



Water Demand Management Plan June 2020 Annual Update



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Please print this plan using the double-sided printer setting.

Cover photograph: Sunrise Over New Croton Dam

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Introduction

Two years since the release of the 2018 Water Demand Management Plan, DEP has launched several new projects under the Water Demand Management Program's six strategies, described below, and built upon existing partnerships to advance additional water conservation measures.

In 2019, after 5 years, DEP marked the successful completion of the Toilet Replacement Program, with total savings of 0.63 million gallons per day. DEP also initiated its Water Conservation and Reuse Grant Pilot Program, and continued implementation of the two-year Water Challenge to Universities. In June 2019, through an ongoing partnership with New York City Health + Hospitals Corporation, DEP completed fixture and appliance retrofits at Harlem Hospital. Retrofits include 570 fixtures and ice machines, more than 900 faucets, and one industrial dishwasher, for a total demand savings of 70,000 gallons per day. Additionally, DEP continued its partnership with the New York City Department of Citywide Administrative Services (DCAS), and began retrofitting inefficient fixtures in DCAS-managed municipal buildings. Retrofits in two buildings were completed in February 2020. In January 2020, DEP also launched its fifth Water Challenge to Wastewater Resource Recovery Facilities, to reduce potable water consumption by 10%.

In 2019, New York City's average daily water demand dropped to the lowest in at least the last 60 years, at 987 million gallons of water per day (Figure 1). The unprecedented COVID-19 pandemic in Spring 2020 and the corresponding economic down turn caused further declines in water demand. DEP will continue to monitor trends and may adjust its demand management programming based on the most cost-effective savings opportunities. Continued savings will help provide a critical buffer prior to and during the repair of the Delaware Aqueduct, planned for 2022. Furthermore, lower demand will help optimize reservoir water levels during times of drought, and reduce the energy and greenhouse gas emissions associated with conveyance and treatment of water and wastewater.

As of May 2020, DEP's water efficiency programs have led to a reduction of 41 metric tons (MT) CO₂ equivalent (CO₂e) per year from reductions of potable water demand and 114 MT CO₂e per year from reductions of volume to Wastewater Resource Recovery Facilities. Overall, DEP's water efficiency programs have reduced carbon emissions by over 155 MT CO₂e per year and energy use by 593,023 kWh/ year. This is equivalent to 43 standard passenger cars (10,000 miles per year) or 3,430 60-Watt lightbulbs (used for 8 hours per day, every day), and a total energy cost savings of approximately \$64,155 per year.

The Six Strategies of DEP's Water Demand Management Program



1. Municipal Water Efficiency Program



2. Residential Water Efficiency Program



3. Non-Residential Water Efficiency Program



4. Water Distribution System Optimization



5. Water Supply Shortage Management



6. Wholesale Customers Water Demand Management Program

This annual report describes DEP’s program highlights from the past year and plans for the coming year, and measures progress toward our 20 MGD by 2022 savings goal. The report, as well as an interactive online map (see Appendix B) that shows the location of DEP’s projects, the estimated demand savings, and the estimated energy and greenhouse gas reductions from each project, is available at nyc.gov/dep/conservation.

DEP is working diligently to advance initiatives under each of our six strategies for water demand reduction,

and will continue to leverage our partnerships, promote leak detection, and optimize our own infrastructure. These strategies will help ensure the reliability of the City’s water resources, both in the near term during the Delaware Aqueduct shutdown and beyond, as we continue to pave our way towards a low-carbon, resilient future.

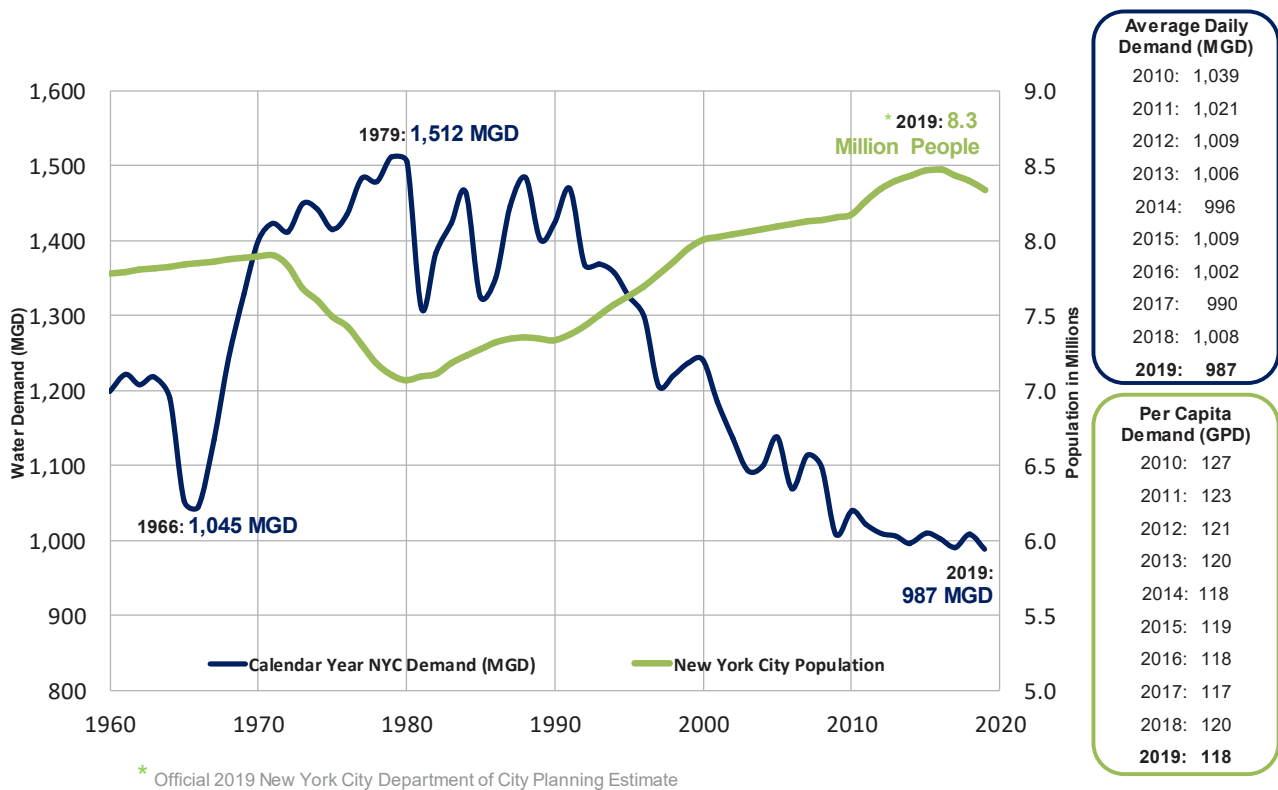


Figure 1: New York City Water Demand and Population Growth



Municipal Water Efficiency Program



New York City government is comprised of over 50 departments or agencies, and each one uses water for daily operational needs and to carry out their individual missions. The goal of the Water Demand Management Program’s Municipal Water Efficiency Program (MWEP) is to ensure that water is used as efficiently as possible in City-owned facilities, by retrofitting fixtures and implementing water reuse projects. Due to the size of New York City government, there is significant opportunity for water savings. In fact, seven years into implementation, the largest share of savings from DEP’s Water Demand Management Program is attributable to MWEP initiatives.

Many partnerships outlined in the 2018 Water Demand Management Plan continue to move forward, and new projects will begin construction in the near future (Table 1). Several initiatives underway include retrofitting fixtures in City-owned hospitals and municipal buildings.

Partner Agencies/Departments	Project
New York City Department of Education (DOE)	Bathroom Fixture Retrofits
DEP	Water Challenges
New York City Health + Hospitals Corporation (HHC)	Bathroom Fixture Retrofits
New York City Department of Citywide Administrative Services (DCAS)	Bathroom Fixture Retrofits
New York City Department of Parks and Recreation (DPR)	Water Recirculation/Reuse and Valve Replacement

Table 1. Ongoing MWEP Partnership Projects

Some large capital projects – including a water recirculation project in Central Park, capital upgrades at DEP’s Wastewater Resource Recovery Facilities, a valve replacement project in Prospect Park, and an expansion of DEP’s successful initiative to retrofit fixtures in New York City public school facilities – are primed for implementation in the coming years. Through MWEP, DEP will continue to advance water efficiency, metering, education, reuse, and water loss control in City-owned facilities.

