2017 Utility Honorees

Utility of the Future Today

EPA United States Environmental Protection Agency

NACWA

Water Environment Federation the water quality people®

WATER ENVIRONMENT & REUSE FOUNDATION WE&RF

WATEREUSE

The partners of the Utility of the Future Today are pleased to present the 2017 program's public and private utilities from across the U.S. selected by a peer committee of utility leaders.

The recipients were recognized and honored during an October 3, 2017 ceremony held in conjunction with WEFTEC 2017 in Chicago — WEF's 90th annual technical exhibition and conference—as well as a number of commensurate events sponsored by the partners.

The recipients received a display flag (below) and a special certificate to further identify and promote their outstanding achievement as a Utility of the Future Today.

The following 25 utilities have met the criteria for Utility of the Future Today by meeting the Organizational Culture requirement plus at least one of the Activities identified on page 5. Recognized Activities are indicated for each utility as identified by a ★ on their front page of this document. Each utility identified in this document has contact information. Utilities receiving recognition through this program are expected to share their practices and experiences to create a community of practice around the Utility of the Future Today, and to enable other utilities to continually learn from each other and evolve as a sector.

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Background: The "Water Resources Utility of the Future" was first articulated in a 2013 publication jointly prepared by the National Association of Clean Water Agencies (NACWA), the Water Environment Federation (WEF), and the Water Environment Research Foundation (WERF). *The Water Resources Utility of the Future: A Blueprint for Action* sought to capture in one place current, emergent, and possible wastewater utility opportunities that, packaged together, presented a revolutionary future for the sector. That revolution would transform the traditional wastewater treatment system to a community-based resource recovery center and leader in the overall sustainability and resilience of the communities they serve. This Recognition Program has been specifically designed to further promote and enable the emergence of this new business model for the sector, provide recognition for those achieving these outcomes, and encourage peer-to-peer learning among utility members of the Recognition Program and with other utilities.

The sponsoring organizations for this recognition program understand that substantial excellence in the operations of wastewater treatment systems exists today. Many utilities optimize and continually improve their operations, consistently meet or exceed their regulatory requirements, plan and invest effectively for the maintenance, repair and replacement of their infrastructure, and engage their employees and communities in meaningful and productive ways.

While a variety of initiatives exist to promote and acknowledge excellent performance and sustainable management of utilities focused on our sector's historic priorities – providing reliable, affordable, and responsible wastewater collection and treatment service, the most prominent of these is ***Effective Utility Management*** (EUM) (www.WaterEUM.org). EUM is supported by eleven Collaborating Organizations, including all five partners of this Recognition Program. The Ten Attributes of Effectively Managed Utilities and Five Keys to Management Success form the basis for Effective Utility Management. When taken together, these Ten Attributes and Five Keys represent the basis for excellence in utility management. While EUM is not a requirement for recognition under this program, utilities are encouraged to use the EUM framework as they seek to become a Utility of the Future.

The 2016 inaugural ***Utility of the Future Today Recognition Program*** was created to promote actions that build on this foundation of excellent management and help small, medium, and large utilities transform their operations over time. During the initial year, 61 utilities were honored. In 2017, 25 utilities were honored (seven were recognized in 2016 and have added one or more new activities meeting the criteria. The Utility of the Future Activity Areas focus on the key building blocks to this transformation: recovery and new uses of a full range of resources; and engagement as a leader in the full water cycle and broader social, economic, and environmental sustainability of the community. In addition, transformation of the internal utility culture in support of these innovations, and engagement in the community and formation of partnerships are necessary for success when operating outside of the traditional span of control of the utility.

Program Statement of Purpose

The *Utility of the Future Today* Recognition Program seeks to reach deeply into the water sector to form and motivate a community of like-minded water utilities engaged in advancing resource efficiency and recovery, developing proactive relationships with stakeholders, and establishing resilient, sustainable, and livable communities. The Recognition Program, through the aggregation and sharing of utility advancements and experiences, enables participants across a broad continuum of capacities and capabilities to learn from each other and continually grow and sustain their efforts to be, and continually advance the concept of, the Utility of the Future.

The Recognition Program seeks to encourage utilities to embed the principles of the Utility of the Future within their organization, beginning with Organizational Culture. Organizational Culture is the foundation by which all other Utility of the Future Activity Areas are sustainably supported.

Utilities receiving recognition through this program are expected to share their practices and experiences to create a community of practice around the Utility of the Future Today, and to enable other utilities to continually learn from each other and evolve as a sector.

79 Utilities of the Future TODAY after two years of program implementation

Utility Description (combine all plants if a multi-site system)		
Utility Name: Atlantic County Utilities Authority (ACUA)		
Type (e.g., single plant, regional system, multiple plants, collection system only, stormwater, etc.): Regional Wastewater Treatment Facility		
Service Area (square miles): 150 Sq. Miles	Average Annual Daily Flow (MGD): 10,200 MGD	
Population Served: Approximately 250,000		
Location		
Street Address: 1801 Absecon Blvd.		
City: Atlantic City State: NJ	Country: United States	
Zip Code/Country Code: 08401		
Contact Information		
Name: Sara Verrillo	Phone: 609-272-6950	Email: sverrillo@acua.com

ORGANIZATIONAL CULTURE

The Atlantic County Utilities Authority's (ACUA) organizational culture has been shaped from the ideals set forth in our mission statement, which reads: "The Atlantic County Utilities Authority is responsible for enhancing quality of life through the protection of waters and lands from pollution by providing responsible waste management services. The Authority is an environmental leader and will continue to use new technologies, innovations and employee ideas to provide the highest quality and most cost-effective environmental services."

ACUA takes its role as an environmental leader seriously. Across our facilities, we have implemented green projects that showcase this commitment. Our wastewater treatment plant in Atlantic City, NJ, is home to the first and only coastal New Jersey wind farm, which along with a 500-kilowatt solar project, supplies the energy needed to operate the wastewater treatment process. Both projects have greatly decreased our carbon footprint while reducing costs. We also use electric vehicles that are charged off this renewable energy at the facility in place of standard vehicles powered with gasoline.

ACUA actively seeks participation from employees in all our operations and services. Employees are encouraged to submit ideas for improving Authority operations. Our dedicated Research and Development Department regularly evaluates these ideas as well as other new technologies to ensure ACUA is mindful of the most effective, efficient and sustainable solutions on the horizon.

To help strengthen our workforce, ACUA actively engages employees in succession planning, and advancement is greatly encouraged by leadership. ACUA regularly makes employees aware of education opportunities at local institutions and offers tuition reimbursement to ensure they can take advantage of those opportunities. Various training programs are held onsite (between five to ten monthly) to expand the skills and improve the safety of employees. Nearly every position is open to internal employees before applications are open to the public to encourage movement across different departments. In fact, many of our Wastewater Division employees started out their careers at ACUA as laborers in our Solid Waste Division. We have instituted standard operating procedures to ensure the smooth transition of positions, and we encourage cross-training to ensure our fresher employees are exposed to all facets of operations.

In addition to sustaining our workforce, we recognize the importance of protecting and renewing our infrastructure. Several resiliency projects, including a sea wall, will be completed over the next three to five years to ensure our wastewater treatment facility will be protected during major storm events and remain a reliable asset far into the future. In addition, ACUA is currently working to establish an asset management plan to effectively prepare for upcoming infrastructure replacements that will improve operations at our facility.

ACUA strives to provide the highest level of service to our customers and ensure accountability. All employees are expected to be kind and courteous, which is proven by the numerous compliments we receive from customers on a weekly basis. Our dedicated customer service team responds to calls, emails, and social media messages in a friendly and timely manner. Customer comments, both positive and negative, are tracked through an online Customer Relationship Management tool to ensure any problems are recognized and addressed promptly. Our Authority Relations Department ensures we reach customers where they are by attending local events, welcoming the community for tours and maintaining our social media presence.

We believe these values that have shaped our organizational culture will continue to shape our growth so that we may provide the highest quality environmental services for years to come.

COMMUNITY PARTNERING AND ENGAGEMENT

Atlantic County Utilities Authority (ACUA) has developed a positive reputation within our community thanks to the vision of its leadership and the commitment of dedicated employees. ACUA has implemented a strategic communication and outreach program to build on its positive reputation and increase engagement with our customers. The Authority regularly welcomes school groups, delegates and interested residents, for tours of our facilities. Tours introduce people to the wastewater treatment process, increase understanding and transparency, and foster community relations through a hands-on, tangible learning experience. ACUA also hosts an Earth Day Festival in April, which is attended by thousands annually. The event is dedicated to exposing visitors to a variety of environmental topics and educational activities. In 2016, ACUA launched an Explorer Post for Environmental Careers as an additional venue to introduce high school students to a variety of job opportunities they may not have known about. In addition to having an open-door policy with members of the public, ACUA also participates in community events throughout the year to engage the public. We regularly use traditional media, such as local newspapers and radio stations, and digital media, like social media and our website, to inform the public of important events or projects. Our commitment to customer service and community engagement has helped us gain valuable feedback from customers, maintain crucial relationships with stakeholders, and create new partnerships with community organizations. Each year, ACUA and its employees generously support local organizations through donations volunteer efforts that help our community flourish. These strategic efforts help further our mission to provide the highest quality environmental services.

How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?

- The most important factor in implementing our engagement activities has been that our leadership team recognizes and continually emphasizes customer service as a core focus. This has allowed the Authority to meet and exceed the needs of our customers.
- ACUA has a dedicated Authority Relations Department, which is responsible for managing community engagement programs. An official tour program was instated after receiving a growing number of requests from area school groups and out-of-town visitors after our wind farm was built at our wastewater treatment facility in 2005. The Authority seized on the opportunity to use the attractive innovation to teach people about wastewater treatment.
- Our Earth Day Festival began 27 years ago as a small event to bring attention to environmental issues. Today, we have expanded on this by partnering with local community groups, businesses, environmental organizations, vendors, crafters and green businesses to provide an interactive, educational and fun festival that attracts area residents to our facility. The festival is an Authority wide effort that requires employees across several departments to work together. It is an excellent opportunity to showcase local community groups, bring attention to our behind-the-scenes work, and have our employees interact with the community we serve.
- Digital outreach was implemented after seeing the growing rise of online communications and the need to reach our customers where they are. A dedicated staff member was hired in 2013 to manage our social media and web presence.
- ACUA supports local charities, environmental organizations and community groups by participating in events or providing donations, volunteers, or educational materials. Employees are regularly encouraged to participate in these community events, and many serve in active role on boards and committees.

What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)

- ACUA has a team of four employees in its Authority Relations Department to handle tours, workshops, educational materials, community events, public relations and digital outreach. ACUA also has 12 employees that answer and log customer questions that come in via phone call or through our online live chat in addition to their regular duties. Our IT Department contributed to the initial setup of our tour portal and website.
- Approximately $57,000 a year is budgeted for our wastewater outreach and educational initiatives, and $3,600 for our Earth Day Festival, which is subsidized by sponsorships from local businesses and organizations.

Did you partner with other stakeholders or organizations as a part of your implementation process?

- ACUA regularly works with stakeholders and community organizations to implement the initiatives discussed above. We work with schools, community groups, governmental agencies and international delegations to organize tours of our facility.

- Our Earth Day Festival is largely funded by community partners from other local utilities and businesses. Our 2017 festival welcomed 138 local groups and vendors to the facility and was sponsored by 38 businesses.
- We lend significant support to more than 50 local charities and organizations through monetary and in-kind donations or volunteer support. ACUA attended 73 events in 2016 hosted by a variety of community organizations.

What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?

- One obstacle we faced was implementing a comprehensive workflow to handle the number of initiatives we handle. For example, as tour requests started to increase, ACUA's IT department needed to develop a workflow system to manage the requests. Today, visitors can request a tour online, or call ACUA and schedule over the phone. All requests are entered into the tour workflow system, which makes scheduling, tracking, and assigning tour guides seamless.

- Another continual challenge we face as a government agency is being efficient and creative with our budget so we can provide these comprehensive activities and use the latest technologies that improve customer service.

Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.

- Yes, our tour workflow system and customer relationship management tools offer us the ability to track and respond to inquiries with ease. We also regularly rely on analytics tools like Google Analytics, Facebook Insights, and more, to measure success of advertising campaigns, website effectiveness and social media engagement.

Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?

- Other utilities can visit our website and social media sites to find information about our tours, projects, events, and see our engaging content in action.

www.acua.com

www.acua.com/tours

www.acua.com/earthday

www.acua.com/blog

www.acua.com/about-us/charitable-efforts

www.facebook.com/ACUA.Green

https://twitter.com/acua_green

www.instagram.com/acua_green/

www.pinterest.com/acuagreen/

/www.linkedin.com/company/atlantic-county-utilities-authority

www.youtube.com/channel/UCvVVINDrQLaA3j7HUsagYsw

MEASURE	**TARGETS**	**RESULTS**
Interest in Tours	Attract visitors to our facilities and increase webpage visits	- **5,021** people visited our facilities for tours in 2016 - **1,829** tour webpage visits in 2016 - **1,027** summer tour webpage visits in 2016

Success of digital outreach	Direct social media followers to our events and webpages	- **4,564** people followed ACUA across its various pages by the end of 2016. - A total of **91,452** unique web visitors visited **349,442** pages on the website in 2016. - **4,235** referrals from social media to our website in 2016. - **3,210** blog visits in 2016
Establish ACUA as a good community partner	Receive compliments from residents, get invited to community gatherings	- **117** resident compliments were logged in our system from calls, emails and letters from our community in 2016. - **73** events and school visits in 2016.
Success of Annual Earth Day Festival	Increase visitors and sponsorships through community partnerships, advertising, social media	- **38** businesses, organizations and community partners sponsored the 2017 event. - **178** vendors and local organizations displayed - Nearly **8,000** people were in attendance - Facebook advertising reached **30K** - The dedicated webpage (acua.com/earthday) was viewed **5,971** times from January through April 2017. - **$3,775** was donated to community partners Big Brothers, Big Sisters and The South Jersey Field of Dreams.

Utility Description (combine all plants if a multi-site system)		
Utility Name: Beaufort-Jasper Water & Sewer Authority		
Type (e.g., single plant, regional system, multiple plants, collection system only, stormwater, etc.): Regional System		
Service Area (square miles): 1,300	Average Annual Daily Flow (MGD): 9	
Population Served: 170,000 water / 80,000 sewer		
Location		
Street Address: 6 Snake Road		
City: Okatie State: SC	Country: USA	
Zip Code/Country Code: 29909/011		
Contact Information		
Name: Jeffrey Boss	Phone: 843-987-8055	Email: jeffb@bjwsa.org

ORGANIZATIONAL CULTURE

Growing Beaufort-Jasper Water & Sewer Authority (BJWSA) towards our best future has been possible by utilizing our best resource – our qualified, dedicated workforce. Our recent company picnic featured the theme "We are Family" – and like a family, our combined effect is that our whole is much more than the sum of the parts.

BJWSA has historically recognized the need to maintain a competent and committed workforce. To foster this need, the organization's strategic focus plan established BJWSA University (BJWSAU). Through a structured skills survey, BJWSAU identified training needs, prioritized those needs and coordinated the delivery using the most appropriate methodology. BJWSAU's commitment to training is evidenced by a 56% increase in training hours (5,488) in 2016.

Recognizing the resource commitment of BJWSAU, the organization has enhanced its selection process in an effort to ensure future hires either have the required skills or have the ability to learn the required skills within a reasonable time. Valid assessments have been identified and implemented initially for the positions requiring the most hiring activity.

With the support of nationally recognized compensation consultants, we recently updated the BJWSA Compensation Policy to ensure the organization's compensation and related policies and practices remain competitive. As an employer-of-choice in our area, BJWSA experiences little difficulty attracting or retaining employees in the more common positions. However, the utility industry is experiencing challenges attracting millennials and Generation Y candidates to the more difficult-to-fill positions e.g. water, waste water, and IT. These challenges will become more concerning as Generation X continues to leave the utility industry. Policy revisions will allow BJWSA the flexibility to positively address challenges while maintaining fairness with current employees.

Internal moves and promotions are common at BJWSA. Former customer service representatives now work in engineering, IT and the communications department. A number of meter readers have transitioned to field operations. To that end, BJWSA is transferring metering from the billing department to field ops. As a new cellular-based metering program comes on board, meter reading will become an office task, and moving those employees will provide job security as we restructure the organization.

BJWSA is dedicated to providing our management team with structured and organized leadership training. Focusing on skills to help build constructive relationships, our goal is to gain stronger commitments to improving performance. This training focused on profiles, principles and hallmarks of genuine leadership to promote organizational trust, respect and commitment.

In 2009, management found it needed more specific, timely and engaging training with follow-up to ensure transfer of knowledge. The solution was to develop an industry leading in-house safety training program using employees. The program has been running since 2010 and currently has 17 active BJWSA employee trainers. These trainers go anywhere in the authority's infrastructure system to conduct classes and/or follow-up with employees on knowledge and skill application.

BJWSA participates in the "*Best Places to Work in South Carolina*" employee feedback program, measuring job satisfaction during even-numbered years. Improvement in all areas, with an overall increase from 69% to 76% between 2014 and 2016, was attributed to opportunities for advancement, generous benefits program, engagement tools and general environment.

The Utility of the Future business model is woven into our strategic focus plan, with our vision of our high-performing, diverse workforce sharing a commitment to serving our community and protecting our Lowcountry environment. At every level, employees are aware of – and committed to – the triple bottom line and how each supports the others.

We completed a *Charting the Future* Strategic Plan in 2014 that gave us a blueprint to follow through 2017. Using the Effective Utility Management's (EUM) *Ten Attributes of Effectively Managed Utilities* as a backbone, we created a new mission statement (To Inspire Trust and Enhance Public Heath) and a robust plan to place BJWSA on the road to the

"Best in Class" standard. Plans are underway for the development of the 2018-2021 Strategic Plan, which will build on our past successes.

Our competent and dynamic team is at the very heart of where we've come from and where we're going. With our staff, BJWSA is dedicated to our mission and our community as a Utility of the Future.

COMMUNITY PARTNERING & ENGAGEMENT

BJWSA is deeply committed to the communities we serve, and to maintaining strong relationships with our customers, employees and other stakeholders. We've spent more than fifty years building and retaining trust while providing valuable product and service.

We were quick to participate in the inaugural Value of Water Coalition's *Imagine a Day without Water* in the fall of 2015, and will take part for our third time in 2017. Our spin invites local residents to imagine the unimaginable – a day without sweet tea, boiled peanuts or Low country Boil. We engage stakeholders of all ages, from local governments to students, as well as the business community – delivering our message through thousands of drink coasters at area restaurants and bars, as well as a *No Water, No Beer* event in conjunction with SCAWWA.

We hold a number of events in conjunction with AWWA's annual *Drinking Water Week*. Students participate in poster, essay and short story contests, where they are encouraged to promote the value of drinking water. Customer appreciation day gives employees and customers time to interact and enjoy a meal together. Ongoing social media campaigns throughout the year keep customers engaged in educational outreach.

Over the last few years, we have increased our social media presence, using Facebook, Twitter, YouTube and Instagram. The number of followers grew markedly during Hurricane Matthew, as we were able to keep in touch with updates for storm preparation and recovery. On an everyday basis, we communicate shutdowns, boil water advisories and promotional campaigns, such as Drinking Water Week and Value of Water Coalition promotions.

The authority had an exceptional opportunity to deliver more than water to several wholesale customers during Hurricane Matthew. Staff members provided a variety of support services, from field operations to communications, in assisting them to recover from the storm and were rewarded with much outpouring of gratitude for the assistance.

As provider to several military installations, BJWSA has strong relationships with these unique customers/stakeholders and after providing them wholesale water since 1965, BJWSA purchased their water and wastewater systems in 2008 and are now providing retail service on the bases. This has allowed the Marine installations to focus on their core missions and make them more valuable in the defense of our nation.

Mass customer notification is improved by enhancements to our GIS program. From boil water advisories to planned shutdowns for development, GIS rapidly identifies all customers within the effected geographic area and provides Customer Service with a list that is downloaded into our notification software that contacts the customers. GIS also allows the communications department to enhance website and social media posts with maps of the affected areas.

BJWSA supports the economic development efforts for all the counties and municipalities we serve and is an Advisory Board member of the Southern Carolina Economic Alliance. The local military bases provide a $2.2 billion economic impact to our region and we are a member of the Military Enhancement Committee, a group that supports, protects and promotes the value of our bases to the local economy and to the defense of our nation.

Recognizing that source water protection crosses state lines, BJWSA takes an active role in a number of state, interstate and regional organizations.

We participate in Savannah Riverkeeper program to promote proper uses and protect the Savannah River. As a member of the Savannah River Basin advisory group, we work with the COE, recreational users and industries to manage

activities in the basin. We share the Savannah River as a drinking water source with the City of Savannah, and are joining again with the City of Savannah to update our Source Water Protection Program later this year.

Throughout the year, the authority has a presence at local festivals and events, providing water, participating in local parades and distributing literature and giveaways to promote our work and our mission. Annual participation in summer ecology camps, career fairs and workshops augments a strong in-house program of educational tours for customers of all ages, from pre-school to a senior leadership program for retirees.

Measure What are you measuring?	**Targets** What was your goal/intended outcome?	**Outcomes** What were your actual outcomes?
Communication with customers	Better outreach through GIS mapping of customer base	Enhanced outbound notification for large areas during construction or emergencies
Regional source water protection	Savannah River and watershed protection programs	Membership/leadership in source water/watershed protection programs
Community outreach	Schools, public, community groups	More tours, participation in festivals and community events

WATER REUSE

BJWSA has eight wastewater treatment facilities (total capacity 18.3 MGD with 9.1 MGD avg. day), all of which have received NACWA Silver and/or Gold Peak Performance Awards. The Hardeeville Wastewater Treatment Plant is BJWSA's first Platinum Peak Performance Award candidate for 2016. All of BJWSA's eight wastewater plants (Cherry Point, Port Royal, Hardeeville, Laurel Bay, St Helena, Palmetto Bluff, Point South, and Palm Key) have received SCDHEC Facility Excellence Awards.

These facilities are regulated by 11 different NPDES/ND permits. Effluent from 3 BJWSA plants is discharged to rivers (Savannah, Broad, and Beaufort) and the other 5 plants discharge to dedicated spray fields, a dozen different golf courses, the Great Swamp , and SC's first total residential reuse system (a housing development with a third pipe system to irrigate common areas and residences with reclaimed water from Cherry Point WRF). BJWSA sells reclaimed water to several golf courses and a residential development.

Over time, BJWSA purchased 1000+ acres of the Great Swamp to develop a wet weather effluent management system. The initial 500+ acre purchase preserved an 80 yr. old stand of cypress trees from being timbered and allowed BJWSA to supplement the original hydrology with highly treated reclaimed water. Subsequent intensive biological monitoring of the area showed a healthier, more robust swamp teeming with wildlife. The second 500+ acres purchased had been timbered and BJWSA removed all logging roads/platforms, restored the natural hydrology and replanted thousands of cypress trees. We performed biological, flora and fauna monitoring for a 6 year period post restoration to confirm the success of our restoration efforts. Plans are to expand the effluent management system into this area over the next two years.

The Hardeeville Water Reclamation Facility (HWRF), currently under construction, has received the *Envision Bronze Award* from the *Institute for Sustainable Infrastructure*. HWRF is the first of its kind in South Carolina, and one of a few wastewater projects nationwide to use the *Envision* process from the start of design through construction. The facility is being expanded to 2.7MGD with provisions made for an ultimate 4MGD WRF. The award recognizes the documented efficiencies, resilience and sustainability designed into the project.

An innovative cooling and heating system for our 24,000 sq. ft. admin building uses finished water from the adjacent WTP to supply a highly-efficient water-source HVAC system, saving $72k/yr. in energy costs. Additionally, we plan to install a 248 KW DC solar array at our St. Helena WRF and a 730 KW DC system at our Port Royal Island WRF. This $1.6M project will allow us to sell power to the local power provider (SCE&G) at a rate that results in a seven-year payback. We have executed the interconnection agreement with SCE&G and anticipate having this renewable energy project on line by December 2017. BJWSA's on-going energy reduction program has resulted in a 13% decrease in the kwh/MG treated (water & wastewater) ratio from the previous year.

Measure What are you measuring?	**Targets** What was your goal/intended outcome?	**Outcomes** What were your actual outcomes?
Permit Compliance	100% compliance with all NPDES/ND permits (11 total)	100% compliance with 8 of 11 permits. Single NOVs on other 3 permits
Energy Efficiency	2% annual reduction in kwH/mg treated.	15% reduction at major wastewater plants from FY16 to FY17

WATERSHED STEWARDSHIP

Our mission is to *inspire trust and enhance public health*. We are charged every day with executing this mission regardless of challenges we may face. We have worked hard over the last 15 years to be a more resilient utility by prioritizing key business processes, identifying significant threats to normal operation and planning mitigation strategies to ensure effective and efficient organizational response to the challenges that surface during and after a crisis.

BJWSA created a secure emergency planning and response website that is hosted external to our information technology network. The WordPress platform enables our employees to easily view, navigate, search and update the website on their smart phones, tablets and laptops. Pages in this website have interactive tools that help managers make decisions from discovery of an incident through to response and recovery. Regardless of the calamity BJWSA experiences, employees can access important information through an Internet connection anywhere.

BJWSA joined EPA's *Partnership for Clean Water* as a charter member in 2016 and is completing the Phase III self-assessments in 2017 for Cherry Point (7.5MGD) and Port Royal (7.5MGD) Water Reclamation Facilities.

BJWSA sponsored WRF Project 4285, *Estimating the Salinity Effects Due to Climate Change on the Georgia and South Carolina Coasts*, to determine the potential impact of sea level rise on our Savannah River intake located at river mile 39.1. Even though the study showed a low potential of adverse impacts to salinity levels at our intake, BJWSA has developed a plan to relocate our intake 9 miles upriver if we start seeing salinity increases at our intake.

BJWSA's comprehensive water supply program, the *Integrated Water Resource Management Plan*, ensures our communities have the water they need for the next 50 years. We focus on three major strategies: become water efficient, increase reclaim/reuse water use and if needed, develop new water sources. Promoting efficient water use and increasing the availability of reclaimed water for irrigation reduces the demand on our water sources (the Savannah River and the Floridan Aquifer). Reduced demands delay the need for costly expansion of water treatment facilities and development of new water sources in the future. A 25-year water and sewer Master Plan was completed in early 2017. The plan updated water demand projections based upon more recent population projections using current census data and took into account the continuing reduction in customer per capita demand. The new demand projections confirmed that our current high quality, robust water supply has sufficient yield to meet our needs for 50 years plus.

We participated in the 5R process (in lieu of TMDL) to resolve the Savannah Harbor dissolved oxygen deficit. This involved a ten-year effort working with EPA, SCDHEC, Georgia EPD and 21 dischargers (large & small municipal utilities and large industry, bi-state from Augusta to Savannah) to develop water quality models to determine allowable wasteload allocation (WLA) needed to achieve the DO water quality standard. This WLA represented an 80+% reduction from current permits. We facilitated at yearlong negotiation between the 21 dischargers to equitably allocate the WLA and convinced EPA to do an innovative 5R process in lieu of the normal TMDL process.

BJWSA's Aquifer Storage and Recovery system maintains the health and reliability of the local groundwater source (Floridan Aquifer) and provides an additional water supply for emergencies and peak demand periods. We are seeking to expand into reclaimed water ASRs to store reclaimed water during the winter and recover it during the spring/summer high irrigation demand periods. We are working with Georgia regulators, USGS, SCDHEC and utilities to better manage the use of the Floridan aquifer and to slow down the rate of salt water intrusion that is occurring on SC's southeastern coastline. Georgia has significantly reduced their permit withdrawal amounts and pumping and alternate water supplies have been developed for Hilton Head Island. Additionally, BJWSA has purchased several utilities in the region that were using the Floridan aquifer and converted them to surface water. The goal is to preserve the Floridan for use in the rural areas of Jasper County where surface water will not be available.

Internally, predictive maintenance for leak detection and more efficient backwashing and filter cleaning, saves water and expenses. BJWSA maintains an Unaccounted Water Percentage below 5%.

As a founding member of the Savannah River Clean Water Fund (SRCWF), we made a $1M, three-year commitment to fund the placing of large lower Savannah Basin tracts (critical to preserving river water quality) in conservation easements with a goal to keep the lower basin (Augusta to the coast) >70% forested. The SRCWF dollars will be leveraged with other conservation funding (Georgia & SC Conservation Banks, Federal Conservation Banks and groups such as The Nature Conservancy) The SRCWF consists of 5 lower basin utilities (bi-state: four in GA and two in SC) and on total, we provide $1M/year for conservation efforts. We are currently evaluating 5 tracts totaling 17,000 acres.

Measure What are you measuring?	**Targets** What was your goal/intended outcome?	**Outcomes** What were your actual outcomes?
Raw water canal and reservoir MIB and geosmin levels	Prevent algae based taste and odor events	By early detection and timely response to of MIB and geosmin producing algae, taste and odor events prevented.
Individual filter effluent turbidity	Less than 0.1 NTU 95% of the time on individual filters at both water treatment plants	Achieved target at Purrsyburg WTP resulting in Phase IV Presidents Award and extra protection against cryptosporidium. Achieved target on combined filter effluent at Chelsea WTP.
Energy efficiency	2% annual reduction in kwH/mg treated	9% reduction at water plants from FY16 to FY17

Utility Description (combine all plants if a multi-site system)		
Utility Name: Brunswick regional Water and Sewer H2GO		
Type (e.g., single plant, regional system, multiple plants, collection system only, stormwater, etc.): Sanitary District, provide water to approximately 10,000 customers and wastewater to approximately 6,600 customers. We operate a 400,000 g/d wastewater treatment plant.		
Service Area (square miles): 16 Sq. Mi.		Average Annual Daily Flow (MGD): 1.75 MGD
Population Served: 25,000		
Location		
Street Address: 516 Village Rd		
City: Leland	State: NC	Country: United States of America
Zip Code/Country Code: 28451		
Contact Information		
Name: Tyler Wittkofsky	Phone: (910) 599-8804	Email: twittkofsky@H2GOonline.com

ORGANIZATIONAL CULTURE

H2GO is committed to assuring a quality of life for our valued customers by providing the highest levels of water and sanitary sewer services, from Source to Stream, in a safe and efficient manner.

As professional service providers, H2GO in cooperation with its community partners will comprehensively plan, develop, maintain and operate the District's utility systems in a customer service oriented and cost-effective manner.

The Brunswick Regional Water and Sewer began servicing their first customers in 1987 and began with approximately 350 customers. Over the past twenty years the District has grown to have a customer base of about 10,000.

The Brunswick Regional Water and Sewer began with the purpose of promoting the health and welfare of the people here in the North Brunswick area, and it is still our primary purpose. The Brunswick Regional Water and Sewer's employees are dedicated to providing our customers with the best all-around service as possible and we are pleased to serve the district of North Brunswick.

Being a leader in the community and in the workplace is something all of our employees, both high and low, are taught to do. Our entire staff act with the utmost professionalism on and off the clock, working to aid and support all who may be in need in the community and providing them with the knowledge and work they need.

H2GO takes great pride in providing their employees with training opportunities as well. So far in 2017, employees have received over 200 training and continuing education hours to advance their knowledge in the water and wastewater industry. Being able to be up to date on the industry trends and being a industry leader is something H2GO strives to see with their employees.

To better encourage their employees, H2GO has implemented an Employee of the Month program to award their hardworking employees with thanks and praise. The program was started in February of 2017 and has awarded an employee each month since then. Being able to show the employees they are appreciated is a key component of the workforce H2GO tries to provide their employees.

One of the most important components of H2GO's culture is their commitment to safety. In 2017 they celebrated 2,000 days of safety. This is in big part thanks to the formation of a safety committee and the creation of a safety policy that provides basic responsibilities and tasks for all levels of employees on ensuring a safe environment. H2GO believes that a safe work environment is a big showing of a happy work environment, because it shows the employees look out for one another on the job.

In conclusion, H2GO looks to provide their customers with the same standards and treatment that they provide their own family, dedicating their time and knowledge to ensuring they are well taken care of and informed. Being able to take care of the customers begins with the culture of the workplace itself, something H2GO has taken a lot of pride in and dedicated much time and resource into. Providing training to ensure employees are seen as industry leaders, encouraging and rewarding safety in the work place are just a few examples of H2GO's culture.

COMMUNITY PARTNERING & ENGAGEMENT

Operation Round Up- gives customers the option to round their bill up to the next dollar amount or add an additional contribution to their monthly bills. All proceeds go directly to our Community Partners. 100% of the contributions will go to assist those in need, with no administrative fees attached to this program. The donations go towards to charities, Brunswick Community College Foundation and Manna Ministries. The contributions help provide area students with scholarships and area families in need with food.

Cooking Oil Recycling Effort (C.O.R.E)- Fats, Oils, and Grease create major problems in our community sewer systems. This allows homeowners to avoid pouring the grease down the drains and gives them the opportunity to take a C.O.R.E container from one of H2GO's fifteen collection sites and fill it with their grease. The cooking oil residents recycle will help reduce sanitary sewer problems, home plumbing and sewer problems and will create sustainable and eco-friendly biofuel. Since inception, H2GO has transferred more than 1,500 gallons of used cooking oil to Mahoney Environmental in Wilmington for the production of bio-diesel.

Buying Local- H2GO has brought much of their business to the North Brunswick area, using The Logo Shoppe for apparel and embroidery, ASG Specialties for stickers and promotional items, local restaurants for catering purposes, hosting their annual Christmas Party at the Leland Cultural Arts Center, using Leland Machine Shop to assist with the construction of their first place Christmas float, shopping at Ace Hardware for many of their hardware needs, using Skip's Tire Service and Tommy's Auto Repair to work on their vehicles and even setting up deals with Gateway Fitness for their employees. Several studies have shown that buying local strengthens the economic base of the community.

NC811- When anyone who embarks on a digging project in H2GO's service area calls 811, H2GO will send a professional locator to the digging site to identify and mark the approximate location of the underground water and sewer lines. The 811 underground utility call system will enable H2GO to better monitor construction activity in our service area and reduce service interruptions from "blind" hits to our water and sewer pipes. In an effort to raise awareness and encourage other utilities in the area to join the system, H2GO has taken a proactive response to educate about the system, creating a page on their website dedicated to 811, sharing it with their social media following, and including it in their newsletters and Consumer Confidence Report.

Assisting the local high school-

H2GO bought 20 tickets for a Community Luncheon at Brunswick Community College that featured former football player Roman Gabriel III and donated them to the North Brunswick High School football team's seniors. This was in an effort to support our local youth as well as giving support to the Brunswick Community College Foundation.

H2GO hosted a Poster Contest for North Brunswick High School students to celebrate Drinking Water Week. The contest received over fifty submissions, with the winner receiving $100 and their artwork hung up in our office. Our youth are the future of our community and we wanted to help them follow their dreams. We hope that this contest will encourage the students in a positive manner and give them a sense of accomplishment from their artwork being hung up in a public display.

Reverse Osmosis Water Treatment Plant- H2GO has been working on building a reverse Osmosis Water Treatment Plant for the last six years to secure a secondary water source for their customers and to stabilize rates. As we currently purchase water wholesale from another water utility our rates can vary, however financial analysis show that with the RO Plant we will be able to stabilize rates. Our current water supply comes from the Cape Fear River which was just placed on the most endangered rivers list in America and has been host to containments such as 1,4 Dioxane, Hexavalent Chromium and most recently GenX.

Board of Director Positions-

Executive Director Bob Walker serves on the Foundation of Brunswick Community College's Board of Directors.

Public Information Officer Tyler Wittkofsky serves on the Board of Directors for the North Brunswick Chamber of Commerce and Communities in Schools of Brunswick County.

How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?

Giving back to our community is an essential part of H2GO's mission. We strive to find an area of need that is not being served to the fullest in our area and find creative and effective ways to provide a solution to these problems.

What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)

Typically, the PIO is the only one involved in working towards these community engagement opportunities. The only costs involved were prizes that may be given out.

Did you partner with other stakeholders or organizations as a part of your implementation process?

Yes, we have tried to challenge other utilities and business to follow suite with many of our programs, including Operation round Up and C.O.R.E and buying local. We try to partner with the area schools and nonprofits to help meet their needs.

What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?

Dedicating a limited amount of resources to the areas that need it the most was the biggest struggle. In a community, you recognize needs in every direction and want to help all the needs. However, having to narrow it down to what is most critical is a large challenge.

Has “smart” information technology supported your implementation/optimization in this area? If yes, please describe.

Yes, using social media and graphic design software has helped promoting different events and contests easier.

Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?

Our website has several sections on the things we do, www.H2GOonline.com

Measure What are you measuring?	**Targets** What was your goal/intended outcome?	**Outcomes** What were your actual outcomes?
NC 811 LOCATES	Ensure no lines are hit.	Around 4-5 lines hit since joining.
Participation in Poster Contest	15-20 entries	We received 50 entries for the contest
Social Media Following	Facebook (started Janurary 2017): Get to 100 likes by end of the year Twitter: Get to 100 follows by end of the year NextDoor	Facebook: 122 Likes Twitter: 31 Followers NextDoor: Able to reach 5,152 residents
Newsletter	One per month	Have successfully provided one per month.

Utility Description (combine all plants if a multi-site system)		
Utility Name: Chesterfield County Department of Utilities		
Type (e.g., single plant, regional system, multiple plants, collection system only, stormwater, etc.): Multiple Plants		
Service Area (square miles): 310.15		Average Annual Daily Flow (MGD): 25.08
Population Served: 277,884		
Location		
Street Address: 9840 Government Center Parkway, P.O. Box 608		
City: Chesterfield	State: Virginia	Country: United States of America
Zip Code/Country Code: 23832-0009/1		
Contact Information		
Name: Scott Morris	Phone: 804-748-1416	Email: MorrisSc@Chesterfield.gov

ORGANIZATIONAL CULTURE

The mission of the Chesterfield County Department of Utilities is to provide the highest quality water and wastewater services that meet or exceed the needs and expectations of our present and future customers. We produce potable water, treated effluent, and process residuals in full compliance with all regulatory and reliability requirements. Our annual performance plan illustrates how well we meet our goals and objectives by tracking over 100 annual and historic performance measures from virtually every work center in the department.

The Department of Utilities has invested significant effort towards refining the department's performance plan to ensure our mission is understood and committed to by all members of our team. Our mission, vision, goals, and guiding principles are embraced by all department employees and are prominently displayed in all work and public areas of the department. Our four department goals reflect a "balanced scorecard" and relate to the quality of our products and services, financial stability and integrity, customer service and work environment. Each of these goals is strategically linked to and supportive of the county's goals. All of the department's fifteen work centers have identified their significant lead performance measures. These measures contribute towards the lag measures used to assess how well the department meets its goals and objectives. Each section generates this data which is posted on our internal department website for all employees to review.

High performing organizations with operational resiliency have a clear vision, strategy, meaningful measurement and employ a workforce capable of successfully executing the organization's strategy. The Chesterfield County Performance Council, comprised of employees from across the organization, developed the county's strategic plan. The Utilities Department developed a Performance Plan in support of the county's strategic goals pertinent to the department. The Utilities Performance Plan includes four main goals supported by multiple objectives measured by more than 100 outcomes, intermediate and support performance measures.

The Utilities Performance Plan is updated annually during the budget process with input from all sections of the department. The process involves: reviewing and revising, as appropriate, the core mission statement; core values, guiding principles; identifying critical quality characteristics of products and services; determining current and future needs and expectations of customers; reviewing major changes in the department over the past three years; identifying potential competencies to address changes; recognizing trends impacting the department; identifying future impacts; developing a vision for the department three years in the future; and reviewing department goals. Each section develops objectives and measures to support department goals. Once this information is collected and verified, a report is generated. This is done on an annual basis and includes measures from all sections of the department to show performance relative to the industry and continuous improvement. The report also includes a comparison with appropriate industry benchmarks and the customer service standards for each measure. By creating this performance plan, staff can see how their performance supports overall department performance and gain a better understanding of what is happening in other sections of the department. As a part of this process, the department's Capital Improvement Program is updated and a ten-year cash flow incorporating anticipated revenue and expenses is developed to determine appropriate rates and connection fees. This process is continuously evolving. Some measures have been in place for up to ten years allowing long-term evaluation of our progresses. New measures have been added to provide a broader evaluation of overall performance through the planning process. The Utilities Department's management team continues to bring to the table new ideas and ways of improving our performance indicators.

In addition to tracking performance, the department has a long-term strategic plan that involves evaluating current operating expenditures and planning future projects to incorporate into the department's Capital Improvement Plan. As an example of our continuous improvement efforts, the wastewater treatment plants implemented EnergyCap in 2012. This energy-tracking software documents energy consumption. Every quarter, each section is evaluated to see if pollution-prevention projects that were implemented were effective and if we are on track to have the same or better performance from the previous year. This software is used in combination with the current Environmental Management System, or

EMS, to optimize the treatment plant operation by looking at ways to reduce electricity, natural gas, and chemical usage to ensure our treatment plants are financially and environmentally sustainable.

Chesterfield County's Department of Utilities strives to operate and maintain our utility facilities as efficiently as possible to ensure competitive utility rates while providing water and wastewater service that is safe, reliable, and environmentally sound. Progressive management and efficient department operations have enabled the department to become a recognized leader in Virginia as well as the nation. Performance measures have been established and are reviewed throughout the year to track how well we meet department goals that support efficient utility operations while meeting or exceeding the requirements and expectations of our customers, employees, county administration and regulatory agencies. The intermediate and support measures indicate that we continue to provide utility rates that are the lowest in the region, partially due to the lean number of staff relative to the number of active utility accounts.

ENERGY EFFICIENCY

Our utility current has four Environmental Management Systems that identify aspects for each division; energy usage is one of these aspects. Pollution Prevention Projects are developed to reduce the impact of each of these aspects with quantitative goals and are reported to the division and management on an annual basis.

Energy audit/benchmarking is conducted to identify priorities for energy efficiency improvements. EnergyCap Online is used to track energy consumption for our department. On a quarterly basis, each section evaluates the pollution-prevention projects for effectiveness by comparing data from the previous year.

Individuals are empowered within our department to champion energy-efficient activities. All sections are provided information regarding energy consumption for every metering device and an engineer from our technical support section assists these center managers in analyzing the information and implementing solutions with the help of frontline staff.

Our utility currently utilizes several energy-conserving operational methods. An example of one these energy improvements is the aeration systems at our treatment plant. The aeration system, consisting of blowers, membrane diffusers and dissolved oxygen controls, were identified as the largest single power user at the wastewater treatment plants. Staff at the plants worked with management to determine the most efficient air flow setting on the aeration tanks, thereby reducing the number of blowers in operation.

Employee Development Plans are used to outline goals for our EMS teams and programs. Effectively tracking and implementing programs that are successful are documented in their EDPs.

Currently, our department uses our EMS teams to champion our energy efficiency programs. We have found that these core group of staff are committed to the goals of effective energy management. The EMS teams have the full support of our management team and available resources to implement process improvements.

Our department prides itself on recognizing the accomplishments of our staff. Staff are routinely recognized with cash awards for successful implementation and completion of projects. An example is the successful implementation of the aeration optimization program, which upon successful completion resulted in all staff at the treatment plants receiving a cash award for the program for their contribution.

Sub-metering is conducted for major critical processes. In addition, our staff recently reviewed the rate structure for all of our meters and implemented contract changes with our energy supplier. In conjunction with this internal evaluation, a third-party firm was utilized to evaluate our accounts further to ensure that our accounts are on the most effective rate structure for their intended uses.

Staff at the treatment plants have incorporated peak shaving of energy as key component to their success. Staff were able to reduce air demand by systematically evaluating process needs and adjusting program controls to accommodate

dissolved oxygen and mixing requirements, thereby reducing the peak demands of the system. The same methodology was used to reduce natural gas consumption related to digester heating.

How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?
Our Proctors Creek Wastewater Treatment Plant was the first wastewater facility in the commonwealth of Virginia to achieve Exemplary Environmental Enterprise, or E3, certification in Department of Environmental Quality's, or DEQ, Virginia Environmental Excellence Program in 2004. On December 15, 2008, the Falling Creek Wastewater Treatment Plant was certified by DEQ as an E3. Building on this success, the EMS was further expanded to include our Wastewater Collection Division. Most recently, our water distribution division was accepted as an Environmental Enterprise, or E2, facility last year. All four centers have maintained their certification levels in DEQ's Virginia Environmental Excellence Program. These EMS are the core component to our ability to engage staff to find innovative approaches to reduce energy consumption and implement success programs. The EMS program facilitates discussion and collaboration with staff that are not a part of typical day-to-day operations at treatment, collection, and distribution systems.

What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)
Our EMS teams consist of a team leader, gate keeper, and team members from all sections of the division. On average, the teams consist of approximately five employees from varying backgrounds within the section. Financial support varies depending on the projects involved; management has committed their support of the program and relies on the team leader to make a business case for the improvements. To date, there has not been a project or initiative that has not been approved based on the merits of the project.

Did you partner with other stakeholders or organizations as a part of your implementation process?
Chesterfield County has a robust EMS component and our department has worked closely with the Department of General Service to perform internal EMS audits and provide general guidance regarding the implementation of our department's EMS. In addition, the Virginia Department of Environmental Quality has been a critical stakeholder to ensure the success of our EMS and ultimately the success of the pollution prevention projects and energy efficiencies.

What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?
The most difficult component of the program was the initial creation of the EMS documents which involved establishing aspects, formalizing procedures, and maintaining all documents to be reflective of the ongoing processes. Staff met on a routine basis to achieve success and built a foundation of trust and encouragement that assisted in cultivating innovative solutions later on. Another major component was the dissemination of information. Staff are routinely rotated out of the core team so that they may become more involved and share new ideas and concepts.

Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.
Our utility has not used advanced "smart" technology in our program to date. However, we are looking at expanding our use of such technology in the future.

Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?
Other utilities may contact us directly at utilities@chesterfield.gov. In addition, Chesterfield County has provided details on many innovative pollution prevention projects, including some of the ones mentioned in this application at the below address: http://www.chesterfield.gov/content2.aspx?id=8590045080

For information regarding starting a similar EMS program, the Virginia Department of Environmental Quality has information available at the below address:
http://www.deq.virginia.gov/AboutUs/EnvironmentalManagementSystem.aspx

Measure What are you measuring?	**Targets** What was your goal/intended outcome?	**Outcomes** What were your actual outcomes?
KWh	Reduction in electrical use by 5 percent	Reduced KWh by approximately 621,301 Based on Fiscal Year 2013 Usage
Electrical Cost	Reduction in electrical costs, previous cost was approximately $0.11/KWh, new cost is approximately $0.07/KWh	Reduced by $287,833.72 Based on Fiscal Year 2013 Invoices
Natural Gas Consumption	Heat digesters primary on methane gas to minimize natural gas use	5,220.58 MCF Based on Fiscal Year 2013 Usage
$/MG treated	Maintain utility rates as low as possible, while maintaining the same level of service	FY13-$1,159/MG FY16-$973/MG
$/MG conveyed	Maintain utility rates as low as possible, while maintaining the same level of service	FY13-$520/MG FY16-$454/MG

City of Cape Coral, FL

Water Reuse

WATER RESOURCES UTILITY OF THE FUTURE TODAY

Utility Description (combine all plants if a multi-site system)		
Utility Name: **City of Cape Coral**		
Type (e.g., single plant, regional system, multiple plants, collection system only, stormwater, etc.): **Multiple Plants**		
Service Area (square miles): 120	Average Annual Daily Flow (MGD): 13.0	
Population Served: 149,358		
Location		
Street Address: 815 Nicholas Pkwy. E.		
City: Cape Coral State: FL	Country: USA	
Zip Code/Country Code: 33990		
Contact Information		
Name: Jeff L. Pearson, MSM,PMP, PWE	Phone: (239) 574-0709	Email: jpearson@capecoral.net

ORGANIZATIONAL CULTURE

The City of Cape Coral is a vibrant waterfront community located in Lee County, Florida, on the Gulf of Mexico. As a City with the vision of being a center of opportunity in the Southwest Florida region, it strives to provide well-managed and efficient potable water, wastewater and irrigation quality water services to its customers.

The City of Cape Coral owns and operates potable water, wastewater, and irrigation quality water systems. The potable water system includes: 55 raw water supply wells, 28 miles of raw transmission mains, the Southwest Reverse Osmosis WTP with a permitted capacity of 18.1 MGD, the North Reverse Osmosis WTP with a permitted capacity of 12 MGD, deep injection wells for concentrate disposal, two storage and re-pump stations, and 906 miles of potable water mains.

The wastewater system includes: 675 miles of gravity sewers, 10,876 manholes, 300 lift stations, 190 miles of force mains, two water reclamation facilities, five canal pump stations, and an irrigation system for water reuse of reclaimed water. The two water reclamation facilities are the Everest Parkway Facility, with a permitted capacity of 13.4 MGD, and the Southwest Facility with a permitted capacity of 15.0 MGD.

The irrigation quality water system includes 725 miles of mains, 5 storage tanks and 35 high service pumps located at the water reclamation facilities, and five canal pump stations.

WATER REUSE

The City of Cape Coral has an abundance of water available from multiple sources like many public utilities in Florida. However, the challenge is that most of that water is replenished by rainfall that is only available for a portion of the year. The City is located in a subtropical climate, which is characterized by a distinct dry season (October – May) and wet season (June – September). This is further complicated as the highest demands for water use are during the driest months of the year, from October to May, when many seasonal residents and tourists come to the City.

To address this concern the City of Cape Coral initiated in 1988 the Water Independence for Cape Coral (WICC) plan, which is widely regarded as one of the nation's largest urban dual water systems. The WICC program was initiated to relieve the potable water treatment plants and fresh groundwater supply aquifer from the demands of irrigation for a projected residential population of 440,000. Understanding that potable water is limited, expensive, that private wells are depleting the Water Table and the Upper Hawthorn Aquifers, and that reclaimed water and canal water are viable sources for irrigation, the City was one of the first communities in the country to implement a dual water system.

Mission statement: Continue to improve our delivery of cost-effective water, irrigation water and wastewater collection services by empowering employees to responsively meet customer expectations for quality, value, safety, reliability and environmental responsibility.

Values: We will anticipate customer needs and listen to their concerns. We will respond professionally, courteously and embrace innovation and improvement.

Vision: Our customers will view Cape Coral Utilities as the benchmark for delivery of water, wastewater and reclaimed water services while having the greatest positive impact on the City of Cape Coral's drinking water supply.

Organizational Structure

The City of Cape Coral Utilities Department is managed by the Utilities Director and is subdivided into four divisions, which are Administration, Collection and Distribution, Water Production and Water Reclamation. The Utilities Department works to continuously improve the delivery of cost-effective potable water, wastewater, and irrigation quality water services to customers, and is organized to achieve the following objectives:

- Establish a participatory, collaborative organization dedicated to continual learning, improvement, and innovation.
- Ensure water availability consistent with current and future customer needs through long-term resource supply and demand analysis, conservation, and public education.
- Explicitly consider its role in water availability and manages operations to provide for long-term aquifer and surface water sustainability and replenishment.
- Explicitly consider a variety of pollution prevention, watershed, and source water protection approaches as part of an overall strategy to maintain and enhance ecological and community sustainability.

The Utility Director is responsible for the administration of the four Divisions within the Utilities Department: Engineering/Administration, Utilities Collection and Distribution (UCD), Water Production, and Water Reclamation.

The Utilities Administration manages overall the utility operations and holds responsibility for developing long term plans. These plans are then implemented by the Utilities Administration, through the appropriate utility construction projects, to provide for existing and future customer flows and demands. Other responsibilities of the Utilities Administration include ordinances, resolutions, permitting, grants, inter-local agreements and development projects.

The Utilities Collection/Distribution (UCD) Division is broken down into three sections, water distribution, wastewater collection and irrigation quality water distribution. The UCD Division is comprised of approximately 100 positions including field technicians, crew coordinators, customer service representatives, equipment operators, trade workers and engineering inspectors. The UCD Division holds responsibility for the operation and maintenance on components of the Utility System.

The UCD Division utilizes a training program designed to build a team with knowledge of all three collection/distribution systems. The program trains staff on the safe operation of equipment required for routine maintenance and emergency repairs. In order to provide the City with a trained UCD Division staff, certifications and licensing through training programs are made a priority.

The Water Production Division has responsibility for producing potable water that meets or exceeds all Safe Drinking Water Standards established by the Environmental Protection Agency (EPA) and the Florida Department of Environmental Protection (FDEP).

The Water Reclamation Division is responsible for operation, maintenance and regulatory reporting required for treating wastewater to meet or exceed all standards established by the EPA and FDEP required for reuse in the City's irrigation quality water distribution system, disposal via deep injection, or discharge into the Caloosahatchee River. Although the City has retained its NPDES permit allowing treated effluent discharge to the Caloosahatchee River under emergency conditions, this method of disposal has not been used since October 2008. Instead, nearly 100% of the reclaimed water has been used for the City's irrigation quality water system.

Together these Divisions employ over 200 employees to properly operate and maintain the City of Cape Coral Utility System. Standard Operating Procedures have been developed and are in place to guide personnel in their efforts to properly operate and maintain the system for maximum efficiency.

A Reuse Coordinator position was created June 5, 2007 within the Water Reclamation Division. This was due to the current and future importance of this resource and to provide greater oversight of this area. The creation of this position allowed a greater level of planning, organizing, controlling, and responsibility in the area of reuse/reclaimed water production. The Reuse Coordinator is responsible for operation and maintenance of five canal pump stations and twenty-eight (28) freshwater canal weir structures, which control water levels in 18 freshwater canal basins. This water from 300 miles of freshwater canals is currently considered to be the primary source for irrigation water in the City of Cape Coral. The effectiveness of 874 fire hydrants in the City connected to the reuse system is dependent on pressures and proper operation of the system to provide fire suppression services to a portion of the City.

Master Plans have been developed and are updated at regular intervals for Utilities and Stormwater. These Master Plans guide future planning and development of the Water, Wastewater, Irrigation, and Stormwater resources.

The City of Cape Coral has developed a Strategic Plan for guidance of the City's Operations. Elements of the strategic plan related to the operation of the utilities department are provided below.

Element G: Work Toward Efficient and Cost-effective solutions to Protect and Conserve Natural Resources, while Promoting Environmental Awareness and Sustainability in the Community.

Initiative G.4: Engage in Best Practices to utilize irrigation water in the most cost effective and efficient manner while still promoting growth.

Performance Measures:

- % of Best Practices Identified by Stakeholders Implemented.
- Gallons Aquifer resources and Potable Water saved.

Element D: Improve the City's image with the purpose of building lasting relationships with our residents and valuable partnerships with other organizations, and continually provide a well-balanced and positive workplace for our internal stakeholders.

Initiative D.3: Establish and maintain proactive partnerships with community, organizations, and external government agencies.

Performance measures:

- % Increase/decrease in scheduled speaking engagements with state organizations, realtor associations, community groups and neighborhood associations.

WATER REUSE

The City began operation of a separate irrigation quality (IQ) water distribution system in1992, which was one of the first in the nation. The City's IQ Water System includes: fresh water canals and canal withdrawal facilities; reclaimed water storage and pumping facilities; and an IQ water distribution system.

The City utilizes fresh water canals as its primary source of IQ water supply. Five City owned and operated canal pump stations draw water from fresh water canals in the City and pump it directly into the IQ water distribution system after filtration/screening and chlorine injection (for disinfection). As water levels decline in the southern canals, a transfer pump station is utilized to pump water from canals north of Pine Island Road into the southern canal system.

Effluent from both the Everest WRF and the Southwest WRF are used as secondary sources of supply for the IQ water system. The City's goal is to utilize one hundred percent (100%) of the plant effluent for IQ water supply. There are (2) 5-million gallon storage tanks at the Everest WRF, and Southwest WRF has (3) 5-million gallon storage tanks. When these are full, excess treated effluent is pumped into the deep injection wells or discharged into the Caloosahatchee River. However, as noted in Part 2 no effluent has been discharged into the River since October 2008.

The irrigation system operates under a permit issued by South Florida Water Management District (SFWMD). This permit restricts the amount of water that can be used from the freshwater canals to 42 MGD. There are minimum operating levels (MOL) at certain weirs and canal pump stations that must be maintained, or enhanced monitoring and action plans must be developed to recover the levels, including the possibility of suspending use of the canal water.

The irrigation water distribution system transports reclaimed water from the two Water Reclamation Facilities (WRFs) to irrigation users. The irrigation system is also pressurized to supply fire suppression service to 874 fire hydrants within portions of the City. Substitution of reclaimed water for potable water reduces demands on groundwater supplies, and reduces the amount of effluent produced by the WRFs that may be discharged to the Caloosahatchee River.

The City has 300 miles of freshwater canals, which supply the majority of irrigation water to the system. This network of canals is controlled with operable weirs designed to optimize freshwater canal water storage and stormwater control in eighteen (18) freshwater canal basins. Infrastructure improvements at many of the City's weirs have increased static heights, which allows for increased harvesting of stormwater for irrigation system use and has reduced harmful stormwater discharges to the estuaries that border the City. The system currently contains approximately 725 miles of installed residential IQ water/reuse piping and serves over 48,000 connections. Since the initiation of this dual water system 21 billion gallons of aquifer resources and 18 billion gallons of potable water have been saved.

Plans to improve the City's dual distribution system include metering residences, removing fire suppression systems from the responsibility of the reclaimed system, and increased public awareness. Finding additional irrigation supply resources will be necessary as the City of Cape Coral continues to expand the availability of irrigation water throughout the City. These additional resources could include cooperative agreements with other municipalities, the development of ASR wells, water sourced from a reservoir, and the potential use of raw water wells.

The City of Cape Coral recently entered into a public-private partnership with Florida Gulf Utilities Authority (FGUA), which operates the North Fort Myers water resource recovery facility, to receive upwards of 6 million gallons a day of reclaimed water. As the City continues to expand the availability of reuse for irrigation, this additional supply will deliver reuse quality irrigation water to the City's northernmost residences. This partnership also gives FGUA a beneficial disposal option for the reclaimed water they produce and prevents the utility from having to construct an additional deep injection well. The City of Cape Coral continues to consider a similar inter-local agreement with the City of Fort Myers with the added benefit of preventing the City of Fort Myers from continuing to discharge wastewater effluent to the Caloosahatchee River.

Aquifer Storage and Recovery (ASR) wells have been identified as a suitable option for the continued growth of the City's utility system. In September 2014, the City of Cape Coral initiated an ASR feasibility study with the goal of determining the potential for an ASR program and identifying viable ASR well sites. Based on the results of the Study, the City determined that an ASR well program is a practical supply option for the growing demand for IQ water and would help to further reduce harmful discharges to the estuarine environment that surrounds the City of Cape Coral. After hydrogeologic and geologic studies were performed, potential ASR well sites and ASR target zones were identified in and around the Everest WRF. To date, the City of Cape Coral has not applied for permits associated with any of the newly identified potential ASR well sites.

Recently the City of Cape Coral was receiving surface water through a public-private partnership with a mining operation in neighboring Charlotte County. Mine water was pumped from the mining pit at a rate of approximately 17 million gallons per day to supplement canal levels that had reached historically low conditions in some areas. The partnership with the mining operation could offer a long-term option for an alternate resource water supply while offering a storage option for the wet season sheet flow of stormwater in the Punta Gorda area that has a negative impact on the surrounding agricultural community.

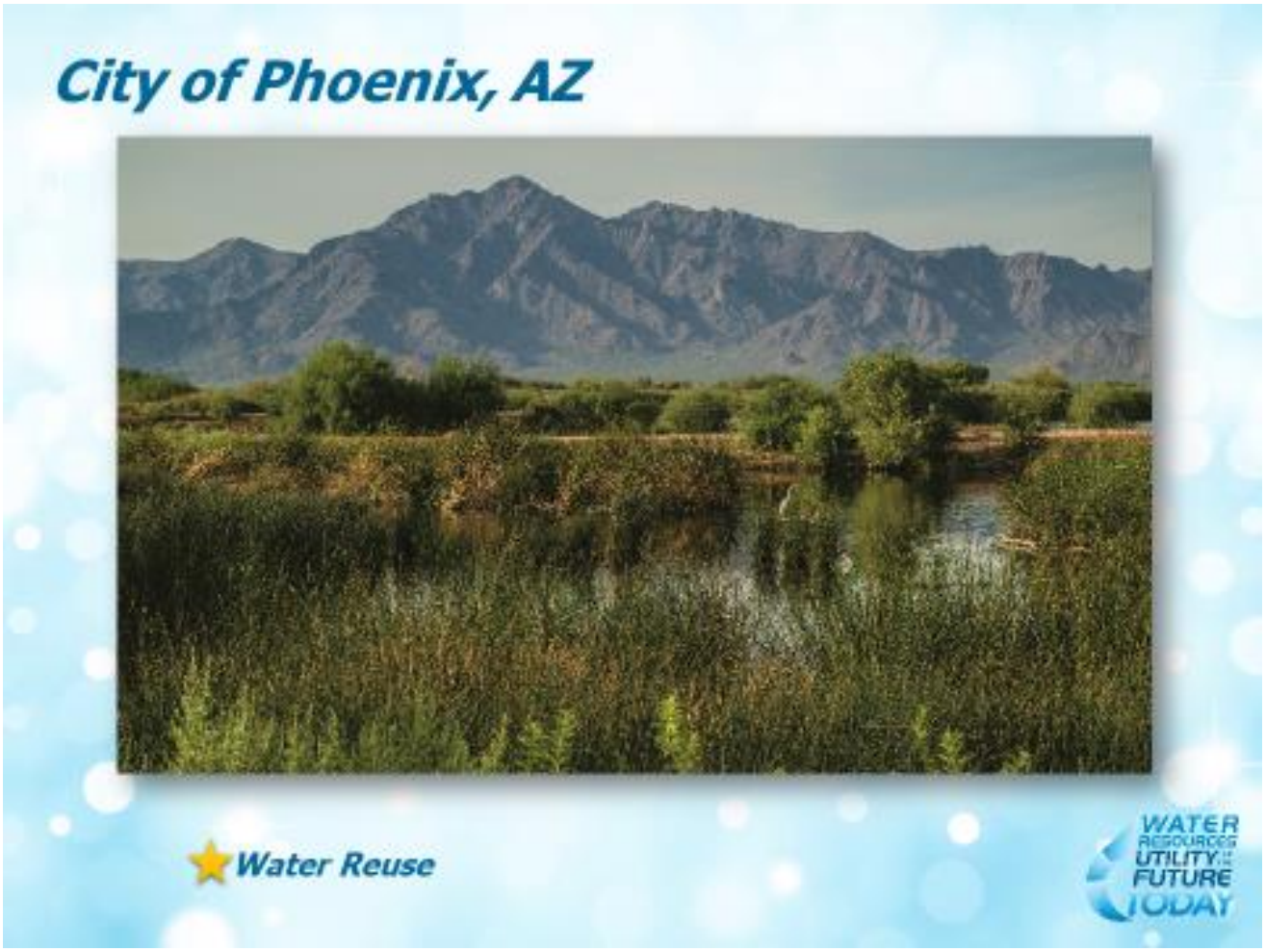
In 2012, potable water interconnects were permitted and installed at each WRF to supplement the IQ water system in case of emergency or severe droughts. The inter-connects were first used this year during a severe drought in SW Florida and were a critical component of maintaining pressures in the system, especially for the life safety issue of fire protection.

In keeping with the City's responsibility to be a good steward of the environment, the City is currently working on a comprehensive water modeling study that will evaluate all current and future water resource demands and how they will affect the environment and future viability of these resources.

A summary of the measures that the City of Cape Coral has taken to expand IQ water/reuse is provided below.

MEASURE	**TARGETS**	**OUTCOME**
% of reclaimed water reused for irrigation	100% reuse	No WWTP effluent discharges to Caloosahatchee River since 2008

Offset potable water demand for irrigation through alternative water supplies	Increase fresh water supply from Canals	Since the initiation of this dual water system 21 billion gallons of aquifer resources and 18 billion gallons of potable water have been saved.
Increase reclaimed/IQ water supply through interconnects with neighboring utilities	Inter-local agreements with FGUA and City of Fort Myers	Recently entered into a 30- year partnership with FGUA, which operates the North Fort Myers water resource recovery facility, to receive up to 6 million gallons a day (MGD) of reclaimed water and only required to purchase the first 2 MGD
Expand IQ water supply through aquifer storage and recovery	Complete Study for potential ASR program	Determined that an ASR well program is a practical supply option for the growing demand for IQ water and would help to further reduce harmful discharges to the estuarine environment that surrounds the City of Cape Coral



Utility Description (combine all plants if a multi-site system)		
Utility Name: City of Phoenix Water Services Department		
Type (e.g., single plant, regional system, multiple plants, collection system only, stormwater, etc.): Multiple Plants including a Regional Plant		
Service Area (square miles): 540 square miles		Average Annual Daily Flow (MGD): 167.2 MGD
Population Served: 2.5 million		
Location		
Street Address: 200 W. Washington Street, 9th Floor		
City: Phoenix	State: AZ	Country: USA
Zip Code/Country Code: 85003-1611		
Contact Information		
Name: Kathryn Sorensen	Phone: 602-262-6055	Email: kathryn.sorensen@phoenix.gov

ORGANIZATIONAL CULTURE

Water is the life-blood of any desert city. A culture that encourages employees to work together to steward this precious resource runs throughout Phoenix Water. After more than seventeen years of drought, Phoenix Water continues innovation to enhance water sustainability and resiliency. The use of reclaimed water, a drought-proof resource, is a cornerstone of these efforts.

Phoenix Water's annual business plan is based directly on the *Ten Attributes of Effective Utility Management*. The organization's vision, mission, and values are displayed on engaging posters in every single department facility across the 540 square-mile service territory. Each year, a middle-manager champions one of the attributes and forms a team that includes employees from different divisions and different levels throughout the organization. This team reviews and revises goals and three-year objectives that are then discussed and vetted at an annual management retreat that includes the executive team and the thirty-odd managers that oversee various divisions within Phoenix Water. The result is an annually-updated business plan that includes goals, objectives, and performance metrics agreed upon collaboratively throughout the organization, and reflects one of the values of Phoenix Water: participatory decision-making at all levels in the organization. The goals and objectives are then incorporated in the performance expectations and reviews of the director, executives, middle managers, and superintendents throughout the organization so that all can be held accountable to contribute collaboratively towards organizational goals. The business plan, including associated metrics and scores, is published for the public on the organization's Web site at https://www.phoenix.gov/waterservicessite/Documents/WSD%202017%20Business%20Plan.pdf. A quarterly performance metrics report, used to track progress towards meeting goals and milestones, is published internally quarterly. Poster boards with metrics displayed in engaging graphics are pinned in breakrooms and communal spaces.

Throughout the year, employees are able to come forward with new ideas and innovations and receive a cash award for successful implementation of these innovations. The City of Phoenix Employee Suggestion Program was created to increase the efficiency of City operations and services by providing employees an opportunity and an incentive to improve the economy, safety, and quality of municipal work. In addition to cash awards, employees may receive plaques and certificates or awards of commendation. Other, smaller, but no-less-important efficiencies, examples of excellent teamwork, exceptional customer service, and safety achievements are celebrated formally on a quarterly basis through the organization's *Pelican Awards*. The *Pelican Awards* are named to commemorate the work of an employee at Phoenix Water's Tres Rios Constructed Wetlands who saved and resuscitated a pelican choking on a fish from the wetlands, and the awards have become extremely popular among the crews.

Safety is priority number one in the organization. In the last few years, Phoenix Water restructured and greatly improved its employee safety division. Safety employees are embedded at different facilities across the 540 square-mile service territory but report through one division so that expectations, methods, training, and job hazard analyses are standardized. A new safety facility co-located at the Deer Valley Water Treatment Plant will open in the summer of 2018 to better accommodate the increase in safety division employees, as well as new, state-of-the-art training equipment, and hands-on training opportunities. The Director of Phoenix Water convenes a quarterly safety meeting with middle managers in which dozens of safety metrics across the organization are reviewed and discussed. Particular attention is paid to the development and annual review of job hazard analyses and standard operating procedures for all major tasks across the organization. Major safety initiatives, such as the new, voluntary-audit partnership with the Arizona Division of Occupational Safety and Health, are discussed and developed through this quarterly meeting. In addition, a formal safety committee exists in every division in the organization: these committees meet monthly and include union representatives. Supervisors are held accountable to ensure that their employees attend required safety training; relevant metrics for this training are reviewed quarterly. The Director ends every meeting with plant staff and field crews by simply stating, *"Work safely. What matters most is that at the end of your shift you go home safely to those that love and care for you."*

Water resource management in the arid West is a team effort. Phoenix Water works collaboratively with nearly every water stakeholder in the State of Arizona, including other cities, local agricultural districts and those located in the Yuma Valley, Indian communities, the U.S. Bureau of Reclamation, the Salt River Valley Water Users' Association, the Central Arizona Water Conservation District, mining companies, major industrial users, environmental non-profit groups, and

countless others. Employees throughout the organization are engaged in local, state, and national industry efforts, and meet hundreds of times a year with local community groups regarding water conservation, stormwater management, rate recommendations, and water resource management initiatives. The Director serves as a member of the Arizona Water Banking Authority Commission, an Advisory Committee member of Arizona State University's Decision Center for a Desert City, as a member of the State of Arizona's Colorado River Advisory Committee, on the Board of Advisors of the Kyl Center for Water Policy at Morrison Institute, as an Advisory Committee member of the Water Resources Research Center, on the Board of Directors of the Water Research Foundation, and as a member of the Rates and Charges Subcommittee of the American Water Works Association

Phoenix Water leadership has created and fostered a culture of best-in-class resource management that is based on innovation, multi-directional collaboration and communication, employee engagement, performance management, and community partnership. Careful resource stewardship in this desert city is a legacy inherited from the ancient Hohokam Indians, who hundreds of years ago built the canals from the Salt River that Phoenix Water relies upon to this day. The vision of the organization is clear: we must continue and improve upon the legacy of wise water management in a desert city. Phoenix Water employees understand the importance of the legacy of wise resource management, are proud to play a role in it, and are determined to continue it for the sake of future generations.

WATER REUSE

Water reuse is not only beneficial, but essential to arid Phoenix and surrounding communities in Arizona. Phoenix Water reclaims all of its wastewater and reuses nearly 90% of the reclaimed water for beneficial purposes, including local agricultural irrigation, groundwater recharge, water rights exchanges, wetlands restoration, and industrial cooling at the Palo Verde Nuclear Generating Station. Supplying reclaimed water for these purposes offsets the need for additional potable water supplies in our desert region.

Phoenix has two active wastewater treatment plants: 91st Avenue and 23rd Avenue. All of the wastewater treated at these plants is committed for reuse. The 91st Avenue Wastewater Treatment Plant is the largest wastewater treatment plant in the state of Arizona. This plant is operated by Phoenix Water but co-owned by a cooperative of five cities in the Valley of the Sun. 80,000 acre-feet per year of reclaimed water from the 91st Avenue Wastewater Treatment Plant is delivered to the Palo Verde Nuclear Generating Station for cooling purposes. Another 25,000 acre-feet is delivered to the Buckeye Irrigation Company (BIC) for non-food-crop agricultural use. The remainder of the reclaimed water available from this facility is delivered for aquifer recharge, wetland restoration, and research through Arizona Game and Fish and the United States Water Conservation Lab.

Phoenix Water collaborated with the U.S. Army Corp of Engineers to develop the Tres Rios Environmental Restoration Area – a flood control area and riparian habitat used to "polish" reclaimed water from the 91st Avenue plant. Natural physical, chemical, and biological mechanisms work together in the wetlands to remove and transform pollutants into harmless by-products before delivery to the Buckeye Irrigation District, providing a suitable habitat for many critters. The Tres Rios wetlands function as "green infrastructure" and obviate the need for traditional treatment facilities. It is the largest reconstructed wetlands in the arid West, and permanent home to coyotes, bobcats, javalina, bald eagles, beavers, and a large flock of pelicans.

Phoenix Water delivers 30,000 acre-feet of reclaimed water to the Roosevelt Irrigation District from the 23rd Ave plant to the district for agricultural use. This delivery is part of a unique three-way exchange of water supplies involving Phoenix Water, the Salt River Pima-Maricopa Indian Community, the Roosevelt Irrigation District, and the Salt River Project. In exchange for the reclaimed water, Phoenix Water receives water from the Salt River that it can use to meet potable demands. In effect, the exchange allows Phoenix Water to convert reclaimed water into potable water. The exchange agreement was a first-of-its-kind in Arizona and a cornerstone of the 1988 Salt River Pima-Maricopa Indian Community Water Rights Settlement, which provided regional benefits to cities, irrigation districts, and other stakeholders in the Valley of the Sun.

How did you go about implementing the practices/activities/programs that your described in your Overview Paragraph?
Tres Rios Environmental Restoration Area

During the 1990s, the City of Phoenix and the U.S. Army Corps of Engineers (USACE) collaborated to develop a flood control solution along the Salt River near the 91st Avenue plant. A multi-agency study was used to examine the feasibility of treating wastewater using biological methods within a wetland rather than mechanical and chemical methods. Demonstration areas were constructed focusing on the removal of metals and chlorine, and reducing nitrate and ammonia levels. In 2010, the Tres Rios project, encompassing 7 miles of riparian restoration, was commissioned, and work began on debris removal, road, channels, flow control structures, piping, levee and an analyzer/electrical building. Extensive public input and collaboration with multiple agencies including Phoenix Water, USACE, Arizona Game and Fish Department, U.S. Bureau of Reclamation, the U.S. Environmental Protection Agency, the Flood Risk Management District of Maricopa County, and neighboring Tribal governments was necessary prior to construction, during construction, and as part of the ongoing administration of the project.

Irrigation Districts, Tribal Government, and Water Exchange

Since 1971, the Buckeye Irrigation Company (BIC) has contracted to take reclaimed water released into the Salt River downstream from the 91st Avenue Wastewater Treatment Plant for delivery through a canal system to agricultural lands. The current agreement, effective in 1994, makes BIC's obligations and requirements contingent on the amount of reclaimed water annually available from the plant. The agreement has four option periods or time periods in which BIC must specify the amount of effluent needed during that period. In kind, one year prior to each option period, Phoenix Water is required to notify BIC of the amount of effluent available. BIC exercised its second option in 2015 and agreed to accept 20,000 acre-feet of effluent annually through calendar year 2020. The fourth option period extends through 2030.

An innovative three-way water exchange involving four entities was born from the 1988 Salt River Pima-Maricopa Indian Community (SRPMIC) water rights settlement, and it involves reclaimed water from the 23rd Avenue Wastewater Treatment Plant. One provision of the settlement agreement laid the foundation for a 1995 agreement between the City, Salt River Project (SRP) and the Roosevelt Irrigation District (RID). As part of the exchange, Phoenix delivers up to 30,000 acre-year per year of reclaimed water from the 23rd Avenue Wastewater Treatment Plant to the RID, which then delivers the water to farms in its district to grow non-food crops. RID in turn provides a like amount of groundwater to the SRP canal system through its own wells or wells leased from SRP. SRP credits Phoenix 2/3 of an acre-foot and SRPMIC 1/3 of an acre-foot for each acre-foot of water received from RID. SRP will then deliver Salt and Verde River reservoir exchange water to Phoenix water treatment plants served by the SRP canal system. Phoenix Water only receives supplies from SRP for what it can directly use. If Phoenix Water does not use all of its exchange water in a given year, some may be carried over to the following year although the amount is capped.

Reclaimed water delivered to RID in excess of the exchange can by state law, earn groundwater pumping credits for the City. The pumping credits – better known as long term storage credits LTSCs - are generated because the City's effluent deliveries to RID are "in lieu" of the district pumping a like amount of groundwater. Phoenix has earned approximately 117,449 acre-feet of LTSCs through this provision. Almost all of the LTSCs earned through recharge are created for the purpose "banking" unused supplies that would be recovered when Colorado River or Salt and Verde Rivers supplies are in shortage.

Palo Verde Nuclear Generating Station

Palo Verde Nuclear Generating Station (PVNGS), located approximately 50 miles west of Phoenix, came online in 1986. The facility is owned by Arizona Public Service (APS), SRP, El Paso Electric Company, Southern California Edison, PNM Resources, Southern California Public Power Authority, and the Los Angeles Department of Water and Power. There are three nuclear generators and all three units are wet cooled. PVNGS is the only nuclear power facility in the world not situated adjacent to an above ground body of water. Instead, reclaimed water from the 91st Avenue WWTP is used by PVNGS for cooling water needs, which is sent directly from the treatment plant to an 80-acre reservoir system at the facility by way of a dedicated pipeline.

The original agreement between the SROG Cities, the Town of Youngtown, APS and SRP was executed in 1973 and provided up to 105,000 AF annually for PVNGS. However, in 2008, APS filed for license extensions with the United States Nuclear Regulatory Commission for all three operating units through 2047. As a result, PVNGS owners sought to

secure an effluent supply through 2050, and a new agreement, which replaced the existing one, was executed between the SROG cities and PVNGS ownership in 2010 and expires in 2050.

What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)
Significant capital improvement and operating funds were and are required to support the implementation of the Tres Rios Environmental Restoration Project; the total first cost was $99,321,000 with a total annual cost of $9,722,100 that includes operating and maintenance costs of approximately $2,414,150 (U.S. Army Corps of Engineers, 2000). However, utilizing the wetlands natural treatment for secondary effluent saved ratepayers an estimated $300,000,000. Project managers, engineers, and budget staff are required to oversee project design and implementation as well as ensure that procurement proceeds according the City procurement code and requirements.

Palo Verde uses 100% reclaimed water for cooling and maintains "zero discharge" water into rivers or streams. In order to convey the reclaimed water from the 91st Avenue WWTP to Palo Verde Nuclear Generating Station, 22 miles of gravity flow pipe were installed from the treatment plant to a pump station, with an additional 8 miles of flow pipe to Palo Verde. Regional water rights attorneys were required to write the 40-year contract that also provides revenue for the maintenance and technological enhancement of the treatment plant. The negotiated fee structure has reclaimed water initially priced at $58 per acre foot, adjusted annually to approximately $300 per acre foot by 2026, after which prices are adjusted by consumer price indices.

Did you partner with other stakeholders or organizations as a part of your implementation process?
Phoenix Water works with the other partner organizations for the operation and maintenance of the 91st Avenue WWTP. In addition, significant collaboration with partners and stakeholders was necessary to navigate the federal and state regulatory requirements to plan for, construct, and maintain the Tres Rios Environmental Restoration Area, supply reclaimed water to irrigation districts, and to supply Palo Verde Nuclear Generating Station. The 1995 Tres Rios Steering Committee comprised of local, state and federal officials formed the Tres Rios Public Involvement Subcommittee to facilitate public involvement and dialogue with USACE. Water rights attorneys assisted in the development of the SRPMIC water rights settlement and continue to work with Tribal governments to develop mutually beneficial water exchanges. Over the years, other partners have included the Maricopa County Flood Control District, the Gila River Indian Community, the Salt River Pima-Maricopa Indian Community, the Maricopa County Sheriff's Office, the cities of Glendale, Mesa, Phoenix, and Tempe, the Arizona Department of Water Resources, the Arizona Department of Environmental Quality, the USACE, the BIC and RID, Maricopa County Environmental Programs, Arizona State University researchers, the U.S. State Department, the Nature Conservancy, Phoenix Audubon, and countless schools and community groups.

What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?
In 1990, the Arizona Department of Environmental Quality set stringent water quality standards for wastewater discharges into Arizona water ways, which affected discharges from the 91st Avenue WWTP into the Salt River. The 1995 Tres Rios Wetlands demonstration project was initiated in part to cost effectively meet the new discharge standards, particularly in regards to removing nitrogen.

Perhaps the most difficult obstacle for any utility to overcome is thinking outside of the box in order to capitalize on an opportunity, or solve a complex issue, such as the SRPMIC Water Rights settlement. As an example, the 91st Avenue WWTP is located far from the valley, but relatively close by agricultural lands as well as Palo Verde Nuclear Generating Station. These two opportunities were also enhanced by the gravity based piping to each area. Developing wetlands in the arid southwest seems counterintuitive, yet is a cost-effective means to treat effluent while providing flood control for the area.

Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.

Supervisory Control and Data Acquisition (SCADA) is a control system that uses computers, networked data communications, and graphical user interfaces for high-level process and plant supervisory management. The SCADA System is used for real-time monitoring and controlling the process of treating and distributing reclaimed water throughout the system.

The Oracle Utilities Work and Asset Management System is used for its Computerized Maintenance Management System. This allows Phoenix Water to know what assets are owned, where they are, track maintenance activities, and track condition changes and remaining useful life. This ensures Phoenix Water is effectively planning for the asset's replacement while maximizing useful life to continue to provide high quality, reliable, and cost effective water services.

Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?

The Phoenix Water Services Department Business Plan can be found online at https://www.phoenix.gov/waterservicessite/Documents/WSD%202017%20Business%20Plan.pdf.
Information about Tres Rios can be found at https://www.phoenix.gov/waterservices/tresrios.
Information about the Water Resource Plan can be found online at https://www.phoenix.gov/waterservicessite/Documents/wsd2011wrp.pdf

Measure What are you measuring?	**Targets** What was your goal/intended outcome?	**Outcomes** What were your actual outcomes?
Reclaimed Water Reuse at least 90%	90%	FY1516: 84% FY1415: 88%
Reclaimed Water Delivered to BIC	8,200 MG	FY1516: 6,517.02 MG
Reclaimed Water Delivered to RID	9,800 MG	FY1516: 10,907.80 MG
Reclaimed Water Delivered to Palo Verde Nuclear Power Plant	21,000 MG	FY1516: 6,341.39 MG
Reclaimed Water Delivered to Tres Rios Habitat Restoration Area	6,500 MG	FY1516: 6,341.39 MG
Wastewater Treatment KwH Usage per MG	Less than 2,000	FY1516: 1,762
Wastewater O&M Cost per MG	Less than $1,300	FY1516: 1,392
Total Number of Days per Year in Full Regulatory Compliance	100%	FY1516: 100%

Utility Description (combine all plants if a multi-site system)		
Utility Name: City of Quincy Industrial Reuse Water Treatment Plant (IRWTP) and Industrial Wastewater Treatment Plant (IWTP)		
Type (e.g., single plant, regional system, multiple plants, collection system only, stormwater, etc.): Multiple plants		
Service Area (square miles): City of Quincy is 5.04 square miles	Average Annual Daily Flow (MGD): 2.2 MGD Industrial WTP, 1.2 MGD Industrial Reuse WTP	
Population Served: 7,000		
Location		
Street Address: 104 B Street SW		
City: Quincy State: WA	County: Grant	
Zip Code/Country Code: 98848		
Contact Information		
Name: Tim Snead	Phone: 509-787-3523	Email: tsnead@quincywashington.us

ORGANIZATIONAL CULTURE

The City of Quincy (City) is engaged in advancing resource efficiency and recovery, developing proactive relationships with stakeholders, and establishing a resilient, sustainable, and livable community. The City provides a participatory, collaborative culture dedicated to continual learning, improvement, and innovation. The Water Reuse project described below demonstrates that the City adopts innovative initiatives that encourage appropriate risk-taking, which are adequately funded and staffed. Throughout the Water Reuse project implementation and in other utility operations, employees have been engaged and consulted to discuss their insight and understanding of current conditions, and if they have any thoughts on potential new processes, innovations, or designs that should be considered before building. The City has established processes for periodic tracking of progress toward meeting project goals and milestones, and opportunities are provided for employees to find and fix inefficiencies, and share ideas for solutions to problems. As an organizational practice, staff and consultants regularly attend and present information at regional and national industry conferences (specifically related to Water Reuse and other areas) to facilitate engagement with other utilities and regulators that promote *Utility of the Future* practices. There is also an awareness and commitment to workplace safety established as a key organizational expectation.

The City has adopted an internal utility culture that supports sustainable water supplies, advanced wastewater treatment and Water Reuse innovations, engaged the community and formed partnerships to ensure success while operating outside of the traditional role of the utility. City leadership has proactively engaged in both internal organizational and broader external community priorities. The Mayor, City Council, City Administrator, along with engineering and support staff, are implementing a long-term, innovative approach to water resource management that is the first of its kind in Washington State to ultimately replace all wastewater discharge with beneficial Water Reuse to create a virtual zero discharge system. After more than 10 years of planning, the City Council unanimously adopted the 2017 Quincy 1Water (Q1W) Plan. The Q1W Plan provides for a positive change to support the City's long-term growth management planning by improving water use by providing a stable, sustainable future water supply. Implementation of this ground-breaking solution will be an example for other communities, especially small, rural communities, facing water supply and quality concerns to promote Water Reuse and sustainable water resource policies and management.

A new industry cluster (cloud computing) has located in the City, consuming significant amounts of potable supply for industrial cooling. The City is constructing a 1.2 MGD Water Reuse facility to supplement the use of valuable potable water supplies with Water Reuse to meet existing industrial demand, take advantage of opportunities for economic growth in cloud computing and expansion of the food processing industry, to replenish the aquifer, and provide a sustainable resource for future generations. Because it was pro-active in working with local stakeholders and forming private-public partnerships, the City has been able to secure Water Reuse customers from the cloud computing industries. New industrial customers have communicated with the City about their interest in locating in the area contingent on utility services and a stable water supply being available.

The City faced an extreme challenge when its 50-year agreement with the U.S. Bureau of Reclamation (USBR), that to allowed the City to discharge treated industrial wastewater (from food processing industry) into a USBR canal for disposal, expired in 2015. USBR will not allow the City to use its canal for disposal so the City created the Water Reuse project, in part, to eliminate all discharge and provide a long-term solution that meets USBR's policy of removing all non-agricultural discharges from their system. The City is operating under a temporary discharge agreement with USBR, while negotiating a five-year license agreement, to complete the Water Reuse project. The City meets with USBR, Washington Department of Ecology (Ecology) and other stakeholders on a routine basis to discuss project updates, seek feedback and to keep the project moving forward.

Meanwhile, growth from Quincy's food processing and cloud computing customers is creating new wastewater treatment challenges and increasing demand on the City's water supply. The City's recent Water System Plan update revealed that projected increasing demands on the City's domestic groundwater supply can be reduced by implementing a closed loop Water Reuse utility. Recent planning efforts have revealed that without the Water Reuse project to offset current customer projected use, the City will run out of water within five or six years. In addition, technical studies

demonstrate the groundwater supply is declining, limited and could prove to be a costly and unreliable water source for the City.

The City embraced these challenges and competing needs to reduce and eliminate industrial discharge, meet growing water supply demands, and meet regulatory changes by developing the Q1W Plan which integrates all four of the City's water utilities to create a closed loop Water Reuse system that will remove the City's discharge from the USBR canal by redirecting this water as supply for data centers and aquifer storage and recovery (ASR). Specifically, the City will use more than 1.2 MGD of industrial effluent in reserve at the City's Industrial Water Treatment Plant (IWTP) to generate more than 1.2 MGD of high quality reuse water at the Industrial Reuse Water Treatment Plant (IRWTP). This innovative approach to integrate all four utilities will reduce utility stranded assets, reduce demand on the City's limited potable supply and improve the City's water balance and sustainability.

In this process, the City has 1) sought to optimize and continually improve wastewater operations, 2) consistently met or exceeded regulatory requirements, 3) developed plans and invested effectively for the maintenance, repair and replacement of infrastructure, and 4) engaged with their employees and communities in meaningful and productive ways. The City's Water Reuse project has been supported and moved forward by a dedicated City leadership and staff that have engaged with consultants, stakeholders, legislators, new and existing industries, funding agencies, and regulators to ensure project success. The City has been successful in negotiations to retain its current food processing industries, while also attracting and partnering with new hi-tech industries and others. When this small rural community lacked in-house expertise, it contracted with nationally-recognized engineering consultants and regional specialists to assist with the design, construction and operations of its facilities. During implementation of the project the City has hired a rate and funding specialist to determine the most effective financing strategy for the Water Reuse project and a legislative lobbyist to promote the project on a state and national level. Importantly, in 2017 the City hired a Program Manager to manage the Water Reuse project, for at least 5-years, thru completion. These collective human investments for the technical expertise to support, guide and implement a complex Water Reuse project demonstrates the City's commitment to the stakeholders and the community. The adopted Q1W Plan generates new tax and utility revenues, which will support utility costs, and improve the economic stability and livability of this small, rural, low to moderate income (LMI) City.

The Mayor led a City delegation in numerous meetings with State legislators and agency executive management in Olympia, and with federal Congressional leaders and agency officials in Washington, D.C. to secure Water Reuse project funding. City officials and customers have supported rate increases to fund utility operations and build reserves. To maximize its ability to finance the system, the City has secured $12.3 million in state and federal grants and low interest loans for the Water Reuse project to date. It is authorized to receive another $10 million loan for capital improvements, pending the approval of the 2017 modified state budget, and continues to seek funding. The federal and state grants and loans require the City to effectively manage their investment in the Water Reuse system, and provide annual reporting on its management, for at least 20 years.

Over the last decade, the City has negotiated with Microsoft to expand local operations and to use reuse water instead of the City's limited potable water supply for the company's cooling towers. In 2015, Microsoft started construction and is building its largest $2.2 billion global data center in Quincy. Microsoft will pay a significant amount of the operating costs and debt for the Water Reuse project and will be the largest City Water Reuse customer. Importantly, the City has fully leveraged the significant private infrastructure investments made by Microsoft and American Water/Environmental Management Corporation (American Water) with federal, state and local grant and loan funding and substantial City revenues (over $8.5m to date) to develop the Water Reuse project.

The City has generated on-going project support from local officials, staff, customers, Grant County, Quincy Valley Leadership Group (state legislators, Grant County Board of County Commissioners, Quincy Chamber of Commerce, Grant County Health Department, Quincy Port District, Grant County Hospital District #2, Quincy School District and others), and state and federal Ecology, USBR and other) agencies. The City has worked with regulators and received positive feedback from them encouraging groundwater recharge and industrial Water Reuse that supports the City's innovative Water Reuse project.

WATER REUSE

The City has developed and is implementing Water Reuse opportunities to use treated water for multiple beneficial purposes including data center cooling water, industrial processes, groundwater replenishment, aquifer recharge and potential crop and City irrigation. The City is proactive in water resource recovery and developing new uses for its array of natural resources, and has been the leader in pursuing a collaborative, integrated approach that considers the full water cycle and the broader social, economic, and environmental implications to accomplish the City's priority of being a sustainable community. The City Council unanimously adopted the 2017 Quincy 1 Water Reuse Management Plan (Q1W Plan), that provides guidance on sustainable Water Reuse efforts that utilize existing infrastructure (reducing stranded assets), to integrate and resolve the City's complex water-related problems. The City began constructing facilities to provide for Water Reuse in 2011. The Water Reuse project infrastructure allows all industrial wastewater (mainly from existing food processors) within the City to be treated to a high enough quality level, to make it available for new data centers located in the area to use as cooling water, and new industrial users as process water. Specific Water Reuse activities, and examples of other Activity Areas (as part of the Water Reuse project), are listed under the Question and Answer section below.

