



A Message from Robert J. Willert, Executive Director, DELCORA

DELCORA successfully settled its Series of 2016 Bonds in the principal amount of \$52,885,000.00. The total available proceeds will be used toward various capital projects of the Authority, including improvements to the Western Regional Treatment Plant (WRTP) in Chester, the wastewater conveyance system within Delaware County, and the Combined Sewer Overflow system in Chester; and purchases of a real estate parcel adjacent to the WRTP, the Spring Hill Farms wastewater treatment plant in Chadds Ford, and a building and easement at the former Baldwin Run Pollution Control Facility in Aston. Moody's affirmed the Authority's very strong "Aa3" credit rating and assigned a "Stable Outlook". The Bonds were structured with a 30-year final maturity of November 1, 2046 and had an overall arbitrage yield of 2.64%.

Conversion of an older treatment plant to the Rose Valley Pump Station will effectively eliminate a potential source of pollution to Ridley Creek. Constructed in the 1930s, the plant would have required significant upgrades in order to remain in operation following a change in the discharge permit. Construction is underway to convert this treatment plant to a pump station by spring of 2018. Once completed, all wastewater will be conveyed directly to the WRTP.

The upgrade to the Marcus Hook Pump Station was a complete overhaul of a major pump station—and unique because it was performed in-house. The DELCORA Operations and Maintenance staff scoped the project, procured the material/equipment, and executed the work. This streamlined approach reduced costs compared with a traditionally delivered capital project.

The DELCORA collection system, which includes seven siphons constructed over 40 years ago, will be rehabbed and renewed. The project will address

the valves, pipes, screens, and weirs on each siphon. This effort, which began in 2016, is being performed by DELCORA Operations and Maintenance staff with assistance from outside firms.



The addition of secondary combustion chambers to the incinerators at the WRTP places DELCORA on the leading edge of air pollution control. To illustrate, the system that was placed into operation in 2016 cleans the air so well that the particulate count is one-tenth of what is allowed by our permit. This project directly improves the air quality of our community, demonstrating a continued commitment to environmental

The aeration panel replacement and aeration system fourth blower installation projects at the WRTP reinforce a cornerstone of the wastewater treatment process.

stewardship and public health.

These critical components supply air to the microbes in the aeration tanks and allow them to rapidly treat wastewater. The existing aeration panels were failing and in need of significant upgrades. Three of the four tanks are complete, and the benefit to the process already has been dramatic.

In addition, the loading to the WRTP aeration tanks has increased so that all three existing blowers are needed on a daily basis.

Under this condition, it is difficult to perform maintenance on the blowers and there is no backup provision for the mechanical failure of the units. This project added a fourth blower and achieved the level of redundancy needed for this essential process equipment.

The upgrade to the WRTP utility water system, which is underway, will replace one of the plant's most troublesome

systems. The original system relied on a single pipe with a high failure rate. When it failed, it caused shutdowns in the incinerators, as well as sludge processing, sludge wasting, and the chlorination of the return sludge. These routine system failures also had a detrimental impact on the hauled waste business, limiting our acceptance capacity.

In order to make DELCORA facilities more secure, the Authority has implemented and installed new security equipment. A

centralized monitoring center has been created for select individuals to monitor the Administration Building and WRTP. The installation included new closed circuit television (CCTV) cameras, video phones at the front and back gates of the WRTP, internal door access systems, and a new sign-in procedure for guests entering these buildings. A new feature that will be implemented soon will be new security gates at the WRTP. Altogether, 40 new CCTV cameras were installed in 2016. DELCORA continues to look for security improvements, and it is safe to say a few more items are being considered for the future.

The Sewer Maintenance Department is in the process of migrating the City Works system to Granite Net to improve service and maintenance. The purpose of this migration

is to improve our previous systems to enable better mapping, score pipes for maintenance purposes, and access real-time video and live feeds of our system.

From the beginning, the investment in the drone project has been one of the most beneficial expenses for the Authority. The

drone has not only given us the ability to take aerial photos of our facility, it has also allowed us to inspect DELCORA bulkheads, rooftops, stacks, radio towers, bypass lines, and utility pole electrical connections. It would appear that the functionalities of the drone are endless, especially with the purchase of a mounted infrared camera.