New York City Department of Education

Savings Achieved (May 2020): 3.31 MGD

Potential Savings by 2022: 4.71 MGD

Since 2013, DEP and Department of Education (DOE) have partnered to upgrade bathroom fixtures in DOE facilities. To date, 402 facilities have been retrofitted with over 34,600 new and efficient fixtures, for a savings of 3.31 MGD. In 2019, DEP received capital funding for up to an additional 200 DOE facility retrofits. DEP continues to coordinate with DOE’s Division of School Facilities and the School Construction Authority to execute a Memorandum of Understanding (MOU) and anticipates that the retrofits will begin in 2020.

Wastewater Resource Recovery Facilities

Savings Achieved (May 2020): 1.83 MGD

Potential Savings by 2022: 1.98 MGD

In January 2020, DEP launched its fifth Water Challenge to Wastewater Resource Recovery Facilities (WRRFs) to encourage water reduction in DEP’s own facilities. To date, all 14 WRRFs have participated in a Water Challenge round and seven have achieved a 10% reduction or more over their baseline average, attaining a total savings of 1.83 MGD. As part of the fifth Water Challenge, all WRRFs are encouraged to target an additional 10% reduction from their baseline average. For more information on the Water Challenge and DEP’s efforts to save energy, see Case Study: Water Challenge to WRRFs on page 9.

New York City Health + Hospitals Corporation

Savings Achieved (May 2020): 0.07 MGD

Potential Savings by 2022: 1.22 MGD

The New York City Health + Hospitals Corporation (HHC) operates the City’s public hospitals and clinics and is the largest municipal healthcare system in the United States. In general, hospital facilities are water-intensive, making HHC an important partner for DEP and a top candidate for water efficiency upgrades.

Following the completion of retrofits at Harlem Hospital in Summer 2019, HHC and DEP coordinated to identify additional HHC facilities eligible for retrofit. Specifically, DEP received capital funding to complete retrofits at Jacobi Hospital, Woodhull Hospital, Elmhurst Hospital, Bellevue Hospital, and North Central Bronx Hospital. As an initial step, HHC’s contractor will survey these facilities in 2020 to identify the count and type of fixtures that are eligible for retrofit. HHC’s contractor previously completed a survey of Bellevue Hospital. DEP executed a Memorandum of Understanding with HHC and retrofits are anticipated to begin in 2020.



Water Cooled Ice Machines Were Replaced with More Efficient Air-Cooled Models at Harlem Hospital

New York City Department of Citywide Administrative Services

Savings Achieved (May 2020): 0 MGD

Potential Savings by 2022: 0.24 MGD

The New York City Department of Citywide Administrative Services (DCAS) manages, leases, and purchases property for the City; operates, manages, and repairs courthouses and other City-owned public



buildings; administers an energy conservation program; purchases supplies, materials and equipment for use by City agencies; is responsible for citywide fleet management including operation and maintenance of a motor vehicle pool; and supports government recruitment.

DCAS's direct portfolio includes approximately 50 public buildings throughout the city, including courts and City office buildings that have both full-time employees and many daily visitors. In 2018, partnering with DEP, DCAS surveyed 10 buildings within their portfolio: City Planning Building; Excelsior Building; Court Square Building; Supreme Courthouse; Civil Courthouse; Family Courthouse; Bronx Family Court; Queens Criminal Court; Queens Borough Hall; and Bronx County Court. In Winter 2019, DCAS began retrofitting the over 1,300 fixtures indicated as eligible for retrofit in these surveys.

New York City Department of Parks and Recreation

Savings Achieved (May 2020): 1.1 MGD

Potential Savings by 2022: 2.73 MGD

The New York City Department of Parks and Recreation (DPR) is the steward of more than 30,000 acres of land — 14 percent of New York City — including more than 5,000 individual properties. DEP has partnered with DPR since 2013 on water conservation projects in City parks, beginning with retrofitting 400 spray showers and nine recreation centers citywide. DEP looks forward to continuing this partnership and moving forward with water conservation initiatives in Central Park and Prospect Park.

Central Park

In 2019, DEP continued coordinating with Central Park Conservancy (CPC) on the North End Recirculation Project. The project, which will save up to an estimated 0.83 MGD of potable water by recirculating stormwater between the Harlem Meer and Jackie Onassis Reservoir, is moving toward the design and permitting phase. This project is the first of its kind in Central Park and one of only a few stormwater recirculation projects in New York City, and due to its complexity, DEP and CPC held several coordination meetings and site visits in 2019. DEP and CPC continue to coordinate on the conceptual design, engineering, and operation and maintenance considerations of this innovative project. DEP is currently

working to execute an MOU with CPC and DPR to transfer funding to DPR.

In addition to sizeable potable water savings, this recirculation project is expected to reduce combined sewer overflows (CSOs) during rain events to the East River by 4 million gallons per year. Through this project and others, DEP has been actively working to reduce flows to sewers and wastewater facilities through water conservation and reuse, as part of an integrated approach to water resources management in New York City.

Prospect Park

In 2019, DEP continued coordinating with Prospect Park Alliance (PPA) to replace an existing service line valve in Prospect Park to achieve an estimated demand savings of 0.8 MGD. The service line supplies potable water to Prospect Park Lake and during rain events, PPA staff discharge water from the lake into the combined sewer system to avoid flooding the park. Additionally, during summer when evaporation occurs, Prospect Park Lake is supplied with an estimate 1 MGD or more of potable water, to maintain health and aesthetics. In 2019, DEP and PPA held site visits and meetings to discuss design, engineering, and feasibility, and construction of this project is anticipated to begin in 2021. As an integrated water management co-benefit of this project, it is expected to reduce CSOs during rain events to Gravesend Bay and the Upper Bay by 12 million gallons per year.

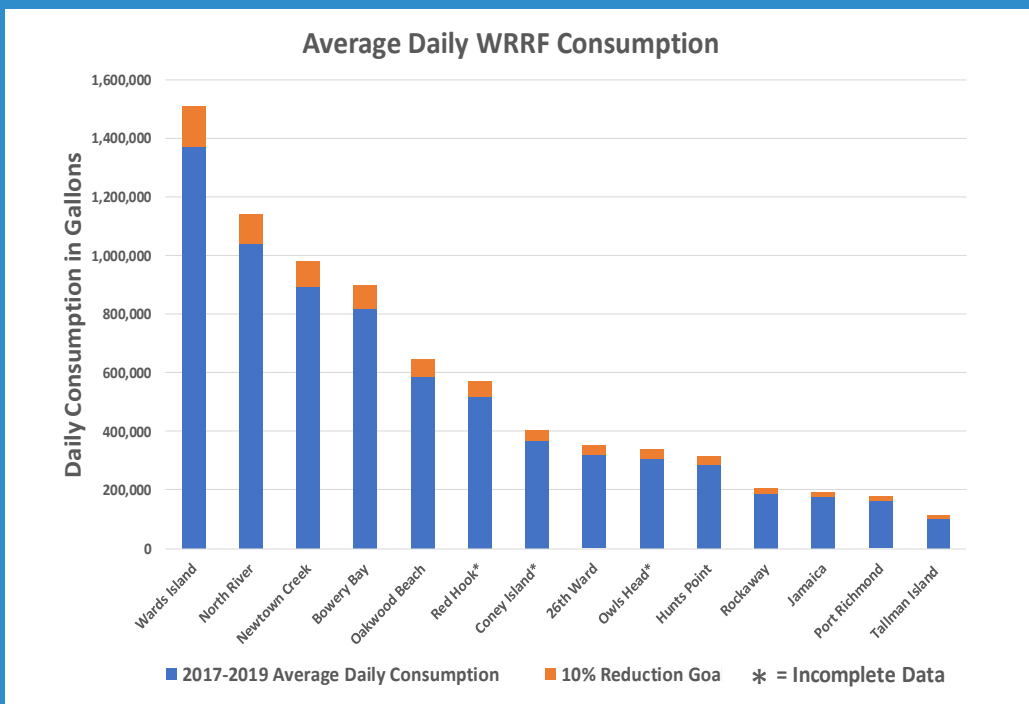


DEP Staff Inspecting Service Line Valve in Prospect Park

Case Study: Water Challenge to Wastewater Resource Recovery Facilities

Since 2013, DEP has organized four Water Challenges to our Wastewater Resource Recovery Facilities (WRRFs) to actively promote water conservation in DEP’s own facilities and identify opportunities to improve operational efficiency. In January 2020, DEP kicked off a fifth Water Challenge in which all 14 WRRFs are encouraged to target additional water savings over the course of a year. Prior to current Water Challenges, all 14 WRRFs had previously participated in a Water Challenge round, competing with two or three other WRRFs. Total water savings from the prior Water Challenges amount to 1.89 MGD, with seven WRRFs achieving a 10 percent reduction or more. Through the fifth Water Challenge, the WRRFs are encouraged to achieve an additional 10 percent reduction in daily water consumption, which has the potential to yield additional water savings of 2.73 MGD.