How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph? To implement Water Reuse, the City is engaged in activities including the following:

- The City has completed over 10-years of engineering studies for the Water Reuse project, which ranks as the highest priority project in the City, and began construction of facilities in 2011. The City received a 2017 grant from the USBR to complete a final Feasibility Study to guide Water Reuse practices and decisions into the future.
- Facilities went on-line in 2017 to begin providing Water Reuse for off-site industry water purposes (e.g., cooling tower operations). Potential industry process water and irrigation uses have been planned for and could be implemented when and if it is economically feasible.
- The City has invested $24.5 million in Water Reuse capital infrastructure to date. Another $21.2 million is projected to be invested in capital in the next 5 years.
- In addition, the City has spent over $5 million in engineering planning and design to date. Another $3.6 million is projected to be invested in final planning and design in the next 2 years.
- Community partnerships and engagement is achieved through continuous one-on-one meetings, group discussions, public hearings, and a project newsletter, throughout the Water Reuse implementation process. The City has held monthly project meetings with stakeholders and regulators for over 3 years and now conducts routine meetings as needed.
- The City has recruited data center customers including Microsoft, Yahoo, Intuit, Dell, Sabey, and Vantage, with a new facility expected to be announced this year. The City recently began providing process water to Amway and Baseline Lake Properties, and additional food processors have shown interest in locating in Quincy.
- The City replaced its long-term contract with American Water, and signed an agreement with Woodard and Curran (W&C) in 2017, to efficiently and reliably provide the Process Operations of the City water and wastewater facilities, including the IRWTP, through 2028.
- The City has involved regulators in the Water Reuse project (particularly Ecology and USBR), conducted necessary environmental and cultural reviews, secured necessary approvals, permits, and responded to agency concerns. The City intends to push for state legislative and regulatory changes to allow industrial reuse water for ASR.
- The City provided comment to the Environmental Protection Agency (EPA) Local Government Advisory Committee, Small Community Advisory Subcommittee on development of a National Drinking Water Plan and provided recommendations.
- The Q1W Plan includes bio-gas recovery that can provide an alternative source of power generation. Energy efficiency opportunities include the use of variable frequency motors and avoidance of peaking operations via storage of reuse water.

- Watershed stewardship (via storm-water management, climate resiliency, and economic development) is included in City planning.
- The City has discussed bio-solids use, nutrient and materials recovery with its contract operators and potential customers and looks for opportunities to expand the Water Reuse project in those areas when feasible.
- Water Reuse customer rates have been adopted, reviewed and updated as needed.
- Market assessments of reuse water to public/private and public/public entities are conducted on an ongoing basis.
- The Q1W Plan promotes implementing the Quincy ASR project that allows the City to replace ground water withdrawal with reuse water withdrawal.

What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)
City management, financial and engineering staff, City attorney, engineering, environmental and hydrology technical consultants, a finance and funding consultant, a government affairs lobbyist, contracts with utility operators, customer contracts and negotiations, a dedicated program manager, community support, a municipal bond lending agency and issuance support, plus regulatory, customer and funding partnerships are all part of the necessary human and agency resources that have been and are engaged to support the implementation of the Water Reuse project. The scope and depth of the Quincy Water Reuse project required over 10 years of planning, financing, engineering, local management and other resources to support the initial construction and operation of the project. The Water Reuse project is designed to be flexible, and can expand and grow as customer demands emerge. The City has already secured $28.8 million in Water Reuse financing and actively pursues on-going financial support.

Did you partner with other stakeholders or organizations as a part of your implementation process?
Yes! The City has conducted meetings with stakeholders (staff, customers and regulators) since the project's inception, with monthly technical coordination meetings held over the last 3 years during project implementation. The City has held Mayor and City Council briefings, public hearings and provided a project newsletter to continually update and inform decision makers, stakeholders, interested parties and the community on the Water Reuse project.
The City is partnered with USBR to develop the Water Reuse project as it relates to the IWTP license agreement and interim IWTP disposal solution, while the Water Reuse project is being implemented.

The City has multiple funding partners including the federal Economic Development Administration (EDA), the state Department of Commerce Community Economic Revitalization Board (CERB) and Public Works Assistance Account (PWAA), state legislature (via capital budget grants), USBR, Grant County and local utility customers (via rates and charges).

Microsoft has been a major stakeholder since it arrived in 2006, and will be the City's largest Water Reuse customer. The City continues to partner with the company to build facilities to serve the company data centers and develop the infrastructure to add new facilities. Microsoft has built multiple data centers, including its largest global data center, in Quincy and supplied more than $12 million for its own infrastructure related to the Water Reuse project, donated a $6 million facility to the City for its Water Reuse operations, and will pay a significant amount of the operating costs and debt for the Water Reuse project. The City is also planning to collect $2.5 million from Microsoft in 2017 for facilities directly related to serving the company.

The City partnered with skilled plant operators and signed operations contracts with American Water and W&C, to provide the process operations of the water, reuse and wastewater facilities through 2028.

What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?

The City has overcome many obstacles in implementing the Water Reuse project (financing, existing industrial customer costs and industry retention, engineering and geological constraints, ever-changing data center customer usage

requirements/schedules and regulatory agency negotiations). However, project financing and affordability was the most critical obstacle. To overcome this obstacle the City needed a coordinated and creative solution.

The overall Water Reuse project (including creating an alternative wastewater discharge for the IWTP) will result in a projected financial investment of $60.3 million for the small, rural, LMI community. Paying for the Water Reuse facilities while keeping rates affordable, retaining existing industries, and attracting new customers willing to use and help fund Water Reuse, has been a major challenge to the City.

The Water Reuse project is required, in part, because the USBR will not let the City continue to discharge its IWTP treated industrial wastewater into the USBR canal as described above. Quincy's physical environment makes traditionally cheaper discharge options unavailable or undesirable. Therefore, the Water Reuse project is necessary for the continued operation of the existing food processing industry and to permit expansion and new facilities. The food processing industry is commonly described as the backbone of the regional agricultural based economy. The City's existing industrial food processors claim that the City's existing rates and charges pose a financial hardship and have threatened to leave the community if the City increases their rates to pay for new facilities to meet USBR's requirement to eliminate all industrial discharge to the USBR canal. Meanwhile, the City has been attracting data centers that require significant amounts of water for its cooling tower operations. To be successful, the City had to provide a reasonable-cost alternative discharge option for the IWTP, significant amounts of cooling water for data centers and maintain sufficient utility services and water supplies to affordably serve all customers in the future, along with projected growth.

Engineering consultants determined that by treating industrial wastewater to a level that could be reused and purchased by the data centers for cooling water, rather than disposed into the USBR canal, the City could reuse water for multiple beneficial uses in the community, and spread the cost among multiple customers. Implementation of the Q1W Plan provides for this innovative solution to the City's problem and creates an alternative group of Water Reuse customers and a new revenue source to offset the costs, while economically preserving the City's dwindling water supply and replenishing the aquifer for recovery and reuse. Since the Water Reuse costs are considerable for a small rural community, the City had to form outside partnerships (Microsoft, funding agencies and local government) to help fund the project. The City has actively encouraged economic development and new industries to locate in Quincy and that, in part, has led to the City crafting the innovative Q1W Plan solution to the City's water and wastewater needs. The City has or will build over $40 million in Water Reuse facilities by 2018, while maintaining affordable food processor rates to retain that industry and provide service to a new industry.

Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.
No

Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented? City Website: http://www.quincywashington.us Project Newsletter Q1W Plan

Measure What are you measuring?	**Targets** What was your goal/intended outcome?	**Outcomes** What were your actual outcomes?
Self-sustaining Water Reuse Fund Revenues	2016 Budget: $1.985 million	2016 Actual: $1.985 million
Build advanced reverse osmosis (RO) treatment Water Reuse facility	Construct a 1.2 MGD RO IRWTP	RO equipment purchased and building secured. Complete construction of a 1.2 MGD IRWTP in Fall 2017.
Securing affordable financing	Eligible Water Reuse project costs	Secured $28.8 million, and authorized to receive a $10 million state loan plus $2.5

		million from Microsoft. The City continues to seek low cost financing and charges rates for service.
Economic-development:	Retain and grow food-processing and cloud-computing industries	Build over $40 million in Water Reuse facilities by 2018, while maintaining affordable food processor rates. Over 900 full time jobs have been retained with over 700 new jobs planned and over $2 billion to be invested in the area.
Reduce dependence on potable water and remove IWTP discharge from USBR canal and	Produce 100% ratio of wastewater disposal to Reuse Water (to produce near zero discharge).	Facilities are being built to treat 1.2 MGD of IWTP discharge and create 1.2 MGD of Reuse Water. Based on negotiations with USBR and Water Reuse demand, the City will incrementally decrease disposal into the USBR canal, until 100% of IWTP discharge will be removed by September 2022, with full implementation of the Q1W Plan.

Utility Description (combine all plants if a multi-site system)		
Utility Name: City of Raleigh Public Utilities Department		
Type (e.g., single plant, regional system, multiple plants, collection system only, stormwater, etc.): Regional System		
Service Area (square miles): 296		Average Annual Daily Flow (MGD): 51 MGD
Population Served: 560,000		
Location		
Street Address: One Exchange Plaza, Suite 620		
City: Raleigh	State: NC	Country: United States
Zip Code/Country Code:		
Contact Information		
Name: Edward Buchan	Phone: 919 996 3471	Email: edward.buchan@raleighnc.gov

ORGANIZATIONAL CULTURE

The City of Raleigh Public Utilities Department (CORPUD) has long recognized the value of organizational excellence, which led to the development of a Departmental Strategic Plan based on the Effective Utility Management principals. The plan was initially developed in 2011 through a collaborative effort between a private consultant, the executive management team and employees through a series of in-person meetings and analysis of other utility strategic plans. These efforts yielded a Departmental Strategic Plan with 8 specific areas of development: Customer Service, Employee Leadership & Development, Financial Viability, Environmental Stewardship, Operational Optimization, Stakeholder Outreach, Reliability, and Water Resource Management. These areas of development subsequently informed the organizational core values: accountability, honesty & openness, equality, effectiveness, empathy, fairness and fiscal responsibility.

After the Departmental strategic plan was finalized in 2012, a Departmental employee survey was conducted in 2013 to quantify how well employees understood the strategic plan and how it impacted their roles in the organization. The survey was offered for 3 weeks and was available through both electronic and paper options. The survey response rate was exceedingly high at 80%, with 442 out of 550 employees providing a response. In analyzing the survey results, employees provided positive feedback regarding training, safety and relationships with supervisory staff:

- 73% agreed that their supervisors were willing to listen and consider their ideas for process improvement
- 80% agreed that they have an appropriate level of training to perform their job effectively
- 93% agreed that safety was taken seriously in their Division

However, it was also evident that employees strongly valued additional training opportunities and a compensation system which rewarded high performing employees. Therefore as part of the Employee Leadership & Development component of the Departmental strategic plan, CORPUD worked to implement an incentive for certification program that offered salary increases for employees who acquired formal certifications specific to their respective operational areas. This approach represented a substantial change from the previously existing system, which was “merit based” and provided an equal percentage salary increase for all employees who received a “standard” or better for their annual performance review. The incentive program was offered in 5 separate areas: Surface Water Treatment (C,B,A), Biological Wastewater Treatment (I,II, III, IV), Water Distribution (I,II, III, IV), Wastewater Collection Systems (I,II, III, IV), and Maintenance technology (I,II, III, IV). The lower levels of certification received a one-time $500 bonus for successful certification and the higher 2 levels of certification also received 5% and 7% salary increases upon certification. Of note, while it is not uncommon for some water and sewer utilities to offer similar incentives for water treatment and wastewater treatment plant operators, it is unusual for this type of program to be expanded to other areas of field operations. In FY15, 67 employees were received pay increases for certification, and 48 employees received pay increases for certification in FY16. Perhaps more importantly, the program provides “certification for pay” opportunities to approximately 60% of the employees in the Department and has been well received by operations staff.

Attention to safety continues to be a point of emphasis for CORPUD, and 2 additional safety officers were hired in FY15 to further enhance the Departmental safety program. These additional safety staff members have allowed for more frequent safety meetings, the assignment of a safety coordinator for all Divisions, and expansion of specific training such as active shooter training for all CORPUD facilities. These efforts have contributed to help lower the Departmental accident incident rate from 9.0 in FY14 to 3.3 in FY16, which is below the average for North Carolina incident rate of 4.2 for water and sewage utility workers.

Ultimately, having a more well-trained, motivated and safety conscious work force has benefited CORPUD in several different ways. Working with key operations staff and applying Lean Six Sigma principals, all major business processes were mapped and inefficiencies were identified. This has resulted in an estimated $3.5 million in reoccurring savings, money which in turn can be used to help fund the incentive for certification program. Examples include utilizing existing CORPUD staff and utility owned agriculture fields the application of Class B biosolids rather than using a private contractor and improving the primary sludge dewatering process so only one employee is required to operate the

loading facility. This organization-wide dedication to constant improvement is further exemplified by the voluntary programs CORPUD participates in and awards received by industry organizations:

AWWA Partnership for Safe Water: The *Partnership* is an alliance of professional drinking water organizations with the mission to improve the quality of water delivered to customers by optimizing water system operations. The *Partnership* requires self-assessment and optimization programs so that operators, managers and administrators have the tools to improve performance above and beyond even proposed regulatory levels. Examples include enhancing filter performance, improving flocculation and sedimentation processes. Since joining the Partnership, CORPUD has developed goal oriented process improvement plans for every facet of water treatment, and has been recognized for achieving continual operational improvement with the 5-Year Directors Award – Treatment Program (Phase 3).

Area Wide Optimization Program: Since June, 2013, CORPUD has participated in the North Carolina Department of Environmental Quality's Area Wide Optimization Program (AWOP). The AWOP Program was developed to encourage water providers meet more stringent requirements and achieve a higher level of water quality by setting lower settled and combined filter water turbidity limits (0.1 ntu). The goals of AWOP include eliminating or reducing fluctuation in water quality and treatment facility performance with particular attention to turbidity removal and optimization.

National Association of Clean Water Agencies Peak Performance Awards: CORPUD continues to participate in this NACWA program and the waste treatment facility awards are listed in the following table:

Facility	2016 Award	Expected 2017 Award
Neuse River Resource Recovery Facility	Platinum	Platinum
Smith Creek WWTP	Platinum	Platinum
Little Creek WWTP	Gold	Gold

By meeting the requirements of the Peak Performance Awards and through the development of a Reuse Water distribution system and Bio-Solids Program, all three treatment facilities are well below permit requirements, which are summarized in the following table:

Parameter	Permit Limits	Neuse River	Smith Creek	Little Creek
NH_3-N (mg/l)	2.00/1.00/1.00	0.03	0.00	0.00
Fecal Coliform (col/100mls)	200	4.10	1.50	1.80
BOD (mg/l)	5.00	0.35	0.00	0.14
TSS (mg/l)	30.00	0.11	0.00	0.05
TP (mg/l)	2.00/1.00/1.00	1.23	0.47	0.53
TN (Permitted Annual lbs)		687,373	70,814	26,660
TN (Actual lbs)		439,280	20,189	4,307

Association of Metropolitan Water Agencies Platinum Award for Utility Excellence: In 2016, CORPUD earned this award which recognizes utilities which effectively integrate the Ten Attributes of Effective Utility Management and the Keys to Management Success. Winning applicants are expected to show progress in implementing the attributes and keys, as well as a distinctive level of management expertise and expanded utility achievement. Three years after winning a Gold Award, member utilities are eligible to apply for the Platinum Award for Utility Excellence.

In summary, these achievements are only made possible through the efforts of a modern, forward thinking work force and one that CORPUD will continue to invest in to create a truly sustainable utility in the future.

WATERSHED STEWARDSHIP

CORPUD provides water and sanitary sewer service to approximately 560,000 residents in Raleigh, Garner, Wake Forest, Rolesville, Knightdale, Wendell, Zebulon and is the 2nd largest water and sewer provider in North Carolina.

The Falls Lake Watershed is the primary source of drinking water for the City of Raleigh Public Utilities customers, and has been the main focus of the Watershed Protection Program. The Swift Creek Watershed, which includes Lake Wheeler and Lake Benson Reservoirs, provides a supplemental drinking water resource to Falls Lake. These two sources ensure reliable year-round delivery of high quality water to all residents and businesses within the service area. Since 2005, the City has partnered with local land trusts and governments to protect these critical drinking water resources. The UNCWI (Upper Neuse Clean Water Initiative) program was originally spearheaded by six local land trusts and coordinated by the Conservation Trust for North Carolina worked to protect lands through acquisitions and easements in the Falls Lake Watershed. This watershed, colloquially referred to as the Upper Neuse River Basin (UNRB), covers approximately 770 square miles, and encompasses parts of six counties, eight municipalities, six public drinking water supply systems, and nine water supply reservoirs. Over half of the watershed area is located in Durham and Orange Counties. Since 2005, UNCWI has helped permanently protect 81 projects totaling just over 7,000 acres and 70 miles of stream in Raleigh's drinking watersheds. CORPUD's watershed protection program has helped fund approximately half of these projects.

These land conservation projects protect and preserve drinking water quality by filtering pollutants and sediment before it reaches the City's drinking water resources. Raw water from these resources is treated at the E.M. Johnson Water Treatment Plant near Falls Lake and the Dempsey E. Benton Water Treatment Plant at Lake Benson. The Public Utility Department invests a significant portion of revenue into its grey infrastructure including this system of treatment plants, pipes, valves, pumps, tanks and meters. The watershed protection program provides the City with an opportunity to invest upstream in its green infrastructure, a complex system of land streams, river, and lakes that provide and protect critical source waters.

The City of Raleigh's Watershed Protection Program, also known as the Upper Neuse Clean Water Initiative, is funded through the Watershed Protection Fee established in November of 2011. The volumetric charge ($0.15 per CCF of water used) is shown on a customer's utility bills and on average is approximately $0.57 per a month for a residential customer, and generates approximately $2.2 million per year. Prior to November of 2011, the program was funded through nutrient reduction fees assessed to new water customers. The Watershed Protection Fee provides funds for project facilitation and program administration, outreach and project development, public education, conservation plan updates, and land protection. Since the program's inception in 2005, the City has worked with the Conservation Trust for North Carolina to implement the program and coordinate with land trusts and other conservation partner's preserving land in the Falls Lake Watershed. CORPUD works cooperatively with the land trusts and other conservation partners since it has very little jurisdiction in the watershed, only 1,118 acres of the City's 92,838, or about 1 % are located in the Falls Lake Watershed. The financing, work plan, and details of this partnership are detailed and outlined in an agreement which is renewable each fiscal year.

The majority of the funds collected through the Watershed Protection Fee have been dedicated to land protection efforts including both easements and acquisitions of conservation properties in the Falls Lake Watershed. In order for a project to qualify, it must be located within the Falls Lake and Lake Benson watersheds and be considered a conservation priority as defined by a GIS based priority model developed at the outset of the program. The GIS based priority model rates properties on soil type, topography, proximity to water resources, water features onsite, and connectivity to other preserved areas. Properties are also evaluated on the development potential based on nearby utilities and land use. Projects are then reviewed by a technical team of City staff, land trust staff, Triangle J Council of Government staff, and Clean Water Management Trust Fund staff. Next, recommended projects are taken to the Budget and Economic Development Committee and Raleigh City Council for final review and approval.

The program provides a non-regulatory approach to protect water supply resources for the City of Raleigh Public Utilities customers. While most of the funds have been allocated to the purchase of land and easements in the Falls Lake Watershed, one land protection project has also been completed in the Swift Creek Watershed. The program is completely voluntary, and real estate deals are negotiated between landowners and local land trusts serving the area. This approach has enabled the Public Utilities Department to leverage substantial financial resources from other grant

programs and contribute approximately 11% (on average) of the total funding to the projects. Additional resources for completing the projects have included state and federal funds as well as landowner donations.

In 2010, the North Carolina Environmental Management Commission (EMC) established the Falls Lake Nutrient Management Strategy as a surrogate TMDL for Chlorophyll *a* water quality violations, requiring two stages of nutrient reductions. The Rules establish a Nutrient Management Strategy for Falls Lake Reservoir aimed at attaining:

> "…the classified uses of Falls of the Neuse Reservoir set out in 15A NCAC 02B .0211 from current impaired conditions related to excess nutrient inputs; protect its classified uses as set out in 15A NCAC 02B .0216, including use as a source of water supply for drinking water; and maintain and enhance protections currently implemented by local governments in existing water supply watersheds encompassed by the watershed of Falls of the Neuse Reservoir." (15NCAC 02B .0275)

It should be noted the Falls Lake Nutrient Management Strategy and associated rules are intended to significantly reduce current sediment and nutrient loads to improve water quality within Falls Lake, whereas UNCWI is intended to preserve areas within the Falls Lake watershed and thereby avoid potential future pollutant sources.

The program was further updated in 2015 with the development of a formal mission statement and a reassessment of the conservation priority model, which is used to rank potential land conservation projects:

Mission Statement –

> The Upper Neuse Clean Water Initiative works to protect and enhance drinking water resources through land acquisitions, planning, and innovative water quality improvement activities which

- Have long term, lasting, measurable, and beneficial impacts
- Are non-regulatory and voluntary
- Address impacts from a variety of sources including agriculture and forestry activities
- Leverage additional partners and funding resources
- Are located in an active drinking water supply watershed, including the Upper Neuse River Basin and the Upper Swift Creek Watershed

Given the critical need to reduce and/or avoid nutrient loads to Falls Lake, a nutrient estimation tool was developed to approximate the pounds of nutrients (phosphorus and nitrogen) which would enter the lake if a given property was developed according to local zoning ordinance and best use plans. These estimates are summarized in the table below:

Measure What are you measuring?	**Targets** What was your goal/intended outcome?	**Outcomes** What were your actual outcomes?
Potential Total Phosphorous loads delivered to Falls Lake (lbs)	Prevent Phosphorous loads into Falls Lake from future land development	14,132 lbs
Potential nutrients Total Nitrogen delivered to Falls Lake (lbs)	Prevent Nitrogen loads into Falls Lake from future land development	2,254 lbs
Chlorophyll a levels near CORPUD water intake (ug/l)	Help improve water quality so that the designated area meets the Chlorophyll a water quality standard (40 ug/l)	Lower basin of Falls Lake around the water intake has not exceeded the chlorophyll a water quality standard for the past 6 years
Number of municipal land conservation programs in the Falls Lake watershed	Increase municipal funded land conservation programs in the Falls Lake watershed	In January, 2017 the City of Durham established a parallel land conservation program to preserve land in the Falls Lake Watershed

Utility Description (combine all plants if a multi-site system)		
Utility Name: St. Cloud Resource Recovery Facility		
Type (e.g., single plant, regional system, multiple plants, collection system only, stormwater, etc.): Regional System		
Service Area (square miles): 91.2	Average Annual Daily Flow (MGD): 10	
Population Served: 118,000		
Location		
Street Address: 525 60th Street South		
City: St. Cloud State: MN	Country: USA	
Zip Code/Country Code: 56301		
Contact Information		
Name: Patrick Shea	Phone: 320.255.7226	Email: patrick.shea@ci.stcloud.mn.us

ORGANIZATIONAL CULTURE

The St. Cloud Resource Recovery Facility is part of the Wastewater Services Division of the City of St. Cloud's Public Utilities Department. The mission statement for the department is to "provide utility services in a safe and cost-effective manner, while providing excellent customer service and environmental protection."

Along with the mission statement, the departmental vision consists of primarily advocating innovation and continuous improvement in the services provided. This vision was created and has been well established by the executive leadership within the Department. How can things be done better is asked and acted upon daily. This mindset and culture has been nurtured, accepted, implemented and expanded to help St. Cloud become a regional leader in providing innovative public services.

The City of St. Cloud recently implemented a new branding message, ST. CLOUD GREATER. This branding message has blended perfectly with the Public Utilities Department vision of innovation and continuous improvement.

Citywide, department, facility and individual goals are set each year, through strategic planning processing and using the S.M.A.R.T. criteria. These goals are reviewed throughout the year and updates made at annual goal setting sessions.

In the last few years, for any large project and/or program, a representative from various areas of the facility are included in as part of the project team. For example; the City is part of the National Biosolids Partnership Environmental Management System (EMS) program and is currently 1 of 22 communities in the nation that is platinum certified. The EMS team consists of members from management, regulatory specialists, operations and maintenance.

A project team is developed for all large construction projects. Complete transparency is provided to all team members throughout the project design and construction period. All team members provide feedback and ideas throughout the entire project. This transparency and collaboration has resulted in employee buy-in of the project and process all the way from design to operations after construction is complete.

Leadership training opportunities are provided through third party and internal training programs developed and implemented by Public Utilities leadership team members.

Innovation at the facility continues to thrive. Employees are encouraged and empowered to take leadership roles related to projects, programs, troubleshooting and problem solving. This has led to a great many of successes by the St. Cloud RRF team; examples include the installation of a low-cost high strength waste receiving station and development of a dissolved oxygen valve operating strategy that has resulted in significant energy savings.

The St. Cloud RRF staff have fully embraced the paradigm shift from sewage treatment, to wastewater treatment and now to resource recovery. An example of this is the implementation of the Resource Recovery and Energy Efficiency (R2E2) Master Plan that was developed in 2014. All projects and/or initiatives identified as part of that Master Plan have either been completed and/or are scheduled for construction. The results of the implementation of this Master Plan has far exceeded expectations.

The current organizational culture at the St. Cloud RRF has been created by a group of water professionals that have an enormous passion for the water industry, resource recovery and sustainable operations. Hiring practices are focused on identifying individuals with the strength sets that fit well with the existing team. More often than not, it is finding individuals that have an internal drive for success, high emotional intelligence, have a strong work ethic and strive to make a difference in what they do.

ENERGY GENERATION & RECOVERY

The St. Cloud RRF created an initiative in 2014 and developed the Resource Recovery and Energy Efficiency (R2E2) Master Plan. From this plan, four large initiatives/projects were created; Citywide Solar Initiative, Energy Efficiency Improvements, Biofuel Recovery Project and Nutrient Recovery and Reuse Project. Since the development of the R2E2 Master Plan, the City has installed several solar arrays; the first two systems were installed at the St. Cloud RRF.

The City has also subscribed to over 20,000,000-kilowatt hours of electricity from community solar gardens. The St. Cloud RRF team focused on energy efficiency in 2014 and 2015 and reduced electrical demand by over 1.5 million kilowatt-hours of electricity by optimizing the blowers, installing replacement lighting and adding a HVAC controls system. The Biofuel Recovery Project is currently at substantial completion which includes the installation of biogas conditioning equipment and a 633kW internal combustion engine that uses the biofuel generated from anaerobic digestion and converts this to electricity; over 5 million kilowatt-hours of electricity can be generated by this engine. With the combination of solar and biofuel energy sources, the facility has experienced several days where it produces more renewable energy than it consumes. Due to these efforts initiated at the St. Cloud RRF, the City of St. Cloud as a whole is on track to have 80% of its electrical demand to provide City services coming from renewable energy sources by 2018. The Nutrient Recovery and Reuse Project consists of the installation of biofuel storage, solids dewatering, Class A Biosolids processing and struvite recovery. This project is scheduled to start construction in the summer of 2017. The results and status of the project and initiatives developed from the R2E2 Master Plan is a true testament of the St. Cloud RRF organizational culture of innovation, continuous improvement and doing something GREATER each day. The amount of work and successes completed in such a short period of time is almost unbelievable.

How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph? The R2E2 related practices/activities/projects/programs were implemented by engaging the team from the very beginning. A team of eight individuals representing all areas of expertise/skills were part of the R2E2 development process. By involving everyone early on, each individual strengths and passions shown through. Each individual worked on aspects of the R2E2 Master Plan related initiatives/projects that was the best fit for them. Transparent communication and involvement opportunities for all members was crucial for the success of all related initiatives/projects.

What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)
Significant staff resources were dedicated to the R2E2 related projects/initiatives. All team members have dedicated a lot of time and resources towards to the development and implementation of these projects/initiatives. Non-traditional means of project/initiative funding were scouted and received. Some examples of this include the use of a guaranteed savings/performance contracting for the Biofuel Recovery Project so the City did not have to raise user rates to complete the work. Another example is the solar related initiatives, all solar projects have been installed with little or no capital costs. The City's subscription to the community solar gardens results in a bill credit on the utility bills that are higher that the power purchase agreement cost, the behind the meter solar projects were all installed by third party developers with no upfront capital cost to the City.

Did you partner with other stakeholders or organizations as a part of your implementation process? The St. Cloud RRF partnered with several stakeholders and organizations. An application was submitted to the Minnesota Technical Assistance Internship Program in 2014. With the help of an intern from this program, over 700,000 kilowatt-hours is being saving annually due to the blower optimization related work completed. The fees associated with this program were paid for by the St. Cloud RRF's electric utility. The St. Cloud RRF was also accepted into the electric utility's Process Efficiency Program. As part of this program the St. Cloud RRF went through an energy assessment and developed an energy action plan. After the energy action plan was completed, the City become eligible for a significant amount of energy related rebates, totaling over $600,000.

What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that? Limited staff resources was an obstacle. The R2E2 related projects/initiatives are all above and beyond the

normal job responsibilities and tasks for the RRF staff. Increased communication and being aware of others schedules/responsibilities at all times helped with ensuring adequate resources were available for implementation.

Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe. Some of the "smart" information technologies that supported the implementation of the R2E2 related initiatives/projects include; improved SCADA communications/reports, electronic bulletin board used throughout the facility to keep everyone on the same page and in the loop and Go To Meeting were used to allow for all members of an initiatives/project to participate even if they couldn't be there in person.

Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented? The City's Wastewater Services website has been updated to include information and results related to the R2E2 related initiatives; http://www.ci.stcloud.mn.us/331/Wastewater-Services.

Measure What are you measuring?	**Targets** What was your goal/intended outcome?	**Outcomes** What were your actual outcomes?
Purchased power from grid	25% reduction in purchased power by 2019 at the St. Cloud RRF	Currently, the facility has reduced amount of purchased power by 75% since the biofuel generator began operation in February 2017
Percent renewable generation	10% onsite city generation of renewable energy	With onsite solar and completion of the biofuel recovery project, the City is currently generating 19% renewable power of the electrical demand
Percent renewable generated or subscribed to	80% by 2018	Currently the City is at 19% renewable, after the completion of the community solar gardens in 2017, the City will be at 80%

Columbus Water Works, GA

Community Partnership & Engagement

WATER RESOURCES UTILITY OF THE FUTURE TODAY

Utility Description (combine all plants if a multi-site system)		
Utility Name: **Columbus Water Works**		
Type (e.g., single plant, regional system, multiple plants, collection system only, stormwater, etc.): **Public water and wastewater utility with one wastewater treatment plant, two combined sewer overflow facilities, and two water treatment plants.**		
Service Area (square miles): **430**		Average Annual Daily Flow (MGD): **33**
Population Served: **255,779**		
Location		
Street Address: **1421 Veterans Parkway**		
City: **Columbus**	State: **GA**	Country: **United States**
Zip Code/Country Code: **31901**		
Contact Information		
Name: **Paula Goble**	Phone: **706-653-4804**	Email: **pgoble@cwwga.org**

ORGANIZATIONAL CULTURE

Columbus Water Works (CWW) is an organization of approximately 280 employees with widely varying skills committed to providing high quality drinking water and environmentally sound wastewater treatment to the Columbus-Fort Benning region, including service connections to Harris and Talbot Counties. CWW derives general policy guidance and rate setting from the Board of Water Commissioners of Columbus, Georgia, a five-member appointed group. CWW's president and staff are responsible for planning and day-to-day operations. CWW is dedicated to providing future generations with a legacy of responsible environmental stewardship of the middle Chattahoochee River watershed. We deliver treated water directly to our customers and we are responsible for collecting and treating the resulting wastewater before returning it to the Chattahoochee River.

The Effective Utility Management (EUM) initiative, developed by collaborating utility organizations, identifies the best management practices to promote sustainable water and wastewater systems. CWW uses the EUM initiative, its 10 attributes and five keys to management success for reviewing and developing operational strategies, goals and objectives. Strategic planning is one of CWW's means of continuous improvement in order to achieve the vision. An emphasis on strategic planning means that all team members at CWW are striving for common goals. By conducting regular assessments of strategies, goals and accomplishments, CWW ensures that our improvement efforts and business operations remain on track. Six strategic initiatives serve as the foundation for achieving the mission of CWW: Enhance Customer Satisfaction, Strengthen Regional Partnerships, Leverage Information Technology, Optimize Infrastructure Performance, Develop Sustainable Workforce, and Maintain Financial Stability.

CWW's vision, "To be an outstanding provider of utility services, dedicated to protecting the environment, aspiring to new opportunities and compelled to excel in service to our community", serves as the driver for all of our operational decisions and is reflected in our six core values: Integrity, Customer-Focused, Employee-Oriented, Environmental Stewardship, Innovation, and Community Leadership. Our core values form the foundation on which we perform our work for our customers, what we abide by. They are not bare descriptions of our work, but they underlie our work, how we interact with our customers and community partners, and how we fulfill our commitment to the community. These are the practices we strive to use every day in everything we do.

The core value of integrity reflects our commitment and dedication to a standard of excellence that promotes honesty and transparency. We strive to ensure that our practices are dependable and trustworthy in meeting our customers' needs. This commitment is reflected in state, local, and national awards we receive. CWW is recognized in the areas of environmental stewardship, operational planning, management, water quality monitoring safety, and financial operations. By competing for awards, we strive for stellar performance in order to better serve our customers.

Using state-of-the art technology, our talented and dedicated employees work diligently to ensure the highest level of service to our customers. We continue to seek opportunities to improve our processes to increase stakeholder involvement and we recognize and value the importance of our customers' input and ideas. Being creative and flexible is a key element in order for us to successfully expand our outreach efforts, and the valuable feedback from our customers helps us to become more operationally efficient, enhance our services, improve lines of communication with our customers, and stimulate innovative ideas.

At CWW, we recognize and value the contributions of all our team members. This is reflected in our commitment to ensuring the work environment is safe, secure and positive. We provide valuable opportunities for employees to receive training, certification, leadership development and advancement opportunities. By doing so, we are able to ensure continuity in transferring job knowledge, skill, and future leadership for the organization.

In addition to our core business of providing quality water and properly treating wastewater, we share a serious responsibility for environmental stewardship. This is manifested by ensuring the health of our rivers and streams, protecting our watersheds, and using our water resources wisely by maximizing efficiency and returns.

We strive to maintain an awareness of industry research and development activities to anticipate and support timely adoption of operational improvements. Since automating our treatment facilities in the late 1990s, we have evaluated and implemented a multitude of innovative technologies to help drive a wide range of improvements in the area of efficiency, safety and security. These initiatives support our efforts towards ensuring ongoing, timely, cost-effective, reliable, and sustainable performance in all facets of our operations.

CWW supports and provides national, regional and tri-community leadership in the areas of public education, community involvement, environmental stewardship, and economic development. Our leadership and staff are active participants on a national and regional level supporting industry and community goals and programs as keynote speakers, peer reviewers, as well as serving on local boards and agencies.

At Columbus Water Works, we use the strategic planning process as one of our management tools to help us focus our efforts and energy to meet organizational performance goals. Our commitment to this process not only ensures all members of the CWW team are working towards the same objectives, but it allows us to continuously evaluate and assess our progress in response to an uncertain and ever-changing environment.

For CWW, the emphasis placed on strategic planning at all levels in the organization results in the highest level of quality service being provided to all customers, while at the same time, ensuring our operational activities support our mission and vision. Today, our strategic direction is spelled out in strategies, goals, and objectives, which are supported by tactics, actions, and responsibilities with targeted measurable performance indicators.

One of the critical components of our strategic planning process is the monitoring and evaluation of the progress of the associated activities. As part of our strategic journey, the monitoring of program results is an element in our efforts to "check the sign posts" along the way to ensure that we remain on track and moving in the right direction. We also evaluate and consider industry trends, as well as legislative, economic, technological and environmental concerns when developing our strategic programs. As a result, we are able to identify specific projects and activities which align with our operational direction and then develop a deliberate and strategic approach to achieving these specific goals.

Leadership proactively engaged in both internal organizational and broader external community priorities

- These efforts include conducting periodic stakeholder interviews, online community leaders' survey, residential door hanger program, social media outreach efforts, monthly customer satisfaction surveys, and hosting internal Strategic and Master Planning work sessions.
- Since 2004, we have conducted periodic stakeholder interviews (2004, 2006, 2010, 2012, 2014) and community leaders' online surveys (2012, 2014, 2017) to solicit input on key issues, industry trends and significant business drivers.
- Participants in the stakeholder interviews and surveys include our elected and appointed officials, representatives of private and public businesses, regulatory agencies and key interest groups, as well as our large regional and industrial customers.
- The responses, comments and feedback gathered, as a result of the interviews, help us better understand our strengths, weaknesses, and opportunities for improvement.

Measure	**Targets**	**Outcomes**
Customer Satisfaction Index Score (measures customer perceptions and expectations)	Meet or exceed an average score of 825/Fiscal Year (with a margin of error ± 25) on a range from 0 - 1000	Achieved a goal of an average Fiscal Year score of 821 which is within the margin of error

- Workforce and leadership development program in place to assure recruitment, retention, and competency of utility staff
  - Implementation of the CWW Workforce Ready Program as an avenue to complement our current workforce through internships, co-op and apprenticeship experiences by providing learning and hands-on work opportunities for students or entry-level workers. The ultimate objective of the program is to promote the water and wastewater industry as a prominent career of choice.

- Develop and deploy to managers an annual training calendar which outlines all supervisor, leadership and mandatory training opportunities for the year, such as Annual Alcohol and Drug Awareness Training, Discrimination and Harassment Awareness Training, Financial Awareness, Retirement Transition Planning, Servant Leadership Program, and Public Speaking.
- CWW offers a tuition reimbursement program for 100% of in-state tuition costs and 50% of books (per quarter/semester). CWW also provides full payment for participation in job-related workshops, seminars, conferences, certification preparation and testing, and other related training sessions.

Measure	Targets	Outcomes
Average Training Hours Per Employee	Meet or exceed the AWWA Benchmark Target of 29 (Top Quartile)	Exceeded the target of 29 by achieving a rate of 37 average training hours per employee
Average Emergency Response Readiness Training per Employee	Meet or exceed the AWWA Benchmark Target of 1.3	Exceeded the target of 1.3 by achieving a rate of 4.89 average training hours per employee
Turnover Rate	Remain below the Compdata Survey Rate of 6	Met this goal - Total Turnover Rate for FY was 4.9

- Awareness and commitment to workplace safety established as a key operational expectation
  - Our safety program, a journey of continuous improvement, includes supervisory and employee training opportunities, regular communications to employees, leadership involvement, rewards and incentives for safety behaviors, implementation of an employee safety committee to review and make recommendations for program improvements, and conducting inspections and site visits on a regular basis.
  - Organization provides training in the areas of Risk Mitigation and Workers' Compensation, Defensive Driving Training, Safety (Excavation, Trenching, Confined Space, Flagger, First Aid/CPR, Fall Protection, OSHA).

Measure	Targets	Outcomes
Worker's Compensation Expenses	Remain below FY budgeted amount ($285,000)	Met target; Total expenses was 41% of budgeted amount
Preventable Injuries	Remain below industry standard (Incident Rate), calculated at 4 per FY	This goal was met; Incident Rate for FY was 2

- Employees engaged and consulted on new processes, innovations and designs
  - For FY 2016/2017, we focused on six strategies, with each strategy implemented and managed by individual organized teams made up of diverse groups of employees. Team membership reflected an equitable distribution of skills and expertise.
  - Each team is charged and empowered with developing annual Performance Work Plans (PWPs), which identify a minimum of three major projects to be completed during each fiscal year. Individual PWPs include milestones, funding requirements, identification of resources, and measurements (targets). PWPs focus on issues and projects which impact the Strategic Plan and are valuable tools for monitoring efficient and effective program implementation.
  - We use strategic benchmarking to track rapid responses to changing events and to measure our progress relative to defined strategic objectives. For FY 2015/2016, we tracked 30 operational performance benchmarks and reported them throughout the organization. Each benchmark is aligned with a specific strategic initiative and is tracked by the operational department.

Measure	Targets	Outcomes
Total number of benchmarks met	% of benchmarks met to equal or exceed 85%	Met target; 87% of benchmarks were met (26/30)

COMMUNITY PARTNERING & ENGAGEMENT

Columbus Water Works is dedicated to meeting the ever-increasing challenges of sustainability, innovative technology and green energy while protecting the environment and preserving our most precious resource – water. CWW's program for community sustainability emphasizes public education about the environment, energy conservation, return rate, and water use optimization. The integral part of our business is public education, community involvement, environmental stewardship, and economic development. CWW's environmentally friendly programs are used to protect, restore and enhance the natural environment. The following information describes these programs and projects.

- Help the Hooch and Watershed Festival – Columbus Water Works is dedicated to the care of our environment and improving the quality of life of our community. We believe in supporting programs that promote our goal of environmental stewardship, which is one of our core values. Since 1994, CWW has worked with Keep Columbus Beautiful Commission in the annual Help-the-Hooch event, the single largest clean-up effort of the Chattahoochee River in the southeast that includes Muscogee County, Harris County, Fort Benning, and Russell County in Alabama. During this two-day event, more than 12,000 volunteers on both sides of the river participate in cleaning up the environment by collecting litter from area creeks, streams, lakes, and other public areas. In recognition of volunteers' efforts, a Watershed Festival was added to the clean-up event. The Watershed Festival celebrates the volunteers by treating them to lunch, t-shirts, giveaways and souvenirs, and the opportunity to learn more about our environment and community through educational activities and games sponsored by vendors and exhibitors.
- Fats, Oil and Grease (FOG) Recycling Program – To reduce the impact of FOG on our sewer system, CWW developed a FOG Program that requires restaurants to control the amount of grease they release into the system. These controls include good kitchen practices, containment of the FOG, and removal. This program has dramatically reduced the amount of back-ups in CWW's sewer system. Homeowners also participate in a FOG recycling program, held biannually, where they are asked to bring used fats, oils and grease to two designated locations. In addition, there are eight stationary collection sites located throughout the community where residents can drop off used kitchen grease at any time. CWW collects and uses commercial and household FOG to produce an alternative energy source at the wastewater plant through two methane fueled generators, which provide approximately 40% of the plant's energy. Since the FOG Program's inception, a total of 133,663 gallons of fats, oil and grease has been collected and CWW's carbon footprint has improved by approximately 9,600 metric tons.
- Pharmaceutical Recycling – CWW partners with Keep Columbus Beautiful Commission and the Muscogee County Sheriff's Department to collect outdated and unused pharmaceuticals that may normally be flushed or poured down the drain. This type of disposal endangers the environment and eventually ends up in the Chattahoochee River. Since this recycling program began in 2011, a total of 6,148 lbs. of pharmaceuticals have been collected and properly disposed of by the Muscogee County Sheriff's Department.
- Together 2016 – CWW partnered with 22 community leaders for the Together 2016 campaign, a collaborative effort sponsored by the Columbus Ledger-Enquirer that brought together these partners to promote the region's best assets and create new projects that help build a better region. More than 200 public ideas and suggestions were received. Selected projects of this campaign included $140,000 worth of enhancements to the Frank K. Martin Pedestrian Bridge, which spans the Chattahoochee River connecting Columbus, GA and Phenix City, AL. Improvements to the bridge made a welcoming and friendly respite for residents and visitors at the river. The remaining selected projects, totaling $70,000, were:
  - Five $2,000 scholarships for local high school seniors
  - More than 55 Little Free Libraries in local neighborhoods
  - 17 markers for the Martin Luther King, Jr. Learning Trail
  - 22 Please Be Seated Benches in local neighborhoods
- Students Taking Action Towards the Environment University (S.T.A.T.E. U) –CWW, Oxbow Meadows Environmental Learning Center, Chattahoochee River Warden, and Keep Columbus Beautiful Commission developed an environmental awareness program, S.T.A.T.E. U, which is designed to promote a quality, responsible learning experience for students. The program is a competition aimed at students in middle and high school. Students participating in this collaborative effort integrate biological sciences, mathematics, communications, and problem solving skills. The students interact in a workshop environment where they

engage in critical thinking and pose questions and formulate opinions about the watershed and the impact humans have on it. The focus of the S.T.A.T.E. U program is: W^5 (Watersheds + Wetlands + Water Quality + Wildlife + Water Conservation). Each year, one of these programs is selected for the school's project that will be presented at the workshop. At the end of their experiment, each school presents their findings to a panel of volunteer judges. Funds are awarded for 1st, 2nd, 3rd and 4th place winners. The objective of the program is for each team to develop a project demonstrating the concept of a watershed approach to riverine stewardship, and to use their project in a public outreach manner.

