2013 TOP WATER & WASTEWATER PROJECTS

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Aging infrastructure, ever-changing regulations and tightening budgets present the water and wastewater treatment industry with a challenging road ahead. Still, innovation continues to propel tens of thousands of noteworthy efforts, and they are flourishing in the face of challenges.

From June to August 2013, *Water & Wastes Digest* (*WWD*) encouraged project leaders to submit entries showcasing industry-specific projects in design or construction during the past 18 months.

Nominated projects differed in terms of goal, size and price, from $530,000 up to $637 million. The editorial staff selected the winners based on the variety of obstacles faced and overcome by all parties involved with the projects, as well as final goals achieved and success met. *WWD* is proud to highlight these achievements in its annual list of Top Projects.

Thanks to all project leaders who took the time to submit entries and photos for our program, and congratulations to the owners, designers and contractors honored in *WWD*'s 2013 Top Water & Wastewater Projects.

Winner profiles, compiled by *WWD* associate editor Amy McIntosh, are featured on pages 22 to 32.

For more information, contact *WWD* at wwdeditor@sgcmail.com or write in 1103 on this issue's reader service form on page 61.

AGUA NUEVA & TRES RIOS WATER RECLAMATION FACILITY REGIONAL OPTIMIZATION MASTER PLAN PROJECT

To comply with new regulatory requirements set by the Arizona Department of Environmental Quality, the Pima County (Ariz.) Regional Wastewater Reclamation Department (RWRD) needed to reduce total nitrogen concentrations in the effluent it discharged into the Santa Cruz River. The department also hoped to optimize biosolids and biogas production.

The $673 million project—known as the Pima County Regional Optimization Master Plan (ROMP)—comprises four components: a 5-mile, 72-in. interconnect sewer pipeline; a water, energy and sustainability center that includes a National Environmental Laboratory Accreditation Conference training center; a new 32-million-gal-per-day (mgd) water reclamation campus; and an upgrade and expansion of the Tres Rios Water Reclamation Facility (WRF)—formerly known as the Ina Road WRF—to 50 mgd.

The 32-mgd facility, known as the Agua Nueva WRF, will replace the county's Roger Road WRF and will address the Santa Cruz River discharge issues. Solids from this facility will be transferred to the Tres Rios WRF via the new sanitary sewer interconnect.

The project, which has an estimated completion date of Jan. 31, 2015, will replace 90% of Pima County's existing wastewater reclamation capacity.

"ROMP is a key effort in Pima County to upgrade wastewater infrastructure. It produces highest-quality effluent water to support sustainability and growth into the future," said Jackson Jenkins, director of Pima County RWRD. "The high-quality water can be used on ballparks, golf courses and riparian habitats. We also are banking the water for future use and to lessen the demand on groundwater.

Location: Pima County, AZ
Owner: Pima County
Construction Management: CH2M Hill
Contractors: MWH Global Inc., Greeley and Hansen LLC, Parsons Corp., D.L. Whithers Construction, Kiewit Corp., HDR Eng. Inc., McDade & Woodcock Inc., SunWestern Contractors Inc., Sundt Construction
Manufacturers: Westfalia, Flygt (Xylem Inc.), WEIR, WSP, Hartzell, BLC Industries, Velodyne Velocity Dynamics, Ashbrook Simon-Hartley, EMA, Ovivo, Siemens
Cost: $637 million
Size: 82 mgd

BACON PROCESS WASTEWATER TREATMENT SYSTEM PROJECT

The wastewater produced by a Kansas bacon processing facility contains a high concentration of fats, oils, greases and sanitation chemicals. The water from the facility's original dissolved air flotation and chemical treatment process was not compliant with the local biochemical oxygen demand (BOD) requirements.

To help the plant comply with these sewer discharge limitations, Kemco Systems designed and installed a ceramic microfiltration (CMF) system with a reverse osmosis (RO) component that treats 100 gal per minute.

The CMF system removes emulsified oils, greases and total suspended solids (TSS) from the wastewater. The filtered water then is treated by the RO membrane, which removes dissolved contaminants such as salt. The result is water that is suitable for reuse in other areas of the facility's operations.

Raw wastewater from the plant contains approximately 5,300 mg/L each of oil and grease and suspended solids, and 5,500 mg/L of BOD. After the CMF and RO treatment, oil and grease are reduced to 6.9 mg/L and TSS to non-detectable levels. BOD is reduced to 36 mg/L.

