacity Pumps A and D, and they have been replaced approximately three times in the past twenty years. Most recently the existing small 10 MGD (A&D) pumps were installed in 1997 and the large 25 MGD (B&C) pumps were installed in 1955. The building experiences severe heat in the summer with no capability for cooling. Rehabilitation Approach: This project replaces all 4 pumps with higher efficiency units, modern controls and lower Net Positive Suction Head requirements. The suction and discharge piping and vaults were replaced, reducing dynamic headlosses. A new sodium hypochlorite dosing storage and feed system, housed in a building that matches the existing historic features, replaces the gas cylinder system for disinfection, improving safety of City workers and nearby residents. Integration of the station with the new covered potable water storage tanks on the adjacent property was achieved through an updated disinfection control scheme. All the electrical equipment in the pumping station was replaced for code compliance, improved efficiency and redundancy. The new energy efficient HVAC system uses the potable water as the cooling medium. Unique Project Features/Challenges: The unique features and challenges experienced on the project to be presented are a new HVAC system that features a unique energy efficient cooling system design which utilizes the finished water as the cooling medium, coordination with the adjacent WC1173R Guilford Reservoir replacement project, construction sequencing and maintaining City water service, space constraints (HVAC/pump motors/conduit routing/ MCCs), coordination of pump controls, equipment setpoints and SCADA, community and CHAP (City Historic Preservation Office) acceptance through preservation of the historic character of the original building exterior.

What Will Attendee Learn: Attendees will learn about opportunities and challenges associated with the design and construction of rehabilitation of large historically significant water pumping stations. In the case of the Guilford pump station, the issues were numerous including hazardous material controls, code compliance, historic preservation, construction sequencing and maintenance of station operations during construction, management of space constraints, coordination with other station operations and the Guilford reservoir project, and safety. Attendees will also learn about an innovative approach for station HVAC which used the potable water as the heat sink/cooling medium.

Speaker Bio: Brian is a professional engineer currently serving as a Senior Project Manager for Mott MacDonald out of their Hunt Valley Maryland office. He is been working in the Maryland area for more than 23 years on water and wastewater facility projects.

Water System Infrastructure, Room 205/206
Thursday, September 1st, 2022, 8:30 AM
Steve Soldati, Aegion
Choosing the Right Rehabilitation Technique for Water Mains

Abstract: Pipelines that carry flows under pressure represent a special set of challenges for water rehabilitation. Historically, most pressurized pipelines were rehabilitated using open cut construction. Part of the reason for that choice has been a lack of trenchless rehabilitation technologies appropriate for pressurized pipelines. A lack of investment in the aging pressure pipe infrastructure, coupled with increasing congestion both above and below ground, has accelerated development in the trenchless rehabilitation industry. But there are several trenchless rehabilitation technologies available, how do you choose between the different technologies? Where do you start? What factors about the project make one rehab solution better than the other? Who are the key players who need to be involved? What questions need to be answered to make an educated decision? These are the critical questions that many engineers and owners have and once answered, provides these project teams with real, innovative solutions to addressing their aging water infrastructure. In this presentation we'll review the concept of structural classification for pressure pipe linings as defined by American Water Works Association (AWWA), and we'll discuss where emerging trenchless renewal technologies fit within the AWWA classification framework for water mains diameters ranging from six inches to over 72 inches. This presentation will provide the necessary tools for both engineers and owners to work through the down selection process to assess and identify the proper rehabilitation technique for the project among many other options. At the end of the presentation, owners and engineers alike will be equipped to take that next step to achieving a successful pipeline rehabilitation project using a trenchless technology. This presentation will also review four case studies that utilized separate trenchless products for pressure pipe rehabilitation (Cured-in-place Pipe (CIPP), Tight-Fit HDPE, Fusible PVC, Carbon Fiber Reinforced Pipe (CRFP), and hose-style linings) and discuss the engineering, material construction, installation and cost-effectiveness of each solution with the intent to demonstrate the strengths and limitations of each product/process.

What Will Attendee Learn: This presentation will provide the necessary tools for both engineers and owners to work through the down selection process to assess and identify the proper rehabilitation technique among many options for their projects. Owners and engineers alike will be equipped to take that next step to achieving a successful pipeline rehabilitation project using a trenchless technology.