The DELCORA website has been revamped to allow for easy navigation for the end user.

The project features updated software for customers to make payments online and enhances access to important updates to large construction projects, financials, and the Long Term Control Plan. To date we have received positive feedback, and we look forward to making more changes to meet the needs of the end user.

The Executive Staff and the Human Resources Department at DELCORA recognize the importance of managing employee retention and engagement. DELCORA's

commitment to employee engagement has been reflected in numerous ways, such as: training (both technical and soft skills); employee recognition, such as merit awards, birthday/special occasion acknowledgements; and employee appreciation events, such as our annual holiday party, safety barbecue, golf and bowling outings, chili cook-off, trivia contests, safety bingo, and so much more. Our employees are a direct reflection of DELCORA, and the Authority takes pride in recognizing their continual efforts not only to provide a service to the community, but to run a successful organization.



Complete Sewer Line Data And Images to Become Available to Employees From Any Location

> Integrating two powerful web-based applications— City Works and Granite Net—will give DELCORA comprehensive planning and maintenance data. Secure online access via an Amazon website will make the data available 24/7 to employees.

DELCORA uses City Works, a GPS-based mapping and work-order management system, to provide access to real-time data and increase the efficiency of the maintenance process. The software stores digital maps of the sewer lines throughout the county that comprise DELCORA's collection and conveyance system along with any associated work orders.

The Authority's maintenance team uses Granite Net to upload and store field photos and videos of the sewer lines when they use cameras to check for defects or to perform routine inspections.

DELCORA is one of fewer than ten municipal wastewater agencies or authorities in the Commonwealth of Pennsylvania currently utilizing this innovative approach.

Prior to this project, City Works and Granite Net operated as two separate programs on DELCORA's internal server. If a field crew needed to look up a maintenance work order and photos or videos of a specific sewer-line segment, they would need to contact the office for the information and drive back to pick it up in hard copy.

City Works has already been upgraded to a secure Amazon web server, which allows crews direct access to internal information such as maps and work orders from any location, at any time, from an iPad, iPhone, or computer. DELCORA's on-call crews are equipped with an iPad and utilize the mapping app to pull up information already populated into the app, such as pipe size, location, and manhole locations. The app provides satellite imagery to assist crews, especially when they are working at night or in a challenging location such as a wooded area.

When the Authority completes the integration of Granite Net data into City Works, crews will also have access to real-time, live updates on a specific segment in a street. Any past inspections, breaks, lateral locations, dates, and photos or video footage for that line will be viewable in real time.

The Amazon web server is also providing support for existing servers that are at maximum capacity, functioning as a backup and freeing up server space for information that is managed internally. In addition, the reduction in use of paper products has environmental and economic benefits.

Thanks to this project, DELCORA will be able to improve service and maintenance because of crews' ability to rapidly identify and solve problems in the field.

Thanks to this project, DELCORA will be able to improve service and maintenance. The projected cost of this project is \$35,000.

Real-time images and mapping make difficult repairs simpler and safer

A hypothetical situation: a DELCORA crew gets called out in the middle of the night to repair a blocked manhole—and part of the sewer line runs through a heavily wooded area.

Prior to realizing the advantages of the integrated technologies of City Works and Granite Net, the crew might be in the woods with flashlights, trying to find a manhole that could be buried under leaves or hidden by a tree.

Using the web-based City Works program, the crew is able to get out the iPad and use the mapping feature to pinpoint their location and that of the manhole that requires repair. Soon this will be augmented by web access to video footage from Granite Net to assist them in locating the source of the problem, such as earlier evidence of minor tree-root penetration somewhere on the line, and placing their equipment in order to break up a subsequent blockage.

Integrating City Works and Granite Net will provide enhanced efficiency, allow our crews to locate and repair problems before they become operational issues, and work with additional safety. Protecting our customers and our employees is a win-win.

