



WATER DEMAND MANAGEMENT REPORT

June 2015 Update



Bill de Blasio
Mayor
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Commissioner

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INTRODUCTION

Through a complex arrangement of dams, reservoirs, tunnels, and aqueducts, the New York City system serves 8.4 million New York City residents, millions of commuters from the tri-state area, and more than one million residents in 55 upstate communities per day. From the 1840s to the 1960s the City's approach to water was to increase supply to meet demand. Since then, New York City Department of Environmental Protection's strategy has been to optimize the existing systems while promoting water conservation and managing demand to fall within available supplies. The city played an important role in driving significant decreases in water demand during the 1980s and 90s through implementation of several policies and programs that incentivized water efficiency (Figure 1). Overall demand has decreased by approximately 30% since the 1980s despite a 19% popu-

lation increase over the same period. Last year, average demand in New York City fell below 1 billion gallons to 996 MGD.

Since establishing the Water Demand Management Plan and the goal of reducing water demand by 50 million gallons per day, DEP has made significant progress toward accomplishing this goal. We have negotiated partnerships, put contracts in place, retrofitted over 250 buildings, and replaced 14,000 fixtures throughout NYC.

In addition to the original 5 strategies outlined in the in Water Demand Management Plan, DEP has made significant progress in advancing partnerships with our upstate wholesale customers that was incorporated as our sixth strategy in last year's update.