- S.T.E.M. & S.T.E.A.M. Programs – CWW is proud to be a part of the local and regional schools Science, Technology, Engineering and Math (S.T.E.M.) and Science, Technology, Engineering, Art and Math (S.T.E.A.M.) programs which are designed to promote students interest in science by exposing them to careers utilizing math and science. We have partnered with local and regional elementary and middle schools to incorporate hands-on experiences for students as part of the S.T.E.M. and S.T.E.A.M. curriculum. For one project, CWW employees met with first and second graders to teach them about the water cycle and helped the students make multicolored bead bracelets that represented each event of a water cycle.
- Water Use Optimization – In 2011, CWW implemented the IWA/AWWA Water Audit tool to provide a comprehensive evaluation of both apparent and real water loss for the system. Results from this year showed a calculated infrastructure leak index (ILI) of 2.65, which is within the optimal range of 1.0 to 3.0. Though within this range, CWW continues to apply strategies and update infrastructure to reduce water loss in the system, including a state of the art leak detection program.
- Inflow and Infiltration Program – In 2009, CWW initiated a systematic long-term program to identify and ultimately eliminate sources of rain-induced inflow and infiltration (I&I) into the sanitary sewer system. Using multiple inspection methods, including smoke testing, dye testing and TV inspection, CWW makes the necessary corrections to the public sanitary system and works with homeowners to make repairs to eliminate I&I from private sewer laterals.
- Communication Outreach – In addition to bill inserts and television, radio and newspaper announcements, CWW's various communication venues include social media through Columbus Water Works' website, cwwga.org, which keeps the community up to date on current and future events, an informational blog, Facebook, and a video created in-house, What Not to Flush, which can be seen on YouTube. CWW holds annual open houses at the drinking water plant and wastewater treatment plant which provide opportunities for our customers to join CWW staff for a day of plant tours, learn about plant operations, and gain an understanding of the value of these facilities.
- Imagine a Day without Water Campaign – In 2016, CWW joined more than 300 other water professionals, elected officials, nonprofit organizations and water providers across the nation to raise awareness about the importance of water. The "Imagine a Day without Water" campaign recognized the importance of water through social media and other communication platforms, and promoted conversations on how water is essential, invaluable and worthy of investment.
- Fix a Leak Week – CWW is a promotional partner with the EPA's WaterSense program, which includes sharing information and promoting WaterSense. This year CWW partnered with Home Depot to set up a display table of CWW information within the store. CWW staff interacted with customers explaining the importance of water conservation, the extra cost of household leaks, and how to detect leaks. As incentive following the demonstrations, CWW continues to promote this initiative by providing free Water Leak Detection Kits.
- Group Tours – CWW offers group tours of our water and wastewater treatment facilities. It is important that our facilities be available for educational visits by individuals or groups from academic institutions, civic organizations, and professional societies. These tours are approximately an hour and are appropriate for adults and children age 10 and up.
- H2O Academy Tour – The H2O Academy is a new outreach program developed to introduce community stakeholders to CWW staff, learn about the water distribution and collections systems, and visit our plant facilities, locations, and Oxbow Meadows Environmental Learning Center, a partnership between CWW, Columbus State University, and the City of Columbus. This behind-the-scenes tour is an opportunity to speak candidly with our employees, get up close and personal with select processes, and gain a better understanding of the quality service CWW provides customers.
- Partners in Education – The Greater Columbus "Partners in Education" (PIE) program was established in 1987 as a joint venture of the Muscogee County School District and the Greater Columbus Chamber of Commerce.

Originally known as "Adopt-A-School," its purpose was to improve education by stimulating meaningful business and community involvement in public schools. Through individual partnerships with businesses, professional organizations, churches, civic clubs and military units, public and private schools are now able to tap into resources to meet the individual needs of each student body, provide excellent educational programming, and recognize achievements. CWW has been a proud participant of the Partners-In-Education program for 28 years by partnering with Richards Middle School. Each year has brought new activities and programs that benefit the students and community. CWW is committed to utilizing our resources to strengthen the local school system, and specifically, our Partners-In-Education, Richards Middle School. During the school year, various activities in which CWW plans and participates include Arbor Day, Earth Day, and Career Day, an event in which 4 to 5 students shadow different CWW department activities for half a day.

- United Way of the Chattahoochee Valley – Columbus Water Works is not only a proven leader in the water and wastewater industry, but we are also a leader in our community as a result of the tremendous success of our annual United Way campaign through payroll deductions, fund-raisers, and participation in volunteer programs. This past campaign season, CWW employees rallied together in employee giving and sponsored nine fund-raisers to meet our goal of $80,000. With the support of executive staff, managers and team members, CWW raised a total of $89,371 (exceeding its goal by $9,371).

Performance Measures and Results

- Help the Hooch – annual volunteers of 12,000+
- FOG Recycling Program – total of 133,663 gallons of fats, oil and grease collected
- Pharmaceutical Recycling Events – 6,148 pounds of pharmaceuticals collected
- S.T.A.T.E. University Program – four schools participated: two middle schools and two high schools; total of 24 students participated
- S.T.E.M. and S.T.E.A.M. – Forty classrooms attended, total number of students: 1,076
- Inflow and Infiltration Program – 145 repairs to sewer lines; 67,291 linear feet of sewer lines smoke tested; 56,544 linear feet of sewer lines CCTV'd
- Communication Outreach – "What Not to Flush" video published in 2014, uploaded to CWW Facebook page in 2017; 8.7K views; 117 shares; 56 post reactions; 642 Facebook "likes"
- "Imagine a Day without Water" Campaign - Daily Facebook postings. Created two TV spots, partnering with the Columbus Fire Department and the Columbus Health Department, sharing how water impacts the community's health and safety
- Fix-a-Leak Week – event held at Home Depot, attended by 38 consumers
- Open House Attendance – 1,260 people; 19 Group Tours attended by 278
- H2O Academy Tour – May 11, 2017, three media representatives attended
- Partners in Education – partners with Richards Middle School since 1989
- United Way of the Chattahoochee Valley – total contributions in 2016 - $89,371

ENERGY EFFICIENCY

Columbus Water Works has an ongoing strategic initiative to Optimize Infrastructure Performance. Our Energy Management Program (EMP) emphasizes prudent and environmentally responsible use of energy in the operation of its utility facilities, and will follow a program to minimize the cost of energy without sacrificing service reliability. The objective of the CWW EMP is to establish a results-oriented procedure to ensure that:

- Energy-saving operating practices are incorporated in the daily routine
- Advances in technology are used to efficiently analyze, control, forecast and monitor facility operations
- Cost-effective facility improvements are made that promote efficient and environmentally responsible energy use
- Energy procurement takes full advantage of alternative electric rates

CWW is actively implementing and investigating options for accomplishment of major EMP objectives. These tasks include:

- Carry out an ongoing energy-monitoring program at each facility that measures the results of how efficiently energy is being used and seeks to apply the most favorable rate structure.
- Maintain the lowest net electric power cost possible by the implementation of the EMP and utilize applicable measures to reduce energy cost.
- Review facility operations and evaluate equipment performance on a continuing basis to identify cost saving opportunities.
- Optimize operations with the use of new technology and advanced computer applications.
- Use equalized storage operating practices and economical pumped storage capabilities to optimize energy costs for pumping operations.
- Modify or replace treatment and pumping equipment where the costs savings payback is justified.
- Use time-of-day strategies to optimize the facility's electric load profile and minimize electricity cost.
- Educate and train staff on the potential impacts and cost of electric usage associated with the various treatment processes operating strategies.
- Minimize adverse environmental impacts and conserve energy when planning for implementing changes in operations.

Performance Measures and Results

- Obtaining best power use rate for service
- Combined water plant and river pump station meters
- Use of “Modernization Rider” at water plant with the standard Power & Light Large (PLL) rate
- Use of “Off-Peak Rider” with PLL rate at water plant
- Use of “Real Time Pricing” rate at wastewater plant
- Use of “Real Time Pricing” at two Combined Sewer Overflow facilities
- Use of Multiple Load Management Tariff which combines WTP & WWTP into one load, with both facilities utilizing “Real Time Pricing” rate
- Performed an “Energy Management Roadmap Report” or “Energy Gap Analysis” to see where we are now vs where we want to be in 10 years
- Since implementation, CWW has been able to realize savings in excess of $9.2M in energy related areas as a result of the changes made.

ENERGY GENERATION & RECOVERY

CWW takes energy generation and recovery seriously. Our approach has not only been to look at areas for energy capture but also for energy reduction. It has been through the use of several control strategies as well as the use of equipment designed for the best use of our energy generation practices that we have seen recovery of energy wasted in the past. As noted in the listing of completed projects, we have realized some savings from each of the noted projects as a means to collect or reduce energy thus leading us toward lower overall energy consumption. We have added power generation ability at our facilities which allows for us to take advantage of the best rate structures from our energy providers.

Performance Measures and Results

- Automation of aeration blowers at the wastewater treatment plant
- Operators minimize load during On-Peak time periods assisted by the use of SCADA systems
- Use of operational strategies to minimize power use
- Installed two 1.75 MW generators at the wastewater treatment plant that utilize the methane gas generated from the anaerobic digester process to fuel the generators. Our purpose was to maximize the value of the

electric energy as well as the renewable energy credits (RECs) and emission credits produced by the generation of power from the new generators installed during the Columbus Biosolids Flow-Through Thermophilic Treatment (CBFT3) project.

- Installed five 600 kW (for a total of 3.0 MW) generators at the water treatment plant that enable peak saving operations necessary to decrease electric demand and energy consumption during peak periods.
- Work has been done to capture heat energy from the power generation process at our wastewater treatment facility in an effort to offset the required heat energy required to be generated from our onsite boiler systems.
- Because of the measures taken, we have been able to transition the culture of our staff from one that utilizes the resources related to power and generation assets as an endless resource. Our staff now understands each decision related to power usage has to be weighed against a total overall cost benefit that takes into account more than short term gains and looks at the long term benefit from a measured approach to energy usage.

WATERSHED STEWARDSHIP

Columbus Water Works has always had a philosophy of being at the forefront of rules and regulations that affect our operations. The Source Water Assessment Program (SWAP) grew out of the need to control combined sewer overflows and develop a holistic Watershed Protection Plan. CWW added the SWAP and the Source Water Protection Program (SWPP) to our own scope of work in the late 1990s and early 2000s, to include a SWAP for several municipal utilities on both sides of the Chattahoochee River. The SWAP, developed through a partnership between the United States Environmental Protection Agency (USEPA), Georgia Environmental Protection Division (EPD), Alabama Department of Management (ADEM), CWW, Georgia Power, Mead Coated Board, Inc., and other stakeholders and water purveyors, was developed in conjunction with an inter-state watershed study.

Columbus was one of the first drinking water communities in Georgia to initiate the requirements of the SWAP. In 2001, CWW and regional partners completed a Middle Chattahoochee River Watershed Study which included a Regional Source Water Assessment and Protection Program of surface water intakes for the City of West Point, the Chattahoochee Valley Water Supply District, Harris County Water Department, CWW in Georgia, and Opelika Water Works, Smiths Water and Sewer Authority, and Phenix City Utilities in Alabama. CWW continues to facilitate regional source water protection practices of communicating, monitoring and delineating strategies for intake protection. CWW will begin an updated Source Water Assessment Project in November 2017.

CWW has an active water quality monitoring program and a 25-year history of comprehensive monitoring and calibrated modeling of wet weather contributions from tributaries.

CWW implemented a source water monitoring strategy for both the Columbus and Fort Benning water systems intake that includes:

- Real-time monitoring with YSI Sondes and ZAPS Technologies equipment at the intake of both facilities, facilitating early warning for intake protection from a potentially hazardous spill or water quality condition
- Daily bac-t monitoring in the whitewater river segment
- Daily monitoring at the Lake Oliver intake of CWW's North Columbus Water Resources Facility for water treatment operations
- Wastewater treatment systems monitoring
- Urban tributary monitoring and stormwater Best Management Practice for correction of impairments
- State water quality monitoring for public health and general assessment

To reduce impacts the sanitary sewer system has on creeks and streams in Muscogee County, CWW began a new program in 2014 called Creek Walker. This group walks the creeks and streams in Columbus to ensure that the sanitary sewer infrastructure is working correctly, as well as conducting inspections of manholes, creek crossings, and sewer lines within the system. As part of the program, CWW also works with the City of Columbus stormwater department inspecting part of the stormwater system and testing suspected illicit discharges into the creeks and streams. By 2015, this program led to 107 corrective actions that eliminated potential impacts to the streams in Muscogee County.

CWW participates in many educational, outreach and voluntary programs:

- Oxbow Meadows Environmental Learning Center, located at the southern end of the Columbus Riverwalk, includes two classroom-laboratories, an 86-seat auditorium, state-of-the-art instructional media, the National History Discovery Center, indoor and outdoor exhibits of living reptiles and fish, a stream habitat supporting various plants and animals, a pollinator garden, bee hives, and environmental art. The Center provides exhibits, displays and nature trails, and formal and informal programs about the ecology and natural history of the region. Through projects such as Adopt-a-Stream and Help-the-Hooch, CWW provides the Center with resources and leadership in providing watershed education and preservation. CWW and CSU have recently completed an 8,500 square foot expansion of the Center.
- CWW is actively engaged in regional and tri-state water planning to include membership in the Middle Chattahoochee Regional Water Planning Council and the Apalachicola-Chattahoochee-Flint Stakeholders.
- The City of Columbus has been named a "Water First Community." This designation symbolizes the combined efforts of the private, public, and academic sectors to promote environmental education and preserve our water resources.
- The City of Columbus is a WaterSense partner, part of a voluntary partnership program sponsored by the USEPA. WaterSense seeks to protect the future of our nation's water supply by promoting water efficiency and enhancing the market for water-efficient products, programs, and practices. Products and services identified as WaterSense make it easier for customers to make selections that will save water and protect the environment.

Performance Measures and Results

- Continuous monitoring through the use of strategically located YSI sondes and leading edge technology of ZAPS provides CWW with the capability to oversee 25 water quality parameters in real time 24/7. This technology not only helps the plant operators produce high quality water using fewer resources, but it also gives CWW an early warning system when something may be coming into the plant.
- Routine monitoring of Lake Oliver and Lake Harding, a larger impoundment upstream, provides CWW with a good profile of water quality in the lake. Sampling is done during dry and wet weather events and includes metals, organics, and bacteria.
- CWW also monitors the impoundments twice per month from a boat utilized to pull samples for bacterial and chemical analyses. These sampling events allow CWW personnel to monitor water quality health on a routine basis and ensure that land use has not changed dramatically.
- Continuous monitoring of nutrient loads give CWW a good indication of possible issues that may arise from algae growth. As cyanobacteria have become an important issue over the past year, CWW has been monitoring for algae and byproducts of algae growth for several years. Tests conducted in the lab include GC/MS for MIB and geosmin, Abraxis for cyanotoxins, and high definition camera microscopes to identify species of algae. CWW has finished the second year of a three-year study to look at precursors and climate conditions along with speciation of types of algae seen in our source water to develop a predictive model to determine when harmful algae blooms may occur. This along with the real time monitoring systems already in place allows CWW to utilize its current treatment technology to provide safe drinking water for its community.

Utility Description (combine all plants if a multi-site system)		
Utility Name Renewable Water Resources		
Type (e.g., single plant, regional system, multiple plants, collection system only, stormwater, etc.): Regional System		
Service Area (square miles): 844.4 square miles		Average Annual Daily Flow (MGD): 42 million gallons
Population Served: 495,777		
Location		
Street Address: 561 Mauldin Road		
City: Greenville	State: SC	Country: USA
Zip Code/Country Code: 29607		
Contact Information		
Name: Ashley Rhinehart	Phone: 864-299-4000	Email: AshleyR@re-wa.org

ORGANIZATIONAL CULTURE

Through the passion of our workforce, ReWa has been a community partner and an industry leader safeguarding our water environment for future generations since 1925.

We serve more than 400,000 industrial, commercial and residential customers in Greenville County and parts of Anderson, Spartanburg, Pickens and Laurens counties, all located in the northwest corner of South Carolina known as the Upstate.

As part of this continuing effort to promote a cleaner Upstate, we sometimes find it appropriate to look inward. We spent a good part of the past year thinking about how to make our goals more in line with what we do every day. That led to ReWa creating a new mission statement:

"Enhancing our community's quality of life by transforming wastewater into renewable resources through responsible and innovative solutions."

Our new vision statement is: "Through the passion of our workforce, ReWa will be a community partner and an industry leader safeguarding our water environment for future generations."

We also defined our core values for the future: Professionalism, Unity, Integrity and Trust, Safety, Accountability, and Dedication. Throughout our offices and facilities, you can see the Mission, Vision, and Core Values displayed on signage, computer log in screens, employee t-shirts and much more. This is a reminder to our employees of the importance of embodying the values that make ReWa and the Upstate a great place to live and work.

We seek to promote a cleaner environment through our treatment process, which means that in addition to treating wastewater and replenishing our Upstate rivers and streams, we are continuously seeking new ways to recycle our by-products.

Furthermore, the clean water can be used for irrigation of recreational areas such as golf courses, and ultimately conserves our drinking water. ReWa uses clean water to irrigate the lawn at its administration building as well as for multiple uses at our WRRFs. ReWa recently completed a Native Garden and Reclaimed Water Educational Campus at the Mauldin Road Facility to serve as a tool for education, community partnerships, and engagement.

Also, ReWa utilizes a Combined Heating and Power unit that makes use of our methane gas, a renewable by-product of the wastewater treatment process, to create an efficient source of energy and reduce costs.

Our recycling initiatives are key to safeguarding the environment. Our biosolids program allows farmers to utilize a safe, organic by-product of the wastewater treatment process as an agricultural fertilizer. ReWa innovatively utilizes its renewable by-products on a daily basis to reduce energy consumption and demonstrate environmental stewardship.

We feel it is important for public utilities to evaluate how they can become more effective, especially when facing certain challenges, like aging infrastructure and increasingly stringent regulatory requirements. Recognizing this need, we adopted the Effective Utility Management (EUM) strategies as developed by the U.S. Environmental Protection Agency (EPA) in conjunction with six national water and wastewater associations.

We are implementing these strategies throughout all organizational levels. We are also a charter member of the American Water Works Association's Partnership for Clean Water program, which will eventually take our WRRFs to a comparable credentialing level with the biosolids EMS program. Partnerships with local utilities, schools, and organizations are a vital part of creating a connected community and providing educational and career opportunities for people of all ages. Over the past seven years, we have developed and implemented several public education campaigns to support our goal of promoting a cleaner environment and protecting the public health and water quality of the Upstate Rivers, lakes and streams. These campaigns are designed to inform and educate, resulting in community-wide efforts that collectively make a difference. ReWa values environmental education and continually create new and exciting ways to engage our local community. To learn how you can protect the environment and implement our public education campaigns visit: www.befreshwaterfriendly.org or www.ariverremedy.org.

BENEFICIAL BIOSOLIDS REUSE

As part of its "good neighbor" efforts, ReWa has operated a cost effective, regulatory compliant, environmentally sound, and nationally recognized Biosolids program for 27 years. ReWa is committed to, and has demonstrated, continual improvement in process, product, and community outreach.

ReWa started biosolids land application on one hundred acres of bermuda/fescue hay fields at its Durbin Creek Water Resource Recovery Facility (WRRF) in 1989 with about 2 million gallons of class B biosolids annually. From there the program has grown to 45 million gallons annually. ReWa's biosolids are closely monitored through SCDHEC certified laboratories. ReWa's biosolids program has met or exceeded federal, state, and local environmental standards for recycling of biosolids since the program began in 1989.

In 2010, ReWa was recognized by the National Biosolids Partnership (NBP) for the implementation of the Biosolids Environmental Management System (EMS) Program. ReWa was the first agency in SC and 33rd in the Nation to receive this certification. ReWa was awarded Platinum level certification for this program in 2014, 2015, and 2016.

Today, through a strong partnership with the agricultural community, ReWa operates one of the largest liquid biosolids land application programs in the southeast, producing 45 million gallons (7,200 dry tons) of class B liquid annually. On average, 95 percent of the organics recovered by ReWa are recycled back into the local farm economy. ReWa has 7,803 acres permitted for biosolids land application on 65 farms in four counties in the upstate of South Carolina (Anderson, Greenville, Laurens, and Spartanburg Counties). These sites are primarily bermuda/fescue fields used for livestock grazing or hay production.

How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?
Through development of its biosolids EMS program, ReWa established reliable credentialing of the quality control practices inherent to producing its biosolids product. This step was critical to program marketing efforts. Beginning in 2003, a cost-benefit analysis was conducted to compare the cost of landfill disposal of biosolids against various land application alternatives. These alternatives included conventional cake production/land application, lime-stabilized cake production/marketing; lime stabilized liquid biosolids production/land application, and conventional Class B liquid biosolids production/land application. ReWa staff developed and tested its own model in-house to facilitate this analysis. Production and land application of conventional Class B liquid biosolids won out as the greatest value and lowest net present worth cost. However, there was one obstacle remaining: In order to make this approach viable, ReWa needed to substantially increase its permitted acreage within a reasonable transportation distance. Given that ReWa depends on the voluntary participation of private farms in its land application program, ReWa's contracted residuals Management Company feared that the necessary acreage could not be obtained within a reasonable distance. Nonetheless, ReWa undertook an education and partnering effort with the agricultural community that quickly resulted in enough voluntarily permitted private acreage that the demand for ReWa's biosolids soon exceeded its supply. This program includes free delivery of biosolids as well as periodic applications of lime in order to enhance nutrient uptake by the grass crops. With well over twice the permitted acreage needed, and a waiting list for its biosolids, ReWa operates a sustainable program that is economically beneficial to both ReWa and the state's number one economic driver (agriculture), while safeguarding our water environment. With an eye toward the future, ReWa continues to evaluate and implement continuous improvement opportunities, including regionalization of biosolids processing between area facilities.

What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)
Resources primarily consisted of:

i. ReWa utilized internal staff to develop the biosolids EMS program, which became an essential part of the marketing efforts.
ii. ReWa used grassroots marketing, which utilized a combination of ReWa staff and ReWa's contracted residuals Management Company to inform the local community of the benefits of using biosoldis as an organic fertilizer.
iii. The internal staff effort to develop and test a cost analysis model for ongoing comparison of the various alternatives for biosolids production and disposition.

iv. The technical costs for permitting additional acreage for land application. ReWa contracted with its existing residuals management company for these technical services. Unit prices for this work were already included as an option in ReWa's existing agreement with this company.
v. An annual operating budget increase of approximately $50,000 to $100,000 for lime application as needed to maintain field pH. This was more than offset by the savings realized from the avoidance of landfill tipping fees.
vi. A substantial operating budget increase to cover the transportation of liquid biosolids as opposed to cake. This cost was more than offset by the combination of savings from producing liquid biosolids instead of cake and the avoidance of landfill transportation and tipping fees.

Did you partner with other stakeholders or organizations as a part of your implementation process?
ReWa initially partnered with the local agricultural community to establish the biosolids program in its early years. The transition to 100% liquid land application required a revitalized and more intense partnering and grassroots education effort with an expanded audience that included farmers, environmental groups, and neighbors of the proposed land application sites.

What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?
The most critical component would be the marketing and public acceptance of beneficial biosolids reuse. A secondary obstacle involved the incorporation of true-cost accounting into the cost analysis in order that the present worth cost of each alternative would be considered instead of the simple operating costs that seemed to have constituted the traditional approach.

Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.
The network-based Water Information Management System (WIMS) software enhances efficiency of water resource recovery operations at ReWa. A web-based fleet tracking system allows for real-time tracking of transportation and maintenance resources. In the biosolids arena, these programs facilitate enhanced scheduling, route planning, and resource allocation based on real-time conditions.

Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?
Our website has a comprehensive overview of the program and practices associated with it. Audits are performed by a third party and a report is generated for each audit. These reports can also be found on the website. To view this information, visit www.rewaonline.org.

Measure What are you measuring?	**Targets** What was your goal/intended outcome?	**Outcomes** What were your actual outcomes?
Optimize biosolids % Total Solids for transportation cost savings	4% Total Solids (from original 2%)	3.8 % Total Solids
Improve public participation	Survey to measure level of farmer satisfaction with our land application program. Response from at least 30% of our farmers surveyed	Survey to start July 2017
Land Application VS Landfill percentages	100% land application	95% land application
Odor complaints	Zero valid complaints on land applied biosolids odor (validated by state regulatory authority)	Zero valid odor complaints
NPDES permit compliance	100% compliance	100% compliance
Safety performance	Zero staff injuries/accidents	Zero staff injuries/accidents

Utility Description (combine all plants if a multi-site system)		
Utility Name:		
Greenwood Metropolitan District	**Average annual daily flow (MGD): 6.5**	
Type:		
Multiple Plants		
Service Area (square miles): 115		
Population Served: 50,000	**Zip Code: 29646**	
Location		
Street Address: 110 Metro Drive	**Phone: 864.943.8001**	**Email: gmartin@greenwoodmetro.com**

ORGANIZATIONAL CULTURE

To tell the Greenwood Metropolitan District's (GMD) organizational culture development story I need to provide a bit of history. GMD was formed as a Special Purpose District in 1959. From 1959 through 1972 GMD was operated as a function of the City of Greenwood Commissioners of Public Works. In 1972 a manager was hired and GMD began operations as a standalone entity. The entire area of responsibility included two treatment plants, 43 miles of various size trunk lines and the operation, by contract, of three pump stations. There were a total of 18 employees. These

employees were dedicated to operations at two treatment plants and the pump stations. The total focus of operations was meeting the NPDES permit requirements at the treatment plants. There was some opportunity for advancement in certification for the treatment plant operators but not a culture that embraced continual learning or employee involvement in decision making or soliciting ideas for improvements. There was a lot of organizational structure missing when it came to personnel policies and performance standards. There was not a written plan for preventative maintenance at the treatment plants or the three pump stations. The trunk lines were not a maintenance priority and GMD did not own any equipment to relieve stoppages and preventative line cleaning did not exist. GMD actually hired a local plumber to relieve line blockages or make any repairs to the collection system. The GMD culture thought process was that everything was a separate entity to itself. Management and plant operators were somewhat separated and there was not an organized plan for the operation and maintenance of the sewer system.

In 1995 there was an addition to GMD management. The management addition came from a larger utility with 15 years of experience in operating and maintaining a sewer system. To say the culture needed a turnaround would be an understatement. The change was slow but a purposeful journey. It began with the development of personnel policies. The mindset that it would meaningful to have a job at GMD, instead of the attitude that you had to settle for employees that were uninspired or worse, was one of the early talking points. There would be evaluations of each employee. Attendance at work would be the minimum expectation of management. Abuse of sick leave became a focal point. The other real stumbling block was the beginning level of pay. It was very difficult to hire exceptional employees at $5.00 per hour, especially in 1995. A raise in beginning pay took time to evolve in the decision makers minds. The real argument from management was that we were getting exactly what we were paying for. Knowing and convincing the decision makers of the importance of good co-workers is the beginning of real team building.

Skipping ahead to the past few years it was obvious that all the earlier work had been paying off. GMD had been able to recruit and maintain a good basic work group. This allowed GMD to look at other options for the District itself and the services it needed to give the Greenwood community. In the enabling legislation of 1959 GMD was not allowed to spend any money to install collection lines. In order for a neighborhood to have public sewer service, each neighborhood had to form a Taxing District to fund the installation of the sewer system. There were 36 of these Taxing Districts, each with three Commissioners appointed by the SC Governor, along with the City of Greenwood system which was a sub-district of GMD. In EPA Region IV CMOM (which is the proper operation of the collection system) became enforced on a somewhat regular bases. Since GMD did not have agreements or contracts with any of the (neighborhood associations) satellite systems, it was impossible to conform to the CMOM requirements concerning SSOs and preventative or preform any maintenance activities. GMD began writing letters to the governing bodies (three Commissioners) requesting information on their operation and maintenance activities. Since these were neighborhood associations and not accustomed to public ownership of a sewer system, they did not have a clue about requirements for maintaining the sewer system. After about two years of quarterly maintenance requests, 26 of the Taxing Districts demanded a Public Hearing with the Commissioners of GMD. Their request to the Commission was for GMD to assume the responsibilities of owning and operating their sewer systems. The Commission agreed that on January 1, 2000 GMD would assume ownership and operating responsibilities of the 36 neighborhood systems and operate the City of Greenwood's system by contract. On March 1, 2004 GMD took ownership of the City's sewer system. Our inventory went from 43 miles of trunk lines to 387 miles of sewer lines, 35 pump stations and two treatment plants. All this history brings us to the place where GMD could have the resources to operate as a progressive public utility.

Today the most important word at GMD is passion. It begins with our leadership team because we realize that we must have a passion to succeed for all our co-workers and all the responsibilities of operating a forward thinking, progressive public sewer system. We hire people for a specific purpose; being a great team member is the quality that is a difference maker when there are equally qualified applicants. This spirit is contagious and has become the standard with all the co-workers. The existing team members are the standard bearers and sustainers of this philosophy today. We place a large value on continual learning in all phases of life. We now have 62 employees with a wide range of skills. Teamwork is the

management style. Teamwork is recognized and rewarded with additional responsibilities and merit pay increases, often during their annual evaluations. There is strong encouragement for advancement in certification at the treatment plants and for collection system operators. There are opportunities for self-improvement training in several areas such as retirement, parenting and finances.

The GMD staff has become very active in the community serving on various boards from Economic Development, United Way, United Ministries, Hospice, Cornerstone (a program for substance abuse) and the Chamber of Commerce. Many employees are involved in community coaching of at-risk youth, as well as various sports teams.

Another continuing goal is that of record keeping and the total utilization of all our computer software can perform. We continue to advance our knowledge all the advantages software can give us such as the instant retrieval of information and the ability to query summary information for our predictive maintenance program.

GMD has had a turnover rate of 5 employees in the past 6 years. Five of the employees retired and one was call into full time ministry. GMD has not been under a Consent Order from South Carolina Department of Health and Environment or EPA Region IV in the past 8 years. We have met or exceeded our NPDES limits at both treatment plants. We continue to upgrade our collection system with the goal of zero SSOs.

We have moved from a preventative maintenance philosophy to a predictive maintenance operations plan. Our emergency maintenance response is about 1% of our total maintenance activities. In the past 10 years GMD has spent about $60,000,000 on treatment plant upgrades solely to handle peak wet weather flows and about $70,000,000 on trunk line upgrades, upsizing, CIPP lining and line replacements. GMD's customer service has been praised by the majority of our users. We have had rate increases on the average of about 6% per year for the past twelve years. Out of the 50,000 customers we normally receive about 5 to 10 calls per budget cycle concerning our rate increases. About 80% we are able to satisfy while the other 20% remain upset.

In closing, GMD has been very diligent in self-evaluation and owning mistakes in order to improve as a team and individuals. Our honesty is not easy at the time of review but in the long range view we are much better for this approach. We are not content with where we are and I hope we never will be satisfied. We believe that investing in our team brings benefits to the entire utility. GMD made the decision to manage as a team, to bring together the best co-workers possible. GMD Commissioners have and continue to invest to develop GMD. We try to do things together, either work wise or for fun. Management empowers each member with responsibilities and various levels of authority, we celebrate our successes and continually evaluate our actions as a team. This has created new opportunities for each team member. We will not continue to invest in team members who do not have the desire to grow. There are many challenges ahead and we will strive to be prepared to meet them through a vision, passion and hard work. We are fired up about being at work because we want to be the best in class of our chosen profession.

COMMUNITY PARTNERING AND ENGAGEMENT

GMD works hard to build public trust and understanding of the waste water treatment processes and the system's operations. Each year, our two treatment plants hosts facility tours for students of all ages, community members, and visitors to engage and inform the public about the value of water.

Since 2003 GMD has held an annual industrial customer recognition program. Representatives of all 17 permitted industries, along with local regulators, are invited to a luncheon, an educational program, and networking opportunities. The industries with perfect permit compliance (Gold Award) and those with only one permit excursion (Silver Award) are recognized for their accomplishment.

GMD recognizes the importance of protecting the entire ecosystem. Each year GMD staff, along with area volunteers, gather at the Lake Greenwood Recreational Area for the Annual Lake Greenwood Clean-up Day. This event removes litter and debris from the roadsides, shore line of the lake and some of the contributing streams. GMD conducts Fats, Oil and Grease (FOG) outreach events with area neighborhood associations to inform them of the proper ways to dispose of grease and cooking oil. GMD staff distributes brochures and containers for collecting residential cooking oil.

Participation in local, state, and federal government; We take an active role at all levels of government, maintain contact with elected officials, providing data and testimonials as required, and participating in various civic organizations. Examples include Chamber of Commerce, Greenwood County Sherriff's Department, Salvation Army, and the United Way.

Each year GMD sponsors one employee to the Leadership Greenwood program. This program was founded in the 1980's by the Greenwood Area Chamber of Commerce. The program is a nine month course designed to develop informed, committed, and qualified leaders for Greenwood County. Each year, a new class embarks on a journey to understand the inner-workings of our community including managed growth, the economy, quality of Life, human services, local government, the justice system, local education from kindergarten through Lander University and our State Government.

GMD has partnered with the Greenwood County Sherriff's Office to conduct two prescription drug take back events each year. For years the thought has been to dispose of these drugs by flushing them down the toilet. There has been a growing concern of water contamination at the treatment plants by these products, and this practice is an undesirable solution. This program provides an avenue for the public to return unused or expired medication. The Greenwood County Sheriff's deputies, along with DEA agents', store, transport and properly dispose the collected medications according to U.S. Drug Enforcement Agency protocols.

GMD has also worked with the Sherriff's Department when they are raiding suspected drug houses for illegal drugs. GMD has set up our CCTV on the service line of the suspected house to see if any items are flushed down the toilet. GMD has been able to record the items that are flushed from the suspected house service line and allow the deputies to retrieve the drugs in the downstream manhole. The video of the service line which shows the drugs leaving the house service line has been used in court cases.

One of the important community services GMD is involved in is the coordinate with the City and the County to clear sections of streams, especially where there are chances of homes being damaged by high creek or stream flows during significant wet weather events. By removing fallen trees and other debris the chances of flooding are reduced.

For many children, the gifts they receive through the Angel Tree will be the only ones they open on Christmas Day. The Angel Tree is the Salvation Army's cornerstone Christmas program. Each Christmas season the GMD employees adopt less fortunate children and seniors and provide them with personalized gifts to those who would otherwise receive very little or nothing during the holiday season.

GMD has also made contact with the City Manager and the City's Chief Horticulturalist to remove Inflow /Infiltration by developing a Green Project as opposed to the traditional repair and replacement of sewer lines. We have not found the right project to date but all the pieces are in place for this to happen when the right opportunity presents itself.

GMD has become an important player in the economic development side of Greenwood. Two of our Commissioners serve on the Executive Committee of the Greenwood Partnership (Greenwood's economic development arm). GMD took an active role in the recruitment of a Japanese Company which has decided to locate in Greenwood. This process took six years before the company agreed to establish its business here. They will create hundreds of new jobs and bring other suppliers and associated businesses along with them.

Utility Description (combine all plants if a multi-site system)		
Utility Name: Hanover Sewerage Authority		
Type (e.g., single plant, regional system, multiple plants, collection system only, stormwater, etc.): Single Advanced Wastewater Treatment Plant and Collection System		
Service Area (square miles): 14	Average Annual Daily Flow (MGD): 2.0 current 4.6 permitted	
Population Served: 15,300		
Location		
Street Address: 40 Troy Road		
City: Whippany State: NJ	Country: USA	
Zip Code/Country Code: 07866		
Contact Information		
Name: Michael C. Wynne	Phone: 973/428.2477	Email: mwynne@hanovertownship.com

ORGANIZATIONAL CULTURAL

Hanover Sewerage Authority has been modifying its practices and operations to meet Utility of the Future goals. This evolution involves changing the manner in which our organization had operated. Traditionally, we viewed our role as collecting and treating wastewater to protect the public health and environment. While this remains our primary purpose, we have been evolving our public outreach, employee involvement and training, energy management and watershed management activities. While implementing change, our goal is to reduce costs and maintain our 29 year record of no effluent limitation exceedances. In order to do this, a cultural change was necessary, beginning with the Board Members, Management, and ultimately our entire staff.

Employees are involved in implementing the changes. Employee input is sought on improvements. Many are funded on a trial basis and eventually become normal practice.

In 2007, the Authority instituted a merit-based annual employee evaluation / compensation initiative to better recognize and reward its personnel. In conjunction with the merit pay initiative, a goal setting system was put in place to energize personnel to excel and be recognized for various achievements, both individually and staff-wide. Goals were developing mutually with the supervisor and the employee, were agreed to be specific, measurable and achievable and were set up in a way that, at any time, a follow-up discussion could take place between employee and manager to gauge progress and adjust timelines or expectations accordingly. Among the general target goals were identifying areas of cost or energy savings, eliminating or modifying potentially hazardous conditions or tasks, process optimization and obtaining or upgrading operator licenses or certification.

The merit program was also implemented to assist in identifying those employees who exhibited the skills and drive for consideration for advancement. These employees have been provided with counseling and training to develop basic skills in all areas of operation, technical skills, process control and front-line supervision. Three of our top four plant management staff were promoted from within. All have taken curses to become Certified Public Works Managers. Eight of our operations staff have licenses. Four of our Managers are NJ Certified Public Works Managers. Ultimately it is the Authority's goal to promote from within for all open positions.

All employees are urged to take courses and to sit for operator certification exams when they become eligible; once certified they receive additional compensation depending upon the level of license obtained. Training opportunities for retainage of certification through accumulation of continuing education units (CEUs) is provided to all personnel with the costs borne by the Authority. The Authority conducts on-going in-house training on all aspects of plant operation in an on-going basis. For new equipment, these are conducted by manufactures' representatives. For existing systems, training is conducted by Authority staff members.

Safety has always been a primary focus of the Authority and its Board and employees consider it to be an integral part of any task. From 2008 through 2016, the Authority's wastewater plant staff has been recognized by the New Jersey Department of Labor (NJDOL) for having no lost time injuries incurred during six of the nine years during that time frame. The report generated from a December 2008 facility inspection by the NJDOL Public Employees Occupational Health division revealed no violations, no deficiencies and no areas of concern noted. The Authority's Joint Insurance Fund risk management representatives conduct semi-annual inspections of the site, the result reports for which continue to echo the findings of the NJ PEOSH. Safety training is conducted as required on site by either the staff safety coordinator, the local Red Cross chapter or by specialized training professionals. Safety training includes 31 specific programs. All required areas are covered and records are maintained and accessible for review by any agency as required. The Authority has received the NJUAJIF Safety Award every year since 1999.

The Authority has expanded the community outreach programs to reach homeowners. This involves annual newsletters, fliers and website information. The Authority also participates in community outreach events such as Hanover Township Day. In addition, to informing users of the Authority's activities, our goal is to provide them with information that will benefit them as users of the system and allow them to more efficiently use water and wastewater resources. We undertake minor repairs to laterals as a service to homeowners, while reducing I & I. We have implemented a follow up system to obtain feedback on our service. We also have an active outreach program in the

business community, particularly with regard to new development. We encourage use of water conserving devices to reduce overall wastewater discharges.

The Authority has an active energy generation and recovery program. This is discussed further in Part 3. In addition to energy generation on an ongoing basis the projects incorporate resiliency features for operation during electrical outages and limited fuel oil availability.

The Authority is engaged in energy efficiency projects and studies. There are current activities such as LED lighting and we are currently designing an upgrade to our aeration system to reduce energy consumption and improve process operations. The Authority has studied water reuse with the largest industrial user. This has not advanced past the initial study stage. The possibility of using effluent for the cooling tower and boiler feed has been reviewed.
The Authority has actively participated in watershed studies and water quality management planning. We have also studied the possibility of undertaking wetlands treatment of storm water in connection with Hanover Township.
Through the efforts of its staff the Authority has received a Platinum 28 award from NACWA and has submitted documentation for an additional year. In addition, the Authority received a NACWA Silver Excellence in Management award in 2016.

Measure What are you measuring?	**Targets** What was your goal/intended outcome?	**Outcomes** What were your actual outcomes?
Increased boiler / HVAC efficiency	Increase Biogas operation	Increased operation, reduced fuel oil use
Increase gas storage	3 new digester covers / more than 24 hour storage	2 complete, 1 under construction
Control gas storage / use	Store / use gas in sequence	PLC control system installed
CHP #1	100kW primarily biogas	Under construction
CHP #2	150kW natural gas	Under construction
Geothermal power	Replace electric	Under construction

ENERGY GENERATION AND RECOVERY

The Authority has an active generation and recovery program. Incorporated into this program are resiliency features to reduce the dependence on the electrical grid during storm events and reduce the need for fuel oil during periods of limited supply. The program includes projects to increase boiler efficiency, increase digester gas storage and the use of digester gas rather than flaring, increase gas production and generation of electricity with combined heat and power systems utilizing both digester and natural gas. We are also installing an effluent based heat pump system.

The program was implemented primarily through four construction projects. These include:

- Contract 36: The replacement of existing boilers, piping and ductwork along with installation of energy efficient lighting commenced in 2009 and is substantially complete. Higher efficiency tri-fuel boilers, new roof-top air handling units and a computerized building HVAC management system were installed to provide flexibility to efficiently heat the facility buildings and anaerobic digesters with either plant produced methane, fuel oil or natural gas.
- Contract 37: Rehabilitation of Primary Digester #1 and Secondary Digester was completed in 2012. The project provided higher efficiency methane gas production by replacing an inefficient Perth mixing system with a chopper pump style mixing/distribution system and increasing gas storage and delivery flexibility by replacing the existing steel floating covers with dual-membrane flexible gas holder covers. A PLC-based operating system with Human

Machine Interface for regulating and adjusting gas feed to boilers and maintaining optimum gas production and storage was an integral part of the improvements.

- Contracts 38: rehabilitation of the Primary Digester #2 in a similar fashion to the improvements noted for Contract 37 which is underway. The project will allow for digestion of raw sludge from the primary settling tanks in Digester #2 as well as digestion of the waste activated sludge from the advanced nitrification treatment process in Digester #1. A new Cannon system that will optimize sludge mixing and gas generation while using minimal energy has been installed in Digester #2. Upon completion of the project, the additional gas production will be utilized as the fuel source for a new combined heat and power (CHP) system being installed as part of this contract. The CHP will not only provide an offset to use of power from the electric utility but will reduce the need for hot water production by the boilers for heating of buildings and digesters. The project also includes new geo-thermal climate control systems for the facility's raw sewage pump station which will utilize the facility's treated effluent as the source to heat and cool the station to further reduce the cost to maintain proper temperature in the motor control center in the station and maintain currently required ventilation in hazardous areas.
- Contract 40: The Fuel Source Reliability and Diversification project includes installation of a natural gas service line to the facility to fuel a second combined heat and power system as well as provide the additional fuel source for the tri-fuel boilers installed as part of Contract 36.

For its efforts, the Authority expects to achieve an overall reduction of up to 80% of current electrical use, with about half of this for biogas, as a result of these initiatives. Both CHP systems are designed to operate to provide emergency power. The use of natural gas as a fuel supply for either CHP or the boilers allows for extended operation during utility loss and reduced fuel oil availability.

A significant portion of the funding for these and other projects has been through grants, low-interest loans with principle forgiveness and other sources through the New Jersey Environmental Infrastructure Trust and the NJ Clean Energy Program.

The total cost of the four projects is estimated to be $20,000,000.00.

The work was done as four projects due to the plant equipment needs and the need to maintain operation during construction. The Local Public Contracts Law limits our ability to select contractors. Finding qualified contractors to perform in a timely manner has proven difficult.

Utility Description (combine all plants if a multi-site system)		
Utility Name: Lancaster Area Sewer Authority		
Type (e.g., single plant, regional system, multiple plants, collection system only, stormwater, etc.): Regional authority serving multiple municipalities, single treatment facility, about 600 miles of pipe		
Service Area (square miles): About 160	Average Annual Daily Flow (MGD): 10	
Population Served: Approximately 108,000		
Location		
Street Address: 130 Centerville Road		
City: Lancaster State: Pennsylvania	Country: United States	
Zip Code/Country Code: 17603		
Contact Information		
Name: Michael Kyle	Phone: 717-344-5832	Email: mkyle@lasa.org

ORGANIZATIONAL CULTURE

Risk taking: The Lancaster Area Sewer Authority (LASA) organizational culture is embodied in its Vision - "Driving Decisions Delivering Solutions", where LASA takes proactive (not reactive) steps to control its environment, resulting in less external organizational risk. This results in the ability of LASA to take its own risks, balanced against expected rewards. Several years ago, LASA took the calculated risk to undertake the largest capital project in the last 20 years, to construct a biosolids resource recovery facility.

Innovation and re-use: The LASA biosolids resource recovery project incorporates a Class A anaerobic digestion system coupled with re-use of the flue gas heat, along with heat drying and end product beneficial re-use. Another project – construction of a new LASA pump station, incorporated a unique barn motif to blend into the surrounding community – and earned the "Project of the Year" representing exemplary civil engineering skills and contributing to the Civil Engineering progress and to the community", presented by Central PA Section of the American Society of Civil Engineers in 2002.

Leader long-range vision: Municipal Authorities in Pennsylvania tend to be longer-range planners because Authority Board members are appointed for 5-year terms, not elected. The LASA Board's leadership and long-term vision includes acquisition of other systems to improve efficiencies and benefit from economies of scale, using a valuation method with a return-on-investment over 20 years. LASA's asset management program projects costs and revenues over the next 50 years, which shows the need to raise rates by 3.4% annually over the next 50 years to pay for the long-term investment in infrastructure. LASA has presented this long-range scenario to its municipal stakeholders who now support the need for long-term investment in the community water infrastructure.

Workforce and leadership development: LASA is dedicated to workforce and leadership development. LASA recently conducted an agency-wide staff evaluation and developed a succession plan. The succession planning included interviews of staff to determine interests in advancement within the organization, aligning skills, abilities, and desires of staff with future openings. As part of the process, LASA provided leadership training to all mid-level supervisors, team leads, and some rank-and-file. LASA also adopted a formal educational assistance program that pays for - or reimburses employees for job-enrichment education and training. In 2016 budgeted education and training for LASA was $110,000, representing just under 1% of total expenses, with an average of 54 hours of education and training per employee. This compares to a benchmark of 32 hours per employee (AWWA Benchmark).