DEP tracks water use during the Water Challenge with automated meter reading (AMR) transmitting devices installed on all potable water pipes entering the facilities. By tracking water usage, plant staff are able to monitor water savings associated with any interventions that they identify and implement. These interventions can range from the introduction of new standard operating procedures (SOPs) to projects that require purchase and installation of new, more efficient equipment. Water conservation SOPs are provided to plant chiefs and include recording water consumption on a weekly basis and comparing to AMR data, isolating and repairing leaks, cleaning effluent strainer baskets more frequently, and minimizing use of potable water and extending effluent use, when possible. Opportunities to save water include utilizing plant effluent instead of potable water, where possible, as well as using potable water more efficiently where high quality water is required.



Average Daily Consumption for Each of DEP’s WRRFs and Their Corresponding 10 Percent Reduction Goal



The Water Challenge will run through the end of December, 2020. As the Water Challenge continues, plant chiefs will focus on implementing water conservation SOPs. Regular meetings will provide an opportunity for plant staff to provide updates on the status of their facilities and encourage the exchange of ideas for water conservation projects. In addition, DEP will provide funds, as available, to implement equipment repairs, retrofits, and upgrades to save water. Currently, DEP is in the process of purchasing new adjustable flow hose nozzles to replace existing hose nozzles to break up and remove scum that forms on the top of gravity thickeners at WRRFs. These new nozzles will allow plant staff to better control the flow of hoses and are estimated to reduce average hose flow rate from 196 gallons per minute (GPM) to 63 GPM, for a total reduction of up to 133 GPM. Additionally, DEP will explore projects to improve effluent quality and extend effluent distribution networks, to allow for effluent reuse during wastewater treatment processes that currently use potable water.



A DEP Wastewater Resource Recovery Facility



Residential Water Efficiency Program



Although New York City's per capita consumption continues to remain low compared to other large US cities, residential properties accounted for 83 percent of the City's total billed water demand in Fiscal Year 2019 (Figure 2), making it the highest water user by land use type. To target this customer class, DEP has promoted toilet efficiency citywide since the 1990s through two incentive programs: the 1994-1997 Toilet Rebate Program, under which 1.3 million toilets were replaced citywide, and the Toilet Replacement Program, which began in 2014 and concluded in June 2019.

In addition to the Toilet Replacement Program, DEP, with support from Honeywell, conducts complementary apartment-level household water surveys in single- and multi-family buildings each year to promote water conservation and identify leaks. DEP and Honeywell also distribute home water savings kits to these customers.

Toilet Replacement Program

Savings Achieved (May 2020): 0.63 MGD

As the Toilet Replacement Program (TRP) came to a close in June 2019, DEP achieved key customer service goals by conducting significant outreach and executing key vendor partnerships. DEP's outreach achievements helped the program conclude on a high note, and introduced homeowners to available resources to assist them with retrofitting fixtures in their buildings. In total, 1,100 vouchers were redeemed for the replacement of nearly 13,300 toilets since 2014 (Table 2), accounting for 0.63 MGD of savings. Although TRP concluded, DEP still offers resources to multi-family property owners to retrofit their buildings. DEP's Water Conservation and Reuse Grant Pilot Program (see page 13) offers reimbursement for fixture retrofits, including toilets, in multi-family buildings.

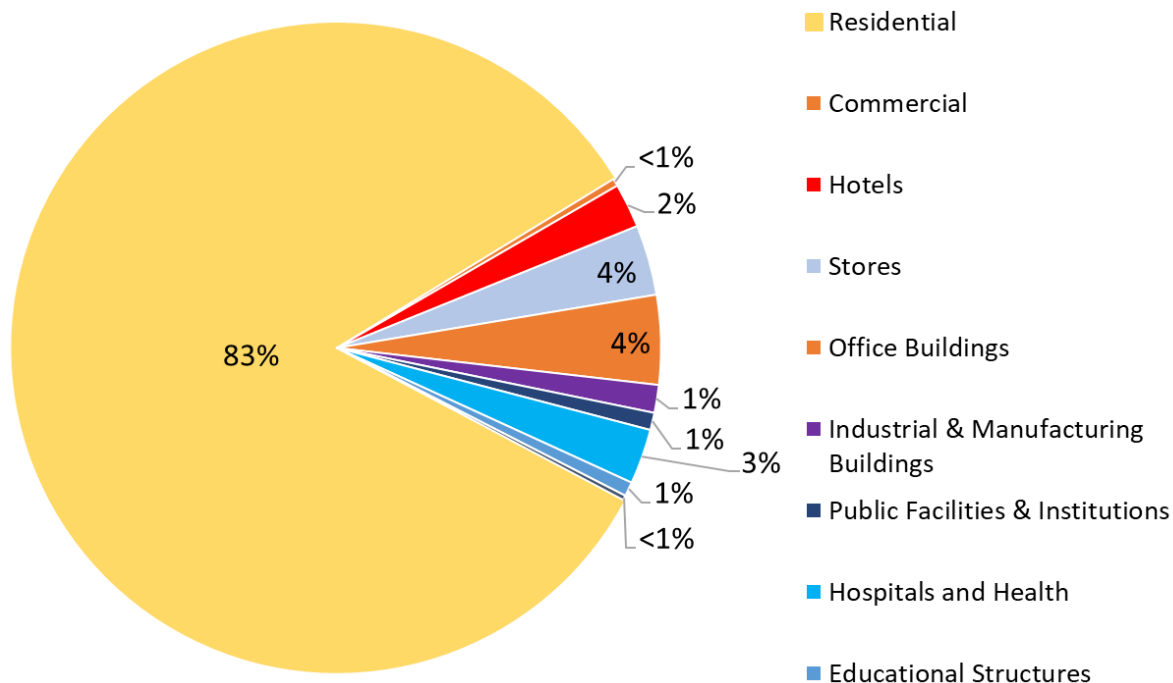


Figure 2: Fiscal Year 2019 Metered Water Consumption by Land Use

Note: Available land use categories in MapPLUTO have changed over time, and all residential land use is combined into a single category.