Speaker Bio: Steve is a registered engineer in Florida and California who has worked in the civil engineering industry since 2010 and in the trenchless water/wastewater industry since 2019. His experience includes positions in construction management, sales, business development, project & program management, and asset management in both the private and public sectors. Since 2019, Steve has been involved with a variety of pressure pipe rehabilitation techniques.

Water System Infrastructure, Room 205/206
Thursday, September 1st, 2022, 9:00 AM
Scott Jauch, HDR
Dealing with Failure

Abstract: Failures of water transmission and distribution systems are disruptive to communities, cause environmental damage and put emergency services in jeopardy. While utility owners implement safeguards to minimize the likelihood of main breaks, nearly 250,000 breaks occur each year throughout the U.S., causing more than 24% of the water treated and pumped into distribution systems to be lost before reaching its end user. Many proactive utility owners implement programs to assess and renew pipes, to limit the number of main breaks; however, they are an inevitable consequence of aging infrastructure. Throughout the water industry, these same utility owners are developing and implementing detailed emergency response plans, to reduce the consequence of these events, as they have learned that having a well-developed response system in place reduces the impact to the surrounding communities and allows for a more reliable system. An effective emergency response plan relies upon having an accurate inventory of system piping and appurtenances, as well understanding the location and operability of system valves. Additional steps that can be taken to reduce the consequence of a main break are having repair kits and replacement valves, having an emergency repair contractor, as well as specialty repair contractors familiar with your specific system under contract and on-call. The cost of a water main break can be significant to utility owner, both from a monetary standpoint, as well as a customer confidence standpoint. Having a plan in place to quickly respond in the event of a failure is imperative to reduce service outage time. This paper will discuss measures that can be taken to develop and implement an emergency response plan for pipeline failures and will provide a case study that highlights the social, economic and environmental consequences of a pipe failure without an emergency plan in place.

What Will Attendee Learn: This paper will discuss measures that can be taken to develop and implement an emergency response plan for pipeline failures and will provide a case study that highlights the social, economic and environmental consequences of a pipe failure without an emergency plan in place.

Speaker Bio: Mr. Scott Jauch is a Water and Wastewater Engineer for HDR's Water Business Group. Mr. Jauch has been working in the water sector for four years with a focus on linear asset condition assessment and renewal. He has assisted utility owners by coordinating and performing field inspections of linear assets, reservoirs and pump stations and developing management and renewal strategies. Working out of Ann Arbor, MI, he supports condition assessment programs in HDR's West, East, Central regions.

Water System Infrastructure, Room 205/206
Thursday, September 1st, 2022, 9:30 AM
Steve Soldati, Aegion

From Concept to Reality: Improving the Integrity of Service Reinstatement in CIPP Lined Pressure Pipes

Abstract: In municipal water distribution systems, services can range from ½-inch to 2+ inches and be either direct tapped or saddled. Currently, the most common practice used relies solely on the ability of the liner to bond or adhere to the interior surface of the pipe and/or to the service connection. For saddled connections, typically a dig is required to ensure a watertight service reinstatement. This paper will focus on advancements to the method of internal service reinstatement using a mechanical seal that is inserted into the service after lining. It is the evolution of a system introduced a decade ago, where a hollow stainless-steel bolt is threaded into the opened service after lining. The concept was revisited with the cooperation of a robotics firm, resulting in a more effective mechanical insert and more effective tooling required to robotically install the insert. The system has undergone significant testing with respect to the ability to withstand vacuum, as well as the expected pressures in a water distribution system. Significant improvements include not only a more cost-effective and less time-consuming method, but also the ability to reinstate saddled connections from within the lined pipe and eliminate the reliance of bond or adhesion between the host pipe and liner. The system includes components that eliminate mis-drilling of the lined over services, which impacts the integrity of the newly lined system. The presentation will present the successful results from a recent field pilot project and review the key aspects of the planning, design, and construction of water main service connection reinstatement. This pilot project provided the opportunity to experience first-hand the reinstatement process and mitigate the fears and unknowns of incorporating an emerging technology with an important needed capability by many owners.

What Will Attendee Learn: The audience will learn about the advancement of the innovative technique of internally reinstating water service connections of CIPP-lined water mains. This method includes state-of-the-art robotics leading the way in the water main rehabilitation industry.