Morale: Good employee morale is a key to LASA's success. For the past 15 years, LASA has celebrated its staff with an annual "Employee Appreciation Luncheon" with activities and service awards. LASA engages all levels of employees before undertaking major initiatives – examples include a recent billing software conversion and a $28 Million biosolids project, which benefitted by input from LASA's certified operators. LASA has heard suggestions from staff to improve facilities, and just completed an expansion and improvement of the collection system/maintenance staff facilities (including lunchroom, locker rooms and office areas), and construction is underway for a new lunchroom, meeting room, offices and locker areas for operators at the LASA resource recovery facility.

Networking and collaborating: LASA leadership is active in networking internally and externally. All four LASA departments (administration, collection system, laboratory, and treatment) have regular staff meetings to share information. The LASA Executive Director (LASA ED) evaluates all department heads annually on their ability to communicate, coordinate, and cooperate with the other departments at LASA. The Board's strategic planning meetings involved LASA staff. LASA staff and leadership are active in various associations and groups in the name of LASA, including the following:

- A local watershed group (the Little Conestoga Watershed Alliance) – The LASA ED is past Treasurer and Secretary, current Board member.
- Lancaster County through the Growth Management Plan – The LASA ED is a member of the planning committee.
- A local non-profit group dedicated to local historical preservation (Washington Boro Society for Susquehanna River Heritage) – The LASA Plant Operations Chief is on the Board.
- A local technical college (Stevens College of Technology) – The LASA ED is a member of the Advisory Committee.

- LASA is one of the founding members and remains an active participant in the PA WARN system. This is a cooperative agreement among water and sewer utilities to provide mutual aid during times of natural or manmade disasters.
- A local regional wastewater manager's workgroup (York, Lancaster, Harrisburg Workgroup), which provides networking and mentoring of younger utility managers – the LASA ED founded and is still active in this group.
- Participate in various WEF and PA WEA activities including WEF On-Demand Wastewater Library to share information with utilities nationwide.

Safety: Workplace safety and health is one of the highest LASA priorities. Over the last decade LASA developed (and updates on an annual basis) a comprehensive safety manual, and has maintained an active safety committee consisting of rank-and-file alongside key management including the LASA ED. LASA held 42 safety-training events for its staff in 2016.

The committee meets once per month, working on tangible goals and milestones. In 2016, LASA met its goal of reducing work-related accidents by 10%, from 16 to 11. In 2016, LASA earned the Eastern Section WPCOA collection system safety award, the PWEA collection system safety award, the national George W. Burke Facility safety award, and the PWEA Plant Safety Award.

Measurement and continuous improvement: LASA completes an annual report to the Board and all 8 municipal partners, which this year included activities measured against 69 goals and objectives. The report also includes goals for the upcoming year, looking to continuously improve. There is a portion of the monthly report to the Board tracking progress on each of the Board's 58 strategic goals with a 2017 deadline. LASA participates in the AWWA/WEF benchmarking, and the LASA ED chairs a group developing Best Management Practices for Authorities in Pennsylvania.

COMMUNITY PARTNERING AND ENGAGEMENT

The Lancaster Area Sewer Authority (LASA) was incorporated in 1967 to provide regional sewer service in Lancaster County Pennsylvania. Since then the LASA service area has more than doubled, partly due to the good reputation of LASA in the community earned by working to develop relationships with local public officials and by educating and winning over the public. The LASA Board encourages professional and community involvement of its leadership team, as follows:

- Partnership with community organizations - LASA worked with its seven member municipalities to develop a regional sewage facilities plan, receiving the 2003 Governor's Award for Local Government Excellence) and the Lancaster County Envision award. LASA also worked with the Little Conestoga Watershed Alliance (LCWA), the Alliance for the Chesapeake Bay, and community volunteers to install a riparian buffer at the LASA Charlestown pump station and a tree buffer at the LASA resource recovery facility, just two of the approximately 12 projects completed by these partners over the past 15 years.
- Engaged in peer learning partnerships within the utility community - LASA is an active member of a regional Wastewater Managers Workgroup, a local group of utility managers who meet several times per year to share information. LASA is also an active member of the 811 Regional Utility Coordinating Committee, which is a group of local "PA 811" members who share information and coordinate underground utility work.
- Community project participation creating recreational opportunities and enhance community assets – LASA works closely with the Washington Boro Society for Susquehanna River Heritage (WBSSRH - a non-profit group dedicated to preserving the local heritage) on projects and activities, and LASA donates the use of its Blue Rock Mill, which is adjacent to the LASA resource recovery facility. LASA helps the Washington Boro Fire Department with its annual fund-raiser by providing acres of free parking, volunteering at one of the stands at the festival, and providing land and liability insurance for an FFA tractor pull event on LASA grounds.
- Stakeholder engagement process used to support decisions – Several LASA projects received significant stakeholder engagement as part of the decision making process, including public sewer extensions in three different townships. Each included multiple public meetings and many one-on-one meetings to soliciting input, with the input used in the final design decisions.

- Regular meetings hosted with community stakeholders - LASA has been hosting an annual municipality dinner meeting and presentation for 22 consecutive years, inviting not only the LASA member municipality public officials (Council, Supervisors, Mayors, Managers) but also other outlying municipalities, to explain what we do and to update them on activities.
- Environmental education opportunities for stakeholders - LASA has provided its laboratory services to local high school students to generate data for science fair projects, and recently analyzed water samples for nitrate for a student's filtration device project. LASA staff has judged local science fairs and has volunteered at local high school and community college career days.
- Environmental education opportunities for community - LASA provides guided treatment plant tours year round to a variety of organizations, including high school and university students, and teachers. Over the past 10 years, LASA has conducted 96 tours, reaching 1,000s of community residents.
- Web presence - LASA connects to its customers and with the community through its website www.LASA.org, which includes a page dedicated to "Environmental Education" that has a link to WEF's "What's Water Worth?" video, a kids section with a coloring book and interactive tour, and LASA Fact Sheets on topics including Pharmaceutical Disposal and FOG. LASA developed its website to provide outreach to the community over 17 years ago, being one of the first wastewater agencies in Pennsylvania with a website.
- Customer outreach - LASA draws attention to its website with information on its sewer bills, which also include information found on LASA fact sheets and are often featured in the printed newsletters of LASA member municipalities. LASA also utilizes the newspaper to promote to the public the good things LASA does – over the past 15 years LASA has generated over 35 press releases, many resulting in at least one newspaper article or segment.
- Outreach to targeted stakeholders - For the past two years LASA participated in a local Halloween Parade, with two of its collection vehicles (including banners) along with LASA staff walking alongside the vehicles handing out candy to the kids, to promote LASA as a community partner. LASA also promotes itself and the water environment industry by making periodic presentations at local Rotary Club and Lions Club meetings and at the local COG (LIMC).
- Outreach to targeted local officials - LASA participated in County water planning through the Lancaster County Growth Management Task Force – a group of public and private interests in developing a plan to manage growth in Lancaster County. LASA staff is active on the Lancaster Intermunicipal Committee (a local Council of Governments including all of LASA's municipalities), and serves on its Land Use Advisory Board, which provides input on proposed local land developments.
- Outreach to targeted regulators – LASA staff represents the wastewater industry on the Lower Susquehanna Committee, the PA State Water Planning citizen's group. LASA also participates in the Lancaster County Clean Water Consortium – a group of public and private interests in clean water in the County, the Lancaster Chamber of Commerce and Industry, and the PA State Board for Certification of Water and Wastewater Operators.
- Community workforce development - LASA is working through an Advisory Panel with the Thaddeus Stevens College of Technology to develop their Water and Environmental Technology program. LASA was designated as one of their "Industry Partners"; LASA has donated equipment to the program and has developed a job description for an internship position, which LASA hopes to fill next year.
- Position ourselves as a "good neighbor"- LASA provides a venue for a local bird watching group at the LASA resource recovery facility, and provides a defined route through its facility for a local charity benefit bicycle and running event (the Turkey Hill Country Classic Race).

How did you implement the practices/activities/programs?
Engagement requires developing relationships and building trust, which takes time. The LASA Board made community outreach a high priority in its strategic plan, and staff developed strategic goals with progress tracked on a monthly basis, which keeps us moving in a positive direction. Goals from the recent strategic plan related to public outreach and community engagement include the following:

- Minimum of 2 general press releases per year.
- Customer satisfaction surveys every 3 years (for the last survey, 841 of 2,500 surveys returned, for a 33.64 % return rate).
- Minimum of 1 presentation at general community event per year.

- Minimum of 2 staff volunteers for creek cleanup or other community environmental project on their own time, per year.

What type and amount of resources were needed to support implementation?
There was considerable expense required for LASA to stabilize the mill that it donates to the WBSSRH for their use. We continue to provide funding for the mill's major maintenance, although the volunteer group has provided significant value in restoration and routine up-keep. Most of the other community outreach takes staff time but limited financial resources. It is important to note that in Pennsylvania there is a law that limits Authorities from contributing more than $1,000 per year toward any project or agency that is not directly related to the Authority's incorporated mission (in our case providing sewer service). There is an estimated 1,000 hours per year to support the various community initiatives, from a workforce of 42 FTEs. Salaried staff in leadership positions account for most of the time, and much of it is volunteer time during off-hours or weekends.

Did you partner with other stakeholders or organizations as part of implementation?
Yes, LASA has partnered with others, which is a key to success. Examples of partnerships include the following:

- Regional Act 537 Plan – 7 municipalities and PA DEP.
- Watershed restoration – LCWA, CBA and various school groups.
- Wastewater Managers Workgroup – at least 20 other wastewater agencies.
- Utility Coordinating Committee – PA One Call (811).
- Thaddeus Stevens College of Technology – PA WEA.

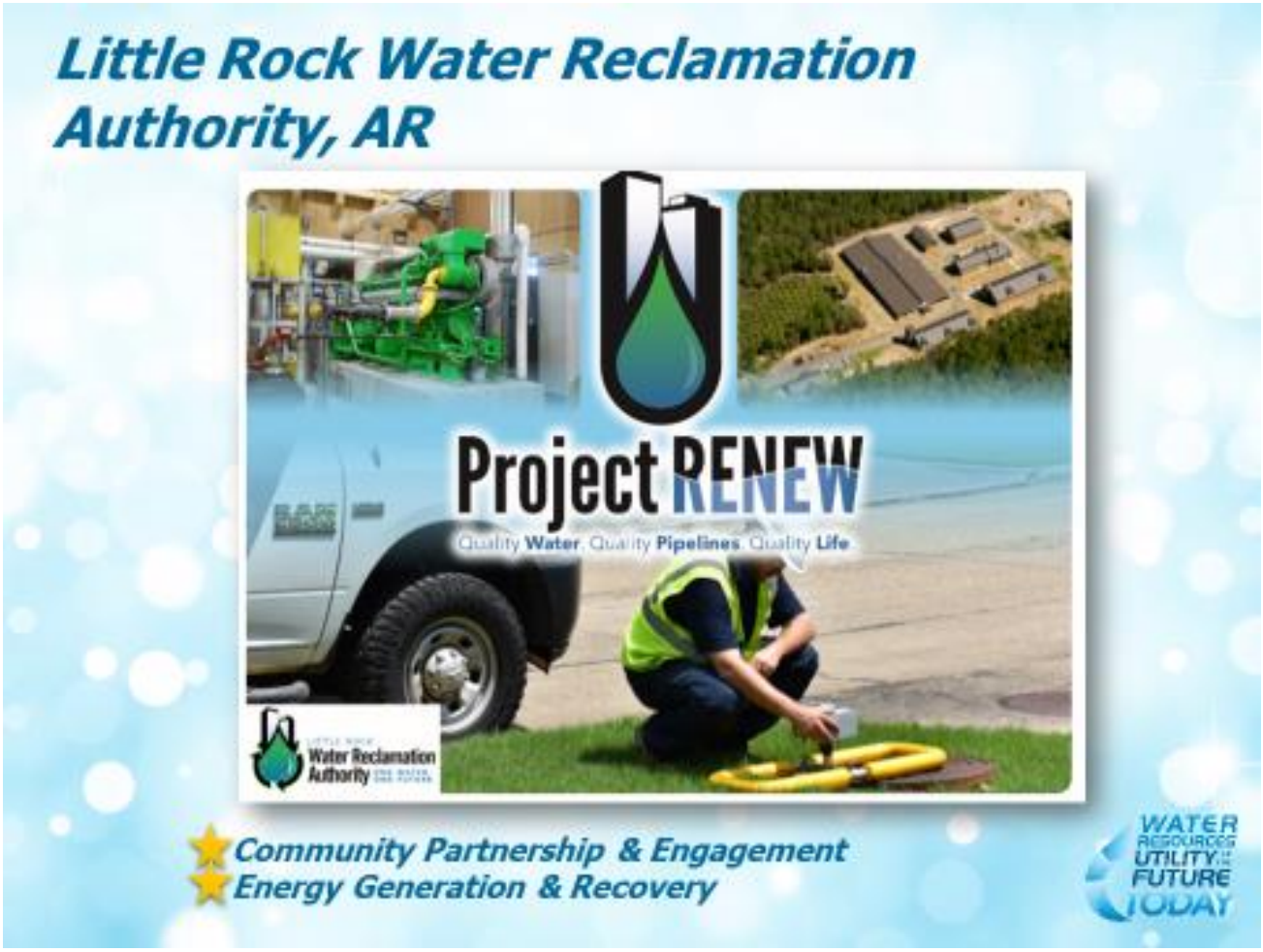
What was the most critical obstacle you had to overcome, and how did you do that?
The most critical obstacle was pushback from public officials and ratepayers that there is no value in community engagement, and that resources are better spent in delivering services. LASA overcame that obstacle through Board leadership, which understands the value of community support. The Board formally recognized the value of community and the environment in its strategic planning, which authorized staff to develop appropriate goals and then to spend the time and resources necessary to accomplish those goals.

Has "smart" information technology supported your implementation?

- Smart information technology has limited use in community outreach. LASA does use its GIS system to target areas for acquisition, and provides maps for stakeholder engagement events. Utility billing and GIS software allow LASA the customer service team to quickly provide accurate information to stakeholders and customers.
- Where could other utilities go to find additional information or the practices/activities/programs that you implemented? There is information on the LASA website www.lasa.org.

What is being Measured	Targets (Goal/Outcome)	Actual Outcomes
Community Partnership – Regional Planning	DEP-approved Regional Plan, community recognition	DEP Approval, received 2 awards – Governor's Award and County Envision Award
Community Partnership – Tree plantings	25 volunteers from LCWA, CBF	Held 2 community plantings, over 25 volunteers at each, posted photos on LASA webpage
Peer learning and utility partnership – WW Manager's Workgroup	2 meetings per year – 5 members at each meeting	Average 3 meetings per year, 5-7 members at each meeting
Peer learning and utility partnership – Regional 811 Utility Coordinating Committee	Sustainable active committee that shares information with other utilities	Committee met 3 times in 2016, more attendees each time, good information sharing
Neighborhood project – WBSSRH	Sustainable community group using LASA-donated facility	WBSSRH continues to meet monthly, membership and finances holding steady

Meetings with community stakeholders – LASA Municipal Dinner Meetings	Annual meeting, minimum 50 in attendance	2016 meeting had attendance of 62, including all 3 County Commissioners, one of largest ever
Environmental education opportunities – Facility tours	More tours than previous year	14 facility tours in 2016, 5 more than in 2015, included 263 attendees
Web presence and community outreach	Engage stakeholders - exceed 50,000 hits	73,000 hits in 2016 – 4,000 unique visitors viewing 249,000 pages
Outreach to stakeholders – Columbia Halloween Parade	Reach out to new customers in Columbia Borough	Participated in community Halloween parade, one-on-one contact with over 1,000 residents/customers
Outreach to stakeholders – State and County Water Planning	Interact with County and State agencies, provide input into water plans	Attended 1 meeting in 2016 to begin review of County water plan. State planning group is inactive.
Outreach to stakeholders – LIMC	Interact with community leaders, educate regarding water issues	Made one presentation to the group, attended multiple meetings
Outreach to stakeholders – LCWA	Interact with watershed group, promote LASA	LASA ED remains an active member, LASA is now the repository for LCWA assets
Outreach to stakeholders - LCCWC	Interact with County water quality group, promote LASA	LASA officially jointed as member in 2016
Outreach to stakeholders – Lancaster chamber of Commerce	Interact with business community, promote LASA	LASA is active member, attends various workshops and interacts with members
Workforce development – Thaddeus Stevens College of Technology	Influence curriculum for sustainable operator program, create workforce of the future	Program is in its 3rd year, struggling to get students, great reviews from students
Workforce development – Staff succession plan	Develop staff succession plan, identify promotional opportunities	Plan implemented, come promotions complete
Position as good neighbor – WBSSRH	Maintain 1 WBSSRH Board position	1 LASA staff appointed to WBSSRH Board
Position as good neighbor – Bird watching	Accommodate at least 1 group per year	4 visits in 2016



Utility Description (combine all plants if a multi-site system)		
Utility Name: Little Rock Water Reclamation Authority		
Type (e.g., single plant, regional system, multiple plants, collection system only, stormwater, et(c): - Collection System - Three-Water Reclamation Facilities: Combined Average Daily Designed Flows of 56 MGD with 144 MGD peek hydraulic - Two Peak Wet Weather Storage Facilities: a 13 MG at a treatment plant and a combination of 10 MG + 20 MG storage system located within the collection system (with an additional 31 MG expansion currently under construction)		
Service Area (square miles): 120		Average Annual Daily Flow (MGD): 33.7 MGD
Population Served: 207,634		
Location		
Street Address: 11 Clearwater Drive		
City: Little Rock	State: Arkansas	Country: USA
Zip Code: 72204		
Contact Information		
Name: **Stanley Suel**	Phone: **501-688-1486**	Email: **stanley.suel@lrwu.com**

ORGANIZATIONAL CULTURE

The Little Rock Water Reclamation Authority is located near the geographic center of Arkansas. Little Rock derives its name from a small rock formation on the south bank of the Arkansas River called *la Petite Roche* ("the little rock"). The "little rock" was used by early river traffic as a landmark and became a well-known river crossing. Little Rock is the capital and largest city of Arkansas. Arkansas is primarily a rural and agricultural state; Little Rock is the center of economic activity. Local, state and federal government have been Little Rock's major employers for many years. Medical facilities, banks, retail, technology, manufacturing and other service industries are among the major industries in Little Rock. The William Jefferson Clinton Presidential Library and the headquarters for Heifer International are located in the River Market District. The Arkansas River Trail is a nationally recognized recreational trail that is currently 24 miles long and is open for use by hikers, joggers and cyclist.

Little Rock Water Reclamation Authority (LRWRA) is the utility that is responsible for the proper collection and treatment of our community's wastewater discharges. Proper collection, treatment and disposal of wastewater is vital to the health and safety of the community. At LRWRA, we ensure that the water that goes down our customer's drain has a safe destination. Liquid and solid waste comes to LRWRA for transport and treatment after water is used in homes and workplaces. The water that is cleaned, processed and released exceeds the current water quality standards.

LRWRA employs 219 staff whose mission is to: (1) provide service to approximately 68,000 homes and businesses; (2) enhance the quality of life for the citizens and rate payers (3) maintain approximately 1,400 miles of public sewer mains and 32,000 manholes; (4) operate an administrative office, a collection system maintenance facility, three water reclamation facilities, two large peak wet weather storage facilities, and over 30 pumping stations. The overall critical mission is to preserve and replenish the environment by reclaiming our most valuable resource, water. The collection and treatment services protect both public health and the environment.

The Little Rock Water Reclamation Commission governs LRWRA and is comprised of seven citizens who are appointed by the Little Rock City Board of Directors. The City Board establishes sewer rates and approves certain financial matters, including the issuance of bonds.

LRWRA is committed to providing excellent quality sewer services, for both residential and business customers, as it keeps water resources safe for wildlife and human reuse. The employees of LRWRA are a group of dedicated professionals who work diligently within the local community, State, and EPA's Region 6. LRWRA is recognized as a leader in the State of Arkansas. Numerous awards have been received from the Environmental Protection Agency, Water Environmental Federation, National Association of Clean Water Agencies, and Government Finance Officers Association.

LRWRA is undergoing an identity shift that will take place at the end of June, moving away from being known as a wastewater collection and treatment utility. The change will move LRWRA from focusing on the product it handles to the process of reclaiming our most valuable resource, water. Through the years and many changes, LRWRA's name has used terms such as sewer or wastewater. As the industry progresses, LRWRA is focusing on the process of reclaiming water. The new identity will be "Little Rock Water Reclamation Authority" with a tag line of "One Water. One Future." In 2016, LRWRA began exploring water reuse opportunities by engaging consultants to evaluate the current regulations and gauge interest from local industrial customers. LRWRA conducted a feasibility study for the potential of water reuse through a reclaimed water system at Fourche Creek and Adams Field Wastewater Treatment Facilities. This reclaimed water system could benefit the high volume, non-potable water consumers near the Industrial Port Authority area.

LRWRA is keenly aware of the value of its people and invests in their future. LRWRA is committed to developing its staff to their maximum ability to benefit its ratepayers and the environment. Listed below are examples of how LRWRA upholds the organizational culture exhibited by a Utility of the Future Today Recognition Program.

"Career Path" Skill-Based Pay System - Hourly positions at LRWRA are made up of tasks and skill sets. Prior to 2013, an employee could only be promoted when a vacancy occurred, no matter when the employee achieved the next level "skill set." In mid-2013, Human Resources began working one-on-one with department supervisors to design and recommend a new and improved way to help both the employee and LRWRA take advantage of skill set achievement.

The new “Career Path” system has led to more timely promotions and has increased employee motivation. It has also increased the knowledge company-wide.

Alternative Work Schedules - “Flexible” work schedules have long been in place at LRWRA facilities for non-exempt personnel based upon the services performed (for example, 12-hour shifts at the treatment plants, or 10-hour workdays for collection system.) The Alternative Work Schedule (AWS) program for exempt personnel was implemented on a trial basis in May 2016 and allows for a 9-day pay period with an alternative Monday or Friday off. Due to the immense popularity of this program, particularly for those who drive a long way to work, LRWRA management permanently implemented the program in November 2016.

Wastewater Innovations Network – Recognizing the power of its workforce to do great things, in July 2015, Greg Ramon - LRWRA’s Chief Executive Officer, challenged the organization’s leadership team to harness the collective power of the organization through the use of teams. This directive, entitled the “Wastewater Innovation Network (WIN),” sought to propel the organization to meet future service, operational and workforce development and support. By empowering employees to adopt a team-based, forward-looking culture, the intent was to transform the historically inward-looking culture into an externally-aware, more strategic and innovative entity. The second goal of the WIN process is to adopt and refine standard team meetings and other protocol for the organization’s employee teams to use moving forward. The original six focus areas were: (1) Information Technology and Data Management; (2) Diversity; (3) Education and Outreach; (4) Asset Management; (5) Future Directions; and (6) Knowledge Retention and Organizational Education. All WIN Teams are comprised of employees who represent all utility departments to assure that diverse ideas are considered as decisions are made.

Engaging and Empowering Staff - LRWRA offers numerous opportunities to engage the staff. Educational programs like tuition reimbursement, classroom and on-line training courses, specialty conferences, and on the job apprentice programs just to mention a few. Staff development is a high priority. LRWRA encourages employees to step out of their normal job roles and volunteer in the local community and professional activities that support LRWRA’s goals. LRWRA firmly believes that engaging employees is a key step in empowering the staff.

Quarterly Supervisor Meetings - LRWRA began company-wide “Quarterly Supervisor Meetings” in June 2016 to bring together the more than 40 LRWRA supervisors who are spread out across Little Rock at five different locations. Meetings begin with a team-building exercise, and meetings include the announcement of new policies/ procedures; remarks from a motivational speaker; updates on current and proposed public activities; and important departmental updates.

Financial Sustainability - In 2013, Little Rock Wastewater recognized the need to provide greater transparency to residents/businesses of Little Rock and city officials for future revenues/rate structure requirements, capital needs, and borrowing costs associated with the entity’s infrastructure improvements. The switch to a 10-year Capital Improvement Plan (CIP) allowed for staff to focus on significant issues/needs associated with National Pollution Discharge Elimination System (NPDES) and System Evaluation and Capacity Assurance Plan (SECAP) and its impact on system revenues and debt costs. By matching revenue requirements with expenses and capital costs over this timeframe, LRWRA staff has been able to communicate its financial planning and needs to the Little Rock Water Reclamation Authority Board of Directors. A positive effect was a 5-year step rate increase approval of 4.75 percent each year from 2017 through 2021 on debt issuance and O&M costs by the LR Board of Directors. Our bond rating agency recently removed a negative rating due to the fact LRWRA was able to provide a very detailed plan with supporting rates to meet all requirements through this process. Other results were the refinancing of a total of 8 outstanding bond issues in 2015 and 2016. The process has allowed LRWRA staff to updated data throughout the year to be very flexible, maintain budgetary control and provide decision points for LRWRA’s executive staff on capital project priority.

Wellness Committee “New Directions” - In February 2016, 10 employees from different LRWRA departments formed teams that meet biweekly and plan “wellness” events that engage employees to become more health conscious. The team calls itself “New Directions,” and it has maintained a high profile by organizing regular employee health awareness events. Some of the most popular events have been a “health premium holiday” for getting a wellness assessment; monthly employee & family walks on the weekend; “Have a Smoothie Day” presentations; fitness and weight challenge contests; providing salad or fruit at employee activities rather than unhealthy alternatives like donuts and chips; and installing scales and blood pressure machines at all LRWRA locations.

COMMUNITY PARTNERING & ENGAGEMENT

Sewer Service Line Replacement Program (SSLRP): LRWRA's SSLRP started up on January 2, 2013. SSLRP is used as a major tool in LRWRA's tool chest to reduce Inflow and Infiltration (I/I) as it is estimated that as much as 40 percent of I/I originates in service lines. LRWRA collects one dollar per month per domestic customer (commercial customers are excluded.) A domestic customer who meets the program requirements, totally replaces their private sewer service line, and is paying the dollar per month, is eligible to receive up to $2,500 in reimbursement from LRWRA.

When the program started in 2013, LRWRA was able to fund approximately 24 service line replacement reimbursements per month, resulting in a backlog or funding lag of up to five months in the first two years. The backlog for these funds has improved to 45 to 60 days, but the real quantum leap in the success of the program has been in securing an agreement with Arkansas Natural Resources Commission (Arkansas' funding agency for USEPA) to qualify the service line replacements for Revolving Loans Fund (RLF) funding. This new funding mechanism began in 2016 and allows service line replacements (especially within main line project areas) to be funded with RLF money. This not only allows LRWRA to leverage funds to complete a greater number of replacements, but also for the customers in main line project areas to receive "fast-track" funding for their service line replacement reimbursements, resulting in them receiving their reimbursements within weeks instead of months. The ANRC funding mechanism, together with the continuation of the one dollar per month funds, now allows LRWRA to reimburse upward of 40 service line replacements per month. To date as of April 2017 LRWRA has received a total of 2,100 applications, of which 1,533 were deemed eligible for the program, resulting in $3,806,242.54 in reimbursements to customers for service line replacements. LRWRA will continue to use the SSLRP program as a tool to reduce I/I and to continue serving our customers.

How did you go about implementing the program you described in your overview paragraph? In 2012, the Little Rock Water Reclamation Authority Board of Directors signed Little Rock City Ordinance # 20,590 establishing the sewer charge of $1 dollar per month on all domestic sewer accounts to fund the replacement of defective private sewer service lines. Little Rock City Ordinance # 20,590 put into place the basic framework and requirements for participation in the Sewer Service Line Replacement Program (SSLRP), and authorized Little Rock Wastewater (LRWRA) with administering and developing program procedures. LRWRA developed procedures for the program and these procedures were adopted by the Little Rock Water Reclamation Commission prior to the implementation date of January 2013 for the beginning of the program.

What type and amount of resources were needed to support implementation? All funds collected for the SSLRP are placed in a special interest bearing account which is used exclusively for the reimbursement of residential customers who totally replace their sewer service line and meet the program requirements, 100% of funds collected are returned to the ratepayers in the form of reimbursement for work done. A position was created within LRWRA for the Sewer Service Line Replacement Program. The Service Line Replacement Program Administrator oversees the day to day operations of the program, and assists customers with the application and reimbursement process. The Administrator is assisted by the Service Line Inspector who conducts all field work and inspection for program eligibility and final installation, as well as, the Permits Desk which monitors permitting and assists customers with questions concerning the program.

Did you partner with other stakeholders or organizations as part of your implementation process? LRWRA has recently (2016) partnered with the Arkansas Natural Resources Commission (ANRC) to access funds in the Revolving Loans Fund (RLF) used for sewer rehabilitation to increase the number of possible reimbursements within the program. This has allowed LRWRA to nearly double the number of reimbursements per month and reduce the fund's availability wait time.

What was the most critical obstacle that your utility had to overcome to be successful in this activity area, and how did you do that? Obstacles to the program have included the eligibility inspection which requires the homeowner to expose a section of the existing service line to determine if it meets the eligibility requirements (old pipe materials - Orangeburg, clay or concrete, or age exceeding 50 years). Location of the private service line as well as the labor involved in exposing it has been difficult for some homeowners. Since the SSLRP is a reimbursement program most people who drop out of the program prior to completion do so because they do not have the funds to pay the plumber prior to the reimbursement or the amount over the maximum $2,500 the program reimburses. LRWRA has experienced

a sharp increase in the number of replacements undertaken as part of the Right of Way (ROW) policy wherein LRWRA assists the customer with replacing that portion of the private service line which may be beneath a paved alleyway or street. LRWRA will complete that section as a benefit to the homeowner for $400 (a greatly reduced price for what a private contractor could do it). Approximately 50 percent of all replacements require a street cut. This has significantly increased the amount of time crews spend on these projects.

Has "smart" information technology supported your implementation/optimization in this area? Please describe. LRWRA has all the information about the program on the utility's main web page. All documents for the program including the program procedures, application and ordinances are available on-line. LRWRA also has a web based sewer main locator which is useful for assisting customers. LRWRA also has map information published online depicting SSLRP locations.

Where could other utilities go to find additional information on the program? All information about the program is available at (http://www.LRWRAu.com/sslrp).

Performance Measures & Results - The addition of ANRC funding eligibility in 2016 had a substantial positive impact upon LRWRA's ability to reimburse applicants. This is evidenced by the differences between Target numbers and Outcomes as tabulated below. ANRC funding allowed LRWRA to greatly exceed its Targets, as the Targets were based on only "Dollar-per-Month" funds.

2016* SSLRP DATA

Measure	Targets	Outcomes
Applications per month	24	42
Total Applications Received	288	500
Applications Reimbursed	288	377
Total Reimbursements	$720,000.00	$939,669.93

*Data in this table is for calendar year 2016 with ANRC funds. Program-to-date data is given in Section 1, above.

Project Renew: Project RENEW is Little Rock Wastewater's multi-year, capital improvement project to renew aging pipelines throughout the city. As part of this project, a communications campaign was developed to reach residents in each project area. LRWRA engages with the community through neighborhood meetings, postcard mailers, door-to-door, informational videos and the development of an interactive website. During the neighborhood meetings, everyone affected by the project is invited to participate in the meeting. Informational tables and maps are available and meetings are held typically at a school or church in the community. On the Project RENEW website, residents can view various project maps including one where an address may be entered and it will detail any work going on in the area of that address, give a project description, project timeline, pictures and video (if one is available). All printed materials are in English and Spanish due to a large Hispanic population in areas of the city. For more information visit the web at http://projectrenew.LRWRAu.com/

Cap the Cleanout Program: Cap the Cleanout is a program created to help eliminate Inflow/Infiltration (I/I) from the sewer system by replacing damaged or missing cleanout caps on the customers' sanitary sewer service. Since sanitary sewer services are in the private sector and not under the control of LRWRA, a program was needed to educate the public about what a cleanout cap is and the importance of it. To engage the public to participate in the program LRWRA supplies a free cleanout cap and will also install the cleanout cap if requested at no expense to the customer. If the customer wants to install the cleanout cap, LRWRA has a step-by-step brochure and video to show the installation process.

For more information visit the web at http://www.LRWRAu.com/capthecleanout and our You Tube Channel at https://www.youtube.com/user/LRWRAasteWater

Can the Grease: The Can the Grease program began in 2002 to educate almost 68,000 households in Little Rock about proper disposal of fats, oils and grease. Through the Can the Grease program, residents receive a free Can the Grease kit which comes with heat-resistant liners. Residents put the liners in the can then pour their cooking grease in the can instead of down the drain. Residents may request a free kit and apartment managers also distribute them to all residents. If there is a grease related back up, the resident will automatically receive a kit. This program is designed to

improve sewer infrastructure by keeping lines free of fats, oils and grease. LRWRA makes deliveries of cans once a week to anyone who has submitted a request. LRWRA also sets up at community events such as National Night Out, back to school celebrations and health fairs. In 2016, LRWRA distributed approximately 2,000 kits to residents. For more information visit the web at http://www.LRWRAu.com/ctg.

School Partnerships: LRWRA offers programs and speakers to schools to educate students on the importance of water conservation and being good stewards of our one source of water. LRWRA has participated in reading programs, school carnivals and other school events where employees were given the opportunity to engage with students and their parents. As part of being good neighbors, LRWRA sponsors a school supply drive at midyear. The students typically have sufficient supplies for the start of school, however by midyear all the supplies have been used and students need items to finish out the year. Employees participate in career day events at local middle schools and partner with one of the largest area high schools to sponsor its science. Employees do everything from set up for the science fair to judging all the projects. During the Holiday season, employees adopt students from an area elementary school and provide them with gifts. During the 2016 holiday season, employees adopted 10 students and provided gifts such as bicycles (with all the safety gear), toys, clothes and shoes for each of them. There were gifts also provided for their parent or guardian.

Community Organizations: LRWRA makes every effort to be a good neighbor by partnering with groups such as the Arkansas Audubon Society, Arkansas Food Bank and Arkansas Hunger Relief Alliance to name a few. With the Audubon Society LRWRA participates in community clean up events and help with projects such as Drain Smart, an anti-littering campaign where storm drains around the city are painted by local artists to depict how litter goes down the storm drain and ends up polluting a local body of water. Through collaboration with the Arkansas Food Bank, employees participate in a cereal drive during the summer and a can food drive during the holidays. By partnering with the Hunger Relief Alliance, LRWRA assists with the planting of a community garden. Once it's harvest time, volunteers spend a day picking the crops which are distributed for free on a fruit and vegetable truck in the community.

Treatment Facility Tours: LRWRA offers tours to students from middle school to college as well as community groups. Each tour for the schools is age appropriate and geared toward the specific class participating and their area of interest. The community tours are informative and meant to educate the public on the processes we use. For more information about the treatment facilities and to see the "Request a Tour" visit the web at http://www.LRWRAu.com/locations

ENERGY GENERATION & RECOVERY

Overview - Little Rock Wastewater has always been a forward-thinking organization, even as far back as 1960 when the first primary level treatment facility, the Adams Field WWTF, was placed into operation. This facility was subsequently upgraded to a 36 MGD secondary treatment system in 1973, and since that time has undergone various hydraulic upgrades to bring its wet weather capacity to 94 MGD, as well as periodic reliability upgrades to sustain its impeccable performance record. Over the past five years, the Adams Field WWTF has met 100 percent of its NPDES effluent water quality requirements.

In 1983, amid anticipated growth in the southwest as well as Industrial Port regions of Little Rock, an additional 16 MGD secondary treatment facility, the Fourche Creek WWTF, was brought on-line to better serve these expanding areas. Again, as part of the progressive thinking, LRWRA foresaw the need for a centralized sludge solids handling facility, thus an anaerobic digestion complex with combined heat and power (CHP) capabilities was incorporated into the original design. The facility has subsequently undergone various biological and hydraulic upgrades to sustain wet weather capacities of 45 MGD, with a targeted peak hydraulic of 52 MGD due by the end of 2019. During the most recent modification, co-digestion of industrial food wastes was added to the anaerobic digestion stream via a dedicated industrial force-main that traverses the Industrial Port area. Only readily biodegradable food processing wastes are transported through this dedicated line which allow for an energy positive alternative to the standard industrial pretreatment requirements. Over the past five years, the Fourche Creek WWTF has met 99.8 percent of its NPDES effluent water quality requirements, with a single excursion occurring in 2014.

As growth for the Little Rock Water Reclamation Authority progressed, the need for a third treatment facility was realized and in 2011 the 4 MGD tertiary treatment facility, the Little Maumelle WWTF, was brought on-line. Serving the

northwest most region of the city, this state-of-the-art facility incorporated full SCADA automation control, high efficiency turbo blowers, as well as low impact lighting, noise, odor, and architectural aesthetics to blend in with its natural surrounds. This aesthetic condition was critical as the facility sits at the base of the State's premiere landmark, the Pinnacle Mountain State Park. Utilizing advancements in SCADA technology, this facility can be monitored and controlled from either of the two larger facilities, or by cellular-remote hand held devices. Over the past five years, the Little Maumelle WWTF has met 100 percent of its NPDES effluent water quality requirements.

ENERGY GENERATION & RECOVERY

The LRWRA has been in the energy generation and recovery realm since 1983. The original equipment installed at the Fourche Creek WWTF included methane gas capture, up to 280,00 cubic feet per day, from the anaerobic digestion complex and delivery into the Generator Building for conversion to supplemental power for the facility, as well as reject heat recovery as the primary heat source for the anaerobic digestion process. This Generator Building housed three (3) 545-kW Kato generators coupled to their respective 800-hp White-Superior naturally aspirated engines. Electrical generation was at 480-volts for on-site use, with a consistent 700-kW*hr. output. Paralleling power-source protective relays and switchgear were electro-mechanical, and served the facility's needs up until 2009. As this protective equipment aged, their capabilities were increasing challenged to keep pace with the re-closure, voltage imbalance, or power fluctuations experienced when coupled to grid power. In late 2009, this electro-mechanical protective circuitry was replaced with up-to-date solid-state circuitry that included computer monitored and controlled re-closure capabilities, along with fiber-optic communication equipment that monitored local electrical sub-station power conditions to provide advanced warnings of power changes.

As part of the protective circuitry investigation, LRWRA also reviewed the significant advancements made in methane powered engine-generators (approaching 38 percent efficiency gas to wire) and the impact such improvements could bring to the Fourche Creek Facility. Therefore, as part of the 2009 equipment replacement and upgrade, a single GE/Jenbacher, Type 3, Model JMS320GS unit was installed to replace the three retired White-Superior eng-gen sets. Due to the sensitivity of the new engine's gas monitoring system, a methane gas conditioning unit had to be installed ahead of the intake to reduce condensation levels. The new CHP system is now capable of producing 1.1 MegaWatt of power with 85.9 percent CHP total efficiency when utilizing the reject heat through thermal energy recovery to maintain proper anaerobic digestion temperatures.

Sludges collected from each of the three treatment facilities is transported through a network of force-mains and gravity lines to the solids-handling side of the Fourche Creek WWTF. Once thickened through traditional gravity thickeners and then a gravity belt thickening system, the 4 - 5 percent solids concentration sludge is fed into anaerobic digestion complex. This complex consists of six primary digesters, each with a volumetric capacity of 1.2 million gallons, followed by two secondary digesters, at 1.0-million-gallon capacity each. The secondary digesters incorporate a floating dome system to maintain some level of methane gas storage along with slightly pressurizing the system for gas feed to the conditioning station prior to entering the engine-generator.

Annually, over 10,500 dry tons of primary and waste activated sludges are processed within the anaerobic digestion system. This sludge is converted through the digestion process into biogas, water, and a beneficial Class B biosolids material. However, since 1983 LRWRA has employed a low-cost, low-tech approach to further reduce volatile solids, pathogens, enteric virus and viable helminth ova through our biosolids lagooning operation. Each year two of the four biosolids storage lagoons, at approximately 16 million gallons each, are continuously filled with secondary digester discharge, while the remaining two lagoons are sealed off and allowed to stabilize. Over the course of the filling period, solids accumulate within these biosolids storage lagoons, while decant waters as well as accumulated rainfall is removed to maintain adequate storage levels.

Each summer the two isolated, or resting, biosolids lagoons are tested for compliance with Class A, E.Q. Biosolids Requirements prior to their mixing and transfer to tanker trucks. Approximately 5,500 dry tons of Class B and/or Class A, E.Q. biosolids is removed and land applied. All biosolids, no matter their classification, are applied to State of Arkansas Permitted land application sites.

Co-digestion of Processed Food Waste: During the 2010 facility upgrade, a modification was incorporated into the Fourche Creek WWTF solids side processing scheme to allow for the reception of industrial food processing wastes via a separate force main system. An abandoned secondary clarifier was re-purposed to receive approximately 125,000 gallons per day of food processing waste. VFD controlled pumps, along with an alkalinity adjustment chemical feed system, were installed to facilitated co-digestion at a SCADA controlled feed rate. On average, 25,000 lbs. per day of co-digestion waste is added to the facilities' primary and waste activated sludges to boost biogas production within the anaerobic digestion complex, up from the original 280,000 cubic feet per day to an average of over 350,000 cubic feet per day. This increase in biogas production has equated to an increase in power production bringing the facility closer to the goal of 100 percent self-sustained.

How did you go about implementing the program you described in your overview paragraph? The original plant was constructed in 1981-1983 at a cost of $19,600,00. The plant was designed by Garver and Garver Engineers of Little Rock, assisted by Dietz Engineers of Little Rock for the Generation Facilities, and by Alvord, Burdick, and Howson Engineers of Chicago, Illinois for the Sludge Digesters. Retrofits to the electrical switchgear, along with the high-efficiency engine-generator set, were designed by CDM in 2009.

What type and amount of resources were needed to support implementation? LRWRA realized early on in its power generation infancy that dedicated staff were required to oversee and maintain the engine-generation equipment. Not just the biogas unit, but all power production/generator equipment required by NPDES Permit standards for major wastewater facilities. LRWRA currently employs two Eng-Gen Technicians that are responsible for the daily operations of the Jenbacher Unit, as well as nearly a dozen backup power units or engine driven pumps.

Did you partner with other stakeholders or organizations as part of your implementation process? While not directly partnering, LRWRA did negotiate the terms for acceptance of industrial food processing wastes through the separate force main. Once constructed, the force main was dedicated over to LRWRA for the use and benefit of all industrial customers within the Little Rock Port Area. The nearly two-mile-long, 10" diameter pressurized system receives only readily biodegradable substrates that are amenable to anaerobic co-digestion with the facility's primary and waste activated sludges.

What was the most critical obstacle that your utility had to overcome to be successful in this activity area, and how did you do that? Installation of the co-digestion operation has maximized the capacity within the anaerobic digestion complex as well as the biosolids lagooning operation. LRWRA has just recently contracted with Carollo Engineers to conduct a digestibility study to evaluated alternatives for regaining digestion capacity and ease hydraulic and solids loading pressures.

Has "smart" information technology supported your implementation/optimization in this area? "Smart" information technology has been employed throughout Operations and Facilities Maintenance with the implementation of SCADA monitoring and control. All three wastewater facilities are at a minimum monitored, with the newest facility being fully SCADA controlled. Major remote facilities, including pump stations and wet weather storage basins, are fully controlled by staff at any one of the WWTFs.

Performance Measures & Results –

	Biogas Production	Power Generation	Biosolids Class A	Biosolids Class B
	Mcf	MW*hr	Dry Tons	Dry Tons
2014	61,036	7,789	3,387	2,575
2015	94,796	6,422	4,815	0
2016	83,917	5,685	5,492	0

Operational Optimization

1. AFWTF Parallel Treatment, Disinfection and Ammonia Facility Upgrades

To help reduce wet weather overflows, LRWRA plans to increase the peak flow treatment capacity of its Adams Field Wastewater Treatment Facility (AFWTF) to 94 MGD by installing pile cloth media filtration as additional treatment facilities that will be operated in parallel with the existing activated sludge facilities. The most distinguishing feature of the parallel treatment process is that the AFWTF's discharge rate is raised to match its influent capacity, therefore eliminating the requirement for equalization storage at the plant and extending the amount of time that the plant can process peak flows. The introduction of an enhanced high-rate treatment process will provide advanced treatment of the portion of the peak flow routed around biological treatment prior to recombining it with the plant's normal effluent stream. In addition, this project will increase the plant's disinfection capabilities with new UV units to be utilized in series with the existing UV disinfection facility during wet weather events. In efforts to maximize ammonia abatement, this project will also include improvements to secondary clarification.

2. Evaluation of Peracetic Acid (PAA) Solution to Aide in Disinfection Process

Adams Field Treatment Facility is a 36 MGD wastewater treatment plant that serves the Little Rock Water Reclamation Authority . Original process for disinfection included chlorine gas. Because of the dangers associated with chlorine, AFTF converted to UV irradiation for effluent disinfection in 2008. The system, designed in 2007, delivers a minimum germicidal UV dose of 24.8 mJ/cm2 in certain conditions.

An evaluation of the performance of UV treatment was completed by LRWRA in 2014. Historical effluent fecal coliform data indicated that there were significant challenges in certain conditions-low UV transmittance (less than 65%) in secondary effluent.

In March/April of 2015, an on-site, pilot-scale treatment evaluation was conducted with 15 percent peracetic acid solution (PAA) as a supplemental treatment to UV disinfection. The use of PAA showed clear advantages:

- Peracetic acid has a longer shelf-life than chlorine disinfectants and can be fed as needed
- Peracetic acid can be used with or without the operation of UV lamps
- Unlike chlorine disinfectants, peracetic acid is unlikely to require residual destruction before discharge to the receiving stream.

As a result of the pilot study, it was recommended a full-scale trial, which is currently in progress.

3. Acoustic Inspection Program

Overview - LRWRA implemented an Acoustic Inspection Program to aid efforts in maintaining approximately 1,400 miles of collection system. This program offers rapid assessment of the gravity sewer system used to provide reliable service to customers and protect the environment.