The project began in November 2012 and was completed by the end of December of the same year. Since beginning operations, the system has processed more than 27 million gal of wastewater.

"The system has exceeded expectations for performance in terms of consistency and water quality," said Gerard Van Gils, vice president of Kemco Systems. "We are particularly proud that we have been able to demonstrate the ability of the membranes to produce excellent water quality without problems of membrane fouling. We feel this project demonstrates the next level of treatment possible for all food processors, to enable them to meet the environmental and sustainability goals of the future."

Location: Kansas
Owner: Confidential
Designer: Kemco Systems Inc.
Contractor: Kemco Systems Inc.
Manufacturer: Kemco Systems Inc.
Cost: Confidential
Size: 100 gpm

CAMDEN, S.C., WASTEWATER TREATMENT PLANT EXPANSION PROJECT

The wastewater treatment plant in Camden, S.C., collects, treats and disposes of wastewater for approximately 4,000 customers. The city's sewer service area encompasses all properties within the city limits of Camden and two miles east along Highway 1. The system includes more than 84 miles of gravity sewer line, 11.94 miles of sewer force mains and 14 lift stations.

The city currently operates a 3-million-gal-per-day (mgd) wastewater lagoon. Responding to new, more stringent wastewater treatment standards for nutrient removal and disinfection limits, the city is constructing a new plant with a capacity of 7.5 mgd. When the new facility is operational, the lagoon will be converted into a natural wetland area.

As part of its new $30-million treatment plant, the city initially chose Xylem's Wedeco TAK55 ultraviolet (UV) disinfection system. When construction was approximately halfway complete, however, the company released its Duron UV system. The city, URS Corp. and State Utility Contractors worked to convert the design to accommodate the new technology. The Camden plant is Wedeco's first global installation of the Duron system.

With low-pressure, high-intensity 600W Ecoray lamps, Camden's UV system is custom designed to meet permit requirements by disinfecting 200 fecal coliforms per 100 mL of secondary wastewater. The ballast technology requires fewer lamps, decreasing the system's footprint. This, combined with intelligent dose control, minimizes the system's energy consumption.

The city is constructing the new plant to accommodate a future expansion to 15 mgd. To save on future construction costs, the building and channel for the UV system were built large enough to house additional equipment to handle increased flows. Additional equipment then can be purchased when the plant increases its capacity.

The Wedeco equipment was installed in November 2013 and commissioning is scheduled for December 2013. It is expected that the UV system will be operational by March 2014 when the entire plant comes online.

"We are very proud to provide the city of Camden, S.C., with an energy-efficient, cost-effective way to disinfect wastewater so that the effluent from the plant has no disinfection byproducts and is environmentally friendly," said Jay Jordan, disinfection market manager for Xylem.

Location: Camden, SC
Owner: City of Camden
Designer: URS Corp.
Contractor: State Utility Contractors Inc.
Manufacturer: Wedeco, a Xylem brand
Cost: $30 million
Size: 7.5 mgd

DICKSON FARMS LIVESTOCK WATER RECYCLING PROJECT

Dickson Farms, a dairy farm located in Bath, N.Y., was in need of a sustainable method of manure treatment that also was cost-effective.

Livestock Water Recycling Inc. (LWR) provided a reverse osmosis system that treats the manure, resulting in a zero-discharge, closed-loop operation. By recycling clean water, the farm is able to maintain a stable source of water for its day-to-day operations.

Before implementing the system, manure from various samples was tested to ensure the process would work based on the manure composition. Installation was completed in August 2012 after six months of planning and construction. The system—LWR's first U.S. dairy farm installation—routinely is monitored to ensure obstacles are identified and addressed in a timely fashion to keep operating costs low.

During the treatment process, manure-rich water is pumped into an equalization tank. Solids are separated from liquids, and then can be used as fertilizer elsewhere on the farm. The water then undergoes a fine particle filtration process, separating the liquid from smaller solids, which settle at the bottom of the tank.

The water then is passed through the membrane system, removing nutrients and ammonium. The ammonium is concentrated and used as a liquid fertilizer. The end result is clean effluent that can be reused for irrigation or elsewhere around the farm. The process eliminates potential groundwater contamination from runoff and reduces costs associated with manure handling.

"Any time we are able to close a waste loop, the environment wins," said Ross Thurston, president of LWR. "There is an ongoing need for a complete manure treatment solution in order to alleviate potential groundwater contamination from nutrient runoff and reduce expensive manure handling costs."