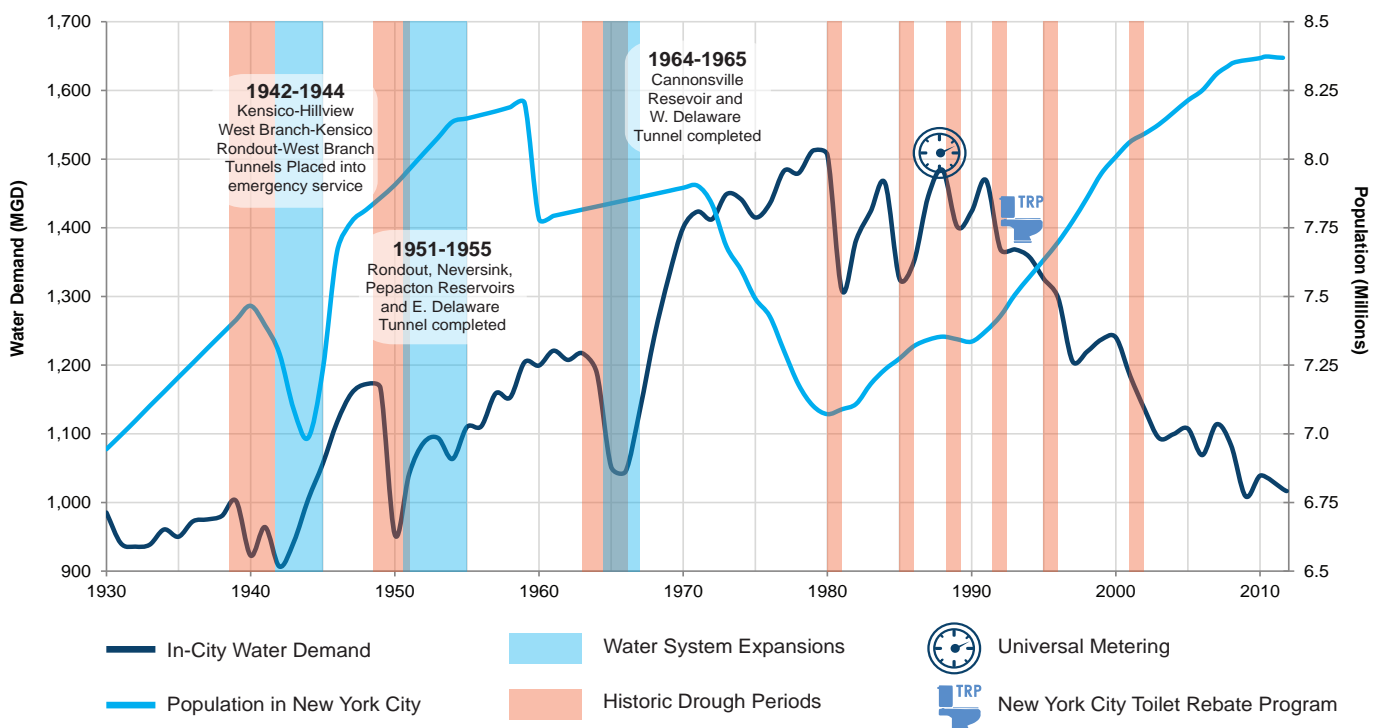
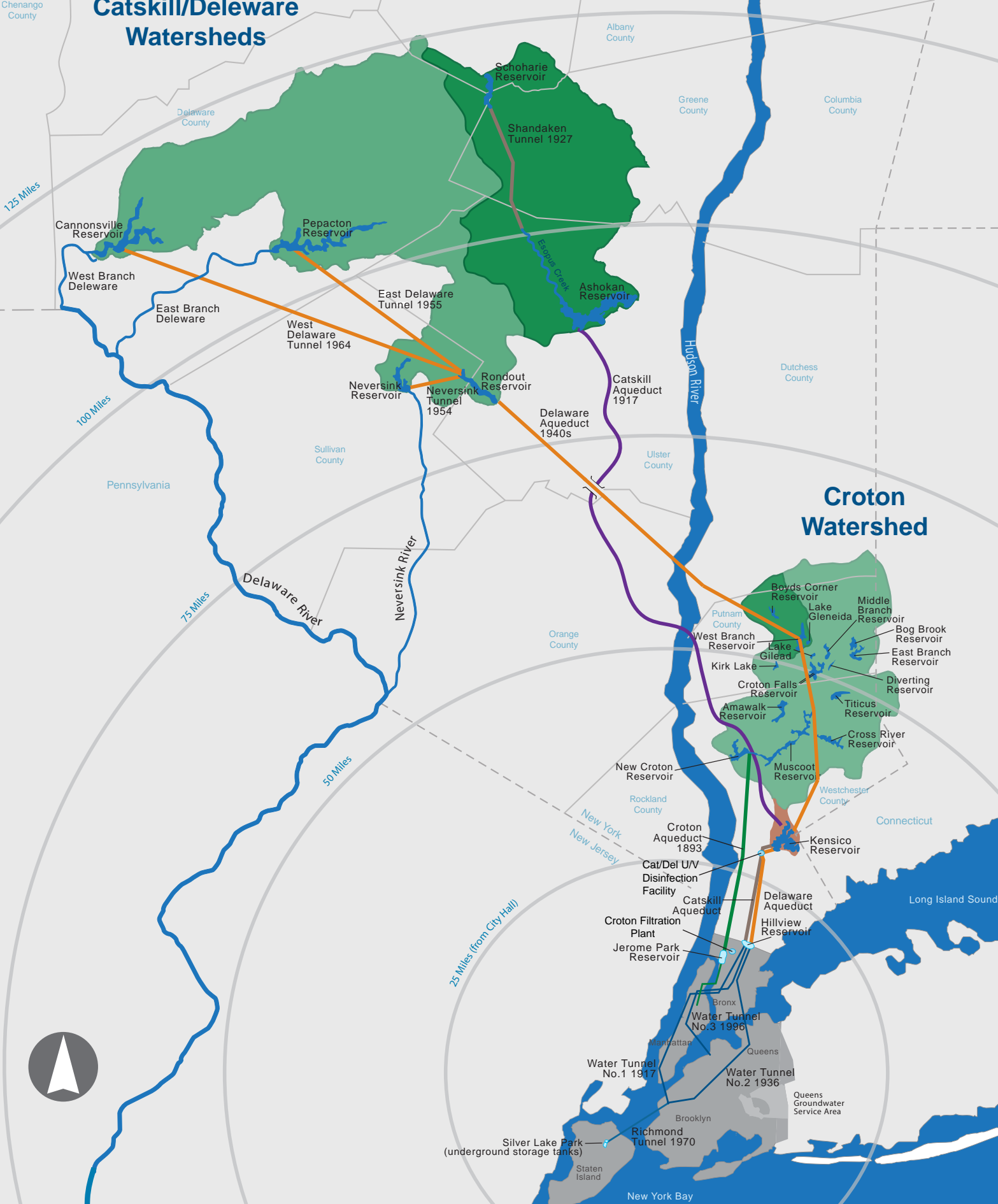


Figure 1: Timeline showing New York City water demand compared with population growth, and other factors affecting overall demand.