Borough	Number of Redeemed Vouchers	Number of Retrofitted Toilets
Manhattan	216	3,212
Bronx	227	4,382
Brooklyn	528	3,699
Queens	136	1,981
Staten Island	3	20
Total	1,110	13,294

Table 2. TRP Participation by Borough, 2014 to 2019

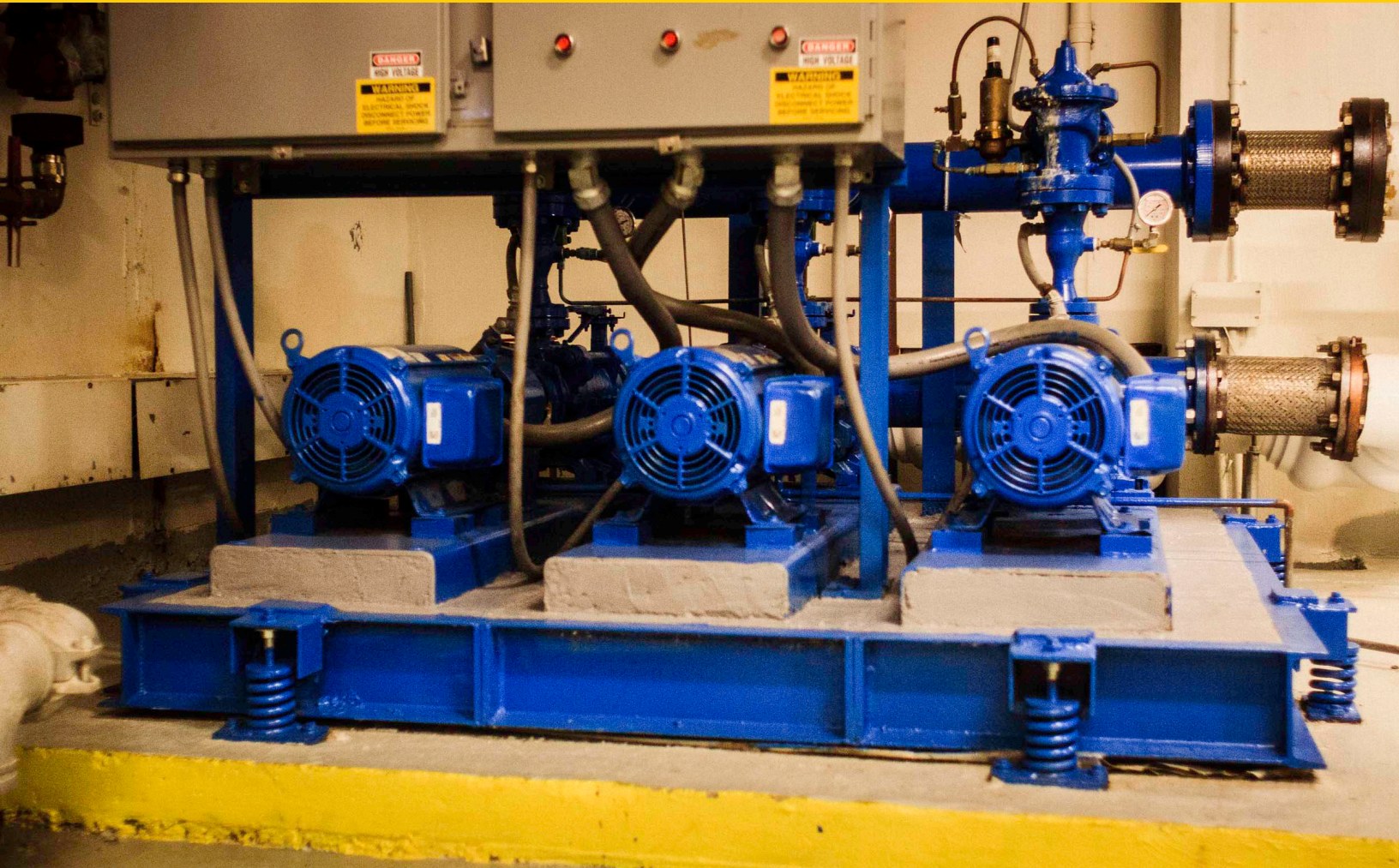
Home Water Savings Kits

Savings Achieved (May 2020): 0.4 MGD

In addition to establishing the Toilet Replacement Program, DEP works with Honeywell to provide building owners with complimentary household water conservation surveys. The surveys assist building owners with identifying opportunities for water savings and detecting leaks. In 2019, Honeywell conducted surveys in 4,244 individual apartments in 2,127 single-family apartment buildings. Honeywell also surveyed 243 multi-family buildings, and 4,212 individual units within these properties.



Non-Residential Water Efficiency Program



To increase water efficiency across all private sectors of New York City, DEP offers cost-sharing incentives and voluntary programs to property owners. DEP expanded its incentive program for water conservation to include non-residential private properties in 2016 by offering its cost-sharing On-site Water Reuse Grant Pilot Program, and then re-launching it as an expanded Water Conservation and Reuse Grant Pilot Program in July 2019. In addition, DEP has encouraged voluntary conservation by engaging non-residential property owners since 2013 through Water Challenges to specific sectors, including hotels, restaurants, hospitals, and, most recently, universities.

Water Conservation and Reuse Grant Pilot Program

Potential Savings by 2022: 1.0 MGD

DEP launched the Water Conservation and Reuse Grant Pilot Program in July 2019. This new program incentivizes commercial and residential fixture retrofits, plus innovative water conservation projects including, but not limited to, on-site water reuse systems. The program has a minimum water savings requirement of 2,740 gallons per day, or 1 million gallons per year. The grant covers up to 100 percent of equipment costs for basic retrofits, and for owner-identified water conservation projects such as on-site water reuse, the grant will fund up to \$10 per gallon per day of water saved.



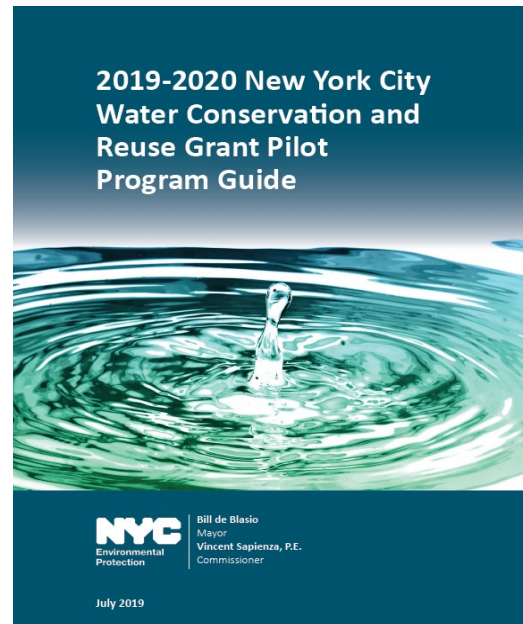
The pilot program received over 20 applications with projects ranging from fixture retrofits to more complex water reuse systems. Of the top 10 ranked projects, potential savings amount to 350,000 gallons per day. Awardees were notified in Spring 2020, and will be announced pending confirmation of funding and legal agreements.

While the goal of the program is primarily to conserve potable water, these projects also offer the potential co-benefit of reducing flows to the sewer system and wastewater facilities. In reducing flow to sewers, on-site water reuse could also contribute to reducing combined sewer overflows (CSOs). As an additional co-benefit, there is a potential reduction in greenhouse gas emissions from reduced flows to our wastewater resource recovery facilities.

Water Challenge to Universities

Potential Savings by 2022: 0.05 MGD

DEP launched the Water Challenge to Universities on August 1, 2018. Like previous Water Challenges, the goal of this Challenge is for participants to achieve a 5 percent reduction in water consumption. The six participants are Fordham University: Lincoln Center Campus, The New School, Long Island University: Brooklyn Campus, Pace



Water Conservation and Reuse Grant Pilot Program Guide

University, St. John's University, and Weill Cornell Medicine. Over the first year and a half, these six participants have collectively reduced their monthly average water consumption by 3,800,000 gallons. For more detail about specific water saving projects developed by participants, see the Water Challenge to Universities case study on the following page.