Drone Provides a New Perspective on DELCORA's Assets and Facilities drone is more than a 20-pound flying camera: it provides a wide range of benefits, including verifying compliance with environmental regulations and inspections, operational and maintenance improvements, increased efficiency and cost savings, and increased employee safety. The drone has become a valuable tool, assisting several departments in gathering data.

The DELCORA

Here are just a few examples of DELCORA's utilization of the new technology:

- Viewing construction projects during the process and after completion without risking employee safety and with increased cost efficiency...
- Performing real-time virtual inspections of the Authority's cables and antenna on a radio tower, avoiding the need to contact the tower company for approval for an

employee to climb the tower to perform a physical inspection...

- Performing fast visual inspections of sites and equipment, which previously required sending a crew and involved the time-consuming process of climbing a utility pole or walking a stream...
- Making bulkhead inspections, which formerly required onsite inspection by a crew in a boat...
- Capturing images of facilities and ongoing construction projects, and also providing access to equipment that is difficult to access, such as bypass lines at pump stations located in creeks...
- Completing a flyover to video Combined Sewer Overflow (CSO) facilities, which involved a lowaltitude flight approximately five feet above the creek, in order to video the CSOs in detail...

• Gathering new aerial photos of the plant, enabling DELCORA to see close-up images of the roof and stack, radio towers, incinerator, and other facilities...

DELCORA has purchased an infrared camera for the drone to create heat map signatures, which provide information on different types of debris and other material flowing into reservoirs and water sources. This additional capability may prove to offer an additional source of revenue in the future, as another municipal authority has already expressed interest in contracting DELCORA to provide this service.

The data gathered by the drone is managed through City Works, an information system that allows for secure access to photographs and other information via a secure Amazon web server.

To be in compliance to fly the drone, DELCORA's process automation specialist has been certified as a drone operator by the Federal Aviation Administration.

Images taken by the drone appear in this Annual Report on the following: front cover, page 8, page 18, and back cover.

The Authority invested approximately \$3,000 in the drone and \$12,000 in the infrared camera.

New Aeration Equipment Will Protect Water Quality

Effective aeration is critical for reducing pollutants that negatively impact aquatic life

In 2016, DELCORA began two projects that will improve the aeration process installation of a fourth air blower and replacement of aeration panels—to reduce organic pollutants before discharge of treated water to the Delaware River.

Aeration is a critical process in the removal of organic pollutants from treated wastewater before it is discharged to a natural water body; otherwise, these types of pollutants can significantly reduce the vital oxygen level in the water, negatively impacting aquatic life. Effective aeration is required for DELCORA to meet Pennsylvania Department of Environmental Protection (PADEP) regulations that set total maximum daily, weekly, and monthly limits on the carbonaceous biochemical oxygen demand (a measure of the pollutants' impact) of discharged water.

Aeration occurs at the beginning of secondary treatment in the wastewater treatment process. After primary treatment has removed most of the heavier solids from the wastewater, activated sludge is added to start a biological process that reduces the remaining organic pollutants to meet the limits required to protect water quality. This process relies on the dissolved oxygen that is added to the combined wastewater and sludge in order for the microbes to function properly. DELCORA's aeration panel replacement project and aeration system fourth blower installation project will enhance the efficiency and effectiveness of this process.

The new aeration panels will inject oxygen into the water by supplying very fine bubbles of air, which are more effective at oxygen transfer. The new panels will function more efficiently under a wider range of conditions, and for a longer projected operational life, than the older panels. Their increased efficiency also will reduce the total cost of electricity to run the blowers. DELCORA is installing 3,852 panels total, replacing approximately 1,000 older panels, with an anticipated completion date in late 2017.

Both upgrades will reduce costs through additional efficiencies both in the process and in the use of electricity.

The total projected cost of the aeration panel replacement project is \$3.5 million; the total projected cost of the aeration system fourth blower installation project is \$1.2 million.



Marcus Hook Pump Station Upgrade: Complete overhaul brings 1970s-era pump station into the 21st century

A comprehensive upgrade of the Marcus Hook Pump Station has brought this 1970s-era pump station into the 21st century with new pumping equipment and electrical wiring, state-of-the-art remote monitoring and control technology, as well as a new roof and flooring.