Catskill/Deleware Watersheds

Croton Watershed



125 Miles

100 Miles

75 Miles

50 Miles

25 Miles (from City Hall)



STRATEGY 1

MUNICIPAL WATER EFFICIENCY PROGRAM

Harry Truman High School in the Bronx

Now in its third full year the Municipal Water Efficiency Program has lead the way in achieving water savings, upgrading city infrastructure and improving services throughout the five boroughs. From Harry Truman High School in the Bronx to the Stapleton playground in Staten Island, DEP has completed or began water efficiency projects both big and small in every borough.

In particular, DEP has made significant progress in advancing water efficiency projects in the properties of municipal entities such as the Department of Parks and Recreation (DPR) Department of Education (DOE), the Fire Department of New York (FDNY), the New York City Housing Authority (NYCHA), the City University of New York (CUNY), as well as the 14 Wastewater treatment plants within our own agency.

Through these partnerships, DEP has been actively implementing water efficiency measures in government-owned facilities citywide, including the replacement of older, inefficient toilets and urinals and retrofits for spray showers in the city's parks and playgrounds. As the program has evolved, DEP has begun to investigate other opportunities for water savings. One such project was the purchase of filters and

pumps for a water recirculation project at the Brooklyn Botanical Garden.

DEP will continue to advance wide-ranging efforts that incorporates water efficiency retrofits, education, curriculum development, metering, and water benchmarking.

Initiative 1: Save Water in Wastewater Treatment Facilities

In 2014 DEP kicked off the second Commissioner's Water Challenge in November with three participating plants, Bowery Bay, Hunts Point and Port Richmond. For the next year DEP will be closely monitoring the water consumption at these plants and looking at possible opportunities to use funding to achieve water savings. For this challenge, we have taken an active role to get efficiencies from the plants, by touring the sites and working with the managers to identify specific water efficiency upgrades where possible.

Last year Jamaica and Wards Island were able to achieve water savings of greater than 10%, totalling savings of .315 MGD. This year a 10% reduction from the 3 plants would result in .24 MGD gallons of water savings a day. Meter data for all plants are tracked consistently to observe long term trends, and ensure that plants continue to save water even after participating in the challenge.

This year DEP spearheaded an effort to reduce consumption at all plants, which included the purchasing of new efficient nozzles for water hoses. In addition to this plantwide investment, DEP also purchased a new cooling tower skid at Bowery Bay to switch the cooling process from city water to effluent.

In relationship to the larger goal of saving 2.1 MGD of water in the 14 DEP wastewater treatment plants these savings represent 26% of the savings desired in the wastewater treatment plants. DEP will conduct a third Commissioner's Water Challenge with more treatment plants in 2016.

Standard Operating Procedure on City and Effluent Water Use

1. **Meters - City Water**
 - Record water consumption on a weekly basis and compare to Automated Meter Readings by logging onto "My DEP Account". If there are discrepancies or if the meter(s) appear to be malfunctioning, contact John Sexton, Chief, Energy Analysis & Planning Section.
2. **Leaks - City Water**
 - Immediately isolate and repair in-house or submit Work Request to Engineering.
3. **Effluent Water Strainer System**
 - Clean strainer basket once per day.
 - If system is malfunctioning, repair leaks in-house or submit Work Request to engineering.
 - Develop maintenance plans and schedules for effluent water pumps. Maintain the effluent water pumps in accordance with the developed plans and schedules and keep an inventory of spares.
4. **Pump Packing - Use of Mechanical Seals**
 - Mechanical seals are only to be used on MSPs and effluent water pumps. They are only to be used in these type pumps if the application meets all applicable manufacturer's criteria. This applies to new pump purchases and when transitioning from traditional packing to mechanical seals.
5. **Use of Effluent Water* instead of City Water**
 - Use effluent water instead of city water in the applications listed below.
 - If an application could be sensitive to the use of effluent water instead of city water, contact the Energy Analysis & Planning Section for further evaluation.