Location: Bath, NY
Owner: Dickson's Environmental Services
Designer: Livestock Water Recycling Inc.
Contractor: Livestock Water Recycling Inc.
Manufacturer: Livestock Water Recycling Inc.
Cost: $530,000
Size: 6,000 sq ft

FORT WAYNE, IND., UV DISINFECTION & RESERVOIR IMPROVEMENT PROJECT

Built in the 1930s, Fort Wayne (Ind.) City Utilities' reservoirs and pump station were outdated. In January 2012, the city began restoring and repurposing these antiquated facilities for improved drinking water quality.

Contractors installed an ultraviolet (UV) system in the old pump station to allow the city to comply with the U.S. Environmental Protection Agency's Long Term 2 Enhanced Surface Water Treatment Rule, which targets *Cryptosporidium* removal.

During installation, a sequenced shutdown of the existing 48-in. piping and valves in a congested plant yard occurred so the discharge pipe loop could be relocated to the outside of the building. Additionally, the utility's four distribution mains were shut down at night.

Meanwhile, the two storage reservoirs, totaling 20 million gal, were structurally reinforced, allowing for more usable volume and at least 80 more years of service life. The reservoirs were baffled to provide serpentine flow and greater water quality. Piping and gates were installed to allow the reservoirs to be taken out of service for inspections and preventive maintenance. The project also included provisions for a future water storage reservoir.

To install the UV units, piping had to be installed from the finished water filters into the UV building and then again into the reservoir. Piping was removed, concrete walls were cored and new piping was installed. Water production was maintained during these carefully planned and sequenced shutdowns.

"The construction of a project is the culmination of design ideas, talents of the team members, and performance of construction services by a large and diverse team of people," said Mark Gensic, engineering manager for Fort Wayne City Utilities. "The benefits of teamwork are many, including better communication, reduced overall project costs, increased productivity, fewer claims and improved project team attitude. This project allows our water utility to be well positioned to meet water quality needs now and in the future."

Location: Fort Wayne, IN
Owner: City of Fort Wayne
Designers: Black & Veatch, Donohue & Associates Inc.
Construction Managment: CH2M Hill
Contractor: Kokosing Construction Co. Inc.
Manufacturers: Calgon Carbon Corp., Caterpillar, Square D, FlowServe, Gexpro
Cost: $19,236,000
Size: 65 mgd

FORT WAYNE, IND., WET-WEATHER PUMP STATION & SCREENINGS PROJECT

In 2007, the U.S. Environmental Protection Agency signed a consent decree with the city of Fort Wayne, Ind., when combined sewer overflows in the city discharged raw sewage directly into the area's rivers and streams. To comply with Clean Water Act regulations, the city agreed to pay a penalty and to make improvements to its sewer system to resolve these overflows.

The project commenced in October 2011 and aimed to reduce the city's wet-weather overflow events while increasing existing pump station capacity from 360 to 530 million gal per day. Because of the consent decree, the upgrades had to allow for the accommodation of all future flows.

The overall goals of the project included providing significant improvements to the management of wet-weather flows, flood protection and wet-weather equalization, as well as the ability to return flow to the plant for treatment. The city also wanted to repair and replace outdated areas of the pump station.

The demolition and construction processes were carefully orchestrated to allow the existing pumps, wet well and electrical infrastructure to remain operational and ready to accommodate flows arriving to the facility. Construction of the new screen facility—which includes space for up to five mechanically cleaned screens—was completed in two phases to allow flows to be maintained.

Crews from different construction trades worked simultaneously in the tight space to build new storage and electrical buildings and complete modifications to the existing concrete discharge structure. A new electrical substation, dewatering facilities and pond improvements also were completed.

The project is set for completion in December 2013.

"The improvements to our wet-weather pump station have been a multi-year project involving our design firms and a solid team of construction contractors from our local community," said Andrew Schipper, senior program manager for Fort Wayne Water Eng. "The teamwork between our engineers and contractors was evident from the beginning and throughout the project. Regularly scheduled progress meetings, special coordination and shutdown meetings—and the diligence of the entire delivery team—were important to the success of this project. The decision to include a schedule incentive bonus for contractor completion per schedule underscored City Utilities' intent to enforce schedule throughout the project. Cooperation among all parties was effective and resulted in a project projected to be complete ahead of schedule."