Questions & Answers

(a) To implement the Acoustic Inspection Program, LRWRA conducted acoustic inspection technology research and potential benefits in 2014. Product demonstrations were conducted as well as benchmarking measures with other utilities. In 2015, LRWRA purchased an acoustic inspection device to further test the technology and evaluate the potential benefits of implementing this activity on a larger scale. In 2016, the product testing, benchmarking, and in-house evaluation process were complete; therefore, LRWRA committed to implementing this activity on a larger scale as part of its efforts to collection system maintenance in 2017.

(b) LRWRA set the goal of conducting acoustic inspections on all gravity sewer mains 12" in diameter and below on an annual basis. This criterion comprises 1,100 miles of collection system. The resources required to achieve this goal required reclassifying job descriptions and restructuring current staff within the Collection System Maintenance department. As a result, the department has three Maintenance Planners and four Acoustic Inspection crews assigned to ensure program goals are achieved and sustained. In addition, purchasing four additional acoustic inspection devices and assigning acoustic inspection crews work vehicles was required.

(c) LRWRA conducted benchmarking with utilities in Greenville-Spartanburg, South Carolina and Augusta, Georgia utilizing the acoustic inspection technology as part of the evaluation process; however, there were no partnerships as part of the implementation process.

(d) The most critical obstacle implementing the Acoustic Inspection Program involved changing how preventive maintenance was performed on the collection system. Historically, preventive maintenance was performed on time-based intervals for sewer mains throughout the collection system. Intervals were in a constant state of adjustment to ensure reliability of service and protection of the environment. Acoustic inspection provides an opportunity to perform a rapid assessment to determine whether a sewer main requires cleaning to avoid an imminent stoppage or overflow. Implementing the Acoustic Inspection Program shifted the preventive maintenance from a time-based method to an assessment prior to cleaning method. As a result, preventive maintenance cleaning schedules greater than three months were expired and acoustic inspection schedules were developed for all gravity sewer mains 12" in diameter and below.

Deciding what acoustic inspection score would initiate cleaning was another factor to the obstacle. The score establishes a failure rate and determines when cleaning occurs. The failure rate had to be managed by available cleaning staff so that sewer mains above the failure rate were capable of sustaining service without cleaning for another year and sewer mains at the failure rate or below were capable of being cleaned without adding staff or cleaning trucks.

Initially, acoustic inspection crews targeted drainage basins causing the most frequent disruption to service through stoppages and overflows. Sewer mains that fail acoustic inspections receive cleaning. Once the cleaning is completed, another acoustic inspection is completed to determine if cleaning improved the score above the failure rate. If not, closed circuit television (CCTV) inspection is conducted to visually inspect the condition of the sewer main. This workflow process had to be developed in a manner that optimized utility resources while ensuring reliable service and protecting the environment.

(e) LRWRA has been able to utilize information technology such as computerized maintenance management systems and geographical information systems to streamline workflow and process acoustic inspection data.

(f) Additional information for the Acoustic Inspection Program can be provided by contacting LRWRA.

Performance Measures and Results

(a) LRWRA measures the failure rate of acoustic inspections. This measurement determines the amount of cleaning demand within the collection system. Through benchmarking and in-house evaluations, the failure rate for acoustic inspections was 30 percent. In 2017, the failure rate is between 20 percent – 25 percent. At this rate, current resources can manage the maintenance demand while directing resources to the appropriate sewer mains and eliminating time and effort maintaining sewer mains unnecessarily.

(b) LRWRA measures the amount of collection system capable of being maintained annually. Implementing the Acoustic Inspection Program has allowed rapid assessment of the gravity sewer system 12" in diameter and below. This comprises 1100 miles of a 1400-mile collection system; which is equal to 80 percent. The goal is to complete initial and repeat acoustic inspections annually on 1100 miles of the collection system. The actual outcome is projected to be 15 months.

(c) LRWRA measures the effectiveness of cleaning on sewer mains using repeat acoustic inspections. Repeat acoustic inspections provides a quality assurance measure. The goal was to be able to improve 25 percent of sewer mains above the failure rate through proper cleaning. Currently, 50 percent of sewer mains that initially failed acoustic inspections are passing the repeat inspections because of proper cleaning techniques.

4. Vehicle Replacement Program

Overview - LRWRA implemented a Vehicle Replacement Program to guide replacement decisions and the budgeting process for sustaining the fleet. This program utilizes an objective assessment format on fleet that has reached 10 years of age and/or 100,000 miles.

Questions & Answers

(a) Little Rock Wastewater needed an objective process for making fleet replacement decisions. Prior to the program, supervisors budgeted for replacements once vehicles reached ten years of age and/or 100,000 miles. This practice needed to be enhanced with a more reliable objective condition assessment process utilizing Fleet Maintenance

Technician's expertise. Developing the criteria necessary to conduct a condition assessment of aging fleet is the first step to implementing a Vehicle Replacement Program. The criteria utilized by LRWRA consist of a 24-point inspection and a test drive assessing major vehicle components. Additionally, scores are weighted and assigned based on how many miles over 100,000, age over 10 years, and utilization of vehicle. Each year Fleet Maintenance Technicians schedule vehicles that have reached the 10 year and/or 100,000 mile criteria for inspection using the condition assessment criteria. Approximately, 20 to 30 percent of the utility's fleet undergoes annual evaluation for replacement. Once annual assessments are conducted, scores are compiled and distributed to supervisors. The assessment scores determine whether vehicles are eligible for replacement in the upcoming year. Typically, around 10 percent of the utility's fleet is replaced annually.

(b) Implementing the Vehicle Replacement Program did not require adding staff or purchasing additional resources. Current staff assigned to the Fleet Maintenance group was trained on the condition assessment criteria and how the scoring system worked. Once technicians complete assessments, the data is entered in a computerized maintenance management system. Each vehicle is an asset and associated work and inspections can be managed. The system calculates a score that is used as a basis for replacing or keeping the vehicle for another year. This process allows for proper work order management and provides a user-friendly method for the budgeting and business decision making process.

(c) The most critical obstacle during the implementation of the Vehicle Replacement Program was developing the condition assessment criteria. The criteria are applied to a wide class/range of vehicles throughout the utility. Ensuring the criteria and scoring method was appropriate to apply across the range of vehicles in a manner consistent to the needs of the utility proved to be the most critical obstacle.

(d) The ability to enter data from the assessment into the computerized maintenance management system and have scores calculated provides a user-friendly process for replacement decisions and the budgeting system.

Performance Measures & Results

(a) Reducing the annual expenses associated with maintaining fleet for the utility is one measurement of the Vehicle Replacement Program. In 2013, annual operation and maintenance expenses had escalated to $573,277. Because of the Vehicle Replacement Program annual expenses for 2016 was reduced by 45 percent, for an annual expense totaling $310,459. The outcome has met the goals of the program.

(b) Improving the reliability of fleet by reducing the average age of fleet owned and operated by the utility is a measurement of the Vehicle Replacement Program. In 2012, the average age of fleet was 11.8 years. Today the average age of fleet is 6.2 years. Being able to reduce the average age of fleet owned and operated by the utility has proven to increase the reliability of fleet while reducing the annual maintenance expense for Fleet.

(c) Creating a better yielding revenue stream through the disposal process of retired fleet is a measurement of the Vehicle Replacement Program. Prior to the program the disposal process consisted of annual onsite auctions; however, since 2012 online auctions through government auction sites has streamlined the process so that retired units can be expedited to auction. To date, LRWRA has been able to sell retired fleet for $240,110.

5. High Rate Treatment

To help reduce wet-weather overflows and other effluent problems, LRWRA is increasing the peak flow treatment capacity of the Adams Field Treatment Facility (AFTF) to 94 MGD by installing auxiliary enhanced high-rate treatment (EHRT) facilities which would be operated in parallel with its existing activated sludge facilities. LRWRA has conducted pilots in the past using chemically enhanced processes, but wanted to try newer technologies.

A collaborative effort between LRWRA, consulting engineers, pilot unit suppliers (Aqua-Aerobics, Schreiber, WWETCO) and their local representative firms was conducted to evaluate the following:

Performance of all three high-rate treatment (HRT) pilot units when treating:

- Primary clarifier effluent during wet-weather events

- Secondary clarifier effluent during dry-weather conditions
- UV, peracetic acid (PAA) and sodium hypochlorite (NaOCl) dose responses for HRT effluents under the influent scenarios described above.

Performance of the two compressible media pilot units when treating primary clarifier influent during wet-weather events. Aqua-Aerobics was chosen due to the simplicity of the unit.

Utility Description (combine all plants if a multi-site system)		
Utility Name: Loudoun Water		
Type (e.g., single plant, regional system, multiple plants, collection system only, stormwater, etc.): Multiple plants and part of a regional system		
Service Area (square miles): 132		Average Annual Daily Flow (MGD): 18.4
Population Served: 260,000		
Location		
Street Address: 44961 Loudoun Water Way		
City: Ashburn	State: VA	Country: USA
Zip Code/Country Code: 20147		
Contact Information		
Name: Sarah E. Lothman	Phone: (571) 291-7990	Email: slothman@loudounwater.org

ORGANIZATIONAL CULTURE

In 1959, Loudoun County, Virginia established Loudoun Water as the public water & sewer authority, with the mission focused on meeting the water and sewer needs of unincorporated areas of the County. Loudoun Water is funded solely by its customers and does not receive tax dollars from the County; our mission is "To Sustainably Manage Water Resources in Advocacy of Health, Environment and Quality of Life."

While the concept of "One Water" is a growing trend in our industry, the leadership and vision of Loudoun Water has incorporated this thinking in our day-to-day operations for many years. Loudoun Water is in the Metropolitan Washington, DC area and shares a very valuable resource - the Potomac River. This offers both great opportunity - access to a reliable source of drinking water - and significant challenge and responsibility. Loudoun Water's Broad Run Water Reclamation Facility is located upstream of the region's major drinking water intakes, reinforcing a high level of organizational commitment and cooperation to protect public health and the environment.

A Loudoun Water Board-adopted Integrated Policy for Water Resources Planning has guided our efforts and approach; Loudoun Water's foundational priorities involve the effective and responsible management of *all* water resources – raw water, drinking water, wastewater and reclaimed water. As indicated through the LW Strategic Plan, a fundamental component of our operation is sustainability. Sustainable practices and approaches - balancing financial, environmental, and social impacts - have been a hallmark throughout Loudoun Water's history.

Loudoun Water is fortunate to have a young system, relative to many water and wastewater utilities throughout the country. While we proactively have been taking care to replace the oldest parts of our system, we do not yet experience aging infrastructure problems like many around the country. Our bigger challenge, however, has been keeping up with the pace of growth. Since the early 1990's, Loudoun County has been one of the fastest growing communities in the country - keeping up and successfully staying ahead of the pace of development has been our trademark. Loudoun Water leadership has put in place a structure that encourages progressive and pioneering thinking. This includes planning, evaluating, and executing forward-thinking business activities such as strategic land purchases, long-range (50-year) master planning, and deployment of physical assets prior to need for service. It is a testament to the leadership and workforce of Loudoun Water that we have consistently been ready to serve when growth has occurred.

Leadership and collaboration are the foundational pillars of Loudoun Water's organizational culture. It starts with a Board of Directors that has throughout the years played a very critical role of setting visionary and effective policies that guide our utility, staying focused on our core mission of providing the safe and reliable water and wastewater services, at affordable rates.

The Loudoun Water executive leadership style is one that starts with a shared vision that is clear to understand, and then empowers all levels of the organization to do their job to the best of their ability, while feeling encouraged to collaboratively work across departments and divisions. The executive leadership team at Loudoun Water is comprised of individuals that represent all the working divisions of the organization; the efficient working relationship of this team enables the consistent communication of goals and priorities to all staff.

Through information-sharing and open doors, staff members are welcomed and encouraged to share thoughts, ideas and concerns with executive management. Loudoun Water invests in staff professional development through a tuition reimbursement program, technical, leadership, and management skills training, and supports skilled cross-training opportunities. Organizational victories are celebrated and fellowship amongst colleagues is encouraged at organizational events such as our Veteran's Breakfast and summer and holiday gatherings. Trust and belonging bolster staff productivity and enthusiasm. The entire team works for the greater goals of the organization and the community it serves.

Partnering with area organizations, schools, community members and customers allows Loudoun Water to share its knowledge about water and wastewater treatment, conservation, source water protection and more. Water education is crucial. Loudoun Water is an active supporter of Loudoun County Public schools' "One to the World" initiative where

students are encouraged to learn "beyond" the school walls and stretch their thinking in ways to improve our world. Further to this, Loudoun Water is home to the Aquiary, a public education exhibit that highlights not only Loudoun Water's operation, but the importance of water stewardship. Loudoun Water takes seriously its role of actively encouraging students to become responsible custodians for the environment.

Supported by its strong relationships, the organization has a higher risk-tolerance for initiatives that might seem daunting otherwise. Building "value" and understanding that value is more than a financial concept, poises Loudoun Water to be a leader in the community, the region, and the water industry.

WATER REUSE

Loudoun Water owns and operates a reclaimed water system with the goals of off-setting potable water demand, managing nutrient discharges to the Chesapeake Bay, increasing total water supply capacity for our customers, supporting economic development efforts within our service area, and serving our region as stewards of the environment. Our reclaimed water is produced at the Broad Run Water Reclamation Facility (BRWRF), a state of the art advanced nutrient removal facility that discharges within the Potomac River Basin and Chesapeake Bay watershed. BRWRF is located upstream of critical drinking water intakes on the Potomac River and is subject to stringent effluent criteria for nitrogen and phosphorus. The strict effluent requirements at BRWRF drove Loudoun Water staff to understand how the effluent, a high-quality product, could be beneficially used. Loudoun Water constructed the first pipelines of its reclaimed water distribution system in 2010 to supply irrigation and industrial cooling water to Loudoun County, Virginia's rapidly growing data center industry. The reclaimed water distribution system has since expanded to 14 miles of pipeline and serves 17 facilities which have independently elected to use reclaimed water service. In 2016, Loudoun Water delivered more than over 1 million gallons per day (MGD) of reclaimed water to its customers, consequently conserving an equal amount of drinking water, while reducing nutrient loads discharged to the Potomac River and Chesapeake Bay. Loudoun Water's Reclaimed Water Program offers rates and policies that allow developers to connect to the reclaimed water system at a lower cost than the potable alternative. The Reclaimed Water Program utilizes an interdisciplinary staff drawn from Engineering, Operations, Maintenance, Compliance and Business Relations teams to carry out its mission.

- The Reclaimed Water Program demonstrates its outreach and education activities to Virginia Department of Environmental Quality (DEQ) through its Reclaimed Water Management Plan. In addition to developing marketing literature, website content, legal agreements, and service advisories, the Reclaimed Water Program also holds an annual customer roundtable to discuss program initiatives and gather stakeholder feedback on program services.
- Loudoun Water is currently updating its Reclaimed Water Market Study to evaluate emerging opportunities, risks, and benefits of future investments in the reclaimed water distribution system.
- Loudoun Water is a state-wide leader in working with customers and regulatory agencies to understand the risks associated with new reclaimed water uses. In coordination with our customers, Virginia DEQ, and Virginia Department of Health, we have collected valuable data necessary to enables new uses. In 2016, Virginia DEQ approved the use of reclaimed water for adiabatic cooling. Now allowed by permit with special use and monitoring conditions, adiabatically cooled data centers will increase reclaimed water demand in our service area by as much as 750,000 gallons per day in 2017 with more growth expected in the future.
- Reclaimed water is used for Loudoun Water campus irrigation and at BRWRF for washdown, chemical dilution, cooling, amongst other uses.
- Reclaimed Water is used off-site primarily for industrial cooling at data centers, irrigation, and construction purposes. A reclaimed water dispensing station at BRWRF allows for bulk truck filling for landscape and construction activities.
- Loudoun Water has developed a reclaimed water hydrant meter program so that hydrant meters may be aligned with above grade hydrants along reclaimed water pipelines. This program allows developers to access reclaimed water for dust control, concrete mixing, and other construction uses normally served by potable water.

- Reclaimed Water Program water quality monitoring and pressure modeling ensure high quality service to our customers.

How did you go about implementing practices and activities described in the overview paragraph?

The reclaimed water program was initially envisioned to be a supplemental irrigation system with minimal demand. However, with the increased presence of data centers with high water demands near BRWRF, staff re-evaluated the program and completed a business case analysis in 2012. This process evaluated program drivers and potential customers, defined infrastructure needs, provided a financial analysis of the investment, and articulated a market strategy to establish and grow our service. As a result of this effort, the Loudoun Water Board of Directors established a funding source for the reclaimed water program by dedicating a portion of water and sewer availability charges to support the capital infrastructure investment. With a funding mechanism in place, Loudoun Water staff embarked on a process to expand the reclaimed water program. This included establishment of policies to guide the implementation of the program from a business and technical perspective. New developments for which reclaimed water is appropriate are encouraged to connect to the reclaimed water distribution system by policies which state that no availability charges (i.e. tap fee or capacity purchase) are due for reclaimed water connections. Availability charges serve to recoup the cost of constructing additional water and sewer capacity in our system. The amount of the charge is based on the demand the customer places on the system, such that each customer pays for a proportionate share of the capital infrastructure provided by Loudoun Water. For those facilities seeking potable water as a backup, Loudoun Water assesses a potable water availability charge in the amount of 10% of the total water demand for that 100% backup supply. The rate for reclaimed water is set at $1.50/1000 gallons as compared to commercial potable water rates, which are established at $3.12/1000 gallons (Tier 1) and $5.37/1000 gallons (Tier 2).

Developers whose parcels are appropriate for reclaimed water are introduced to the Reclaimed Water Program as early as possible, generally in the pre-design stage of their developments. At this stage, staff reviews critical information with the development team, including financial comparisons, water quality information, and pressure models alongside conventional considerations such as reclaimed water easements, engineering design standards, and regulatory requirements. Those customers electing to use reclaimed water submit plans to Loudoun Water for approval and are subject to installation inspections like all other customers. Reclaimed water customers, however, must execute a reclaimed water service agreement prior to their meter being placed. Customers are inspected annually by Loudoun Water compliance teams to ensure adherence to all regulatory and service agreement requirements.

Reclaimed Water Program activities are coordinated by the Business Programs Manager and supported by staff from across the Utility. The most critical aspect of the reclaimed water program is the production and delivery of Level 1 reclaimed water; the Business Programs Manager closely coordinates with the Operations and Maintenance Division to share program activities and to maintain an understanding of O&M activities. Additionally, the Business Programs Manager coordinates activities including plan approval, inspection and final approval of reclaimed water installations, as well as customer communication, marketing, and regulatory reports.

What type and amount of resources were needed to support implementation?

Loudoun Water has invested a total of $20 million in reclaimed water program infrastructure. Direct investment from Loudoun Water totaled $18.6 million; the remainder of the initial investment was funded through American Recovery and Reinvestment Act grant funds totaling $1.4 million. These investments funded the installation of 14 miles of reclaimed water distribution system pipeline, two 1.5 MG reclaimed water storage tanks, and a reclaimed water pumping station. Loudoun Water's reclaimed water is membrane permeate chlorinated in the reclaimed water storage tanks, which is then pumped through the distribution system to end users. Loudoun Water budgets for the chemical and electrical needs of the reclaimed water system, as well as for labor to deliver program services. These operation, maintenance, and program administration activities are funded by user rates set to recover the cost of delivering reclaimed water program services to its customers.

Did you partner with other stakeholders or organizations as part of your implementation process? Our primary stakeholders are our customers. Often, the customer (or their Engineer or Contractor) designs and constructs pipeline extensions from our distribution system lines to their properties. Customers remain an important stakeholder group as the users of the system. Loudoun Water actively coordinates and participates in our local chapter of NAIOP, the

Commercial Real Estate Development Association, which serves as the leading voice for developers, owners and investors of office, industrial, retail and mixed-use real estate.

Successful implementation of the reclaimed water program required coordination and communication with multiple parties. Loudoun Water worked, and continues to work, in coordination with the Loudoun County Economic Development Department to identify potential reclaimed water customers in the industrial, commercial, and data center development industries. Coordination with the regulatory community was crucial during planning, construction, and startup – and continues to be critical to the success of the reclaimed water program.

What was the most critical obstacle that your utility had to overcome to be successful in this activity area, and how did you do that?

The most critical obstacle for the reclaimed water program was funding. If reclaimed water customers had to pay for all the infrastructure and treatment costs, the program would be financially infeasible and nobody would connect to the system. To fund capital infrastructure, Loudoun Water embedded a small amount (approximately $420 per connection) into the availability charge for every new connection system-wide, regardless of whether the customer was using reclaimed water. The Reclaimed Water Program benefits every new water customer in that it effectively reduces total demand on the potable water system and reduces or defers capital upgrades to the drinking water treatment and distribution system. The Reclaimed Water Program benefits every new wastewater customer in that it can reduce nutrient discharge to the Chesapeake Bay. Loudoun Water also determined that the cost to produce Level 1 reclaimed water would be covered by the wastewater continuing usage rates, as it is a requirement of our discharge permit. The reclaimed water user covers chemical for disinfection, electricity for pumping into the distribution system, and administrative time to administer the program; this allows reclaimed water user rates to be set at approximately half that of potable water rates.

Has “smart” information technology supported your implementation and optimization in this area?

Various types of smart technology support Loudoun Water’s management, operation, and optimization of the reclaimed water system. Loudoun Water uses “smart meters” at each point of delivery, enabling hourly meter readings to be transmitted to Loudoun Water via radio frequency signal. This demand information is also available to certain commercial customers and informs better process control for industrial cooling strategies. Loudoun Water is currently piloting units to monitor the service pressure delivered to our reclaimed water customers. These units will enable early notification to Loudoun Water of pressure variations due to demand or service line breaks.

Loudoun Water utilizes GIS and Water GEMS in a variety of ways to support the reclaimed water program including the mapping and modeling of new distribution system lines, modeling of reclaimed water pressure for new reclaimed water customer prospects, and supporting a parcel-by-parcel evaluation and characterization of reclaimed water development opportunities in our service area.

Loudoun Water also requires the use of smart technology in the form of soil moisture sensors and EPA-approved WaterSense weather stations on all reclaimed water irrigation systems to ensure a supplemental application rate.

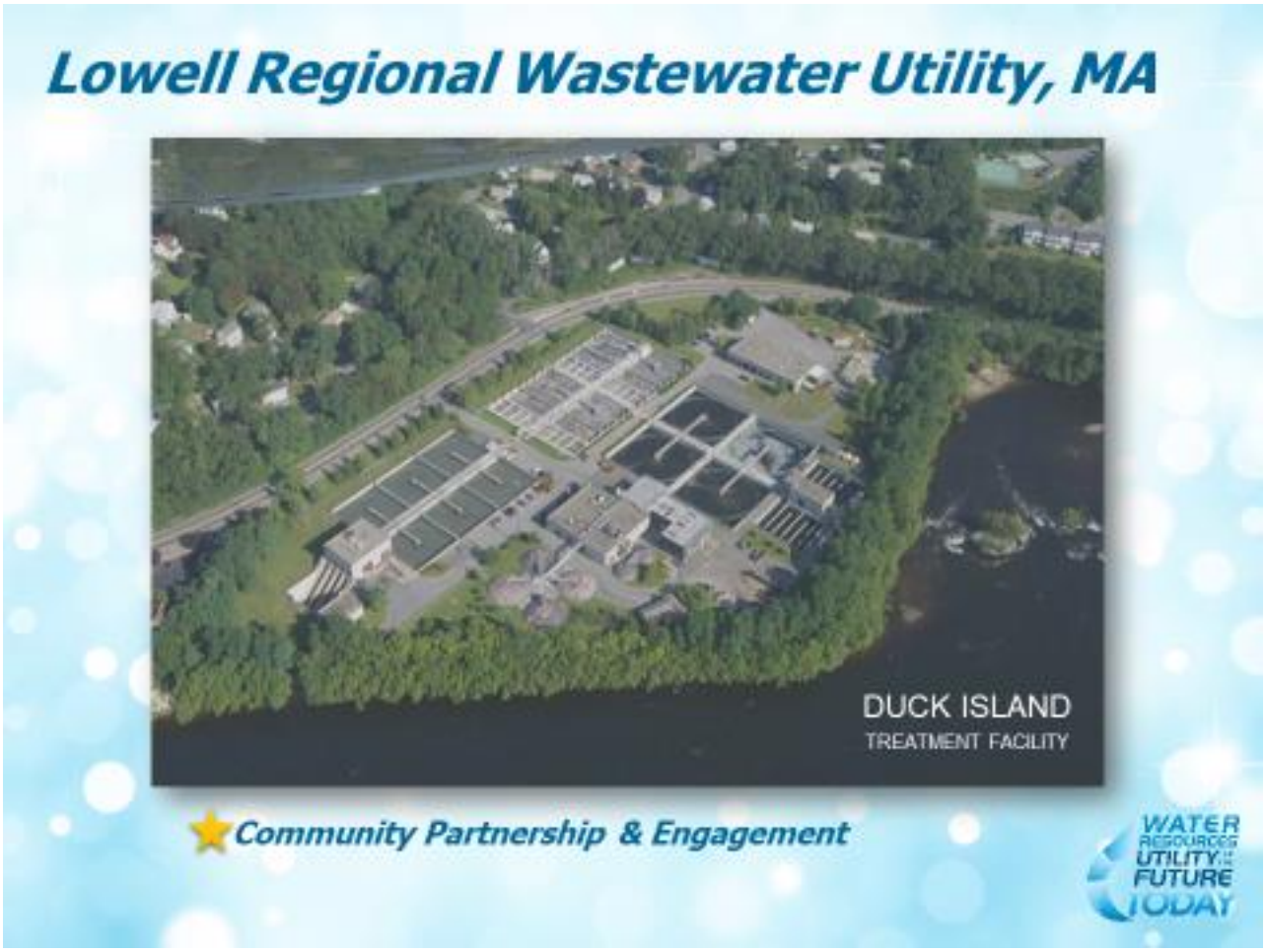
At BRWRF, SAP enterprise business software is employed for work order management of preventive and corrective maintenance. The tools provided in SAP allow Loudoun Water to systematically address asset issues, as well as use the information captured in SAP (equipment failure mode and frequency, for example) to inform decisions related to asset recapitalization.

Where could other utilities go to find additional information on Reuse activities carried out by Loudoun Water?

The Loudoun Water experience is best shared by our staff. We value strong peer-to-peer and utility-utility relationships. We encourage other utilities to reach out to our staff directly. Loudoun Water provides information on the reclaimed water program at loudounwater.org and information taken to our policy-setting Board of Directors is publicly available through our BoardDocs website (http://www.boarddocs.com/va/lwva/Board.nsf/Public).

Measure	Targets	Outcomes

Reclaimed Water Quality at Point of Compliance	Continuous attainment of Level 1 Standards as defined by the Virginia Reuse Regulations	Loudoun Water has continually attained Level 1 Standards per its VPDES permit
Reclaimed Water Pressure at Point of Compliance	Maintain pressure between 70 and 80 psi at point of compliance	Since the commissioning of the reclaimed water pumping station in 2015, pressure has not fallen below 70 psi.
Utility Compliance with Reuse Regulations and Service Agreement	100% compliance. No violations.	No violations or points on permit due to reuse activities
Customer Notifications	Provide customers at least 2 business days advanced notice of any planned service disruption.	Customers are provided at least 7 days advanced notice of any planned service disruption
Customer's Compliance with Reuse Regulations and Service Agreement	All customers remain in compliance with their Agreement with Loudoun Water, including backflow, color coding, signage, labeling, and use conditions.	All inspections have revealed full compliance with backflow, color coding, signage, labeling, and use conditions.



Utility Description (combine all plants if a multi-site system)		
Utility Name: Lowell Regional Wastewater Utility		
Type (e.g., single plant, regional system, multiple plants, collection system only, stormwater, etc.): a regional sewage transport and treatment system; and a municipal stormwater system		
Service Area (square miles): 50 square miles	Average Annual Daily Flow (MGD): 25 MGD	
Population Served: 200,000 people		
Location		
Street Address: 451 First Street Boulevard		
City: Lowell State: MA	Country: USA	
Zip Code/Country Code: 01850		
Contact Information		
Name: Mark Young	Phone: 978-674-1601	Email: myoung@lowellma.gov

ORGANIZATIONAL CULTURE

The Lowell Regional Wastewater Utility (LRWRAWU) is a regional utility that transports and treats wastewater and stormwater from the City of Lowell and four surrounding towns (Chelmsford, Dracut, Tewksbury, and Tyngsborough). Although the utility is organized as a city department, the 48-person organization acts as a regional utility in service to nearly 200,000 residents from five communities.

LRWRAWU operates and maintains more than 220 miles of sewerage, 80 miles of drainage, and a 32-MGD regional wastewater treatment facility (WWTF) at Duck Island in Lowell MA. The sewerage system includes pipes and structures that vary greatly in size, complexity, and age. Aging sewer lines are particularly challenging, with many pipes more than 100 years old, and some as old as 150 years.

In addition to its age, the sewerage system in Lowell includes approximately 60% combined sewer lines, which transport both wastewater and stormwater. The combined system presents significant operational challenges that focus on the elimination of sanitary system overflows (SSOs) into adjacent properties and the reduction of combined system overflows (CSOs) into local waterways.

The Duck Island WWTF is now 37 years old, having first treated domestic, commercial, and industrial wastewater in May 1980. The Duck Island WWTF is an activated sludge secondary treatment facility that discharges treated effluent into the Merrimack River, the second-largest river in New England.

Like many treatment plants of its vintage, Duck Island has undergone significant process changes in the past four decades – notably, the wastewater sludge dewatering process. In the early years, Duck Island relied on a "Zimpro" process to dewater wastewater solids by "pressure-cooking" these residuals in order to remove excess water.

Although the process was effective in terms of dewatering, it was energy intensive and produced volatile side streams and objectionable odors, making work conditions dangerous and creating putrid odors that were nearly unbearable for neighbors and passersby. Indeed, Duck Island became locally renowned, with many passing cars rolling up their windows as they approached the area, and neighbors vehemently complaining about odors emanating from the facility.

The odorous sludge dewatering process was symbolic of a time when work conditions and community relations were not considered priorities. The advent of a new era was ushered in with the adoption of an environmental management system in 1997, when LRWRAWU became one of the first public utilities in the United States to adopt an ISO-14001 program. A leadership team that established a culture of environmental stewardship led a utility-wide commitment to reduce energy use, recycle paper and plastics, and re-use wastewater sludge (biosolids).

With these "green" efforts came a new understanding of the importance of safe and comfortable working conditions, the utility's role in the community, and our responsibility as a primary contributor to the sustainability of aquatic life and human use of the Merrimack River. During the past twenty years, LRWRAWU has expanded its ISO targets to include numerous procedures that ensure reliable water treatment and effective resource recovery in a safe workplace. As importantly, the utility's overall mission has evolved to embrace a prominent role as a steward and community catalyst of thoughtful and cost-effective environmental management.

In the past two decades, LRWRAWU has participated in numerous local, regional, and national initiatives to advance the notion of a "green utility". In the early years of the new century, LRWRAWU implemented a $50 million sewer separation program aimed at eliminating local sewer surcharging. Prior to implementation, heavy rainfall would trigger widespread street and basement flooding – with raw sewage. The highly successful sewer separation program addressed serious public health and safety concerns, brought Lowell "into the 21st century", and significantly reduced CSO discharges.

Subsequently, LRWRAWU capitalized on this momentum to secure additional local funding for substantial improvements to its interceptor system and treatment facility that enabled the optimization of peak flow storage and treatment. The

new “high flow management” (HFM) system featured real-time, remote gate control at satellite stations, via Supervisory Control and Data Acquisition (SCADA), that utilized available in-line storage capacity. A crucial aspect of the HFM program was the staff’s development of a better understanding of the interceptor system, and display of real-time conditions so that operators were not “blind” during these critical (and stressful) times.

This enhanced understanding and new information fostered a culture of pride that focused on maximizing “safe storage and treatment”, while minimizing CSOs and maintaining permit compliance. A natural tension that existed between stressing the treatment process during peak flows and maintaining continuous permit compliance was eventually alleviated. A breakthrough occurred when operators realized that the utility management team fully appreciated the challenge required to balance these two operating objectives that were in tension.

The HFM program demonstrated the importance of effectively conveying utility-wide goals, as well as encouraging staff recommendations for implementation of a new framework aimed at achieving these goals. Through this experience, LRWRAWU managers learned that staff “ownership” of planned changes is instrumental in realizing the intended benefits associated with these improvements.

A similar approach was utilized a few years later, when the utility embarked on a variety of upgrades to Duck Island. At this point, the value of staff “buy-in” was understood; project design workshops with operators provided opportunities for input that ranged from the right septage receiving equipment to smart screw pump controls. Many of these upgrades were funded through the American Resource and Recovery Act (ARRA), including several “principle forgiveness” green projects, such as energy-efficient aeration blowers, green roofs, and rain gardens at Duck Island.

Throughout this era, improvements to the sewerage system continued to be made. LRWRAWU was committed to resolving sewer surcharging problems, and found innovative ways to address these challenges. From converting existing sewers into active drain lines, to offering low-cost installation of sump pumps in wet basements… LRWRAWU sought out the most cost-effective ways to reduce local sewer surcharging, thus protecting public health and improving the quality of life in Lowell’s neighborhoods.

Meanwhile, LRWRAWU was also focused on optimizing the performance of the Duck Island facility – while also improving the working conditions and workplace safety. The utility invested in a new centrifuge to more efficiently dewater its biosolids, a change that eliminated the need to operate a belt filter press that generated foul air with obnoxious odors and elevated Hydrogen Sulfide concentrations. This safer process resulted in lower operating costs and happier employees – a true win-win situation.

Over the past twenty years, LRWRAWU has continually invested in projects and programs that protect the environment, contribute to the well-being of the community, and strengthened the health of the utility organization. This progressive approach towards utility management has been noticed by decision-makers within the City of Lowell’s local government. Recently, LRWRAWU’s Executive Director (Mark Young) has also been appointed interim director of the drinking water utility. This dual directorship was initiated with an eye towards evaluating the potential for integrating the two water utilities into one organization.

In addition to realizing the benefits of shared resources (staff and equipment) and better management, an integrated utility would allow for the proliferation of LRWRAWU’s organizational culture. With reduced costs, increased revenues, and enhanced professional opportunities, an integrated “Lowell Water” utility would be able to better serve its community and protect the environment. The utility’s new slogan of “Community-Health-Environment” would now reflect its expanded mission as Lowell’s “Utility of the Future”.

COMMUNITY PARTNERSHIP & ENGAGEMENT

The Lowell Regional Wastewater Utility (LRWRAWU) engages in a multitude of community partnering projects and programs, involving neighborhood groups, other city departments, the local university, watershed organizations, and other interested citizens. Below are descriptions of several projects that reflect LRWRAWU's commitment to community involvement:

- Decatur West Green Alley – LRWRAWU invested in the transformation of a neglected urban alley into and a public walkway and art gallery that demonstrates stormwater infiltration through porous concrete. Partnering with ACTION (neighborhood group), Lowell public schools, and the University of Massachusetts-Lowell, the utility converted a blighted space into a "green alley" that promotes "green" stormwater management, the city's textile industrial history, and the artistic talents of local school children.
- Highlands Sump Pump Installation – LRWRAWU identified pervasive problems with groundwater intrusion into residential basements in one particular neighborhood (the Highlands). Recognizing the value of community support and cooperation, LRWRAWU made "an offer they couldn't refuse"… the installation of basement sump pumps that would ensure the removal of extraneous flow from the sewerage system. A nominal fee ($100) was charged for this "neighborhood improvement" program that fostered good will towards the utility and support for subsequent projects.
- UML Engineering Internships –LRWRAWU has sustained an ongoing paid internship program with civil engineering students from the University of Massachusetts-Lowell (UML) for the past ten years. By offering part-time engineering internships during the students' senior year, LRWRAWU has provided opportunities for numerous "engineers-in-training", many of whom subsequently established careers in environmental engineering and are now contributing professionals in the wastewater industry.
- City Infrastructure Coordination Meetings – LRWRAWU facilitates coordination meetings between various city departments that manage activities associated with local transportation, public works, site development, drinking water distribution, and other utilities (gas and electric). These efforts have led to the development of a "complete streets" approach to planning and implantation of public and private projects that utilize local roadways and public infrastructure. This approach is manifested in the utility's sewer rehabilitation program, which is integrated into the city's paving program.
- Clean Stream Initiative – LRWRAWU has gathered a team of stakeholders – consultants, environmental advocates, regulators, and scientists – that are interested in monitoring the health of the Merrimack River and measuring the impacts of discharges from urban stormwater, combined sewer overflows, and treated wastewater. The objective of this LRWRAWU-funded initiative is to create a dynamic model that informs environmental management decisions related to this stream, and can also be customized for other receiving streams.

How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph? Most of the initiatives described in the Overview Paragraph (Part 1) were planned and implemented by a progressive leadership team at the utility that understands the importance of neighborhood investment, public support, and engagement from stakeholders in the local community. LRWRAWU's management team believes that the purpose of a public wastewater utility is to serve its community by improving the local quality of life. This mission is accomplished through investments in neighborhood improvements and environmental sustainability that utilize the ratepayer's precious funds in a responsible manner.

What type and amount of resources were needed to support implementation? (e.g., financial, staff, other). Significant investments of capital are necessary to implement the programs described in Part 1. These investments include a substantial amount of in-house staff time, contracted services (both engineering and construction services), as well as equipment and material purchases. None of these investments could be made without the support of the city's government – the city manager, his advisors, and the city council – who approve all of the funding for the utility.

Did you partner with other stakeholders or organizations as a part of your implementation process? As described above, partnerships included neighborhood groups, the local university, other city departments, and paid consultants – who deserve recognition for their skills, knowledge, and interest in producing successful outcomes.

What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that? Public outreach is both challenging and rewarding. At times, the general public is misinformed about issues surrounding the management of wastewater and stormwater discharges and their impacts on the receiving stream. LRWRAWU has learned that it is crucial for wastewater utilities to promote their good work and effectively communicate with its stakeholders.

Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe. LRWRAWU is developing a more strategic use of the city's website… this is a "work-in-progress" with room for improvement. The most effective technological tool that LRWRAWU utilizes is its Supervisory Control and Data Acquisition (SCADA) system, which controls and monitors dozens of facilities and collects vast amounts of operational data.

Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented? The best resource at this time is to connect with LRWRAWU's management team, particularly the utility's executive director (Mark Young) or the utility's engineering manager (Mike Stuer).

Measure What are you measuring?	**Targets** What was your goal/intended outcome?	**Outcomes** What were your actual outcomes?
Community support	Garner support	Widespread support
Neighborhood improvement	Improve neighborhoods	Better local quality of life
Public education	Educate the public	Greater understanding
Industry contribution	Train engineers	Modest contribution

Utility Description (combine all plants if a multi-site system)		
Utility Name: West County Wastewater District (WCWD)		
Type (e.g., single plant, regional system, multiple plants, collection system only, stormwater, etc.): Single Water Resource Recovery Plant, with Collection System.		
Service Area (square miles): 16	Average Annual Daily Flow (MGD): 9.5 MGD	
Population Served: 93,000		
Location		
Street Address: 2910 Hilltop Drive		
City: Richmond	State: California	Country: USA
Zip Code/Country Code: 94806		
Contact Information		
Name: Lisa Malek-Zadeh, Business Services Manager	Phone: (510) 662-3612	Email: LMalek-Zadeh@wcwd.org

ORGANIZATIONAL CULTURE

The West County Wastewater District (West County) is entering its 97th year of protecting public health and San Francisco Bay in the West Contra Costa County Region. West County recently completed our 14th consecutive year of perfect NPDES compliance at our Water Resource Recovery Facility (WRRF) in Richmond, California. We are not aware of any U.S. wastewater utilities with 14 or more consecutive years of perfect environmental compliance that are as small as our agency (10 MGD). In addition to our strong record of environmental stewardship, we are also very strong financially, having minimal debt. West County is in the bottom quartile among San Francisco Bay Area wastewater utilities for our rates.

More than one-third of the electrical power needed to run our WRRF is provided by our 1 megawatt state-of-the-art solar energy system. This innovative, first-of-its kind facility was the recipient of awards from WEF's California Member Association, CWEA, and also from the California Association of Sanitation Agencies (CASA).

West County's Innovative Dual Axis Tracking Solar Energy Array Meets One-Third of Plant Electrical Demand

Perhaps our greatest achievement as a WRRF is that more than 80% of our treated water is reused year-round through our regional partnership with the neighboring drinking water utility and nearby Chevron Oil Refinery, for cooling and boiler feedwater. We have been reusing more than half of our effluent for over 20 years, and ~80% for the past five years. Clearly, West County has long been a leader among northern California utilities in the core areas of environmental and financial stewardship.

Despite these achievements as a well-run WRRF committed to water reuse and renewable energy, we began to realize in 2014 that something was missing. We were a well-run utility, but with a traditional, conventional organizational culture that was holding us back from truly becoming a "Utility of the Future." Up until 2015, we did not engage our community, our customers, or the media. We quietly did our jobs of cost-effective water reuse.

From 2012-2015, three consecutive years of unilaterally imposed extensions of the 2012 labor contract exposed the weakness of our traditional "top-down" culture. For nearly five years, organizational turmoil adversely impacted employee morale and productivity. Our organization cried out for new leadership.

In 2014, our ratepayers voted two new active members of the West County community onto our Board, followed by three more new Board members in 2016. In two years, from 2014-2016, West County had an entire new Board of five, all progressive leaders who brought a new enlightened vision of empowering our employees, creating a participative management culture, educating and engaging our community/customers, and transforming a well-run traditional utility into a true "Utility of the Future." Our evolving new Board has provided a new strategic focus of a more sustainable "triple-bottom-line" approach to our Mission and Vision, adding the "social" component to our long-standing excellence in the areas of environmental and financial stewardship. In less than three years, we have emerged as a stronger organization, engaging employee in the strategic planning process, in development of core values, and on cross-functional teams that have strengthened key relationships across the organization and improved organizational performance.

Following are several examples of programs and initiatives that we have put in place to enhance our Organizational Culture:

1) Actively participated in a northern California collection system program that led to the creation of a joint publication entitled "Collection System of the Future" by SF Bay Area peer utilities.
2) Staff Reports to the Board identify which strategic goals the requested action supports.
3) Established a mentoring program ("Buddy Program") for every new hire to the District. Every new employee connects with a member of someone from a different functional workgroup. They meet monthly, and the "Buddy" helps the new hire better understand our culture, and helps them address any communication challenges that they may be experiencing.

4) Celebrations of successes have become part of our culture. Examples include an annual All-Staff Recognition Luncheon and Board Resolutions that honor every retiring employee.
5) Annual Safety Day, bringing in outside experts to speak on various aspects of utility safety that benefit all of our employees (office and field.)
6) Established required "Prevention of Bullying" and "Prevention of Sexual Harassment" training for all employees.
7) Input by all employees encouraged into the development of our Strategic Plan – 1/3rd of employees chose to participate in this effort. We plan to engage 100% of employees in our next Strategic Plan update.

Recognizing the need for strong, knowledgeable and supportive staff leadership to transform our Organizational Culture fully embrace our evolution to a "Utility of the Future", our Board appointed Past-WEF President Ed McCormick as Interim General Manager in early 2017. Ed was selected, in part, for his success at EBMUD in becoming the first net-positive renewable energy-producing wastewater utility in North America. However, we approached Ed even more for his experience in transforming organizational culture, engaging communities and developing regional partnerships, and for his track record in working effectively with employee groups and labor unions. Hiring Ed underscores West County's commitment to continuing to implement our vision of transforming our organization into a "Utility of the Future." Since appointing Ed, following are several examples of advances we have made in further transforming our Organizational Culture into that of a "Utility of the Future."

Adding the following four key positions:

1. Leadership Development/Organizational Performance Manager *(to fully establish West County as a learning organization focused on developing and fully engaging every employee, and in establishing key performance indicators and an organizational performance measurement with a high level dashboard for the Board and more detailed dashboards for Staff.)*

2. Community Engagement Leader *(to educate and engage our community/ratepayers, build key partnerships and relationships with a broad variety of organizations, upgrade our website, communications/publications and media outreach.)*

3. Wastewater Process Engineer *(to further advance all aspects of water resource recovery, optimize operations in the areas of energy and chemical usage, biosolids reuse and odor control; champion initiatives to achieve 100% water reuse and become a net producer of electrical power.)*

4. Instrument Technician-in-Training *(with a new plant upgrade coming online in fall 2017, the number of instruments in the plant is tripling, requiring an additional instrument technician. Hiring a Technician-in-Training demonstrates West County's continued commitment to "growing our own", with a strong focus on employee development.)*

New Position #1: One of our four, new core values is "People." For the first time, we now have a position dedicated to creating and developing a progressive organizational culture to support our people, with a focus on leadership and employee development soft skills training in the areas of teambuilding, coaching (rather than "supervising"), conflict resolution, communication and interpersonal skills. This person will also facilitate the development of our Strategic Plan Updates, and coordinate a performance management system to align every employee (performance plan) with our strategic goals in order to help us achieve our Vision.

New Position #2: We have also created, for the first time in our history, a Community Affair position who reports to the General Manager and will work closely with the Board and the Executive Leadership Team to educate and engage our community and the media.

B) Developing Board and Board Committee Reports that focus the Board on key strategic direction decisions, rather than on tactical/operational decisions. This approach has been successful in implementing initiatives that directly support the Board's vision of an empowered workforce and an engaged and educated community. A side-benefit of this more appropriate role of the Board and Staff has been a 50% reduction in Board Meetings and Committee Meetings, both of which in the past had encouraged unnecessary Board engagement in operational decisions.