Speaker Bio: Steve is a registered engineer in Florida and California who has worked in the civil engineering industry since 2010 and in the trenchless water/wastewater industry since 2019. His experience includes positions in construction management, sales, business development, project & program management, and asset management in both the private and public sectors. He is currently the Regional Sales Manager of Pressure Pipe, East Region for Aegion Corporation.

Water Treatment, Room 203-204
Thursday, September 1st, 2022, 2:00 PM
Emily Tummons, Black & Veatch
Lead and Copper Rule Revisions - Case Studies on Ways to Simplify Compliance

Abstract: The EPA has finalized Lead and Copper Rule Revisions (LCRR), which will impact water treatment systems in many ways, including: the development of service line material inventories and lead service line replacement plans, evaluations of corrosion control treatments, changes to compliance sampling locations and methods, sampling for lead at schools and childcare facilities, public education and notification changes, as well as the addition of a lead trigger level to engage water systems earlier before a lead action level is exceeded. This presentation will highlight key elements of the LCRR, compliance dates and timelines, and case studies of preliminary steps that several utilities are taking to prepare as described below. Five utilities in the Midwest and on the East Coast have taken a proactive approach and began activities in 2021 to improve public education on risks from lead, while evaluating materials throughout the distribution system to ensure that customers are receiving the highest quality water. Some of these programs were broken down into phases to provide decision points and to better understand the level of effort for the next phases of the project and ensure that the current team members were involved. The scope for the first phase of these efforts has included: gathering and organizing data regarding LCRR tasks into a centralized platform with various dashboards to track project status, sharing information with the public, and planning for next steps in the project; completing activities necessary to meet compliance deadlines with the LCRR; further improving public transparency and enhancing the usefulness of specific dashboards to other ongoing or planned projects in the distribution system; creating an open line of communication between all stakeholders to understand how the LCRR will be enforced and what activities could be started prior to compliance dates; and providing a phased approach to allow for key decisions to be made on the path forward based on data gathered to that point and results of discussions with their primacy agency. These projects utilize predictive modeling to estimate the likelihood that an unknown service line material could be lead and then several locations are verified with potholing field investigations to validate the model. This information is tracked with GIS maps and business intelligence dashboards to ensure that all levels of customer notification, scheduling, pitcher filter delivery, potholing, lead sampling, etc. are tracked and completed. These dashboards are equipped with logic to categorize the service line material type and help the utility understand what actions could need to be taken at each service connection in their system. There are new sampling methods and new sampling locations (schools, childcares, and new compliance sites) and tracking dashboards allow these utilities to stay informed of the program's progress and helps plan for upcoming costs. These program components will be discussed including details of how these utilities are preparing for the compliance date in 2024.

What Will Attendee Learn: Understand the compliance deliverables required by the Lead and Copper Rule Revisions (LCRR). Understand how dashboards and data management techniques can streamline LCRR compliance activities. Understand how predictive modeling can be used to estimate the presence of lead service lines throughout the distribution system and the process of model verification through field investigations.

Speaker Bio: Dr. Tummons joined Black & Veatch in the Water Treatment Technology group after completing her PhD in Environmental Engineering from Michigan State University. Since joining Black & Veatch, she has designed and conducted water quality and corrosion studies for potable water treatment systems involving desktop, bench-scale, and pipe loop evaluations to optimize corrosion control treatment in the distribution system.

Water Treatment, Room 203-204
Thursday, September 1st, 2022, 2:30 PM
Dustin Mobley, Black & Veatch
Surveying Costs on The PFAS Roadmap

Abstract: The US Environmental Protection Agency (EPA) has drawn up an ambitious roadmap to address per- and polyfluoroalkyl substances (PFAS) in our environment, including drinking water supplies. A key element of the plan is new national primary drinking water regulations for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS), two long-standing perfluorinated compounds, and regulations for additional PFAS are almost guaranteed to follow. EPA has committed to issuing a proposed regulation for PFOA and PFOS by fall of 2022 and expects to finalize the rule within the following year. Drinking water utilities will have three years to comply with the new rule, once finalized. EPA has not signaled the severity of the new maximum contaminant limits, but recent toxicity assessments and regulatory trends in other states point to possible restrictions well below the current lifetime health advisory level of 70 parts per trillion for the sum of both compounds. To comply with the new regulation many utilities will have to install advanced treatment technologies as conventional water treatment processes are ineffective at PFAS removal. These include granular activated carbon adsorption, ion exchange, or reverse osmosis, and possibly other novel technologies. The new rule will impact all drinking water utilities. While not all utilities will need to install additional treatment infrastructure to comply with the new rule, all will incur PFAS monitoring and administrative costs. Those that will need to install advanced treatment must determine the cost of implementation for each technology to make an informed selection. However, implementation costs are heavily dependent on the magnitude of PFAS in the water supply and level of treatment required to meet the approaching, unspecified limits. This presentation will explore several possible approaches EPA may take to regulate PFAS and investigate the cost of implementation for each using several scenarios based on actual PFAS contamination cases. Capital, annual recurring, and life-cycle costs will be presented for each technology reflecting the level of treatment required to comply with the anticipated PFAS rule under each scenario. Non-monetary factors affecting technology selection will also be reviewed.