The DELCORA Operations and Maintenance staff scoped the project, procured the material/equipment, and executed the work at considerable savings compared with the cost of a traditionally executed project.

Prior to the formation of DELCORA in 1971, many local municipalities operated their own treatment plants. With the establishment of DELCORA, a number of these plants were incorporated into the new Authority, including the Marcus Hook Plant, which was converted from a treatment plant to a pump station to convey wastewater to DELCORA's Western Regional Treatment Plant (WRTP).

The pumps, drives, and motors in the Marcus Hook building were originally installed during the 1970s; by 2016 this equipment had performed about 40 years of service life and was considerably less efficient in terms of electricity use and pump flow.

Ongoing condition monitoring of the existing pumps clearly demonstrated an increase in the frequency and number of repairs. Obtaining parts for this out-of-date equipment became a problem with long lead times and hard-to-get parts—in some cases, it was necessary to order custom parts from a machine shop. As the frequency of required repairs increased, DELCORA made the decision to replace the equipment to avoid a pump failure that could potentially create an environmental issue.

The new pumps are significantly more reliable and efficient. These "chopper" pumps chop up debris in the water as they pump, thereby reducing potential clogging. The project also included installation of a new bypass system that allows the Authority to remove a pump from service and temporarily replace it with a portable pump, enabling a crew to perform maintenance and repairs without taking the station out of service.

Upgrades to the pump station's technology and instrumentation have increased monitoring and control capabilities and staff efficiency. DELCORA utilizes a Supervisory Control and Data Acquisition (SCADA) system to remotely monitor equipment and operation of facilities all over the county. Information such as bearing temperatures, motor speeds, and equipment status are all monitored through SCADA via transmitters that are incorporated in the new equipment. SCADA provides warnings when equipment is not in the normal range of operation, allowing faster response times for repairs or adjustments.

In addition, tracking the history of this data allows DELCORA to better anticipate and schedule maintenance and repairs. The instrumentation at the pump station was also significantly updated from a telephone-based alarm dialer to a cloudbased alarm system, which functions as backup to SCADA.

The total cost of the project was approximately \$100,000.

Remote Pump Station Bar Screen Project to Improve Reliability and Reduce Costs

Engineering design was completed for bar screen replacements at four remote pump stations in central Delaware County. The bar screens will remove large debris from the influent to prevent pump damage, avoid the risk of an overflow and associated environmental impact, assure operational reliability, and reduce long-term maintenance costs.

The project will upgrade the bar screens in the wet wells at the Muckinipates Pump Station, Darby Creek Pump Station, Chester Pump Station, and Central Delaware Pump Station. The project will also upgrade the electrical and control systems at each pump station, which will enable remote monitoring by the Authority's Supervisory Control and Data Acquisition (SCADA) system.

The project is anticipated to be bid and awarded in 2017, and the project is anticipated to be completed in the second quarter of 2018 at an estimated cost of \$2.5 million.



New Rose Valley Pump Station and F A cost-effective alternative to upgrading a si

In order to better serve customers in the Borough of Rose Valley, DELCORA will construct a new pump station and force main at Ridley Creek in Rose Valley. The new pump station will allow for the decommissioning of the existing wastewater treatment plant with no interruption of service.

Because of a change to the discharge permit issued by the Pennsylvania Department of Environmental Protection, the existing plant would have required major upgrades in order to remain in operation. A more cost-effective alternative was to construct a new pump station and force main to direct the flow to the Western Regional Treatment Plant (WRTP). DELCORA's cost to construct the new pump station and force main will be lower than that to upgrade the existing plant. It also will allow DELCORA to reduce operational costs at this location because maintenance of the highly automated pump station will require less staff attention than operation of a wastewater treatment plant.

Project planning included the challenges of demolition and construction in a busy narrow street. In order to minimize the impact on the neighborhood and facilitate the installation of the force main, pipe will be installed using horizontal directional drilling rather than laying pipe in an open trench. The construction crew will set up at a location along the route and horizontally drill underground for several hundred feet. The construction process will move progressively along the route, creating an underground tunnel to contain the force main. A high-density polyethylene force main was selected for its strength and smoothness, which will allow it to be pulled easily through the tunnel.