C) Holding "All-Staff Roundtable" Meetings every six weeks to develop cross-Departmental teams, ensure that every employee is listened to and good ideas are implemented, find ways to eliminate unnecessary administrative burden and delegate decision-making authority to the lowest appropriate level in the organization.

D) Significantly Enhanced Leadership Participation in Professional Associations and Regional Partnerships. We are "stepping up our game" through increased leadership engagement with regional organizations such as Bay Area Clean Water Agencies (BACWA), and the Bay Area Biosolids to Energy Coalition. In addition, we have entered a partnership with the San Francisco Estuary Partnership, a Watershed-based group focused on regional planning of multi-benefit green projects to address sea level rise and other aspects of Climate Change.

E) Funded a New "Innovative Employee Ideas for Revenue Enhancement" Program Fund at $50,000 in FY18 and $100,000 in FY19. This fund will help identify and develop employee ideas for generation of revenue to reduce upward pressure on rates. This fund is also intended to help accelerate our utility toward all aspects of Water Resource Recovery, including energy and nutrient recovery.

In closing, this section on Organizational Culture, we believe that over the past three years, we have made significant strides in transforming our Water Resource Recovery Utility into a true "Utility of the Future." We are committed to a path toward progressive, participative management, employee development and empowerment, and an educated and engaged community.

WATER REUSE

West County has been involved in water reuse since 1982. In 1990, we entered into an agreement with the local drinking water purveyor to provide approximately 4 MGD of treated wastewater for industrial process reuse at the Chevron Oil Refinery in Richmond, California, located a few miles from our wastewater treatment plant. The water would be used by Chevron in their cooling towers, and it would require more than half of our average annual daily wastewater flow when it would go into full-time operation.

By 1997, we had successfully ramped up to supplying close to 4 MGD for use in Chevron's cooling towers. In 2012, a second industrial reuse project began operation, requiring both reverse osmosis and microfiltration for use in Chevron's boilers. This water is ultra-high quality, and West County is providing approximately 4 MGD of treated wastewater for this use. In total, approximately 8 MGD of West County's treated wastewater goes to Chevron for industrial water reuse.

In addition, West County began its first external water reuse in 1984, for golf course irrigation at the Richmond Country Club (RCC). For nearly 25 years, the average annual demand was approximately 0.2 MGD, prior to RCC switching to groundwater supply. West County and EBMUD also use recycled water for landscape irrigation of our respective facilities, as well as for equipment and building washdown.

Recent Investments Made in Reuse Infrastructure: To solve an issue involving ammonia spikes in our treated effluent, we have recently invested over $25M in a process upgrade of our WRRF. Start-up of these nitrification and denitrification facilities will be completed in fall of 2017. We are hopeful that this upgrade will allow us to approach 90% water reuse! Ninety percent water reuse is likely the highest in California, given that unlike at West County, much water

reuse in the state is seasonal, and is not needed during the 5 to 6 month "wet season." Currently, California reuses an average of only 15% of its treated wastewater.

Communication & Outreach Plan: West County's ratepayers enjoy one of the lowest wastewater rates in the San Francisco bay Area. Significant investments continue to be made to ensure the effectiveness of our water reuse, and we continually seek opportunities for new customers. West County distributes a regular newsletter to all customers, to keep them informed of the benefits of water resource recovery, including both our water reuse program as well as our renewable energy program (solar power plus cogeneration.)

How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?

- West County has led the planning, design and construction of needed facilities at our WRRF; EBMUD has led the planning, design and construction of facilities at EBMUD's microfiltration and reverse osmosis facilities; Chevron has led the needed capital improvements at their cooling towers and boilers. It is critical to develop an environment of trust and excellent working relationships among all parties for a complex program like this to be successful!

What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)

- A major commitment to developing "Operators of the Future" has been essential to controlling ammonia and chlorides in our treated effluent to ensure that reuse would not cause fouling/damage to equipment to the Refinery, and was of a quality that it can be reused continuously.
- We have had a Joint West County/EBMUD Recycled Water Board Ad Hoc Committee in place for nearly 25 years, to ensure excellent communications and prompt addressing of potential issues. The West County-EBMUD-Chevron partnership is very strong, and we are currently negotiating a new 30-year supply agreement with the parties.

Did you partner with other stakeholders or organizations as a part of your implementation process?

- We partnered with the local drinking water purveyor, the local community, the City of Richmond, the local sanitary landfill, Chevron Corporation, and the Richmond Country Club.

What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?

- The most critical obstacle that we needed to overcome was the complex decision-making needed to identify the best approach to solving the issue of ammonia spikes in our treated effluent. Ultimately, the decision was to construct an upgrade at our WRRF to a Biological Nutrient Removal (BNR) process, now nearing completion. The challenge continues, as our Plant Superintendent of twenty years is retiring this year, as we complete plant start-up!

Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.

- Yes; for example, the number of instruments at our WRRF is tripling, requiring the addition of an Instrument Tech to our maintenance staff. Control systems will be much more complex than the basic activated sludge secondary treatment facility that we have operated for decades. In addition, we are making a major commitment to employee training and leadership development to "grow our own" as baby boomer operators and maintenance staff continue to retire at a high rate.

Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?

- The West County and EBMUD websites.

Measure What are you measuring?	**Targets** What was your goal/intended outcome?	**Outcomes** What were your actual outcomes?
% Water Reuse of Treated Wastewater	Current Target: 75% Reuse	Dry Years: up to 92% Reuse Average Years: ~80% Reuse Wet Years: 70-80% Reuse
WateReuse Diversification	A minimum of four different types of Water Reuse	Most years since 1996, we have achieved the target, as follows: 1) Industrial Cooling 2) Boiler Feedwater (since 2011) 3) Landscape Irrigation 4) Equipment Seal Water 5) Plant Washdown


The following 7 honorees,
recognized in 2016,
have successfully added activity areas
WATER
RESOURCES
UTILITY OF THE
FUTURE
TODAY

Utility Description (combine all plants if a multi-site system)		
Utility Name: City of Fayetteville Water Resource Recovery Facilities		
Type (e.g., single plant, regional system, multiple plants, collection system only, stormwater, etc.): Multiple plants		
Service Area (square miles): 46	Average Annual Daily Flow (MGD): 14	
Population Served: 92,000		
Location		
Street Address: 1400 N. Fox Hunter Rd		
City: Fayetteville State: AR	Country: USA	
Zip Code/Country Code: 72701		
Contact Information		
Name: Jeff Hickle	Phone: 479-443-3292	Email: jeff.hickle@ch2m.com

ORGANIZATIONAL CULTURE *(Not required for organizations adding additional activities to the previous recognition.)*

WATERSHED STEWARDSHIP

The City of Fayetteville's Paul R. Noland Water Resource Recovery Facility (WRRF) is located approximately 10 miles upstream of Beaver Lake Reservoir and approximately 30 miles upstream of the water supply intake for Beaver Water District, which serves approximately 330,000 customers in north Arkansas. The largest producer of drinking water to northwest Arkansas communities, Beaver Lake Reservoir is a critical part of the NW Arkansas landscape, is one of the fastest economic and population growth regions in the state and nation. Beaver Water District, Carroll-Boone Regional Water District, Madison County Regional Water District, and the Benton/Washington County Regional Public Water Authority rely on Beaver Lake as their primary water source to service nearly 500,000 customers across most of northwest Arkansas, and communities of eastern Oklahoma and southwest Missouri. Beaver Dam also provides hydroelectric power to approximately 100 power utilities in Arkansas, Kansas, Missouri, Oklahoma, Texas, and Louisiana. These utilities provide power to nearly 7 million people and businesses. In addition to drinking water supply and hydroelectric power generation Beaver Lake is vital to the local tourism industry being used by an estimated 2 million people annually.

For 31 years, the City of Fayetteville has contracted CH2M to provide operations and maintenance of the Paul R. Noland WRRF as a 'front-line' protection of water quality for the Northwest Arkansas region by removing water pollutants and nutrients from the White River prior to flowing into Beaver Lake Reservoir. In 2016, Paul R. Noland WRRF discharged 1.7 billion gallons of treated effluent to the White River.

Over those years of operations, CH2M, on behalf of the City of Fayetteville, has formed several partnerships with local and regional organizations with aim to protect the present and future of water quality in the White River and Beaver Lake Watershed. Three of these critical partnerships and the activities undertaken with them include:

- Beaver Water District (BWD) – A 2006 Beaver Lake Watershed Agreement drafted in partnership by BWD, City, Arkansas Department of Environmental Quality, and CH2M outlined strategic goals towards a net reduction of total phosphorus load into Beaver Lake by improvement made towards reducing both point source and non-point source nutrient and sediment loads.
- Watershed Conservation Resource Center (WCRC) – The WCRC uses natural channel design principles to improve streambank stability and reduce loss of bank soils to receiving streams. Large trees with intact root-wads, boulders, streambank gravel, sloped banks, and soil mattresses are all components used to construct a robust, strengthened riverbank capable of withstanding the potentially destructive forces of flood-stage stream flows.
- Cooperation with local watershed protection associations such as Beaver Watershed Alliance and Illinois River Watershed Partnership for installation of largest square footage Rain Gardens in Northwest Arkansas providing ecosystem buffering utilizing native vegetation uptake and soil infiltration of stormwater run-off within facility.

How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?

- Partnering with Beaver Water District, the drinking water counterpart, because of concerns over increases in nutrient loading into Beaver Lake, the Arkansas Department of Environmental Quality (ADEQ) has proposed a discharge limit for total phosphorus (TP) on the City's NPDES Permit of 0.5 mg/l, a reduction from the City's current limit of l mg/l. Recognizing that the City has a track record of maintaining the concentration of treated effluent below 0.5 mg/l and that the more stringent limit of 0.5 mg/l would cause significant additional costs to the city, CH2M and BWD worked on a series of actions that will allow the Paul R. Noland WRRF to maintain its NPDES discharge limit of 1 mg/l TP in exchange for the City conducting a program to reduce nonpoint source loadings of TP within the watershed. The agreement is based on the City's and BWD's commitment to show reductions of TP from nonpoint sources sufficient to offset the increased loading from the treatment plant allowed by the more liberal NPDES limit. The agreement was drafted, with agreement from ADEQ, and signed by both BWD and the City of Fayetteville in March 2006. It is still being honored today.

- In addition, CH2M also worked with BWD and ADEQ to draft regulations for the land application of water treatment residuals (WTR). Land application of WTR's is a beneficial reuse that protects available landfill space and works to reduce phosphorus in stormwater run-off by chemically binding excess to phosphorus available within the soil.
- White River Streambank Restoration Projects, partnership with the WCRC – Addressing an eroding riverbank problem that contributed up to 3,600 tons of sediment per year to the White River and Beaver Lake, which in turn contributed total-phosphorus loads up to 3,500 lbs per year; the WRRF and City staff work with the Water Conservation Resource Center on the funding and design for the first stream bank restoration in 2012. WRRF and City staff also help with preparing access to the site, coordinating use of heavy equipment, recruiting volunteers for tree planting, and providing year-round maintenance and monitoring of the reconstructed riverbank. In 2017 we partner with WCRC again on a restoration of another streambank that is upstream from the WRRF discharge location. This project addressed and eroding riverbank that contributing up to 4,400 tons of sediment per year, which contributed total-phosphorus loads up to 3,800 lbs per year to the White River and Beaver Lake.
- Rain Gardens Development for WRRFs – Project staff partnered with the Illinois River Watershed Partnership and Beaver Water District as participants in their Rain Garden Project. This grant program, funded through Arkansas Natural Resource Commission and the United States Environmental Protection Agency (US EPA), promotes enhancement of water quality in both the Illinois River and White River Watersheds through installation of rain gardens. Four rain gardens were installed at the Paul R Noland WRRF with Rain Garden Grant funds. The Noland rain gardens are a combined 7,200 square feet in area, while their stormwater run-off catchment area is nearly 125,000 square feet or just under 3 acres. Two rain gardens were installed at the West Side WRRF through the Rain Garden Project. These rain gardens measure just over 17,500 square feet in area; similarly, their stormwater run-off catchment area is over 200,000 square feet.

What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)

- There were no costs involved except for staff time on the development of the WTR application regulations and the agreements between the City and BWD. However, the WTR agreement produces minimal revenue stream for the City of Fayetteville.
- For the 2012 White River Streambank Restoration Project, the City of Fayetteville contributed $136,275 of the $352,000 total project costs; CH2M contributed staff time towards coordination of project site logistics, improvements to project site access, volunteer native vegetation planting, and post-construction inspections.
- For the 2017 White River Streambank Restoration Project, the City of Fayetteville contributed $195,705 of the $577,000 total project costs; CH2M contributed staff time towards coordination of project site logistics and post-construction inspections.

Did you partner with other stakeholders or organizations as a part of your implementation process?
Besides Beaver Water District (BWD), Watershed Conservation Resource Center (WCRC), Beaver Watershed Alliance, and Illinois River Watershed Partnership; we also work closely with other organizations to protect the precious water resources: Arkansas Department of Environmental Quality (ADEQ), Washington County Extension Services, Arkansas Natural Resource Commission, U.S. Environmental Protection Agency, Watershed Conservation Resource Center.

What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that? Gaining support from the public and Regulators to trust the merits of the ventures. Open communication and public education have been the keys to gain support and trust. Leveraging communication channels through other local organizations and partners, WRRF and City Staff often attended meeting or provided presentations at given opportunities to keep people informed, gather inputs, and responded to concerns.

Has “smart” information technology supported your implementation/optimization in this area? If yes, please describe.

- In addition to the above activities, CH2M and the City are constantly in search for better ways and technologies to improve the water quality. In 2007, the City was the first in the nation that purchased and installed Supersaturated Dissolved Oxygen Injector (SDOX) at the Paul R. Noland WRRF. The SDOX, produced by BlueInGreen, won the EPA innovative award in 2006. The SDOX provided greater reliability towards ensuring monthly permit requirements, even during challenging hot and dry summer conditions, and increased efficiency of dissolved oxygen delivery for post-treatment aeration and improvement of dissolved oxygen quality to White River.
- Again, in 2016, the Paul R. Noland WRRF is the first wastewater treatment plant that installed the Hyperconcentrated Ozonation (HyDOZ) System, a pioneering disinfection process provides high quality effluent disinfection while also providing additional benefits of maximizing dissolved oxygen quality and reduction of dissolved contaminants of emerging concern (CECs). The ribbon cutting for the new process occurred June 8, 2017, and representatives of the US EPA and Arkansas DEQ toured the Unit Process to view this new technology on June 19.

Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?

- The City of Fayetteville website, http://www.fayetteville-ar.gov/370/Wastewater-Treatment
- WRRF contact – Greg Weeks, CH2M Project Director, greg.weeks@ch2m.com, 479-443-3292

Measure What are you measuring?	**Targets** What was your goal/intended outcome?	**Outcomes** What were your actual outcomes?
Effluent water quality and phosphorus load to White River and Beaver Lake	1. Annual phosphorus concentrations no greater than 0.5 mg/L 2. Annual Effluent phosphorus load no greater than 9.49 tons. 3. Seasonal (Jul-Oct) Effluent phosphorus load no greater than 2.85 ton. 4. Seasonal (Jul-Oct) Effluent phosphorus maximum daily load no greater than 93.4 lbs.	All goals achieved annually since 2006; for 2016: 1. Effluent annual average phosphorus concentration was 0.3 mg/L –40% higher water quality than goal of 0.5 mg/L. 2. Effluent phosphorus load was 1.59 tons – achieved phosphorus load just under 17% of allowable goal. 3. Effluent phosphorus load was 0.91 tons – achieved phosphorus load just under 32% of allowable goal. 4. Effluent phosphorus daily max load was 47 lbs – achieved phosphorus load 50% of allowable goal.
Provide beneficial reuse for Beaver Water District (BWD) alum sludge (WTR)	Providing benefit of saving local landfill space; Provide City of Fayetteville additional annual revenue from land application operation.	In 2016: - 5,814 wet tons of WTR land applied; equivalent of over 250 semi-truck loads that would otherwise be landfilled. - $181,749 in revenue sent to City for accepting WTR from BWD. Since Nov 2012: Over 18,000 wet tons – over 800 semi-trucks – of WTR have been reused and not sent to landfill!
Installation of SDOX system to increase efficiency of	Improve efficiency of post-treatment aeration process	- Operational costs of SDOX provided annual savings of $30,000.

water treatment process and improve effluent quality to White River.	and improve effluent Dissolved Oxygen (DO) water quality to White River	- Monthly permit compliance for Dissolved Oxygen reliably achieved during system's 8+ years of operation; even during historically challenging hot, dry summer months improved effluent DO concentrations typically greater than 8.0 mg/L to White River.
Improving effluent water quality to White River with installation of HyDOZ Disinfection system utilizing dissolved ozone to achieve 1. Reliable effluent disinfection 2. Higher quality post-treatment aeration 3. Provide 'forward-looking' oxidative treatment of Contaminants of Emerging Concern (CEC's)	1.Provide reliable effluent disinfection 2. Improve post-treatment aeration dissolved oxygen concentrations 3. Improve effluent water quality through oxidative treatment of CEC's	1. The HyDOZ Disinfection system has been successfully operated and met fecal permit compliance for 16 months or since system start-up. 2. Annual average dissolved oxygen concentrations of effluent, just over 16 mg/L, to White River have improved by nearly 80% following HyDOZ start-up compared to a 2015 annual average dissolved oxygen effluent concentration of 9.4 mg/L 3. 2017 process sampling has measured several reductions in CEC's. Concentration of the insecticide DEET indicated a 40% reduction; concentrations of antibiotics such as sulfamethoxazole, trimethoprim and amoxicillin were reduced 78%, 93% & 95% respectively; trace concentrations of caffeine were measured being reduced by 97%!
Riverbank restoration to reduce sediment loads and resulting total phosphorus loads caused by erosion	2012 & 2017 White River Streambank Restoration Project: Restoration of 1,000 & 1,330 linear feet of highly eroding streambank respectively.	5 years after construction the stabilized bank has achieved a 99% reduction of erosion resulting in 99% reduction of sediment and total-phosphorus load into the White River and Beaver Lake. The 2012 & 2017 streambank restorations together can prevent nearly 8,000 tons of soil and 7,000 lbs of phosphorus nutrient from being released into the White River and Beaver Lake. In comparison, 7,000 lbs of total-phosphorus is approximately equivalent to 2 years of effluent discharge from the Noland WRRF to the White River.

Utility Description (combine all plants if a multi-site system)		
Utility Name: DC Water		
Type (e.g., single plant, regional system, multiple plants, collection system only, stormwater, etc.): Single plant		
Service Area (square miles): 725	Average Annual Daily Flow (MGD): 272	
Population Served: 2.2 million		
Location		
Street Address: 5000 Overlook Avenue SW		
City: Washington State: DC	Country: USA	
Zip Code/Country Code: 20032		
Contact Information		
Name: Pamela Mooring	Phone: 202-787-2089	Email: pmooring@dcwater.com

ORGANIZATIONAL CULTURE *(Not required for organizations adding additional activities to the previous recognition.)*

DC Water has an executive team and leadership that recognizes the value and absolute necessity of actively engaging both its internal and external stakeholders. The culture at DC Water is one that embraces innovation and promotes the discussion of new ideas. DC Water recognizes that, for good reason, the wastewater industry is very conservative in its efforts to protect the health and well-being of humans and the environment. We also recognize that innovation can occur in a manner which limits risks while improving treatment and efficiencies. In order to do this, the organization recognizes the need for a fully engaged and versatile workforce.

15 years ago, DC Water committed as an early founding member, to our participation in the National Biosolids Partnership Biosolids Environmental Management System, which emphasizes continual improvement. An early goal of the program was to change the perception of the product we produce from that of a waste to a product. Staff embraced this vision and made improvements to the Class B biosolids system that greatly improved the acceptability of this product, and engaged WEF in the conversation about changing the way we speak about our processes. WEF, through an initiative of the Residuals and biosolids committee, adopted the term "Water Resource Recovery Facility" to replace "Wastewater Treatment Facility". This forward thinking has helped pave the way for more biosolids products and has improved public acceptance.

5 years ago, DC Water has developed a 2020 vision program to set aggressive goals for the organization. These goals, which are the basis of individual employee goals, include training and engagement improvements, succession planning, workforce engagement, and community outreach. Recently, the executive team launched a Leadership Development program, where nominated employees are offered the opportunity to gain knowledge on how the organization runs in different departments. DC Water launched this program to ensure that an engaged workforce understands their value within the organization, and the pathway to leadership positions. In addition, DC Water has an innovation program that encourages and stimulates employees to develop new ideas that can improve financial stability, promote a safe working environment, and improve processes.

Employees feel empowered to make change at DC Water and in the greater world through encouragement to attend conference, publish papers, serve and chair committees in utility organization, and through recognition within the utility. Our most recent annual report highlighted individuals in the organization who have made a difference in the DC area, and common areas have screens that rotate images of ground breaking projects and the people who championed them. The workforce at DC Water is extremely engaged, and it has become a very desirable place to work, as it is recognized as a place where one can come, have his/her ideas recognized and implemented, and change the world for the better. This is a rare characteristic for a public utility.

At the very dawn of this workplace environment a decade ago, we set forth to change the way we treat and recover solids from our processes with the design, construction, and operation of the North America's first (and the world's largest) thermal hydrolysis/digestion/ combined heat and power project. This new-to-the-US technology was fully vetted with site visits in Europe, pilot testing in our labs, and collaborative research with academic partners both here in the US and in Europe before our board of directors rendered a decision to go forth with the project. To their credit, our board and the executive team allowed for the necessary international travel to occur in order to vet the technology, and then green lit the project based on the rare combination of both financial and environmental benefits. The results of this project are now, 2.5 years into operations, proving to be incredibly positive, both from the green energy produced (not emphasized for this application) and the exceptional soil amendment derived from the digesters – trademarked as Bloom soil amendment. None of this would have been possible without the culture of innovation at DC Water. Our new mantra – "*There is no such thing as waste, only wasted resources*".

BENEFICIAL BIOSOLIDS REUSE

DC Water has implemented a project that has transformed a waste product into a highly sought after resource – its trademarked Bloom soil amendment product. Through diligent outreach to the public and press, research with local universities, and implementation of groundbreaking technology, we now have a biosolids product that we sell to businesses and individuals who come with their own trucks and pick it up from our plant. This not only generates revenue,

but also a much larger savings over our other options, where we pay a firm to haul it away to farms in Virginia, exporting this asset out of the service area. Our goal is to use as much of this asset within the DC Water service area to generate revenue, save operating costs, and cure environmental problems in our urban area. We have a logo, a marketing plan, sales to date, a healthy relationship with the local press and environmental groups, and a bright outlook on the future of Bloom.

The District of Columbia Water and Sewer Authority (DC Water) operates the Blue Plains Advanced Resource Recovery Facility, the largest advanced wastewater treatment plant in the world with the capacity to treat an average flow of 270 mgd. DC Water provides wastewater collection and treatment services to more than 2 million customers in the metropolitan Washington, D.C., area. Blue Plains has been a leader in environment stewardship since the beginning of plant operations in 1938. With continual upgrades in response to community needs, Blue Plains has been a pacesetter in restoring the Potomac River, the Chesapeake Bay and their watersheds. DC Water has received awards for peak performance from the National Association of Clean Water Agencies for more than 10 consecutive years, and has received numerous awards for research and innovation from Water Environment Federation, National Association of Clean Water Agencies, the American Academy of Environmental Engineers, and the International Water Association.

The "project" for purposes of this award application narrative is called the DC Water Biosolids Program. This roughly $470 million capital investment has dramatically transformed the way in which wastewater solids are processed at Blue Plains and will greatly influence how they are managed within the United States, recovering a biosolids cake product that is economical and has greatly enhanced characteristics for beneficial reuse. In the past, we used lime stabilization to produce a Class B biosolids product for use in agriculture and reclamation work. In 2009 after an extensive study of options, DC Water decided to move forward with biosolids management program improvements, including digestion preceded by thermal hydrolysis. The project, completed in 2014, produces a digested, EQ Class A soil amendment, having converted half the organic matter to digester gas. This project alone will reduce our grid power draw at Blue Plains by over 40%, and reduce the overall carbon footprint of DC Water by over a third (approximately 57,000 metric tons per year) through green energy, reduced trucking, sequestration of carbon to the soil, and the avoidance of chemical fertilizer (which require great amounts of energy for production) use on farms.

The DC Water Board and executive management team early-on adopted a policy when it accepted responsibility for implementation of the NBP EMS program at Blue Plains. In doing so, DC Water committed to advocating for beneficial reuse, product recognition, and public engagement. Our public engagement has been critical to the success of our program, both when we were land applying Class B biosolids to farms in VA and MD, and now that we are promoting and selling product to landscapers, nurseries, and community gardens. Our relentless pursuit of the un-engaged urban user has led to a core belief within the DC urban ag community that the reuse of Bloom biosolids product is a sustainable and responsible duty to perform. We have our own demonstration garden at Blue Plains, and bees on top of the office building our team sits in, demonstrating to the urban users that we understand the importance of bees and healthy soils in an urban setting.

The business case for the project showed and is now proving to be true, that the $470M investment could be recovered within a reasonable amount of time with the nearly $28M per year savings from reduced hauling, self-produced power, lime elimination, and others. Our "do nothing" option would have cost $175M for refurbishment of the lime system, so the payback period for the difference is 12-15 yrs – reasonable for this sort of project.
We have a marketing plan for Bloom biosolids products created, and have engaged the local sols industry to the point that we have, since 1/1/17, sold approximately 3500 tons of product in various forms (fresh bloom, cured Bloom, and Bloom mulch mix). This has gone to landscapers, tree nurseries, garden centers, and to the National parks service. We have sold to over 50 different customers in two states and DC. Our goal for last year was 1000 tons (met that), for this year is 9000 tons (on target) and for next year is 20,000 tons.

DC Water is a founding member and fully certified participant in the NBP EMS program.

Staff has engaged diligently with the public through community garden meetings, local conferences, the press, and with individual meetings. We strongly believe that our outreach efforts have played a key role in the acceptance of our product, which has drawn zero complaints in the 6 months we have marketed the material.

We have developed several products for use, including a cured Bloom product, for use in wetland and other disturbed area restorations.

Management and the executive team have granted staff to this project to ensure we can continue our marketing efforts and transform this waste into a product.

Although the key decision-making criteria used in developing the DC Water Biosolids Program contain elements of economic analysis, they are also sustainability-oriented. This is the rare project that is both economical and environmentally beneficial, on a very large scale. Not only will the project save ~$28 million per year, it will also reduce our impact on the environment in very substantial ways. The criteria for the project include the following:

- Renewable Power and Energy Production. Increasing power rates in recent years are making digester gas more valuable for power production and in offsetting purchases from the power utility at Washington DC. The 10 to 14 megawatts produced by the new cogeneration system have major positive economic benefits. Also, using newly-enhanced combustion gas turbine and heat-recovery steam system technology provides overall CHP energy efficiency in excess of 65 percent.
- Climate Change Impacts. Reducing greenhouse gas (GHG) emissions from DC Water facilities is a major criterion for the program. Emission calculations show large reductions due to renewable power offsets, reduced trucking fuel use, and carbon sequestration in soils resulting in GHG reductions of 58,000 metric tonnes of CO2-equilvalents per year.
- Biosolids Product Quality. Class A cake material (about 30 % solids) greatly improves product sustainability from several standpoints – criteria include odor level, debris content, pathogen level, inability for pathogen-indicator reactivation-regrowth, product stability; as well as handling, storage, and transport characteristics.
- Reduced Biosolids Quantities. Biosolids minimization is greatly enhanced by the TH process and high-performance digestion, resulting in maximum conversion of carbon to methane and improved final dewatering, within minimum digester tank volumes. Over 50 percent reduction in trucking is anticipated.
- Digestion Performance and Site Efficiency. Maximum organic solids destruction along with maximum digester gas production is highly desirable within the least tankage volume and footprint while leaving space for expanded capacity in the future. Site constraints limit the new biosolids facilities to less than 2.5 hectares (6 acres), an extremely small footprint for such large-capacity systems.
- Capital Constraints and Economics. Economic analyses of the biosolids program have been developed to relate the cost impacts and cost savings over the years. The program is well-justified and well-supported by staff, management, and the Board of Directors.

How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?

- We engaged with every urban agriculture group and meeting in the DC area in the years leading up to the project implementation. We met with influential environmental groups and courted the press to come for tours so as to foster a better understanding of what we were trying to do and the benefits we would see from a successful implementation.

What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)

- Staff time, support from our board and executive team to engage with non-traditional stakeholders.

Did you partner with other stakeholders or organizations as a part of your implementation process?

- We sponsored a few local environmental and urban ag conferences, during which we sat on panels and made presentations.

What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?

- Trust within the urban ag community was critical. We engaged them through meetings and tours, and showed them our demonstration garden and results, and even host 5 hives of bees at our plant to show our commitment to urban agriculture. It was a simple act that required some convincing here at the plant (Risk Management was not initially a fan). But it has paid great dividends.

Has “smart” information technology supported your implementation/optimization in this area? If yes, please describe.

- We do gather a lot of data in the field through our field inspectors, including odor data which has helped us fix things at the plant that caused odor inconsistency issues. A product must be consistent and predictable, and the filed olfactometer (odor) data was critical in improving product quality.

Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?

- We have a web site www.bloomsoil.com – please check it out. Also, please see our larger website at www.dcwater.com.

Measure What are you measuring?	**Targets** What was your goal/intended outcome?	**Outcomes** What were your actual outcomes?
Percent of biosolids beneficially used vs. total volume produced on an annual basis	100%	100%
Demonstrated performance against projected performance in business case (e.g., actual versus projected biosolids volume acquired for soil amendment by agricultural producers)	100%	100% (including urban ag)
Increase in agricultural or silviculture growth yields	10%	Studies underway using our Bloom product in an urban ag setting
Increase in improved soil characteristics resulting from biosolids amended soils	Increased carbon, cation exchange capacity, pH, iron content, nutrients, etc.	Studies underway using our Bloom product in an urban ag setting
Increased use in an urban setting	2016 – 1,000 tons 2017 – 9,000 tons 2018 – 20,000 tons	2016 – met goal 2017 – on target

Utility Description (combine all plants if a multi-site system)		
Utility Name: Gwinnett County Department of Water Resources		
Type (e.g., single plant, regional system, multiple plants, collection system only, stormwater, etc.): Multiple plants		
Service Area (square miles): 437		Average Annual Daily Flow (MGD): 68
Population Served: 895,823 (2015 U.S. Census)		
Location		
Street Address: 684 Winder Highway		
City: Lawrenceville	State: GA	Country: U.S.
Zip Code/Country Code: 30045		
Contact Information		
Name: Tyler Richards	Phone: 678-376-6923	Email: tyler.richards@gwinnettcounty.com

ORGANIZATIONAL CULTURE *(Not required for organizations adding additional activities to the previous recognition.)*

COMMUNITY PARTNERING AND ENGAGEMENT

The Gwinnett County Department of Water Resources (DWR) is an integral part of our growing and thriving community. Our mission is "Superior Water Services at an Excellent Value." The Services referred to in the mission are more than just delivering clean water and treating wastewater. Our Services help the County and the various communities meet their objective of making Gwinnett a great place to live. Accomplishing this takes a lot of communication and outreach.

Over the years, the Gwinnett County Department of Water Resources (DWR) has developed a number of initiatives to facilitate Community Partner and Engagement. Since 2011, the Outreach Section has partnered with numerous groups for environmental education, specifically the Gwinnett County Public Schools. In 2015, the department brought on a Communications Manager/Public Information Officer to further increase community partnerships and engagement. This Communications Section includes a Community Outreach Manager, Educational Program Manager and additional support staff to further bolster partnerships and engagements.

I. Partnerships with County Departments

DWR partners with County departments to ensure that our mission is achieved. Public education partnerships serve to promote water conservation, environmental stewardship through stream cleanups, proper septic tank maintenance and appreciation for our water resources infrastructure and staff. In addition, we need a knowledgeable community that understands how important DWR is to the community, environment and economy. DWR's established partnerships with County departments include:

<u>Parks and Recreation</u>

- Stream and wetland cleanups and watershed improvement projects to enhance parks and other public spaces.
- Walking trail connections through watershed and sewer extension projects (examples: Beaver Ruin Wetland and Middle Yellow River Sewer Extension)

<u>UGS Extension Services</u>

- Environmental Education Workshop Partnerships

<u>Health and Human Services</u>

- Partnership with Senior Services to identify needy seniors and assist them with home leak detection and bill pay.
- Presentations to senior groups about reducing leaks, bill adjustments and the water system.

<u>Environmental and Heritage Center</u>

- Educational water displays in center and coordination of waste water facility tours for school groups

Libraries

- Community outreach and environmental education workshops

Volunteer Gwinnett

- Community outreach and involvement

Planning and Development

- Inspection and education collaboration to enhance public spaces
- Partnered to incorporate green infrastructure requirements into Gwinnett County Stormwater Management Manual

Fire and Emergency Services/Police

- Education to enhance public spaces

The main resource required for Partnerships with County Departments is staff. The personal involvement of staff is what makes partnerships with other county departments successful.

The most critical obstacle that DWR overcame with Partnerships with County Departments was staff. To overcome this obstacle, DWR added a Community Outreach Manager who manages DWR's involvement and cooperative work with the various departments.

II. Partnerships with Other Organizations

In addition to these internal county department partnerships, DWR works closely with two other organizations in the fulfillment of their mutual goals.

- Gwinnett County Public Schools (GCPS): This long-term relationship has provided environmental education for close to 40,000 elementary and middle school students since 2011 through DWRs "Water on Wheels" education program. The grade-level programs are created to ensure DWR assists teachers in meeting the GCPS AKS standards (Academic Knowledge and Skills), while promoting the protection, conservation and value of water.

  DWRs high school and college career orientation and intern programs include both staff participation at Career Days, as well as both paid and unpaid internship opportunities for students. DWRs inaugural internship program with the Gwinnett School of Math, Science, and Technology saw three seniors participate in this opportunity.

  The Garner Creek Restoration project will be constructed at the Parkview High School. High School students and faculty are participating in the design and have collected invertebrate and other stream data for baseline conditions.

  In addition to the close working relationship with Gwinnett County Public Schools, DWR also has connections with the numerous colleges and universities in the area. The DWR college internship program has been extremely successful as a workforce development tool, with 29 interns in the past two years. Of those, eight are currently interns, eight were hired into full-time positions at DWR, five returned to school and three went on to other positions within the water industry.

- Gwinnett Clean and Beautiful: In this co-branded partnership, both organizations focus on inspiring behavior changes to increase environmental stewardship, prevent litter and graffiti, reduce waste and increase recycling. Public participation programs include Adopt-A-Stream, Stormwater Protectors (a storm drain stenciling program), stream cleanups and workshops. This partnership was recently recognized by the Georgia Department of Natural Resources Environmental Protection Division with the 2016 Watershed Award for the partnership's watershed efforts.

Other partnership organizations include:

Gwinnett County Health Department	Public education and engagement on water quality through proper septic tank maintenance and management
NAMAR (Northeast Atlanta Metro Association of Realtors)	Partnership to educate Realtors on septic tank maintenance and management (current) and BMPs (future).
Yellow River Water Trail	Partnership and community engagement on stream cleanups along the Yellow River
Upper Chattahoochee Basin Group	Formalized Partnership with 2 other Counties and 1 City that also get drinking water from lake Lanier to collects data on tributary nutrient loading to the Lake.

The main resource required for Partnerships with Other Organizations is staff. The personal involvement of staff is what makes partnerships with other organizations successful.

The most critical obstacle that DWR overcame with Partnerships with Other Organizations was staff. To overcome this obstacle, DWR hires two college-age interns each school year to help provide the in-school programs for GCPS. They work under the direction of the Education Program Manager. Another intern works with the Community Outreach Manager to help facilitate the work with Gwinnett Clean & Beautiful, as well as the other organizations.

III. Project Partnerships

Two recent partnerships include a project with the Georgia Environmental Protection Division (EPD), Atlanta Regional Commission, and the Lake Lanier Homeowners Association that will look at the impact of septic systems located on properties on Lake Lanier – Gwinnett County's water source. Gwinnett County is going to install low pressure sewer, remove septic tanks, and determine the impact on the Lake. This project will involve a number of community meetings to review the data and discuss implications on water quality in the lake.

The second project is with AT&T, CH2M and QualComm. As part of the Global Cities Team Challenge, DWR will conduct a Smart Cities Pilot Project that will involve installing digital smart meters in a pilot area. The technology will track water as it moves through the system, allowing DWR to find even small leaks in the system and prevent loss of water. As part of this pilot project, DWR will test different types of smart meters for reliability and accuracy. The initial public meeting for this project was held in June 2017. Residents in the pilot area have responded positively and are looking forward to seeing the results.

In the past 3 years six sewer extension or water and sewer rehab projects have been initiated in partnership with various Cities in Gwinnett to promote redevelopment.

The main resources required for Project Partnerships are staff and finances.

The most critical obstacles that that DWR overcame with Project Partnerships were staff and finances. Both obstacles were overcome through the pooling of resources from the various project partners.

III. Engagements

DWRs communications programs include both traditional and new media to increase community engagement. The underlying messages for all communications are: (1) water is a precious resource that should be protected and conserved, and every resident can play a part in doing this and (2) DWR provides superior water services at an excellent

and is a recognized leader in the water industry. Each month educational articles are sent to all residents in the Gwinnett County Connection newsletter (which is included in water bills). Educational information and involvement opportunities are disseminated through other communications channels, such as the "News for Neighborhoods" email newsletter for residents and the "GC Insider" email newsletter for county employees.

DWR conducts numerous workshops each year. The format for these workshops range from lecture style to hands-on "Fix-a-Leak" where residents can talk with a plumber. DWR staff are available after each workshop to speak with residents about any questions or concerns they may have about water in Gwinnett County.

While the County does not have a social media presence, DWR takes advantage of digital media through several venues. First is the website. Updated information on events, workshops, educational programs and other current topics are featured on the website. Vanity URLs enable residents to quickly locate information on conservation (www.dwrconserve.com) and FOG - fats, oils, and grease (www.unclogthefog.com). Second, through the self-publish portions of the Gwinnett Daily Post and Patch, workshops and events are announced.

Media relations with local newspapers, TV and radio have been enhanced over the past several years, with DWR taking advantage of every opportunity to position the utility as a critical asset to the community. This has resulted in a number of positive stories in the media about DWR, showcasing the Department's technology (article about Sewer Line Rapid Assessment Tool for detecting clogs), education (article about the presentation of the "Scarbrough Water Award" to students for their science fair project) and community involvement areas (watershed cleanup events), among others.

Another DWR engagement with the community is a program that works with apartment management firms on conservation (toilet rebate programs) and protection (FOG/Flushable education to residents).

DWR is working on programs that would provide stream clean up "kits" for HOAs and neighborhoods, expansion the Adopt-A-Stream program, increased involvement at Dog Parks (for nonpoint source pollution education) and other events that will allow us to further engage with our community.

The main resource required for Engagements was staff.

This obstacle was overcome by bolstering the department with additional personnel. Having a team within DWR that was dedicated to communicating and engaging with the community through various channels has resulted in a more knowledgeable and educated populace.

While the department does not have social media – as mentioned above – DWR does monitor social media, specifically Facebook and Twitter for references to DWR. Over the past 12-18 months, the comments surrounding the department show that residents have become more knowledgeable about what the department does to provide superior water service at an excellent value. (This data is tracked, and is more qualitative than quantitative.)

Measure What are you measuring?	**Targets** What was your goal/intended outcome?	**Outcomes** What were your actual outcomes?
Number of water/sewer rehab projects completed with cities within Gwinnett	Promote redevelopment through rehab projects at six locations.	Provided infrastructure for redevelopment at six locations.
Number of formal recognition of partnership by outside group	Increase community involvement in protect the water in Gwinnett.	DWR, along with Clean and Beautiful, were recognized with the 2016 Watershed Award for the partnership's watershed efforts. The two organizations teamed up for 4 formal clean-up events, where over 700 individuals

		participated in picking up close to 9,000 pounds of trash.
Website hits and newsletters	Provide education and become a resource for residents.	DWR provides 33 articles for governmental various newsletters in Gwinnett County (county and city). The DWR pages of the County website see a monthly average of 185,000 hits.
Outreach events	An increase in events, resulting in more interactions and engagement with the community.	In 2016, DWR either hosted or participated in 45 community outreach events. These ranged from tabling events to workshops to Open Houses. These interactions gave residents an opportunity to speak in person with someone from the water department and helped build support for water and water services. In 2017, DWR is looking to increase the number of events where we participate by approximately 25%.
Measure What are you measuring?	**Targets** What was your goal/intended outcome?	**Outcomes** What were your actual outcomes?
Media Contacts	DWR is in a shared media market (metro-Atlanta). This can make it difficult for DWR to provide educational information for residents through this outlet. The goal was to increase hyper-local media interactions in Gwinnett County so DWR could increase engagement with our stakeholders.	DWR PIO and management have been proactive in promoting the utility as a Utility of the Future by ensuring Press Releases are distributed for initiatives. Management and PIO have also made themselves available for interviews and other interactions with media. In 2016, DWR issued 9 Press Releases. To date in 2017, 12 have been issued.
Water Quality Improvement through Partnership	Increase Real Estate Agent knowledge about septic tank maintenance, so this information could be passed along to homeowners.	A partnership with NAMAR (Northeast Atlanta metro Association of Realtors) has been created where DWR offers septic tank maintenance workshops (for CEUs) for realtors. Two workshops have been held with ~70 realtors educated.
Water Quality Improvement through Partnership	Partnership with Georgia EPD, Atlanta Regional Commission and the Lake Lanier Homeowners Association on a project to Improve water quality in Lake Lanier, near DWRs water intake system by replacing septic systems on surrounding lots. Target is 180 homes.	This project is currently in process, with water sampling still being conducted. Initial meetings with partners have been positive. Public outreach meetings with residents are scheduled to begin July 2017.

Measure *What are you measuring?*	**Targets** *What was your goal/intended outcome?*	**Outcomes** *What were your actual outcomes?*
Number of students engaged through partnership with Gwinnett County Public Schools	To increase in-school interactions and engagements by 25% over the 2015-2016 school year.	In-school interactions and engagements increased by 32%. For the 2015-16 school year the program engaged 8,250 students. For the 2016-17 school year, 10,900 students were engaged.
Number of toilets replaced/ volume of water conserved	Engage customers through workshops, website, emails and other communications venues to encourage conservation through the replacement of older toilets.	In 2016, 1,192 toilets were replaced with an estimated 8.7 million gallons conserved.
Water conserved and leaks detected through Pilot Project Partnership	(1) Community engagement on water conservation utilizing new technology (digital smart meters) for leak detection. (2) Actual volume of water conserved. Pilot area is 500 homes.	This project is currently in process, with meter installation occurring June 2017. Public meeting was held with community in the pilot area. Residents responded positively to the pilot concept.

King County, WA

2017
- ★ Beneficial Biosolids Reuse

2016
- ★ Organizational Culture
- ★ Energy Efficiency
- ★ Energy Generation & Recovery

WATER RESOURCES UTILITY OF THE FUTURE TODAY

Utility Description (combine all plants if a multi-site system)		
Utility Name: King County Wastewater Treatment Division		
Type (e.g., single plant, regional system, multiple plants, collection system only, stormwater, etc.): Regional System		
Service Area (square miles): 424 square miles	Average Annual Daily Flow (MGD): 200 mgd	
Population Served: 1.6 million		
Location		
Street Address: 201 South Jackson Street, Suite 500		
City: Seattle State: WA	Country: USA	
Zip Code/Country Code: 98104		
Contact Information		
Name: Sandra Kilroy	Phone: 206-477-4531	Email: Sandra.kilroy@kingcounty.gov

ORGANIZATIONAL CULTURE *(Not required for organizations adding additional activities to the previous recognition.)*

BENEFICIAL BIOSOLIDS USE

King County's Wastewater Treatment Division (WTD) produces on average 122,000 wet tons of class B biosolids annually. This number is expected to rise as population continues to grow steadily in our region. WTD has a goal of 100 percent beneficial use of biosolids and began beneficially using our biosolids through land application in 1973. Over many decades we have built strong partnerships and a solid reputation with universities and key agriculture and forest landowners. In 2012, we branded our biosolids as Loop® with a promotional tag line of "*Turn your dirt around*." The branding effort has provided a positive, visually appealing communication platform to help not only with marketing of the product, but also with general education and awareness among the local and regional community. Along with the goal of beneficially using 100 percent of biosolids, WTD has goals related to strategic climate action and equity and social justice. Land application of Loop helped WTD attain the goal of carbon neutrality in our operations by sequestering 41,092 metric tons of CO_2. Loop also helps advance WTD goals for equity and social justice through partnerships with tilth organizations, environmental groups, and even food banks. By supplying Loop-based compost for P-Patches and small urban farms, and providing language and engagement access in our outreach and educational activities, we help build healthy communities by engaging culturally and ethnically diverse neighborhoods in producing healthy food. Our program is successfully using 100 percent of Loop biosolids as a fertilizer and soil amendment. Despite success with our current program, market changes and sustainability drivers motivate WTD to continually evaluate alternative markets and biosolids products. As such, we just launched a 20 year strategic planning effort to improve the resiliency of our program and further benefit our community.

How did you go about implementing the programs that you described in your Overview Paragraph?