Location: Fort Wayne, IN
Owner: City of Fort Wayne
Designers: Donohue & Associates, CDM, GAI, ASP, Clemson Eng. Hydraulics, CTL
Construction Managment: CH2M Hill
Contractor: Weigand Construction
Manufacturers: Xylem Inc., Square D, Rockwell Automation
Cost: $21,758,000
Size: 530 mgd

HAYS MINE & ALDRICH WATER TREATMENT PLANT UPGRADES PROJECT

The Hays Mine Water Treatment Plant, Becks Run Pumping Station, Arlington Booster Station and E.H. Aldrich Treatment Complex in Pittsburgh and Elrama, Pa., serve approximately 500,000 southwestern Pennsylvania residents and are capable of producing a total of 110 million gal per day.

The Hays Mine treatment complex was built in the late 1800s and straddles two municipalities: the Baldwin borough and the city of Pittsburgh. The plant's outdated infrastructure above and below ground continued to operate through June 2010, when Pennsylvania American Water began the project to upgrade it and the other facilities in the area.

The utility made the $101-million investment to ensure that its drinking water continued to comply with the new U.S. Environmental Protection Agency (EPA) drinking water standards that took effect in 2012. These investments also improve public safety at both treatment plants by replacing gas chlorine with onsite liquid chlorine generation.

The Hays Mine and Aldrich plants both remained in service during construction. Their proximity to traffic, homes and businesses made the three-year demolition and construction process a challenge. Logistical concerns arose at the Hays Mine site—which is located in the middle of a residential neighborhood—during the transportation and replacement of 3,000 ft of new 42-in. pipe.

New clearwell tanks, as well as new chemical storage and feed facilities, were built and put into service at both facilities, improving the capacity and process in treating finished water.

Other improvements included replacement of aging infrastructure at the pumping station serving Hays Mine and Aldrich and replacement of the pipe serving those treatment plants, as well as a booster station in the Arlington section of Pittsburgh.

Despite the logistical concerns, several instances of inclement weather and a tight schedule, the project was completed in June 2013.

"We're proud of how our team was able to manage three major construction sites while working closely with local officials to minimize the impact on customers in these heavily traveled residential and commercial areas," said Kathy L. Pape, president of Pennsylvania American Water. "With the significant investment we made, we've renovated and upgraded a 100-year-old water treatment plant to provide reliable water service for generations to come, while complying with all EPA regulations and improving public safety."

Location: Pittsburgh and Elrama, PA
Owner: Pennsylvania American Water
Designer: Gannett Fleming Inc.
Contractors: Kokosing Construction Co. Inc., Lighthouse Electric Co. Inc., McKamish
Manufacturers: Severn Trent Services, KSB, Peerless (Grundfos), Cummins, Eaton, DN Tanks
Cost: $101 million
Size: 110 mgd

ONTARIO CLEAN WATER AGENCY LEGACY PROCESS DATA COLLECTION SYSTEM REPLACEMENT PROJECT

The Ontario Clean Water Agency (OCWA) in Ontario, Canada, serves approximately 600 treatment facilities in the province, managing more than 20,000 daily streaming SCADA tags and processing 450 weekly lab samples. The agency used a home-built data collection system to generate, collect, manage and report its data. This Process Data Collection (PDC) system soon became outdated, with no room for improvement.

After a pilot project in which OCWA assessed various software programs that could integrate streaming SCADA data with data loggers, mobile devices, lab data uploads and historic data migration from PDC, the agency selected the WISKI 7 application from Kisters North America.

The Kisters team designed a solution that helped OCWA manage its growing amount of incoming data. Because PDC was the agency's standard, OCWA's more than 400 operators attended workshops to provide input on how the new system should look and feel. The result was software that looked like the old system, but performed more efficiently.

The WISKI 7 application includes data historian functionality with the ability to store, analyze and report on fine resolution data, and adoption of a commercially developed, well supported and internationally recognized software solution for water time series management. A single system is capable of managing both time series and discreet sampling data. The system features automated reporting, is user configurable and can be integrated with handheld mobile technology.

The Launch Pad—a component of the application where users can directly connect to areas of the software to perform their daily tasks—was customized to simulate the look and feel of PDC for user accessibility, with the enhanced functionality of the new system. Additionally, WISKI Web Pro is an online platform that allows users and clients to access information about their facilities from any Web browser.