The new pump station will be located adjacent to the existing facility on the same plant site; the existing plant will remain operational until the new pump station is fully on line. The existing facility, which was constructed in the 1920s by the Works Progress Administration, will no longer be a functioning pump station, but will remain standing. DELCORA will clean and preserve a small stone building for its historical value, and it will be reused as an electric equipment room.

orce Main: mall treatment plant



The new pump station will convey approximately 100,000 gallons per day of wastewater to the WRTP, which is fully prepared to treat this additional sanitary load. The construction of the Chester Ridley Creek Pump Station, which was completed some years ago, permitted the additional flow capacity.

This project advanced as a result of cooperation among DELCORA and a number of agencies and municipalities, including Rose Valley Borough and Nether Providence, as well as Middletown Township, which has signed an agreement allowing wastewater to flow through the township's pipes on its way to the WRTP.

DELCORA anticipates that the pump station and force main will be fully operational in spring of 2018 at a projected cost of \$2.8 million.

Siphon Rehabilitation Project: Increasing efficiency and capacity

Interceptor lines throughout DELCORA's collection system collect flows from smaller lines, conveying wastewater to area pump stations and the Western Regional Treatment Plant (WRTP). To assist in this conveyance, the system has five siphons located at creek crossings, including those at Ridley Creek and Chester Creek, where the interceptor lines cross beneath the creeks. These lines can fill with grit, reducing or even stopping flow. The siphons are critical to the operation of the collection system as they keep the interceptors flowing and maintain proper capacity within the interceptors.

The siphons were built and installed with the original construction of the interceptors and, although they have been maintained over the years, there has been significant deterioration in the concrete chambers, pipes, and valves.

The 2016 rehabilitation project included: valve inspections and replacement of those that are no longer functioning; cleaning the pipes that go underneath the creek and videotaping or photographing them for upload to Granite Net; and assuring that the entire system is clean and functional. This work was performed by DELCORA's Operations and Maintenance Department at a cost of approximately \$39,000. The Authority will follow up with a quarterly inspection to identify any major repairs to be made to the concrete walls and/or to the pipes themselves.

This project will offer a number of benefits to DELCORA and its customers. The Authority will be able to minimize or avoid backups in the interceptor lines, which can cause potential environmental impact. The project will also permit more capacity as new housing and industrial developments tie into DELCORA and additional flow is introduced into our sewer lines. It is critical for all of our systems to be prepared to handle increased flow.

DELCORA will also realize improvements in efficiency. The project will enable the Authority to schedule preventive maintenance before a line decreases in efficiency. In addition, the higher flow increases water velocity in the sewer lines, reducing grit build-up and associated maintenance requirements.



CCTV Upgrade Provides Additional Security and Operational Information

DELCORA is upgrading physical security to protect the vital assets and processes performed by the Western Regional Treatment Plant (WRTP) and all of its other facilities.

In 2016, 40 additional closed-circuit television (CCTV) cameras were installed at DELCORA facilities throughout the county, along with a server capable of handling the additional data, and the network infrastructure was upgraded with fiberoptic cable. By 2019, there will be approximately 300 cameras in the system.

Additional security has been in place since 9/11, including enhanced access control and monitoring at facilities, and increased physical security at wastewater pumping and treatment facilities and chemical storage areas.

In addition to security, cameras will be utilized for increased operational efficiency in performing functions in challenging situations. As an example, in order to view the sludge on a conveyor belt at the WRTP, a plant operator currently has to go outside of the building and climb a ladder to view the top of the belt. The camera will provide a live video stream on the operator's computer, enabling the operator to make process adjustments without leaving the desk. Not only will this save "travel" time, but the employee can view the process in real time and with greater safety.

Expanded CCTV also will enable continual observation of the properties surrounding the Authority's facilities, which will allow staff to be alerted on a real-time basis when maintenance and repairs are necessary.