Our biosolids program began with a partnership between the University of Washington (UW) and the Washington State Department of Natural Resources (WDNR). Liquid biosolids were applied to forests and used for land reclamation to restore old mine sites. The research demonstrated the environmental benefits of using biosolids as a fertilizer and soil amendment, especially for soil health and tree growth. The research lead to a partnership between Weyerhaeuser and WTD to apply biosolids at working forests. Our collaboration has been innovative and experimental. We contract with a small company called Ramco that specializes in biosolids application. We originally applied biosolids through a liquid applicator, but through our partnership with Ramco, we developed machinery that could maneuver the forest trails and apply a dry material, lowering our hauling costs, improving precision and aiding aesthetics. The forestry program has withstood three land ownership changes. We have successfully demonstrated the value of biosolids application and maintained our contract with each new landowner. WTD currently has contracts with both WDNR and now Campbell Global (who took ownership of the private forest in 2016). We apply Loop to an average of 300 acres/year on WDNR land, which spans a total of 30,000 permitted acres and to 1,000 acres/year on Campbell Global forestland which contains 60,000 total permitted acres.

In the 1990s, shortly after our forestry program was established, we began our agriculture program, developing our partnerships with farmers in eastern Washington – a four hour drive from Seattle. Farmers actually approached King County as a potential biosolids supplier. After the first field demonstrations, the demand for biosolids from wheat farmers and hops growers increased. Farmers using biosolids became community spokespersons. WTD began to focus on building large capacity, community-supported agriculture projects through contracts with two local agriculture companies: Boulder Park Inc. and Natural Selection Farms. These companies serve as wholesale suppliers to hundreds of individual farmers. Our partnership with each operates differently, lending to the need for flexibility and adaptability when building a sustainable program. Our agriculture project at Boulder Park has grown from an original five farmers to over 100 farmers and now includes contracts with 30 local municipalities for the distribution of their material in addition to ours. Our biosolids application includes over 90,000 acres of permitted land. The success from building these partnerships has been instrumental for our ability to consistently reuse 100 percent of Loop.

To further diversify our market we have partnered with a local composter, GroCo Inc., which composts biosolids with sawdust to make commercially-available GroCo compost. GroCo compost has enriched Pacific Northwest landscapes for decades and is used widely by commercial landscapers.

Did you partner with other stakeholders or organizations as part of your implementation process?

Our strong community partnerships helped created both our agriculture and forestry programs and are integral to our success in fostering community support. King County began to build community outreach and education early in order to gain support for the continuation of the land application program. Our forestry program includes a 50-year agreement that brings King County, land conservation organization Mountains to Sound Greenway Trust, University of Washington, Weyerhaeuser and WDNR together to enhance the natural greenways between Puget Sound and the Cascade Mountain range where biosolids are applied. Through this agreement we have the support of state agencies and local non-profits that provide outreach and education to the public.

We worked with the farmers to build community support and education regarding the benefits of Biosolids to soil and crop yields by bringing in the farmers who were using the biosolids to talk about their experiences. We recognized that outside government could not "sell" a product without the endorsement of local users.

Within King County, we have worked to build support for local use by sending Loop to a private composter to create a local product, GroCo compost. WTD uses GroCo in education programming and at outreach events, as well as on a demonstration farm at one of our treatment plants, through a partnership with urban ecology organizations DIRT Corps and Tilth Alliance and theKing Conservation District. The demonstration farm displays the benefits of using recycled resources, provides an educational resource, and grows enough food to donate over 3,000 pounds of food per year to the local food bank. WTD also supports urban agriculture and local community gardens through additional partnerships with King Conservation District. We have even hosted numerous dining events, such employee luncheons and donating food to the King County CHOMP Festival fundraising dinner, where sustainable local food production was emphasized and participants enjoyed eating meals from produce grown with GroCo compost made with Loop (and recycled water).

WTD participates in many local events such as the Northwest Flower and Garden show, where we won an award for the 2016 Outstanding Educational Booth. WTD also has an extensive education program that offers treatment plant tours and in classroom education at every level, from grade schools to university.

As population grew, we recognized that public perception of biosolids, specifically low awareness and prevalent misinformation, was a significant factor in acceptance of biosolids and land application. WTD embarked on a branding and marketing effort in 2011. The Loop® brand was rolled out in 2012 and included the name, the infinity symbol and the tag line "Turn your dirt around." The primary goal of the branding effort was to increase awareness and promote acceptance of King County's biosolids. Branding provided a platform to communicate about biosolids and a means to market our product. Loop's truck hauling fleet is now comprised of clean, beautiful trucks that serve as rolling billboards, instead of un-marked trucks that hid what was inside. The branded content includes a suite of videos, beautiful visual communication tools, and positive messages that make it easy for staff to communicate effectively about biosolids to target audiences. Employee awareness of Loop is almost 100 percent, and pride in the product is high for both WTD staff and Loop customers.

In 2016, the first brand evaluation was conducted to identify areas for improvement and evaluate performance of the brand. The brand evaluation included:

- Analysis of brand alignment with division and biosolids program mission and strategic objectives, including strategies and tactics used to promote the brand
- Stakeholder interviews
- Market research to segment the market and identify target audiences and messages, general research on biosolids awareness, support, and interest, and a media test of the Loop videos.

- Website and social media analytics to analyze behavior and engagement

As a result of the brand evaluation, gaps in communication strategies and tools were identified and a new set of (not yet released) Loop videos was created specifically to answer key questions for target audiences. A marketing plan was developed for the video campaign that focuses uses both inbound and outbound marketing tactics, such as low cost paid advertising via social media, email campaigns, and leveraging partner networks. In addition, the biosolids websites are undergoing revision, and improvements are being made to the Loop brand platform and messaging.

Through our program, we have been able to achieve three WTD goals: Build a sustainable and resilient future; Educate and engage customers; and Advance resource recycling. While resource recycling is often a main goal of wastewater utilities, the success of our program is in part due to our continual emphasis on community partnerships, communications and enhancing the communities we serve. Today, we are in the process of a creating a new 20-year strategic plan for biosolids. Our objectives are to continue to diversify our markets, build resiliency into our system, and address some of the physical and environmental challenges in hauling our biosolids long distances over steep mountain passes. This current planning effort will analyze the current risks facing the program and the capital and policy alternatives for continuing with Class B product as well as benefits/costs to moving to a Class A product. The strategic plan is projected to be completed in June of 2018.

Has “smart” information technology supported your implementation/optimization in this area?

Smart information technology has not been a large part of our biosolids program. We have deployed smart technology on our hauling trucks as part of our energy reduction/climate action to help us reduce fuel use, however that is not directly related the beneficial use goals.

What type and amount of resources were needed to support implementation?

Outside of operations where our Loop is produced, we have a team of six staff (and four external contractors) who are fully dedicated to managing the permitting, distribution, application, and communication requirements of the program. This staffing level has been critical to our success. This allows us to provide excellent customer service to our Loop users as well as fully engage in community and education activities. Operating costs are offset through rate payer fees and sale of biosolids. Farmers and foresters pay for the nutrient value of the biosolids they receive. The fee charged is competitive to commercial fertilizers. We charge $7.50 per dry ton or $23 per acre. We received $243,500 in revenue in 2016 from the sale of our biosolids for its nutrient value.

Where could other utilities go to find additional information on this Activity?

The Loop Biosolids website is a platform for the Loop brand and offers positive, factual, information and videos about the Loop product and its partners.
http://www.loopforyoursoil.com

The WTD biosolids website is currently being re-populated with new branded content, and will focus on our programs in agriculture, forestry, gardens, as well as resources and data.
http://www.kingcounty.gov/services/environment/wastewater/resource-recovery/Loop-Biosolids.aspx

Measure What are you measuring?	**Targets** What was your goal/intended outcome?	**Outcomes** What were your actual outcomes?
Distribution of Biosolids	100% distribution of biosolids for beneficial use.	We consistently meet our target of 100% distribution for beneficial use.

Carbon Neutrality	Tons of carbon sequestered through Loop application. WTD operations carbon neutral by 2017. WTD as a whole agency carbon neutral by 2025.	2016 – biosolids use sequestered 41,092 metric tons CO2. Met the carbon neutral operations goal in 2016. Working towards consistency in meeting goal year after year and achieving the broader carbon neutral goal by 2025.
Equity and Social Justice and Community Engagement	Community outreach events	2016 participated in over 6 community outreach events including partnerships with local foodbanks
Competitive market value of Loop Biosolids	Maintain competitive value of Loop biosolids as a soil amendment and fertilizer	Current chemical fertilizer value is at $30 per acre, we have kept our price at $23 per acre to maintain competitiveness.
Acres permitted for application	Continual increase in number of acres permitted/available for application	Permitting 160 new acres in 2017 with the availability for expansion in 2018.
Customers	Continual increase in number of customers	For 2017 we will increase our customer base by 7 farmers.

Utility Description (combine all plants if a multi-site system)		
Utility Name: Miami-Dade Water & Sewer Department		
Type (e.g., single plant, regional system, multiple plants, collection system only, stormwater, etc.): Multiple Plants (3 large and 5 Small WTP's plus 3 large WWTP's); a large Water Distribution System (8,206 mi of water mains) and a large wastewater collection system (1,047 PS's plus 6,309 miles of pipelines).		
Service Area (square miles): 400 square miles	Average Annual Daily Flow (MGD): 290 MGD	
Population Served: 2.7 million people		
Location		
Street Address: 3071 SW 38th Avenue		
City: Miami State: FL	Country: United States	
Zip Code/Country Code: 33146		
Contact Information		
Name: Hardeep Anand, P.E.	Phone: 786-552-8571	Email: hardeep.anand@miamidade.gov

ORGANIZATIONAL CULTURE *(Not required for organizations adding additional activities to the previous recognition.)*

BENEFICIAL BIOSOLIDS USE

The Miami-Dade Water & Sewer Department has historically advocated and engaged in the beneficial use of all its biosolids. Historically, this has taken the form of land application of predominantly Class B dewatered and partially solar dried biosolids at our South District and Central District Wastewater Treatment Plants. Additionally, a fraction of our biosolids material has been processed and distributed as Class AA compost from our South District Wastewater Treatment Plant. Due to increasing regulatory requirements, decreased availability in Class B biosolids land application site, and continued interest in land and environmental stewardship, the utility has engaged in the development of a Class AA biosolids process for all biosolids produced within our facilities. The project as currently envisioned would be for the pre- or post-digestion thermal treatment of biosolids to achieve Class AA, and to distribute the final product for beneficial use. This project has taken the form of a Design-Build, Finance, Operate and Maintain solicitation that will be advertised later this year.

How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?

- The planning phase for this project began more than 15 years ago.
- The project has been the subject and recommendation of a biosolids master plan completed in 2008, and it was included in numerous biosolids technology evaluations since.
- Based on budgetary constraints in the past, the project solicitation has experienced delays. But the project goals and needs have remained critical to the utility in achieving a sustainable and resilient utility.

What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)

- This project has been handled internally by a small group of process engineers with the support of the utility's operations, maintenance, financial, procurement and legal staff.
- Outside engineering consultants have been employed to conduct technology evaluations, design reports, and assist in the creation of solicitation documents and master plans.
- The utility has invested more than $2 million in project development efforts up to date.
- The utility expects the final solicitation to cost approximately $400 million over 20 years.

Did you partner with other stakeholders or organizations as a part of your implementation process?

- The utility has engaged with key stakeholders, including:
  - related regulatory agencies
  - agriculture community
  - biosolids processing and handling community

What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?

- Due to the variety of technologies that exist in the realm of biosolids processing, technology evaluation has been one of the most exciting and painstaking parts of project development.
- Comparison of different technologies with varying resource requirements, input conditions and end products in a dynamic regulatory and product marketing landscape has been both exhilarating and challenging to analyze.

Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.

- Upon narrowing down to three technology groups (composting, thermal hydrolysis and thermal drying), we used environmental, social and economic factors in a triple bottom line-weighted matrix to evaluate and select the most viable project alternatives.
- Out next step will be to employ a formal sustainable infrastructure rating system, such as Envision, to evaluate the Biosolids Processing Facility Project.

Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?

- Other utilities can obtain additional information on the Miami-Dade Water & Sewer Biosolids Processing Facility Project by contacting Manuel E. Moncholí, Manuel.Moncholi@miamidade.gov.

Measure What are you measuring?	**Targets** What was your goal/intended outcome?	**Outcomes** What were your actual outcomes?
Biosolids Quality	Class AA Biosolids	Pending solicitation, processing facility construction and operation
Biosolids Processing Cost	Most cost-effective price $/wet ton (pending solicitation, price to be determined)	Pending solicitation
Processing and Marketing capacity	• Ability to process and market all biosolids material promptly • Approximately 400 wet tons per day	• Pending solicitation • Currently being accomplished on a temporary basis for a portion of the material under a processing/hauling contract

COMMUNITY PARTNERING & ENGAGEMENT

The Miami-Dade Water & Sewer Department recognizes the importance of communicating with and engaging utility customers, other residents and community partners to maintain mutually beneficial relationships as well as to gain support in its efforts to advance the Utility of the Future concept. To this end, here are some key examples of the utility's efforts:

- Customer Initiatives: In 2016 and early 2017, the utility launched an interactive self-service application and web-based chat option to provide customers 24-hour access to their water utility bill with greater ease and personalized details. These include historical usage and trend, payment history and transactional tools to establish or stop service as well as the ability to update account information. While access to information and services has always been available through the traditional methods, to expand reach and engage Millennial customers, the chat option was vital for providing answers to basic questions and payment extensions without having to speak with a representative. Another benefit of the chat option is that representatives can focus on assisting those customers with more complex questions.
- Conservation: Educating customers and other residents on water conservation, water restrictions and other sustainability programs and services offered by the utility is a core function. The utility's Water Conservation Program offers residents incentives to reduce indoor water use by providing rebates toward the purchase of high-efficiency toilets, faucets and showerheads. Rebates to reduce outdoor water use are available through landscape irrigation assessment rebates.
- Partnership: With the objective of advancing utility infrastructure resiliency efforts, the Miami-Dade Water & Sewer Department, along with the American Society of Civil Engineers Miami-Dade Branch, the Florida Section of the American Water Works Association, and the Florida Engineering Society, have established the "Resilient Utility Coalition" (RUC). The coalition seeks to invite utility members to come together to develop joint strategies and actions to achieve resiliency within their organizations. The RUC's primary objectives include: advancing resiliency efforts within South Florida utilities, providing leadership and value to members, and developing adaptation strategies and decision-making tools for utilities. More than 20 utilities in South Florida have joined the RUC.
- Public Affairs: The Miami-Dade Water & Sewer Department Public Affairs Section initiated the inaugural Drinking Water Week Photo Contest in 2016: to grow the utility's followers on Facebook, Twitter and Instagram; to increase

and enhance the level of citizen participation; and to increase the understanding of the utility's programs and construction projects. During the submission process, participants were required to use the tag #miamidadewater. The photo contest had a two-prong objective: Contest participants were actively thinking about the importance of the safe drinking water that the utility provides on daily basis, while the trending tag and contest images helped in gaining new active followers to the utility's social media sites.

How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?

- Customer Initiatives: To implement the self-service application, the utility reached out to the Miami-Dade Information Technology Department (ITD) to create the scope and development of the self-service application given the current platform and available tools.
- Conservation: The utility developed a goal-based conservation program using software developed by the State of Florida. The Program implements best management practices (BMPs) with each BMP saving a specific number of gallons per day. The number of BMPs implemented are based on the annual budget developed for the Program. In addition, the program includes an education and outreach component informing the community about the importance of water conservation, services provided by the utility and the high-quality drinking water available to residents.
  Education and outreach requests are made by various organizations, including homeowner associations, county agencies, municipalities, county commissioners, schools, colleges, universities and not-for-profit groups to inform residents about the program.
  The annual Every Drop Counts Poster Contest encourages elementary school students to create posters depicting the importance of water conservation. Lightbulb and showerhead exchanges are conducted during the year, allowing residents to exchange their incandescent lightbulbs and water wasting showerheads for energy efficient Compact Fluorescent Lamps and high-efficiency showerheads for free.
  By providing these services, Miami-Dade Water & Sewer can continue to offer superior service in a sustainable manner.
- Partnership: RUC held a Visioning Workshop in August 2016 to launch the coalition and establish a guiding framework including mission, vision and objectives. The visioning workshop was hosted with support from the Environmental Protection Agency, U.S. Department of Energy and other entities. Since that time, various events have been held and the coalition has continued to expand.
- Public Affairs: The utility promoted the inaugural Drinking Water Week Photo Contest through its website as well as Facebook (including boosted ad placement), Twitter and Instagram. The utility also used more traditional means for promoting the contest, including radio ads and press releases.

What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)

- Customer Initiatives: ITD secured Java developers with specific skill sets from both in-house and outside consulting resources.
- Conservation: A Water Use Efficiency Manager was hired to oversee implementation of the program, as well as two staff members in Clerk 1 and Clerk 3 positions, to assist processing rebates, administering the annual poster contest and other special projects. A paid intern is also on staff to assist with data analysis. Annual budgets are based on the activity anticipated to be completed under the program, including water conservation rebates, water loss reduction efforts and special projects.
- Partnership: The founding of RUC required financial resources in the way of sponsorships and volunteer staff hours.
- Public Affairs: Financial resources were necessary to create and order radio spots on local stations. Staff time was accounted for with the creation of the press release and Social Media posts.

Did you partner with other stakeholders or organizations as a part of your implementation process?

- Customer Initiatives: Partnering with the ITD and IBM was essential in launching the two self-service solutions.
- Conservation: The utility partners with Dream in Green (DIG), a local not-for-profit environmental educational organization, to educate students and residents about the water/energy nexus. Workshops are held throughout Miami-Dade County at local schools and in municipalities that request a workshop. A kit is provided to each participant, which includes a high-efficiency showerhead, CFL bulbs, a shower timer and other items to encourage sustainability.

- The utility also partners with the University of Florida's Institute of Food and Agricultural Sciences Extension Service to implement the Landscape Irrigation Rebate Program providing free assessments for residents that have a functioning irrigation system in place. Recommendations are made to increase water efficiency enabling residents to qualify for rebates.

- Partnership: The founding of RUC required financial resources in the way of sponsorships and volunteer staff hours.
- Public Affairs: The Drinking Water Week Photo Contest was promoted during already established speaking/community outreach events. We partnered with the Miami-Dade County Communications Department, which promoted the contest through its communications channels.

- What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?

- Customer Initiatives: Data validation was a challenge due to critical missing or incorrect customer information and security concerns for authenticating the customer. To overcome this challenge, a great deal of data scrubbing was employed, including comparing fields and resolving discrepancies, reaching out to customers who were missing information, and updating customer contact information. Customer pushback with providing personal information required tact and alternate solutions for authentication.
- Conservation: The most critical obstacle for the program was changing the habits of Miami-Dade County residents while making them more aware of their water use and encouraging them to conserve water. Informing residents of projects developed to assist them in reducing their water use was challenging, requiring extensive outreach including social media, staff attending local and countywide events and distributing literature.
- Partnership: The greatest obstacle in establishing the RUC was drawing interest in the coalition from a broad base of diverse professionals. In order to do this, programming has been tailored to appeal to specifically to subgroups within water utilities, including operations, planning, engineering, capital programs, etc.
- Public Affairs: In advance of the push to increase social media "followers/friends" through the Drinking Water Week Photo Contest, Public Affairs needed to plan targeted site content that was relevant to customers. Also considered was the fact that posts developed for a government agencies – specifically utilities — are not the same as ones created for personal or private industry accounts. For this reason, Public Affairs staff participated in industry webinars that covered social media topics that provided suggested content, as well as possible benchmark and metric monitoring information.

- Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.

- Customer Initiatives: Creating the self-service and chat platforms —as well as establishing sensitive interfaces between the billing systems and these solutions— has resulted in more than 66,000 enrolled customers in 11 months, which this represents 37% of our active population. The chat option engages 1,700 customers a month which represents 4% of our total calls handled in the Customer Care Center. These two initiatives have effectively freed up customer service representatives to assist with more complex service issues.
- Conservation: The program is implementing a pilot project to enhance the customer service experience by offering additional opportunities to reduce residents' water use through customer engagement via an online portal. The application will be made available to accounts serviced by advanced metering infrastructure (AMI) meters. The portal will empower users to take a proactive role with their water use and water bill through computer and mobile device connectivity.
- Partnership: N/A
- Public Affairs: N/A

Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?

- Customer Initiatives: Other utilities can obtain additional information on Miami-Dade Water & Sewer Customer Initiatives by contacting Aimee Martinez, Aimee.Martinez@miamidade.gov.
- Conservation: Other utilities can find additional information regarding Miami-Dade County's Water Conservation Program at www.miamidade.gov/waterconservation.

- Partnership: Other utilities can find additional information on the goals, activities and events of the RUC online at www.ResilientUtilities.org. They can also connect with the RUC on Twitter at @RUCoalition and Facebook at @resilientutilities.
- Public Affairs: Other utilities can find additional information at www.miamidade.gov/water/prindex.asp?year=2017&web=water, or on Miami-Dade Water & Sewer's social media channels, which can be accessed from the utility's home page at www.miamidade.gov/water.

Measure What are you measuring?	**Targets** What was your goal/intended outcome?	**Outcomes** What were your actual outcomes?
Customer Initiatives: Number of Customers Enrolled in the Self-service Application	50,000 customers in the first year, through July 1, 2017	66,815 customers as of June 1, 2017
Customer Initiatives: Chat Conversations	Average monthly conversation equal to 2% of the total calls handled	Averaging 4% per month of total calls handled
Public Affairs: Drinking Water Week Photo Contest	To grow social media followers	• Through the Drinking Water Week Photo Contest push, Miami-Dade Water & Sewer's Twitter followers doubled. • By having the participants submit their photos directly through the utility's social media accounts, followers and friends saw the tag and images in their feeds, which served as free advertising for the utility, and which generated additional likes and follows for the utility's pages.
Conservation: Gallons of Water Saved Per Day	19.62 MGD by 2026	15.08 MGD saved through program efforts as of Dec. 31, 2016.
Partnership: Resiliency Framework for Utilities	• Developing an operating resiliency framework for utilities to adopt. • Developing a training curriculum for coalition members to aid in operationalizing resilience.	• RUC held a Visioning Workshop in August 2016 to launch the coalition and establish guiding principles, including its mission, vision and objectives. • Another outcome of the workshop is the publication, RUC Visioning Workshop Report, which summarizes how the RUC membership can advance resiliency planning while fostering innovation.

Utility Description (combine all plants if a multi-site system)		
Type (e.g., single plant, regional system, multiple plants, collection system only, stormwater, etc.): The San Francisco Public Utilities Commission (SFPUC) operates a regional water system providing wholesale water service to four Bay Area counties, including retail water service to San Francisco. The SFPUC also provides power and combined stormwater and wastewater services for San Francisco.		
Service Area (square miles): Wholesale area of 468 square miles, retail area of 50 square miles	Average annual daily flow (MGD): Combined wholesale and retail delivery of ~196 million gallons per day	
Population Served: 2.6 million water customers (850,000 wastewater customers in San Francisco)		
Location		
Street Address: San Francisco Public Utilities Commission, 525 Golden Gate Avenue		
City: San Francisco State: CA	Zip Code: 94102	
Contact Information		
Name: Paula Kehoe, Director of Water Resources	Phone: 415-554-0792	Email: pkehoe@sfwater.org

ORGANIZATIONAL CULTURE *(Not required for organizations adding additional activities to the previous recognition.)*

WATER REUSE

Faced with 21st century challenges such as drought, flooding, and climate change, San Francisco began to rethink the traditional approach to water resources management and has embraced a new one water management approach, where all water is utilized and valued across all stages of the water cycle. In September 2012, the City and County of San Francisco became the first municipality to adopt groundbreaking legislation that created a permitting process to encourage onsite non-potable water reuse in commercial, multi-family, and mixed-use developments. Led by the efforts of the San Francisco Public Utilities Commission (SFPUC) Water Resources Division, the Non-potable Water Program was established to provide a regulatory framework and water quality monitoring and reporting requirements for the collection and use of alternate water supplies such as rainwater, graywater, stormwater, foundation drainage, and blackwater for non-potable applications such as toilet flushing and irrigation.

The Non-potable Water Program provides a myriad of benefits including a pathway for the development community to achieve greater water savings through onsite water reuse, stormwater pollution reduction, and helps San Francisco achieve greater water resource resiliency and reliability.

Motivation to establish the Non-potable Water Program also stemmed from private developers who expressed interest in incorporating onsite non-potable water systems into new development projects to achieve sustainability goals and meet San Francisco's stormwater management requirements. However, these developers were challenged by the lack of clear guidance and local regulations. The SFPUC heard their concerns and led the effort in coordination with the San Francisco Department of Public Health (SFDPH), Building Inspection (SFDBI), and Public Works (SFPW), to develop the local regulatory framework of oversight and management that is in place today. The Non-potable Water Program also provides the necessary oversight for projects that harvest rainwater for toilet flushing and irrigation to comply with San Francisco's Stormwater Management Ordinance.

The SFPUC has engaged in a wide range of activities to support the implementation of the Non-potable Water Program. In 2012, the SFPUC piloted the first onsite blackwater system at its new headquarters building, located in San Francisco's Historic Civic Center District to test the newly established, streamlined permitting program. The SFPUC's onsite water system collects and treats blackwater to flush toilets and urinals in the building and has been successful in terms of system operation, public education, and encouraging the installation of onsite systems throughout other private and public buildings.

The SFPUC also developed a suite of technical assistance resources including guidebooks, factsheets, and a water use calculator to help developers, architects, and engineers determine the amount of alternate water supplies and non-potable demands for their projects. The SFPUC also launched a grant assistance program to help fund the installation of onsite non-potable water systems that can achieve multiple benefits including improved stormwater management and significant water savings.

Since launching San Francisco's Non-potable Water Program, the SFPUC has been leading a larger national effort to advance the field of onsite water reuse. In May 2014, the SFPUC convened the Innovation in Urban Water Systems meeting with support from the Water Research Foundation (WRF) and the Water Environment & Reuse Foundation (WE&RF) to bring together municipalities from across North America to discuss the barriers, opportunities, and research needs for onsite non-potable water systems. This meeting was the first of its kind, and led to the development of the *Blueprint for Onsite Water Systems: A Step-by-Step Guide for Developing a Local Program to Manage Onsite Water Systems*, a how-to guide for communities interested in implementing their own onsite non-potable programs.

In addition to the development of the *Blueprint*, the SFPUC spearheaded the formation of a national coalition of public health agencies in 2015 to address water quality standards and monitoring strategies to ensure the protection of public health, which is the most critical issue that communities face in implementing onsite reuse. With funding provided by

WRF and WE&RF, the coalition recently released the report, *Risk Based Framework for the Development of Public Health Guidance for Decentralized Non-potable Water Systems*, which provides guidance to regulators on water quality pathogen targets and monitoring regimes and establishes an appropriate water quality framework for onsite non-potable water systems.

Furthermore, the SFPUC partnered with the U.S. Water Alliance in 2016 to convene the National Blue Ribbon Commission for Onsite Non-potable Water Systems to advance best management practices that support the use of onsite non-potable water systems for individual buildings or at the local scale. The Blue Ribbon Commission is drafting model state and local policy that supports local implementation of onsite reuse, as well as identifying emerging business opportunities for water utilities as more buildings and district-scale onsite systems are developed. The Blue Ribbon Commission is comprised of 32 Commissioners representing public health agencies and water and wastewater utilities from nine states and the District of Columbia and is funded by WRF and WE&RF.

How did you go about implementing the practices/activities/programs that you described in your Overview?

- The Non-potable Water Program took over two years of research to develop, identifying roles and responsibilities among four city departments as well as evaluating existing policies and potential regulatory changes. Collaboration among departments led to consensus on water quality criteria, monitoring and permitting requirements for onsite non-potable water systems and the establishment of appropriate fees and available incentives. In addition to interagency collaboration, staff also worked closely with architects, designers, and engineers, to obtain feedback on program implementation strategies and ongoing oversight requirements.

- To establish the program, the San Francisco Board of Supervisors passed the Non-potable Water Ordinance, setting the roles and responsibilities for each city department and creating the streamlined interagency permitting process. To provide effective oversight of onsite non-potable water projects permitted under the program, department staff meet regularly to discuss implementation challenges and successes, as well as consider additional assistance that may further encourage onsite water reuse. Regular communication and coordination with other partner departments help the program adapt as we learn more about water quality criteria, treatment train performance and ongoing monitoring.

What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)

- San Francisco's Non-potable Water Program is sustained by each city department's commitment to the streamlined permitting process and is supported through either full-time or part-time employees. The SFPUC funds two full-time staff to support day-to-day administration of the Non-potable Water Program. SFDPH funds three part-time staff to support the required review, permitting and ongoing monitoring of onsite non-potable water systems. SFDPH instituted a fee to recover the cost of staff hours spent on reviewing each project's engineering report, as well as an annual permit renewal fee to recover costs to review each project's monthly and annual reports.

- SFPUC also provides in-kind time to support its larger national effort to advance the implementation of onsite water reuse in other local jurisdictions and states. Organizations including WRF and WE&RF have provided financial support in the areas of research needs and development of model policies.

Did you partner with other stakeholders or organizations as a part of your implementation process?

- The SFPUC partnered with three other city agencies - SFDPH, SFDBI, and SFPW - to implement the Non-potable Water Program. The SFPUC serves in two primary capacities – program administration and cross-connection control. SFDPH reviews each project's engineering report, issues water quality requirements, and issues a permit to operate for each project. SFDBI oversees the construction and inspection of onsite non-potable water systems, reviews plumbing plans, and issues plumbing permits. SFPW issues encroachment permits for projects with infrastructure located in the public right-of-way.

- Additionally the SFPUC continues to work with local stakeholders within the design and development community including engineers, builders and developers, wastewater treatment system vendors, building owner and management associations, and others to provide education and technical assistance on the requirements necessary to design, build and operate successful onsite non-potable water systems.

What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?

- The first and foremost obstacle to overcome was establishing the oversight and permitting program for onsite non-potable water systems in San Francisco. The SFPUC recognized the lack of regulatory oversight and management structure in place for onsite non-potable water systems. As a result, the SFPUC conducted extensive research and stakeholder outreach to develop the permitting process that is in place today. The Non-potable Water Program represents a successful and streamlined permitting program that helps harness valuable resources that otherwise would not be utilized, and puts them to beneficial reuse.

- The SFPUC also convened a coalition of public health agencies around the nation to help resolve institutional barriers to onsite non-potable water reuse in other communities. The first barrier was the lack of guidance on creating oversight and management programs for onsite systems. The SFPUC led the effort to develop the *Blueprint for Onsite Water Systems: A Step-by-Step Guide for Developing a Local Program to Manage Onsite Water Systems,* which helps overcome this barrier. The *Blueprint* is a step-by-step guide for municipalities interested in developing an onsite water reuse program.

- The second barrier to onsite water reuse was the lack of consistent water quality standards. The SFPUC worked to address this barrier by convening a national public health coalition to establish appropriate water quality standards for onsite water systems. The coalition worked with an Independent Expert Panel to publish the report, *Risk-Based Framework for the Development of Public Health Guidance for Decentralized Non-potable Water Systems.* This report lays out a risk-based framework for water quality standards and includes guidance on appropriate management, monitoring, permitting, and reporting practices specific to onsite non-potable water systems.

- In a continued effort to address these institutional and regulatory barriers, the SFPUC has partnered with the U.S. Water Alliance to convene the National Blue Ribbon Commission to develop model policies and guidance for onsite non-potable water systems that are protective of public health and provide consistent standards across the country for states and local agencies to develop onsite water reuse programs.

Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.

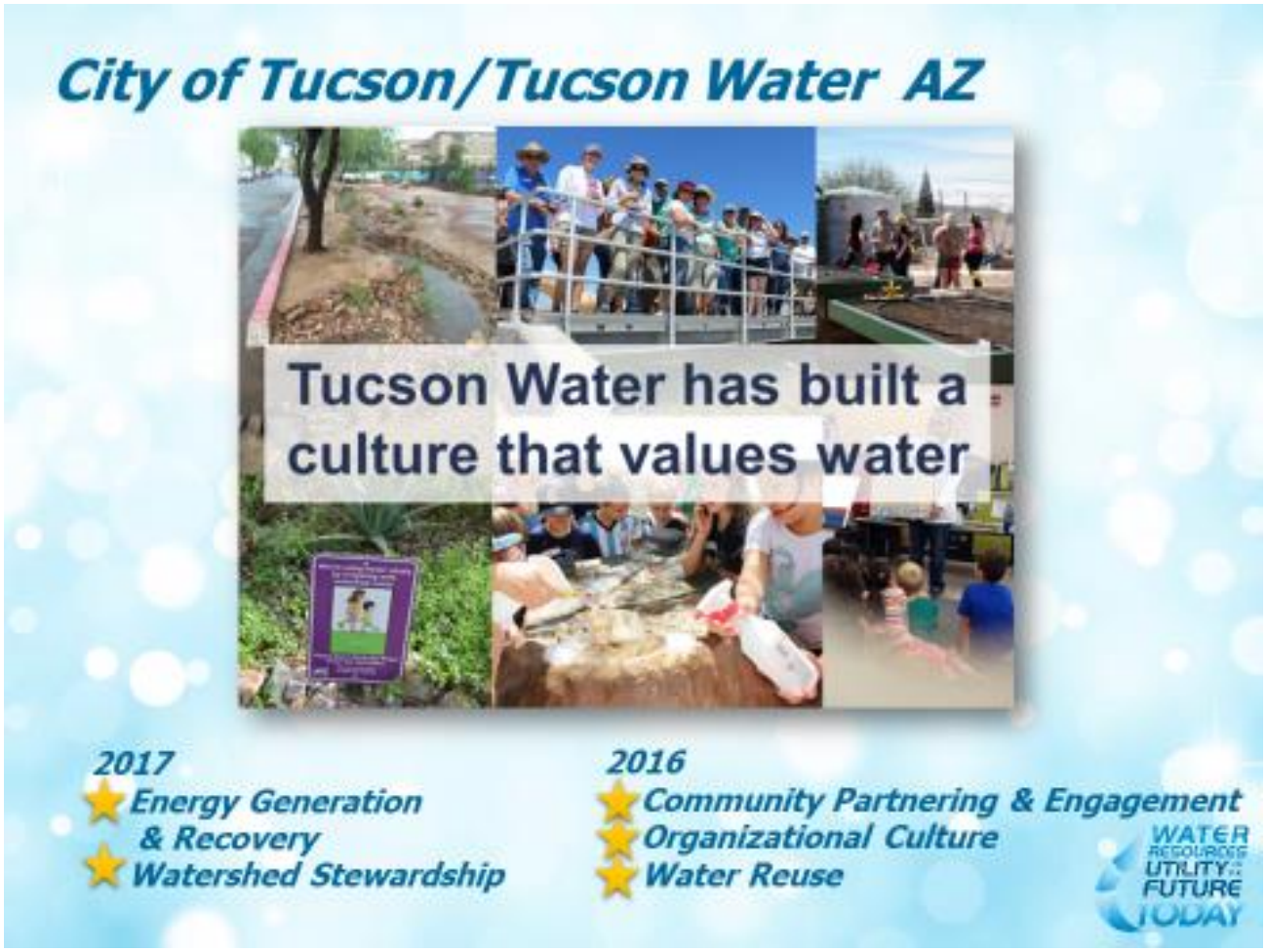
- Smart information technology has allowed onsite non-potable water systems to perform more effectively. Technology advancement has allowed system processes to become more automated and remotely controlled, making the operation and maintenance of these system more efficient for qualified operators. Notifications and alerts regarding maintenance issues are linked to the operator's cell phone so that he or she can respond to any issues in real-time. For example, the onsite blackwater system at the SFPUC headquarters building is fully automated and can be monitored from a control panel in the basement as well as remotely from the operator's cell phone. Smart technology has reduced the amount of time needed to perform daily maintenance tasks and has improved overall system function.

Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?

For more information and resources regarding San Francisco's Non-potable Water Program, visit www.sfwater.org/np.

Measure What are you measuring?	**Targets** What was your goal/intended outcome?	**Outcomes** What were your actual outcomes?

Number of onsite non-potable water projects	Initial goal was to have 3-5 non-potable water projects installed per year.	To date, 20 projects are operational and 52 projects are in the process of being designed and built
Number of project's awarded grant funding for implementation of voluntary non-potable water projects	Two grant projects per year	To date, $2.5 million in grant funding has been awarded to seven non-potable water projects
Potable water offset from the Non-potable Water Program	1 mgd of potable water offset by 2040	Based on number of projects currently in operation and in the process of being designed and built, the SFPUC is on track to meet the 1 mgd target



Utility Description (combine all plants if a multi-site system)		
Type: Large Municipal Water Provider		
Service Area (square miles): 400		Average annual daily flow (MGD): 85
Population Served: 717,875		
Location		
Street Address: 310 West Alameda Street		
City: Tucson State: AZ		Zip Code: 85701
Contact Information		
Name: Jeff Biggs	Phone: 520-837-2111	Email: jeff.biggs@tucsonaz.gov

ORGANIZATIONAL CULTURE *(Not required for organizations adding additional activities to the previous recognition.)*

In 2015, Tucson Water finalized its Strategic Plan, a living document intended to guide the Utility and align its management with its organizational goals. Tucson Water's 2020 Strategic Plan recognizes organizational culture as a top priority for the entire utility. To that end, the Plan *was* developed around a set of core values – behavioral and business, that represent the foundation of the decisions and activities of the Utility. Employees from all divisions of the Utility, of all positions, worked together to agree on the below core values that embody the Utility's culture.

Behavioral Values

- Integrity
- Respect
- Collaboration
- Commitment
- Responsibility
- Leadership

Business Values

- Safe high-Quality Water
- Reliable Water Supplies
- Reliable Water Services
- Exceptional Customer Service
- Sound Planning
- Appropriate Investment
- Sound Financial Management
- Protecting the Environment
- Increasing Efficiency and Conservation
- Transparency and Communication

The Plan adheres to these clearly communicated core values that resonate with our employees and our community. Building a positive organizational culture is an on-going initiative for Tucson Water. The Utility understands that a successful organization is not the result of any one person, but the culmination of the efforts of every employee. To foster this culture, Tucson Water provides continuous opportunities for professional development and training to all of its employees. Additionally, divisions manage their own budgets for travel and training expenses, with which they can send employees to conferences, summits, and other professional venues. Staff meetings are held regularly, and all employees have the chance to provide insight and input. Employees are also offered the option to participate in a job-shadowing program to explore their other interests. Supervisors are encouraged to recognize their employees for their hard work through an employee recognition and rewards program, and the Utility formally recognizes all employees at an annual celebration. The core values extend beyond the development of an organizational culture, and seep into the community and the Utility's water management strategies.

It has never been more important for water utilities to make efficient and intelligent plans regarding future resources and infrastructure. In order to secure the public support and investment needed to advance those plans, a utility's planning process must align with the values of the community it serves. Conservation and education outreach programs and integrated customer service processes strengthen the Utility's reputation as a dependable service provider for current and future customers, and

standards set in every aspect of operation provide accountability for the Utility to the community at large.

To ensure that the Utility is meeting the public's expectations, as well as achieving its goals, Tucson Water's Strategic Planning process includes setting standards in every aspect of operation. As a standards driven organization, each division of the Utility is responsible for setting performance measures and tracking metrics for those measures. This dedication to standards provides Tucson Water with the ability to assess its progress and respond immediately when changes are necessary.

Through standards the Utility achieves accountability not only internally, but to the community at large. Tucson Water works closely with a Citizens' Water Advisory Committee and with the City Manager, Mayor, and City Council to ensure that the community has every opportunity to communicate with the Utility and provide input and feedback. These relationships have been crucial to the community's support of the Utility's initiatives, such as water reuse and watershed stewardship.

Issues related to treatment and public acceptance can often delay and defer water reuse programs. However, the Utility's strong ties to the community and reputation built on transparency and trust have allowed us to fully develop a water reuse program. Previous successes with the recharge and recovery of potable water have led to considerations of another recharge and recovery program. This program would provide additional treatment and storage of reclaimed water supplies and recycle the water for potable reuse.

Tucson Water currently allocates the majority of its reclaimed water for non-potable uses, such as irrigation and industrial processing. This system, first established in 1984, now delivers about 15,800 acre-feet of reclaimed water annually, keeping parks, golf courses, and schoolyards green. The availability of unallocated water, coupled with the historic drought and threat of reduced Colorado River water supplies, led Tucson Water to complete its Recycled Water Master Plan in 2013. The Plan is part of a Recycled Water Program that sets a detailed path for developing potable reuse during the next decade. Tucson Water will use its learned expertise in recharge and recovery in our high desert landscape to help ensure the most beneficial and sustainable use of our precious potable and recycled water supplies into the future. Water reuse is still only a part of the Utility's overall watershed stewardship practices.

Tucson Water's Strategic Plan and Recycled Water Program clearly communicate the Utility's priorities in relation to watershed stewardship. From protection of the regions precious groundwater through the use of renewable supplies, to conservation and education programs, to the Recycled Water Program, the Utility constantly works to reinforce the value of every drop of water in the desert. The Utility also works with other water providers to help deliver renewable water supplies to other communities in the region.

Additionally, Tucson Water supports and encourages green infrastructure inside the city through education and rebate programs for water conservation and efficiency measures such as rainwater harvesting, curb cuts, and low-flow toilets. The Utility also recognizes the importance of supporting the entire ecosystem and Tucson Water voluntarily engaged in a Habitat Conservation Plan for 22,000 acres of retired farm properties it owns. These lands are now in various states restoration. Watershed

stewardship is not accomplished in isolation, and Tucson Water works with its regional and the community to engage in regional watershed stewardship.

It is through the dedication and effort of every employee that Tucson Water is able to achieve such great lengths. It all begins and ends with the organizational culture of the Utility. The communication of core values, and more importantly, the demonstration of core values in action drive Tucson Water to continuing innovation and success with the support of the community behind us.

Additional Activity Descriptions (OPTIONAL)
Establishes an integrated and well-coordinated senior leadership team
Provides opportunities for employees to find and fix inefficiencies, share ideas for solutions to problems
Provides opportunities to consult with employees in new processes, innovations and designs before building
Drives an awareness and commitment to workplace safety
Maintains attention to employee morale including opportunities to celebrate victories for the utility
Established periodic tracking of progress toward meeting goals and milestones
Financial sustainability which could take the form of asset management; long range financial planning and policies or developing new business models to diversify income or leverage other investors

Your Performance Measure(s)	**Your Results (quantitative or qualitative)**
Leadership Training Courses	Positive review of leaders
Meeting Attendance/Participation	High employee participation and engagement
Job Shadowing Program Participation	Positive employee feedback, program improvement
Voluntary Professional Development	High employee participation and engagement
Employee/Customer Focus Groups	Feedback incorporated into final decision/product

COMMUNITY PARTNERING & ENGAGEMENT

Additional Activity Descriptions (OPTIONAL)
Outreach conducted with other stakeholders and other community groups
Community workforce development programs in place
Actively promotes community awareness of the value of water and wastewater and stormwater collection and treatment's role in the social, economic, public, and environmental health of the community
Involves stakeholders in the decisions that will affect them, understands what it takes to operate as a "good neighbor," and positions the utility as a critical asset to the community

Your Performance Measure(s)	**Your Results (quantitative or qualitative)**
Community Outreach Meetings	Moderate participation by community
Citizens' Water Advisory Committee	Provides direction and support of important Utility initiatives such as rate increases
Customer Focus Groups	High participation and feedback
Social Media Tracking	Support from local business and partners
Financial Planning and Rate Setting	Approval by Mayor and Council for a new Multi-Year process

ENERGY GENERATION & RECOVERY

Additional Activity Descriptions (OPTIONAL)
Co-generation systems
Mandate sustainable design practices
Utility board/city council/board of supervisors have an energy and/or sustainability committee in place

Your Performance Measure(s)	**Your Results (quantitative or qualitative)**
Aesthetic/community benefits from green infrastructure	Applications and requests for green infrastructure neighborhood projects
Change in the resilience of critical infrastructure	Renewal energy adding to the resource portfolio of the Utility
Increase in use of renewable energy sources	Progress towards goal to provide renewable water with renewable energy
Percent of energy use that is renewable	Calculation of energy created through solar panels on facilities across the City

WATER REUSE

Additional Activity Descriptions (OPTIONAL)
Development of programs to reduce risk of reuse and improve guaranteed reuse water quality
Potable reuse for downstream water supplies
Steps in communicating to the public the realities of potable reuse
Internal plant methods to insure treated water quality fit-for-purpose reuse
Use of in-house or external laboratories for testing water quality parameters

Your Performance Measure(s)	**Your Results (quantitative or qualitative)**
Customer Focus Groups	Support for water reuse initiatives
Citizens' Water Advisory Committee	Support for initiatives and suggested improvements
City of Tucson Mayor and Council	Support for initiatives and funding
Pilot Program	Establish baseline
Water Quality research/testing	Research and testing of infiltration, UF, RO, and other treatments
Exploration of alternative uses	Santa Cruz River Heritage Project
Involvement in discussions related to regulations on reuse and recharge	Recharge credits and Direct Potable Use discussion

WATERSHED STEWARDSHIP

Additional Activity Descriptions (OPTIONAL)
Systems that add value to the urban landscape with resilient, adaptable, affordable and environmentally sensitive water infrastructure that continues to provide basic services, but also enhanced recreational, aesthetic and environmental value
Maintenance policies that enable green infrastructure maintenance
Stakeholders comment on evaluation of alternatives in triple bottom line analysis, as appropriate

Your Performance Measure(s)	**Your Results (quantitative or qualitative)**
Forming Regional Partnership	Agreements with water providers across the region for both potable and non-potable water
Habitat Conservation Plan	Restoration of purchased retired farm properties
Water Checkbook	Monitoring of all water resources
Water Service Area Policy	Enforcement of reasonable boundaries between water service providers and in unincorporated areas