"This project will allow for real-time information and data entry, increased information accuracy, and a consolidated repository for all process and compliance data," said Cindy Spencer, special projects manager for OCWA. "The new WISKI 7 technology will allow many field-related data sets and functions to be automated, reducing the levels of staff required to manage these systems. This project allows employees to take an active role in managing his or her process and compliance data in order to improve plant performance and the potential for alternate business partnerships."

Location: Ontario, Canada
Owner: Ontario Clean Water Agency
Designer: Kisters North America
Manufacturer: Kisters North America
Cost: $1.5 million
Size: Approximately 600 treatment facilities and 180 municipal clients

PDAM MALANG WATER MANAGEMENT PROJECT

With a growing population and aging infrastructure, the city of Malang, Indonesia, was experiencing daily pipe bursts, with reservoirs dripping up to 20% of capacity at night and leakage rates of up to 400 liters per second.

Ranhill Water Services worked with PDAM Malang, PT Pancatama and Singer Valve to develop a solution to reduce pipe bursts, conserve water and provide improved service to the 30% of customers who were being deprived of water due to the leaks.

The city was split into a number of control zones called district metered areas (DMAs), with a single source of water fed to the meter and a pilot-operated control valve at the source. Inflow and outflow were measured, allowing for pressure to be reduced and leakage to be controlled. The main distribution line had high pressure, but the addition of two pressure-reducing pilots in the main diaphragm-operated control valve set for daytime and nighttime pressures (high and low demand) helps control this.

To convince city water directors to approve the project budget, which called for the installation of 138 valves, PDAM Malang set up three DMAs near a problem reservoir. As a result, pipe bursts stopped, leakage was reduced and reservoir levels were maintained. Additionally, PT Pancatama conducted a test on a standard Singer diaphragm-operated pressure-reducing valve, which helped control pressure, reducing leakage and pipe bursts. The directors were convinced, the budget requirements were approved and the project moved forward.

After the first 42 valves were installed, the city experienced a 75% reduction of non-revenue water loss, a 300% improvement in pipe breakage and a 33% reduction in power consumption.

With increased reservoir capacity and reduced leakage rates, the city has been able to expand its distribution main and make water available to an additional 25,000 service connections—which amounts to approximately 125,000 people.

"Being an important part of a project as a manufacturer and supplying product application knowledge on our product that is truly making a difference, and being able to assist and supply water to thousands of Malang customers that never had the opportunity to have water available to them is a remarkable feeling and a great sense of accomplishment," said Brad Clarke, vice president of sales and marketing for Singer Valve.

Location: Malang, Indonesia
Owner: PDAM Malang
Designers: Ranhill Water Services, PDAM Malang
Contractors: Ranhill Water Services, Singer Valve, PT Pancatama
Manufacturer: Singer Valve Inc.
Cost: $1,093,750
Size: Population of 600,000 with 125,000 service connections

WALDO & GAINESVILLE REGIONAL UTILITIES WASTEWATER INTERCONNECT PROJECT

The city of Waldo, Fla., is a town of approximately 1,000 residents located in Alachua County in northeast Florida.

Waldo's wastewater treatment plant discharged its treated wastewater into a wetland area that connects to the Santa Fe River. Because the river is a classified as an Outstanding Florida Water, the Florida Department of Environmental Protection issued a consent order requiring the plant to find a solution to control these discharges.

After negotiations between the cities of Waldo and Gainesville, as well as the Gainesville Regional Utility (GRU) and Alachua County, a solution was reached.

Designer Mittauer & Associates, along with contractors Worth Construction and Watson Construction, worked to build a new pump station and 11.5 miles of 10- and 12-in. force main.

By decommissioning the old wastewater treatment facility, water could be sent directly from Waldo's wastewater collection system to the GRU plant, eliminating the need for Waldo's treatment facility.

The project was funded by the U.S. Department of Agriculture's Rural Development loan program and was completed in August 2013.

"I feel this project is a benefit to the city of Waldo because the Waldo connection to Gainesville Regional Utilities meets the current regulatory requirements, and it reduces the risk from further regulations that small town systems cannot afford to implement," said Kim Worley, city manager for the city of Waldo. "There is also additional capacity for future growth. The design allows the city of Waldo to buy more capacity on an as-needed basis instead of building a much larger plant that has capacity for future growth but is costly to operate."

Location: Waldo, FL
Owners: City of Waldo, Gainesville Regional Utilities
Designer: Mittauer & Associates Inc.
Contractors: Worth Construction & Development Inc., Watson Construction
Manufacturer: Wilo
Cost: $5.5 million
Size: 11.5-mile force main