A new CCTV camera at the WRTP's trucked waste grease acceptance area will allow an employee a full view of the grease acceptance area, which is not currently visible from the sludge receiving office, enabling a rapid response to drivers requiring assistance.

The 2016 CCTV upgrade was completed at a cost of approximately \$80,000.

WRTP Incinerator Upgrades: Running at Full Capacity with Lower Emissions

Completion of this significant upgrade enables DELCORA to utilize the full permitted capacity and operational flexibility of its two incinerators and reduce air emissions.

In 2016, DELCORA substantially completed a significant upgrade of the air pollution control systems of the two sludge incinerators at the Western Regional Treatment Plant (WRTP). The project enables the Authority to fully utilize the permitted capacity and operational flexibility of its two incinerators—using less fuel to incinerate organic matter and more efficiently conveying the ash to the plant's two storage silos prior to disposal—and to meet the United States Environmental Protection Agency's current Maximum Achievable Control Technology standards for removal of sulfur-oxygen compounds in final stack emissions.

The scrubber/afterburner project, which was begun in 2015, comprises installation of a Multi-Venturi scrubber and wet electrostatic precipitator and a post-scrubber afterburner with regenerative thermal oxidizer (RTO) heat recovery for each incinerator. These technologies effectively reduce the volume of moisture, acid, particulate, metals, and gas that are generated by the sludge incineration process.

The post-scrubber afterburner is a combination afterburner/heat

exchanger vessel located outside the incinerator building. Heat recovery for an RTO can operate at up to 98% thermal efficiency, which will reduce consumption of natural gas by up to 80% compared with conventional afterburner technology. RTOs also have higher total hydrocarbon and carbon monoxide destruction efficiencies. Other benefits of the system include: approximately 90% reduction in particulate emissions; reduced temperature-related stress on furnace internals, which will reduce furnace maintenance; consideration of furnace capacity increases without inordinate increases in fuel demand; and an improved position with future regulatory requirements.

The installation of the new system enables each incinerator to operate at its full capacity of 55 tons per day, which assists the plant in meeting the increased capacity requirements to process incoming hauled waste as well as additional flow from the wastewater collection and conveyance system.

The incinerators were started up in 2016; final project closeout scheduled for 2017. The total cost of the project is approximately \$10.7 million.

Utility Water System Upgrade Underway to Enhance Reliability and Flexibility

Wastewater treatment plants use water during several of the processes necessary to clean and treat effluent, the most critical of which is incineration. The utility water distribution piping that is used to bring this water to the process areas of DELCORA's Western Regional Treatment Plant (WRTP) plant was constructed in the 1970s, and the majority of the piping is cast iron located below grade.

Over the last several years, pipe leaks have occurred, which required DELCORA to undertake emergency repair work. Due to the outdated structure of the existing system, major repairs necessitated the use of emergency pumping equipment or even system shutdowns while the repairs were made.

DELCORA is in the process of upgrading the system to provide more reliability and operational flexibility. In 2014, the preliminary engineering report for the project was completed, with the final design completed in 2015. The project was bid and begun in 2016, with approximately 38% of the project completed by the end of the year.

The new utility water piping system is designed in a looped arrangement, with isolation valves placed at each point of use and at strategic locations in the network. This provides for flexibility within the system, allowing portions of the network to be isolated for maintenance and repairs, avoiding a shutdown of the entire system.

During excavation, the contractor had to work slowly in order not to damage the existing underground utilities. Additionally, a number of unknown abandoned structures and pipelines were discovered during excavation, which required removal or work-arounds.

When completed, the reliability and operational flexibility of the WRTP's utility water system will be greatly improved. The need for plant shutdowns will be reduced, providing enhanced service to customers, while allowing the system to remain operational during maintenance work.

The project is anticipated to be completed in June 2017 at a cost of approximately \$5 million.

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Ensuring that wastewater is collected, conveyed, and treated in a safe, effective way to enable residents and businesses to enjoy clean, healthy water.