MSPs	Ring Flush Water	Dilution/Mixing	Hypochlorite
	Aeration Tanks	Cleaning/Washing	Polymer
Foam Control	Thickeners		Tanks
	Final Tanks		Grit Washing
	Chloroflourine Contact Tanks	Miscellaneous	Grit Suspension
	Blowers		Agitation Water
Cooling Water	Engines		Balance Water (Thickeners)
	Heat Exchangers		Flushing (Centrifuges)
	Centrifuges		Blockage Removal in Pipes
	AC Chillers		
	AC Condensers		

* For cleaning/washing, utilize effluent water only if there will be no human contact with the surfaces after they have been cleaned with effluent water.
6. **Use of City Water**
 - Do not use city water to freshen up tanks.
 - When using any type of hose for washing down areas where city water must be used, a low flow nozzle should be utilized.






Figure 2: Standard Operating Procedures for Wastewater Treatment Plants

Case Study: Spray Nozzles

During the formation of the Water Demand Management Plan, DEP worked with consultants to identify large capital projects that would spur water savings at waste water treatment plants. As part of the second Commissioner's Water Challenge, more effort was made to work with operations staff to identify opportunities for water efficiencies that are not necessarily treatment plant specific.

Through this process, DEP found that the majority of its water nozzles for hosing down equipment and storage tanks were using excessive water. Current hoses use 110 gpm while the new nozzles use 55 gpm. After staff completed their tasks, staff would have to manually shut down the water through separate controls to get the water hose to stop running. DEP purchased the Select-O-Matic water nozzle with hand controls, allowing staff to perform their tasks with sufficient pressure while also allowing them to have greater control of water flow and cutting down potential waste.

An additional benefit of the new nozzles is that they allow only one staff worker to perform the task, whereas before it required at least two people. This has led to increase efficiency of man-hours at plant, freeing up staff to work on other important tasks.



Figure 3: Select-O-Matic Nozzles

Initiative 2: Save Water in Schools

In the Fiscal Year of 2015, DEP completed the retrofit of 100 schools, 25 more than originally anticipated for the year. DEP has now completed retrofits of 130 schools, which puts us 30 over our anticipated amount at this time. Of the 100 schools, over 7,800 toilets and 3,000 urinals have been replaced. DEP has finalized its list of 100 schools slated for retrofit in fiscal year 2016 and has completed fixture surveys to begin work in the summer of 2015. This work will replace 6,800 toilets and 2,600 urinals.

DEP is continuing to install meters and Automated Meter Reading (AMR) devices in every retrofitted school where possible. By installing meters and AMR devices DEP can track the water usage of the schools going forward, and will also allow DEP to implement leak detection. A number of pilot schools that were metered prior to their fixture retrofit showed a water use reduction of as much as 60%. DEP is continuing to track this data and is working on sharing this with educators, sustainability coordinators and custodians.

Within this education outreach, we specifically targeted schools we had retrofitted, to spread awareness of the Water for the Future program while also explaining the water reduction occurring as a result of the retrofitted fixtures. This year education staff from DEP gave presentations work at 33 schools with over 1,000 students.

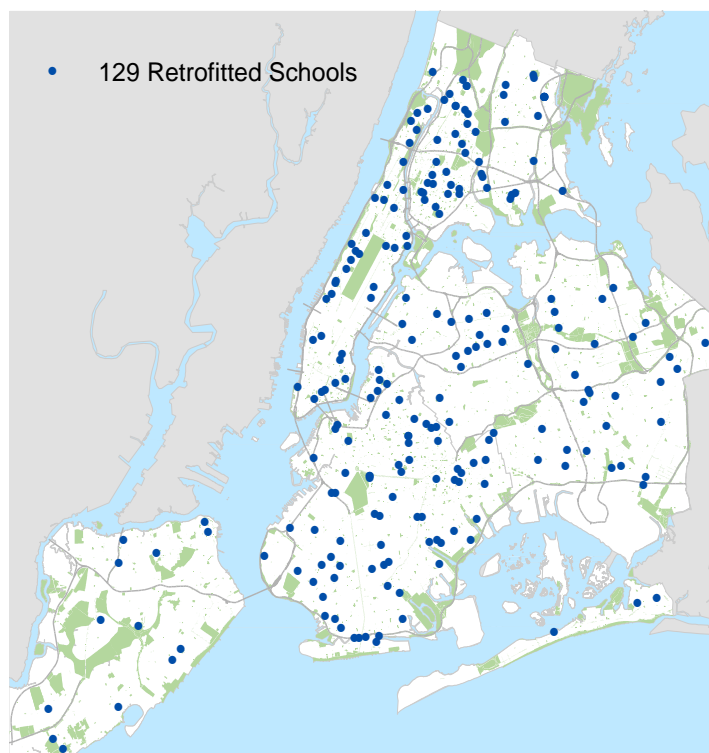


Figure 4: New York City Schools Retrofitted to date



Figure 5: Retrofitted urinals at P.S. 1 in Staten Island

To encourage the demand for this education outreach, we have put in language about the availability of it to principals and sustainability coordinators in letters received by the school notifying them of the upcoming upgrade. We hope this move will push these schools to coordinate the education around the retrofit better.