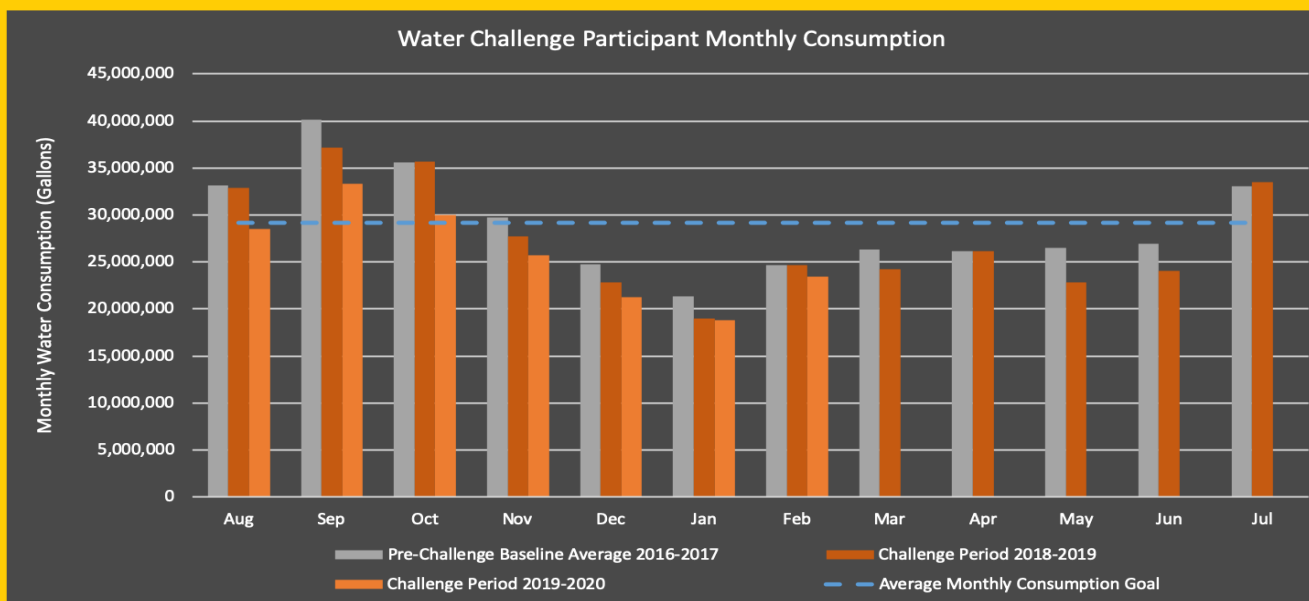
Water Challenge to Universities Workshop, Touring the New School's On-site Water Reuse System

Case Study: Water Challenge to Universities

The Water Challenge to Universities is a voluntary, two-year challenge for participants to reduce their water consumption by at least 5 percent. The Challenge included six participants: Fordham University: Lincoln Center Campus, The New School, Long Island University: Brooklyn Campus, Pace University, St. John’s University, and Weill Cornell Medicine. DEP anticipated that they had the potential to save 14 million gallons of water per year if each participant reduced consumption by 5 percent. In February 2020, prior to the shift to remote learning due to the COVID-19 pandemic, Water Challenge participants had already collectively reduced their monthly average consumption by 10 percent, or 126,000 gallons per day. Due to the campus closures, water consumption declined dramatically after March 2020 and therefore, benchmarking was discontinued for the remaining months of the Challenge.

As part of the Challenge, DEP hosts quarterly workshops to give participants additional tools and resources to perform water audits, identify strategies to achieve savings, and to create water demand management campaigns for their students. Through these workshops, participants identified and shared unique strategies, which in turn fostered a collaborative environment to inspire each other. In the first year of the Challenge, workshop themes included water conservation fundamentals, such as leak detection, sub-metering, sustainability outreach campaigns, and behavior change data and analysis. In the second year, workshops were focused on supporting the implementation of water conservation projects as identified by the participants. These workshops have also focused on larger water conservation opportunities, such as on-site water reuse and cooling tower condensate reuse.

In the second year, participants also implemented individual outreach campaigns for the 2019-2020 academic year. In preparation, DEP and participants collaborated to develop water conservation posters that were distributed across the participating campuses. The posters encourage students to save water and to share their water conservation efforts on social media.



Total Water Challenge Participant Monthly Water Consumption. Benchmarking Ended After February 2020 Due to Campus Closures in Response to the COVID-19 Pandemic.



The participating universities range in size, type, and resource availability. Through focused monitoring of water consumption and learning about best practices during the quarterly workshops, participants have identified and implemented water saving strategies unique to their campuses. Highlights of these initiatives include:

Weill Cornell Medicine

Spurred by a presentation on medical facility conservation opportunities during one of the quarterly workshops, Weill Cornell identified a significant water savings opportunity in one of their research facility buildings. The Belfer Research Building has 24 autoclaves, which use water to produce steam. Previously, the autoclaves were continuously running, even when not being operated, and used an average of 50,000 gallons of water per day. The Weill Cornell facilities team identified a simple and low-cost solution: the team purchased a timer so that the equipment could be programmed to operate only during hours of operation. This modification reduced operation by 12 hours per day, thus cutting water usage in half. The water savings of 25,000 gallons per day decreased total campus usage by 8.5 percent.



An Autoclave at Weill Cornell

Pace University

While monitoring their water consumption data, Pace University noticed excess water use, which was assumed to be a leak. However, it was later determined that the additional demand was from a water-cooled HVAC unit in a small sample storage area of a research lab. In January 2020, Pace installed a portable, air-cooled unit to replace the water-cooled system. This project resulted in immediate savings of over 3,000 gallons of water per day, which will result in an estimated one million gallons of water savings per year.



Pace's New HVAC Unit

St. John's University

St. John's University achieved a reduction in their average monthly water consumption after completing several campus upgrades. These updates included repairs and upgrades to four cooling towers. St. John's made improvements to their steam heating plants and steam distribution systems, leading to an increase in the percentage of returned steam condensate and a reduction in make-up water use. St. John's also implemented campus-wide irrigation repairs, including installing new rain sensors to reduce wasteful irrigation, and installing artificial turf on a baseball field. St. John's promotes water conservation for their student residential living and incorporated its Water Challenge goals into the university's web-based Utility Tracking System. As a result of these varied projects and efforts, St. John's average monthly water consumption is roughly 2 million gallons less than its baseline monthly consumption.