Procurement

DELCORA.ORG Provides Information and Easy Online Bill Paying

DELCORA's updated website, which went live in January, 2016, is a more user-friendly, interactive experience for customers—ranging from local residents to trucked waste haulers—employees, investors, and the community. Offering enhanced online bill-paying, trucked waste pricing and permitting, public outreach, and information about the Authority's projects and financials, DELCORA.org is now a comprehensive resource for all "stakeholders."

One major upgrade improved the online bill-paying area. The new website has increased the ease of paying sewer bills online, as well as allowing customers to view their previous bills and a payment history. In 2011, approximately 1,500 people paid bills online. In 2016, 5,700 took advantage of this option, and now, with more flexible service, online payment is expected to continue to increase. Online bill-paying is becoming increasingly important as DELCORA's service area and customer base expand geographically, with many customers located farther from the main office. The online payment function provides a convenient way for customers to make payments from any location. The online contact form makes it easy for customers to get timely answers to their questions without the need to pick up the phone.

The new website also has additional layers of security for both the public and internal users. For example, employees can log on to the website and view internal information—from employee handbooks to vacation leave forms—from any location.

The Trucked Waste page of the website has been expanded to provide information to DELCORA's trucked waste customers, including permitting and pricing.

Through the interactive FAQs, visitors to the site can click through for detailed information on a range of topics, such as the Long Term Control Plan for the Combined Sewer Overflow system, public meetings, and other resources.

Informing stakeholders about major projects and the Authority's investments of its capital improvement dollars is a priority. By clicking on a photo of a recent DELCORA project, the viewer can read a short blurb about the project and its benefits to the Authority and its customers. The Authority's financial results, including annual reports, are also available online.

As online interaction becomes an increasingly important means of communication and commerce, the Authority will continue to improve DELCORA.org for its stakeholders.

Employee Engagement: Focusing on function, family, and the future

DELCORA's goal for employee engagement is simple: employees who know that they are part of the DELCORA team. The Authority has been providing excellent benefits and compensation for many years, but it is also the everyday things that demonstrate to employees that they are valued—from instituting a modified summer schedule to employee social events such as the holiday party.

Each department holds regular management meetings to discuss issues such as the organization's financial overview, plant overview, flow levels, Human Resources news, challenges and successes: informed employees are engaged employees.

DELCORA values input from all areas of the organization, creating crossfunctional teams to resolve challenging issues and work on projects. The diversity of perspectives and expertise adds tremendous value to these processes. When employees become vested in the solutions developed by their teams, they deepen their commitment to doing the highest quality work possible. Training is an important part of succession planning. Promoting wellqualified employees from within is not only part of DELCORA's commitment to employee advancement—it is also more cost-effective. The Authority provides support to employees as they move up the ladder and assume additional responsibilities; in turn, they bring their organizational knowledge to their new roles.

That is why DELCORA is committed to retaining valuable long-term employees—many of whom bring 25 or more years of experience to their jobs. Experienced employees are more effective at their jobs, and the costs of hiring are reduced because of lower turnover.

Developing and supporting an engaged workforce means having employees who feel connected to DELCORA and its customers and are committed to hard work, high efficiency, and protecting the environment. Our engaged employees allow DELCORA to provide safe and effective wastewater treatment at competitive rates.

Bond issue Generates Proceeds of \$58.7 Million

Moody's reaffirmed DELCORA's "Aa3" credit rating; proceeds will fund significant capital improvements.

On October 6, 2016, DELCORA successfully settled its Series of 2016 Bonds in the principal amount of \$52,885,000. The bonds were sold with approximately \$10,311,578 of net original issue premium which, when combined with other available sources, resulted in total available proceeds of approximately \$58,726,175.

In association with DELCORA's 2016 bond issue, Moody's affirmed DELCORA's very strong "Aa3" credit rating and assigned a "Stable Outlook" based on the Authority's substantial liquidity and strong financial metrics, while acknowledging the Authority's potential to incur debt associated with revision of its Long Term Control Plan.