What Will Attendee Learn: This presentation will provide an understanding of the range of costs that may be incurred by utilities as a result of the first national primary drinking water regulation for PFAS.

Speaker Bio: Mr. Mobley is a Process Engineer for Black & Veatch's Water business. He has 15 years of experience in the evaluation and design of municipal and industrial water treatment systems, including sedimentation, lime softening, filtration, granular activated carbon adsorption, ion exchange, air stripping, and reverse osmosis technologies. Mr. Mobley specializes in the planning, testing, and design of technologies for the removal of per- and polyfluoroalkyl substances (PFAS) from water.

Water Treatment, Room 203-204
Thursday, September 1st, 2022, 3:00 PM
Daniel Jeon, Gannett Fleming, Inc.
Let's Break down Forever Chemicals; Insights from Design/ Build Approach to Provide PFAS Treatment

Abstract: Per-fluorinated chemicals, commonly known as PFOA (perfluorooctanoic acid) or PFOS (perfluorooctanoate sulfonate) are part of a larger range of persistent industrial chemicals, non-polymer and polyfluoroalkyl substances (PFAS), nicknamed "forever chemicals". Given their solubility and stability in water, PFAS have been detected in surface and groundwater in hundreds of locations in the US and around the world. To provide a margin of protection from a lifetime of exposure to PFAS from drinking water, EPA has established the health advisory levels at 70 parts per trillion (ppt) and is planning to establish a national primary drinking water regulation by 2023 for PFOA and PFOS that would set enforceable limits and require monitoring of public water supplies. For small or large water utilities, it can present significant operational and compliance challenge for the upcoming PFAS requirements within a mandated duration. What are recommended scope items for engineering or design/ build contracts to comply with PFAS requirements? What are considerations for PFAS treatment operations and maintenance? How can PFAS treatment construction be expedited by design/ build project delivery approach? What are examples of state health department's requirements for PFAS treatment? Answers for some of these questions will be provided through perspectives from the design consultant and the construction contractor as design/ build team for the PFAS treatment projects in New York State. New York State is one of the states that adopted the enforceable limits of 10 ppt PFOA and PFOS in 2020 and requires water utilities to complete PFAS treatment within 24 months. To meet the aggressive schedule, design/ build project delivery optimized resources and collaboration between client, design consultant and construction contractor. The insights from these projects will provide valuable information for utilities preparing for the upcoming PFAS regulations in each state which hasn't adopted the enforceable PFAS regulations.

What Will Attendee Learn: The purpose of this abstract is to provide lessons learned and insights gained from NYS water utilities PFAS treatment projects for current or upcoming PFAS treatment compliance requirements.

Speaker Bio: Daniel Jeon, PE, PMP, ENV SP is a senior project manager with Gannett Fleming in Baltimore, MD. He worked for over $2 billion program management projects for Baltimore City DPW and New York City DEP and has managed design projects including collection system, water and wastewater treatments and facilities for 20 years. He received his bachelor's degree in Civil and Environmental from Utah State University and master's degree from Cornell University.

Water Treatment, Room 203-204
Thursday, September 1st, 2022, 4:00 PM
Robert Nally, WSSC Water
Optimization of the Residuals Handling Process at the Patuxent Water Filtration Plant

Abstract: WSSC Water started the operation of a residuals treatment system at the Patuxent Water Filtration Plant in late 2018. This presentation will summarize the major challenges faced and our experience with both conventional and innovative solutions to overcome them. For example, one of the persistent challenges was that dewatered cake would bridge in the solids storage bins. Unloading bins became exceedingly difficult and labor-intensive, forcing the plant to schedule centrifuge operations and hauling around the bin's storage limitations. Various solutions were attempted: optimizing the dewatering centrifuges, testing various bin coatings, and evaluating air jets. Finally, the plant created an inexpensive extension arm to the bin's rotary plow which proved successful. Another challenge was that the residuals handling facility was designed to meet maximum solids loading conditions. However, on most days, the plant operated under low solids loading conditions, below the range of existing equipment. Different process adjustments will be shared that greatly improved thickening without requiring the changeout of equipment.