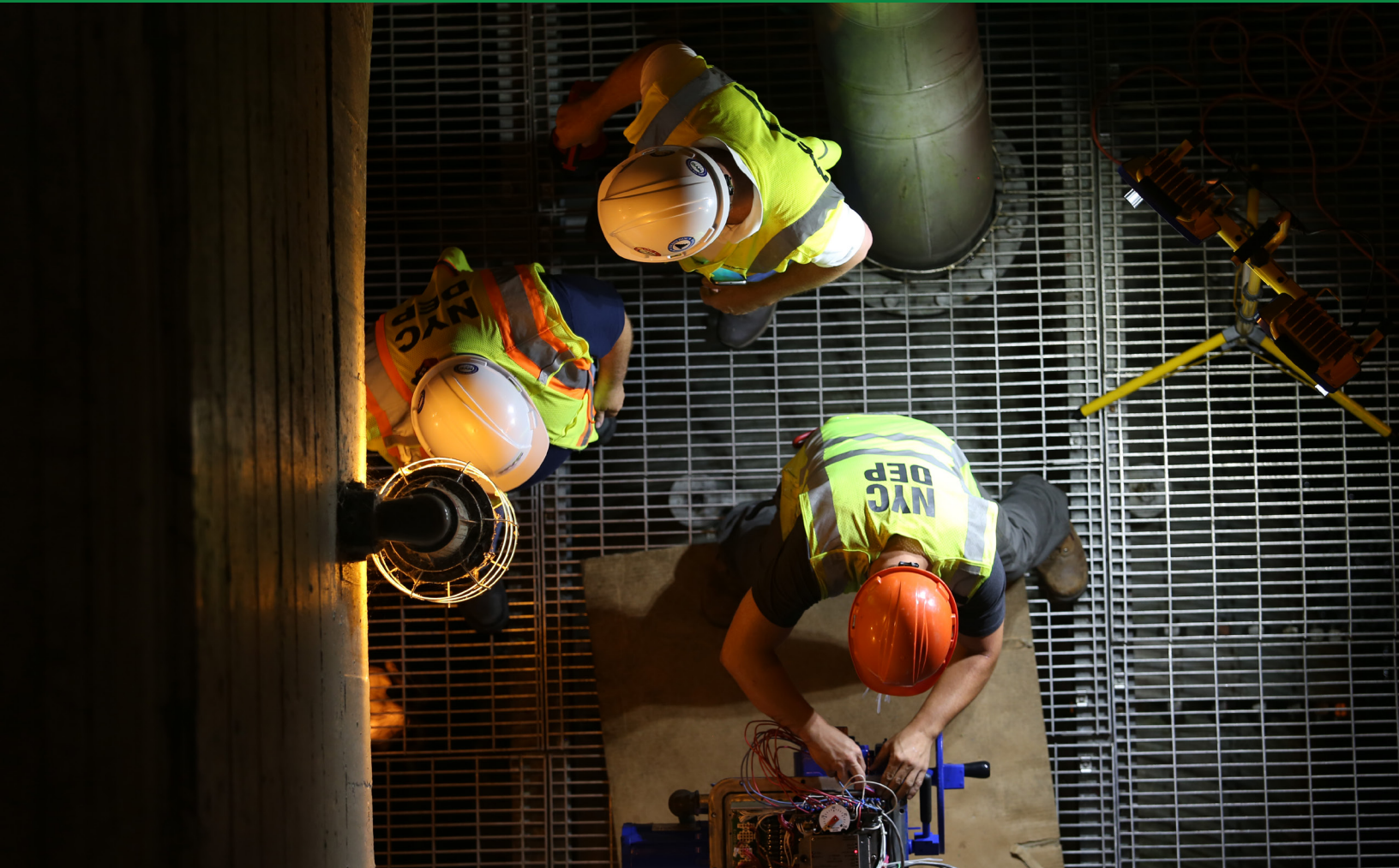


Workers Modifying SJU's HVAC System

Several participants in the Water Challenge to Universities achieved and surpassed the baseline goal of the program months before the close of the benchmarking period. Through workshops, the participants created a space for knowledge sharing between universities. The lessons learned from this Water Challenge will be compiled into a building manager's guidebook and posted on DEP's website so that water conservation tips unique to university campuses can be shared with a wider audience. The benchmarking period will end July 31, 2020, followed by a final meeting to celebrate and recognize the water savings efforts made over the past two years.



Water Distribution System Optimization



On average, one billion gallons of water are delivered each day from DEP's 19 upstate reservoirs to over 830,000 service lines connected to New York City's residents. DEP continues to implement best practices system-wide for maintaining and monitoring this complex and immense system and related underground infrastructure. These best practices include system-wide leak detection and repair, pressure management, Automated Meter Reading (AMR) software, meter replacement, and providing customers with the ability to track and monitor water usage and detect leaks in their own homes.

Leak Detection Program

Savings Achieved (May 2020): 1.89 MGD

DEP's field operations personnel track leaks in two distinct ways: responding to calls through the City's 311 system, and through preventative maintenance. In 2014, DEP implemented a strategic approach to leak detection. Borough-based teams are trained in leak detection to target specific areas served by older network mains more likely to need preventive and corrective maintenance. These teams can respond rapidly to problems compared to when DEP relied on one consolidated resource center. In 2019, DEP surveyed 1,099 miles of water mains.



Hydrant Maintenance and Controlling Illegal Use

New York City has over 109,500 hydrants located throughout the five boroughs. While these assets are intended for fire suppression, New Yorkers, at times, may open hydrants to cool off in the summer. Hydrants spray up to 1,000 gallons per minute and can reduce local water pressure. Therefore, DEP sponsors the Hydrant Education Action Team (HEAT) to educate communities about the dangers of opening hydrants illegally.

DEP ensures proper maintenance by performing assessments, testing pressure, and repairing hydrants when necessary. In 2019, DEP repaired 9,668 hydrants, replaced 1,328, and provided other maintenance services to 13,234 additional hydrants.

Optimize Pressure Management

DEP has been working to improve maintenance of the pressure zones within the water distribution system. In 2019, the number of breaks per 100 miles was 6.23, slightly lower than the City's 10-year average of 6.5, and below the accepted industry average of 25 breaks per 100 miles annually. In 2019, DEP completed 5,287 preventive maintenance inspections/calibrations on pressure regulating valves. DEP also overhauled 38 of the 447 pressure regulating valves that are in use citywide.

Automatic Meter Reading Infrastructure

In 2009, DEP launched its AMR program and largely completed that effort in 2012. To date, DEP has over 97 percent of its customers in its AMR infrastructure. DEP is working to further optimize metering and AMR by installing this technology for DEP's few remaining unmetered accounts.



Hydrant Education Action Team (HEAT) Members Educating the Public on the Dangers of Illegally Opening Fire Hydrants

Optimize Metering and Replace Large Water Meters

DEP's efforts to achieve universal metering of all DEP water and sewer accounts is motivated by the need to reduce non-revenue water and promote conservation among water users by providing accurate consumption information. The universal metering initiative is also critical to measuring the success of many other demand management strategies. Accurate consumption data enables DEP to determine whether target consumer groups have achieved projected consumption reductions or how demand management strategies may be adapted to improve their effectiveness. DEP replaced 1,843 large meters in 2019 (i.e., those over 1.5 inches in diameter).

Another group of customers that typically have large meters are New York City Housing Authority (NYCHA) multi-family buildings. The majority of NYCHA buildings were metered in 2005. In 2015, DEP initiated a multi-million dollar effort to install water meters in remaining unmetered NYCHA buildings to gain a more accurate representation of the water consumption trends of these customers. These buildings are located in Brooklyn, Queens and the Bronx, and contain approximately 50,000 housing units. As of May 2019, all 517 meters have been installed out of the planned 517.

Provide Customers with Easy and Timely Access to Water Usage Data

DEP's Bureau of Customer Services provides customers access to their water consumption data, enabling customers to view their daily consumption so that they can identify leaks and other inefficiencies. By becoming familiar with their consumption trends, customers can identify and correct leaks in their own homes to save money and water.

As of February 2020, approximately 425,000 customers have signed up for My DEP to view their bills, water usage, and payment history online. This service also allows customers to pay their bills online and sign up for automatic billing (eBills); approximately 100,000 customers have signed up for eBills.

Customers who sign up for My DEP also have the option to receive leak alerts, which are sent when consumption triples for five consecutive days. To date, over 250,000 customers have signed up for leak alerts. DEP continues to promote My DEP and leak detection alert enrollment as an ongoing initiative.



New York City Fire Hydrant



Water Supply Shortage Management



DEP continues to reevaluate existing water use restriction mechanisms to adapt to future conditions including the planned Delaware Aqueduct shutdown, changing hydrologic conditions due to climate change, and aging infrastructure. New York City has experienced approximately nine drought periods of record, as recently as 2001, and water shortage management plays an important role in reducing demand when supply is limited. Although this strategy does not provide permanent demand savings, Water Supply Shortage Management—including communication and outreach campaigns—can provide temporary savings during planned, non-emergency infrastructure repair and also during unplanned water supply shortages.

Develop an Outreach Campaign and Communications Strategy

In March 2019, DEP began developing an Outreach Campaign for efforts both in the months leading up to the Delaware Aqueduct shutdown, and during the shutdown, to increase water conservation awareness and achieve non-emergency temporary demand savings ahead of the shutdown.

In April 2020, DEP developed a targeted demand reduction implementation plan as part of the Outreach Campaign. In the implementation plan, DEP identified four key stakeholder groups to engage as part of a broad task force for implementation of short-term conservation strategies: Internal DEP, Interagency and Upstate Wholesale Customers, Large Water Users, and

General Public. The implementation plan also includes an implementation approach (including best practices for engaging each stakeholder group), a targeted demand reduction schedule, and short-term conservation strategies that each stakeholder group can implement.

In addition to these non-emergency and temporary efforts, DEP will also use a three-step communication strategy as part of a public information and education campaign, in the event a water supply shortage emergency occurs during the planned shutdown of the Delaware Aqueduct. The three steps are as follows:

Step 1: Determine who the audience is and which vehicle or combination of vehicles is most appropriate and likely to reach the intended audience.

Step 2: Deliver the message and coordinate with the other agencies and groups that can help amplify the message.

Step 3: Determine if the audience has been reached.

The public information and education campaign would utilize media announcements, social and digital media posts, direct mailing and distribution of hard copy materials, 311 services, phone calls, and other methods for communicating to customers during a water supply shortage emergency, regarding the situation and their role in helping to conserve water and reduce overall demand.

Updated Rules and Plan to Allow for Planned Infrastructure Repairs

DEP is in the process of amending the “Drought Emergency Rules” (15 RCNY Chapter 21). The rulemaking process in New York City, called City Administrative Procedure Act (CAPA), began in July 2013 for this effort and in December 2016, the Mayor’s Office of Operations and the City Law Department certified DEP’s revisions to the “Drought Emergency Rules.” The proposed revised title is “Water Shortage Emergency Rules,” replacing the narrower focus of the previous title. In summary, the proposed revisions address water shortage emergencies due to circumstances not limited to natural drought conditions, including planned and unplanned infrastructure outages and repairs. The proposed revisions also add, remove, and change certain water use prohibitions during the different stages of a water shortage emergency, to better reflect DEP’s understanding of city water use. Although the proposed action would not apply to routine residential water use such as drinking and bathing, or dishwashing, DEP expects that public awareness of the restrictions would lead to decreased residential water use during a water shortage. DEP expects to promulgate this rule before the Delaware Aqueduct shutdown.