Acting on favorable market conditions had interest rate advantages. DELCORA had accelerated the pricing of the bonds by several weeks to avoid the uncertainty surrounding the 2016 general election and to take advantage of favorable interest rate conditions and strong investor demand. As a result, the Authority was able to mitigate interest-rate risk and lock in interest-rate improvements. After the pricing of the bonds, there were significant increases in long-term interest rates. The bonds were structured with a 30-year final maturity of November 1, 2046 and had an overall arbitrage yield of 2.64%.

Proceeds of the bonds will fund significant capital improvements. These projects include: improvements to DELCORA's Western Regional Treatment Plant (WRTP) in Chester, the wastewater conveyance system within Delaware County, and the Combined Sewer Overflow system in Chester; and purchases of a real estate parcel adjacent to the WRTP, the Spring Hill Farms wastewater treatment plant in Chadds Ford, and a building and easement at the former Baldwin Run Pollution Control Facility in Aston.



The DELCORA Board of Directors



DELCORA's Executive Director Robert J. Willert pictured with Senior Staff

DELCORA sent an average of 21.51 million gallons per day (MGD) in 2016 to the Philadelphia Water Department's Treatment Plant. Flow on DELCORA's Western Regional Treatment Plant was 31.81 MGD.

In 2016, revenue from the trucked waste receiving business reached \$4,760,262, an increase of \$760,262 (19%) over the 2016 budget, and an increase of \$382,496 (8.7%) over the prior year. Revenue has consistently increased annually from a level of approximately \$300,000 in 2004 to the present level. (See the chart on page 19.)

Key Rating Drivers

FLOW

Total flow in 2016 was 53.32 MGD. Actual usage was approximately 60% of capacity.

SERVICE AREA

The socioeconomic profile of the base customer is quite strong. Delaware County's population is more than 560,000, and income levels in the county are above average. The median family income of the county's residents is equal to 126% of the US median, and per capita income is 118% of the US median. The county's size and economic diversity are a strength.

Although the Authority recently underwent some revenue pressures from the loss of industrial usage, primarily from a Sunoco Inc. property, the current revenue composition is primarily residential and stable.

DEBT

The Authority has roughly \$176 million of outstanding debt, which includes \$7.5 million of state revolving fund loans through the Pennsylvania Infrastructure Investment Authority (PennVest), which are on parity with the bonds and bound by the same covenants. The debt is equal to a moderate 3.2 times revenues.

All of the system's debt is fixed rate and amortizes over the long-term.

The Authority is not exposed to any derivative agreements.

DELCORA has entered into a consent decree with the EPA and PADEP over overflows in the City of Chester. DELCORA is unable to estimate the costs of this settlement; however, such agreements typically require significant debt to achieve compliance.

The Authority's debt burden and capital funding requirements are likely to increase in future years because of its exposure to two consent decrees, one directly for the infrastructure of the City of Chester, and the other indirectly for the Philadelphia Water and Sewer Enterprise.

Condensed Balance Sheet

	Year Ending 12-31-16	Year Ending 12-31-15
Current Assets	\$159,202,648	\$106,403,801
PP&E (net)	\$190,825,742	\$182,422,188
All Other Assets	\$ 17,089,296	\$ 12,209,893
Total Assets	\$367,117,686	\$301,035,882
Current Liabilities	\$ 14,903,452	\$ 11,928,026
Long Term Debt	\$186,347,553	\$128,545,460
Net Assets	\$165,866,681	\$160,562,396
Total Liabilities and Net Assets	\$367,117,686	\$301,035,882

Statement of Revenues, Expenses, and Changes in Retained Farnings

Retained Earnings	Year Ending 12-31-16	Year Ending 12-31-15
Operating Revenues	\$ 55,849,791	\$ 53,305,786
Operating Expenses	\$ 43,534,852	\$ 44,211,986
Operating Income	\$ 12,314,939	\$ 9,093,800
Non Operating Revenue (Expenses)	\$ (7,010,654)	\$ (3,061,499)
Increase in Net Assets	\$ 5,304,285	\$ 6,032,301
Capital Contributions	-	\$ 2,392,191
Net Assets – Beginning	\$160,562,396	\$152,137,904
Net Assets – Ending	\$165,866,681	\$160,562,396

Total Assets 2008 - 2016



Trucked Waste 2008 - 2016





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