What Will Attendee Learn: Process optimizations for treatment of water plant residuals

Speaker Bio: Robert Nally is the Plant Engineer at WSSC Water's Patuxent Plant. He is responsible for daily operations and maintenance as well as ensuring the plant stays in compliance with state regulations.

Water Treatment, Room 203-204
Thursday, September 1st, 2022, 4:30 PM
Mathew Roder, Arcadis

FAST-TRACK COLLABORATIVE DESIGN OF A MEMBRANE WATER TREATMENT PLANT

Abstract: To save $10 million in construction costs, Frederick Water, Arcadis and ORDERS Construction collaborated to fast-track design of an 8 MGD water treatment plant. In the spring of 2020, Arcadis completed design of a new 8 MGD conventional filtration surface water treatment plant for Frederick Water. After bidding, Frederick Water selected ORDERS Construction. Concurrently, Frederick Water negotiated access to an abandoned quarry approximately a mile away as the new water source. This presented an opportunity for Frederick Water to save $10 million by redesigning the plant to treat quarry water with membranes. Frederick Water, Arcadis, and Orders held three value engineering sessions to quantify potential cost savings. For Frederick Water to meet a VDH funding deadline, Arcadis needed to go from conceptual design sketches to permit ready documents in 11 weeks. To expedite permitting, Frederick Water directed Arcadis to design around one of the two membrane systems VDH has approved membrane systems for use without pilot testing. The membrane treatment process allowed Arcadis to design a treatment plant that VDH allowed to run without onsite staff. Orders then had three weeks to prepare a change order price based on the new design. This included a negotiated price for the membrane equipment. Frederick Water and Arcadis worked with VDH to address their comments and received permit approval in March 2021. Construction began in spring 2021 and is expected to be complete by spring 2022.

What Will Attendee Learn: Attendee will learn about how to manage a fast-track design project and how to collaborate with owner, designer, and builder.

Speaker Bio: Matt Roder has been a civil engineer for over 22 years. He holds a BS from the University of Notre Dame and a Masters degree from the Illinois Institute of Technology. He lives in Bowie, MD with his wife Nicole and children Emma, Sophia, Raymond, and Gianni.

Water Treatment, Room 203-204
Thursday, September 1st, 2022, 5:00 PM
Ron Milke, Eurofins Eaton Analytical
UCMR5 - A Primer: What To Expect, When Does it Start, and Who is Effected.

Abstract: The Unregulated Contaminant Monitoring Rule, or UCMR, will commence in 2023. This will be UCMR number five. This presentation will start with a brief summary of the results from UCMR4. We will then give a complete update and timeline on the expectations of UCMR5. This will include the 30 compounds that will be targeted, which water systems are required to monitor, and how this found data may affect each state. You will discover that this UCMR is much different compared to previous installments of UCMR based on the increased number of water systems that are required to monitor. The impacts of the results from this monitoring could greatly impact all water systems across the United States for years to come. 97% of the targeted analytes for UCMR5 are PFAS compounds. Currently, the reporting limits for PFAS are ten times lower than 2013, which is when six PFAS compounds were targeted during UCMR3. This new data will predictably become much more meaningful, now that several states are regulating PFAS at a very low level.

What Will Attendee Learn: They will learn all updated and finalized information about UCMR5, which starts in 2023. All previous UCMR's were mandatory for only water systems with greater than 10,000 population served, while this requires all water systems serving 3,300 or more people to participate.

Speaker Bio: Ron Milke has been in the Environmental Testing field for 30+ years. He has held positions as a bench chemist, project manager, and account executive. He works for Eurofins Eaton Analytical, as an Account Manager for the Mid-Atlantic States. The two EEA locations are premier water testing laboratories serving both national and international sources. Ron is a graduate of Stockton University, located in Pomona, NJ, where he earned a bachelor's of Science degree in Oceanography.