New Croton Dam Spilling



Wholesale Customers Water Demand Management Program

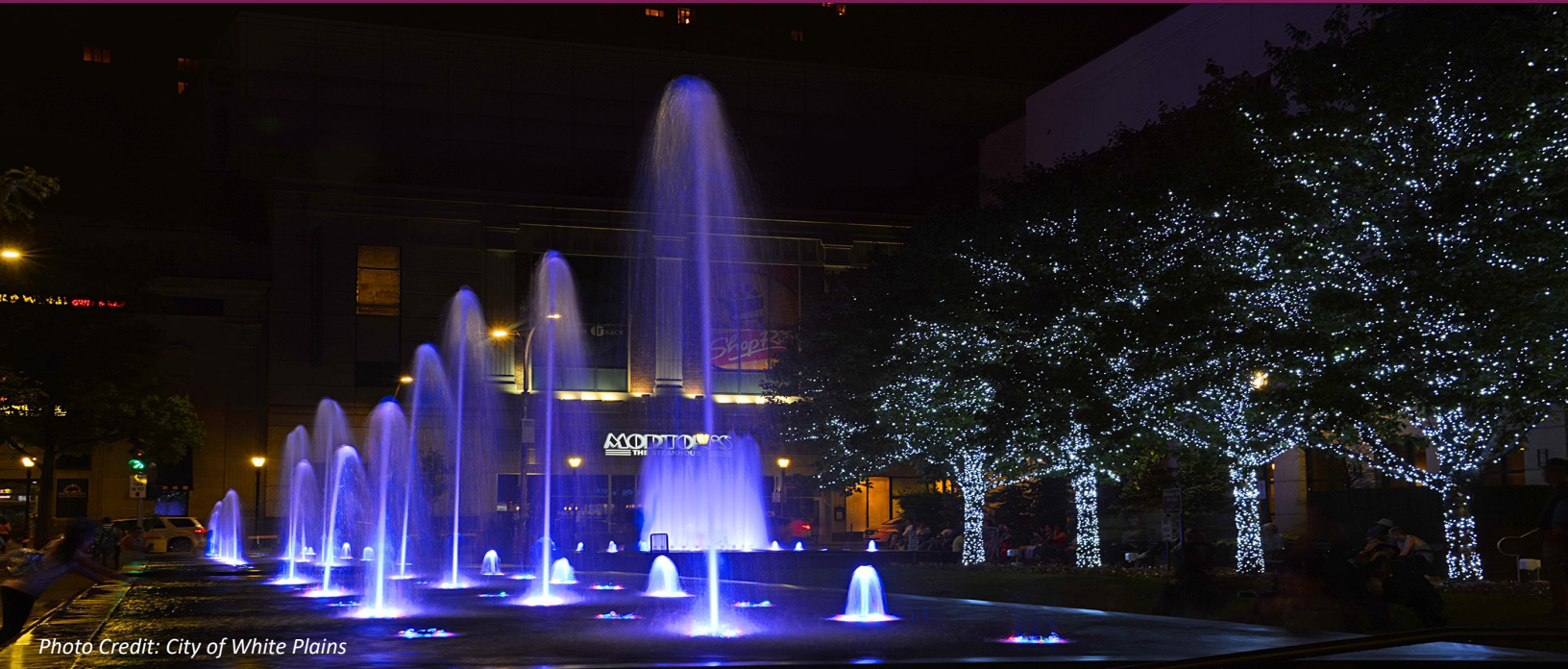


Photo Credit: City of White Plains

In 2014, DEP launched the Wholesale Customers Demand Management Program for some of DEP's largest wholesale customers (Utility Partners).

The participating Utility Partners are the Town of Greenburgh, the Village of Ossining, the Village of Scarsdale, the Village of Tarrytown, Westchester Joint Water Works (WJWW), the City of White Plains, and the City of Yonkers. The goal of this program is for Utility Partners to implement demand management projects to reduce demand by 5 percent from their 2013 baseline demand by October 2022.

To accomplish this goal, DEP collaborated with the Utility Partners to develop custom Water Demand Management Plans (WDMPs), tailored to each Utility Partner's water system. Each WDMP includes a water system profile, a non-revenue water analysis, a summary of current demand management practices, an evaluation of potential demand management measures, and an implementation plan comprised of selected demand management measures for implementation. The demand management measures selected by each Utility Partner were chosen based on feasibility, cost-effectiveness, and combined ability to achieve the 5% reduction goal. To ensure implementation of each WDMP, DEP anticipates providing partnership funding (DEP funding)

to each Utility Partner through an intergovernmental funding agreement. As implementation progresses, DEP will continue to track demand reductions achieved by October 2022.

In 2019, Ossining continued implementing their WDMP, and DEP successfully coordinated with the other six Utility Partners to finalize their WDMPs. DEP and these six Utility Partners also finalized intergovernmental agreements (IGAs) as part of the ongoing procurement process. The Town of New Windsor, City of Mount Vernon, and SUEZ Water Westchester are no longer participating in this program.

Additionally, during 2019, Utility Partners continued to improve their efforts to address non-revenue water, and the combined water demand of these seven Utility Partners decreased by 2.7 MGD from their 2013 baseline demand (a 5 percent decrease). DEP will continue to monitor consumption as the WDMPs are implemented, however, to ensure that these savings, and any additional savings, are sustained ahead of and during the Delaware Aqueduct repair.

DEP will also continue to collaborate with all Utility Partners, to assist them in complying with DEP's contractual requirements, and provide guidance for

completing American Water Works Association (AWWA) water loss audits and implementing water demand management strategies. DEP will also provide the Utility Partners with periodic demand savings updates, to demonstrate overall progress. The success of this program depends on ongoing and frequent communication and collaboration between DEP and the Utility Partners. Periodic progress meetings during implementation are crucial for troubleshooting potential issues before they arise, and ensuring WDMP implementation progress.

The following section summarizes the water demand management strategies these Utility Partners will implement. Note that all Utility Partners will conduct an AWWA M36 water loss audit based on their 2019 consumption data. They will repeat this audit annually, while continuing to address and reduce their non-revenue water. DEP hosted workshops in February and March 2020 to guide these partners through the AWWA audit process and contracting requirements.

Wholesale Customer Progress

Greenburgh

Savings Goal: 0.32 MGD

After completing their 2019 AWWA audit, Greenburgh will conduct a system-wide leak detection survey and make repairs based on the results of that survey. They will repeat this process annually, and complete three system-wide surveys with associated repairs.

Greenburgh will also begin to transition all customers to monthly billing. They will also begin implementing a residential fixture replacement voucher program, and distribute 800 vouchers for up to \$225 each.

Ossining

Savings Goal: 0.13 MGD

Ossining continues to implement a residential toilet replacement voucher program, and in 2019, expanded the program to both Village and Town residents, as well as condo and co-op owners. This entailed developing a protocol for condo and co-op owners to receive and document permission from their respective homeowner associations. As of April 1, Ossining has replaced 59 toilets.

In January 2020, Ossining completed their 2018 AWWA M36 Water Loss Audit and component loss analysis. They

determined that decreasing their Awareness – Location – Repair (A-L-R) time from six hours to four hours could reduce water losses by 0.4 MG annually, and committed to continue using their SCADA system to decrease repair time. Ossining expects to use DEP funding to perform a system-wide leak detection survey in 2020, and make leak repairs based on the results of that survey, as well as make ongoing leak repairs for newly discovered leaks.

Scarsdale

Savings Goal: 0.16 MGD

Scarsdale is eager to continue installing Automated Metering Infrastructure (AMI) throughout their entire water system, and expects to complete this installation and fully transition their customers to monthly billing as early as 2022.

Scarsdale will also conduct a system-wide leak detection survey with associated leak repairs, and will also continue to make ongoing leak repairs as they are found



Rye Lake Water Treatment Plant. Photo Credit: WJWW

Tarrytown

Savings Goal: 0.09 MGD

Tarrytown will conduct a system-wide leak detection survey and inventory their operating pressures. They will make leak repairs and any necessary pressure adjustments in response to these surveys. Tarrytown will complete two additional leak detection surveys and associated repairs, and one additional pressure survey.

Tarrytown will also begin to implement a residential fixture replacement voucher program, and will distribute up to



200 vouchers up to \$250 each for residents to replace their old and inefficient toilets.

Westchester Joint Water Works

Savings Goal: 0.45 MGD

WJWW will complete system-wide leak detection surveys and make leak repairs based on those surveys, as well as inventory operating pressures.

WJWW will also purchase and begin installing new meters as part of their larger effort to transition to monthly billing.

White Plains

Savings Goal: 0.40 MGD

White Plains developed a 30-year water main replacement plan, and will use DEP funding to support that program in its first two years. They will also conduct three system-wide leak detection surveys and make associated repairs.

White Plains will also develop criteria to identify major leaks on service lines, so they can assist customers with these major repairs as needed.

Yonkers

Savings Goal: 1.31 MGD

Yonkers will complete two system-wide leak detection surveys and make associated repairs, and repeat this annually for a total of six leak detection surveys and associated repairs. Yonkers will also begin installation of a Customer Portal for their customers to monitor water usage daily.



Implementation Guide Workshop with DEP and Yonkers, March 2020

	Annual AWWA M36 Water Audit	Water Loss Control	Automated Metering Infrastructure, with Monthly Billing and/or Customer Leak Alerts	Water Loss Control: Service Line Leak Repairs	Residential Indoor Fixture Replacement Vouchers
Greenburgh	✓	✓	✓		✓
Ossining	✓	✓			✓
Scarsdale	✓	✓	✓		
Tarrytown	✓	✓			✓
WJWW	✓	✓	✓		
White Plains	✓	✓		✓	
Yonkers	✓	✓	✓		

Water Conservation Strategies Selected by Each Utility Partner

Appendix A

New York City per capita water consumption has remained steady since the first Water Demand Management Plan was released in 2013, from 119 gallons per day per person, to 118 gallons in 2019. As DEP continues to expand AMR and volumetric meter-based billing, overall water demand is expected to remain stable or decrease. This trend could be affected in the future by factors including, but not limited to, annual temperature fluctuations, weather, climate, potential drought, and population fluctuations.

To explore these trends, DEP conducts water demand data analyses for our system each year. These analyses help the agency with water supply and wastewater infrastructure planning; revenue analysis; affordability

studies; new growth and rezoning assessments; and analyzing and understanding the effects of water demand on agency operations. Since 2013, DEP has used American Water Works Association (AWWA) M36 water audit software to assess system water balance. The table below illustrates the results of DEP's Fiscal Year 2019 audit. Since using the software, DEP has seen a decrease in non-revenue water from 17 percent in 2013 to 16 percent in 2019.

Non-revenue water has decreased since 2013 and remains steady, despite previously recorded decreases in recent years that were determined to be miscalculations.

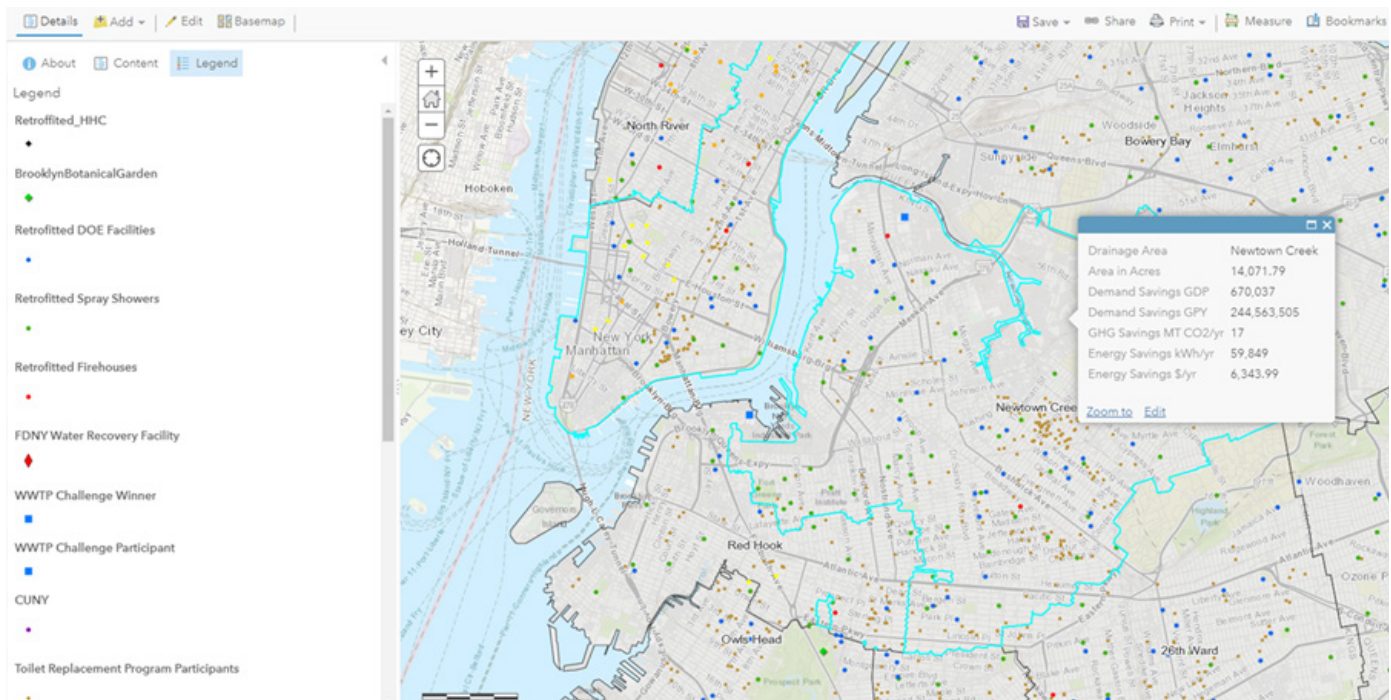
AWWA Free Water Audit Software: System Attributes and Performance Indicators		WAS v5.0 American Water Works Association, Copyright © 2014, All Rights Reserved
Water Audit Report for: NYC Department of Environmental Protection		
Reporting Year: 2019 7/2018 - 6/2019		
*** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 78 out of 100 ***		
System Attributes:		
	Apparent Losses:	16,796,266 MG/Yr
	+ Real Losses:	32,843,897 MG/Yr
	= Water Losses:	49,640,163 MG/Yr
?	Unavoidable Annual Real Losses (UARL):	4,093,56 MG/Yr
	Annual cost of Apparent Losses:	\$226,778,754
	Annual cost of Real Losses:	\$17,407,265
		Valued at Variable Production Cost Return to Reporting Worksheet to change this assumption
Performance Indicators:		
Financial:	Non-revenue water as percent by volume of Water Supplied:	16.1%
	Non-revenue water as percent by cost of operating system:	16.0% Real Losses valued at Variable Production Cost
Operational Efficiency:	Apparent Losses per service connection per day:	55.08 gallons/connection/day
	Real Losses per service connection per day:	107.71 gallons/connection/day
	Real Losses per length of main per day*:	N/A
	Real Losses per service connection per day per psi pressure:	1.80 gallons/connection/day/psi
	From Above, Real Losses = Current Annual Real Losses (CARL):	32,843,90 million gallons/year
?	Infrastructure Leakage Index (ILI) [CARL/UARL]:	8.02
* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline		

AWWA Water Audit Results for Fiscal Year 2019

Appendix B

Starting in 2018, DEP released a public map of its water conservation projects across New York City. All projects and their respective savings have been mapped and are available to view through DEP's water conservation website. In addition, DEP has used the Water-Energy Nexus Tool to estimate the energy savings and benefits of water conservation, including the reduction in electricity and greenhouse gases that would have been

required to process and treat the water (see Introduction for results). A screenshot of this interactive map showing conservation projects and associated energy and greenhouse benefits is shown below.



Demand Management Interactive Map