Finally, as part of the program for 2015, DEP will be recycling the porcelain of the old toilets that are retrofitted under this program. Similar to the recycling as part of The Residential Efficiency Program, the porcelain will be crushed to 2 to 4 inch pieces by contractors and stored at a DEP site for future use in an oyster restoration project.



Figure 6: Crushed Porcelain

Case Study: 29th Annual Art and Poetry Contest

Water

*Water goes round and round,
From the sky to the ground.
In the cycle you can't see,
Water comes to you and me!!*

Poem by Fuma from P.S. 78



Figure 7: Art submittal by Asa from Brooklyn Technical High School

The New York City Department of Environmental Protection (DEP) held its 29th Annual Water Resources Art and Poetry Contest from January through May 2015. This year, 1,350 students (grades 2-12) from New York City and Watershed communities created more than 1,400 original pieces of artwork and poetry. This year's competition marked an all-time record for student participation. Submitted entries reflected an appreciation for New York's shared water resources and the importance of water conservation. In addition, through the art and poetry submitted, students expressed an understanding of New York City's water supply and wastewater treatment systems.

Students from 75 public, private, independent, homeschool, and parochial schools participated in this year's contest. All participants were honored as DEP Water Ambassadors and received a certificate recognizing their artistic and poetic contribution. In addition, from the more than 1,400 submissions, a group of judges selected 60 students as this year's DEP Water Champions. Winning art and poetry entries were selected based on originality, artistic ability, and understanding of one or more contest themes. The four central contest

themes included: Water—A Precious Resource; The New York City Water Supply System; The New York City Wastewater Treatment System; Climate Change and Water Stewardship.

On May 21st, 2015, Water Ambassadors and Water Champions were honored at DEP's 29th Annual Water Resources Art and Poetry Celebration. Held at Manhattan Community College's Tribeca Performing Arts Center, the celebration ceremony was hosted by DEP Associate Commissioner Eric Landau, and included remarks from DEP Commissioner Emily Lloyd and Reggie Harris, Poets in the Branches Coordinator at the Poets House.

Each year, DEP's Water Resources Art and Poetry program raises awareness about the importance of clean, high-quality drinking water, and what it takes to maintain New York City's water supply and wastewater treatment systems. The program is recognized by participating teachers and schools for complementing classroom curriculum and honoring students for their hard work and environmental concern. Through their submissions each year, students have shown great knowledge of and appreciation for the value of our water resources, the importance of conservation in daily activities, and an awareness of more complex issues like climate change.



Figure 8: 29th Annual Water Resources Art and Poetry Celebration



Figure 9: Water Champions honored on stage at BMCC Tribeca Performing Arts Center

Initiative 3: Save Water in Parks

DEP continues to see progress with on work with the Department of Parks and Recreation (DPR) to reduce water consumption in city parks, specifically in spray showers and recreational centers. The goal under the Water Demand Management Plan is reduce consumption by 1.1 MGD over five years of implementation by retrofitting 400 existing spray showers with automated spray showers. The automated spray showers are operated by park users, so the water is only on as people are using it rather than running all day.

Through 2014, DEP has worked with DPR to complete 150 spray shower retrofits. A further 120 are being worked on in the summer of 2015, with an additional 100 already committed for retrofit in a signed MOU for 2015-2016. This brings the total retrofitted or planned to be retrofitted to 370 of the 400 planned, over 90% of our goal.

DEP is searching for additional reduction in consumption of .026 MGD working with the DPR to retrofit DPR owned recreation centers. DEP has begun retrofitting two recreation centers in summer 2015, and an additional two recreation centers in summer 2016. Data will be studied to see if these recreation centers reach critical savings, and if the savings justify the costs.

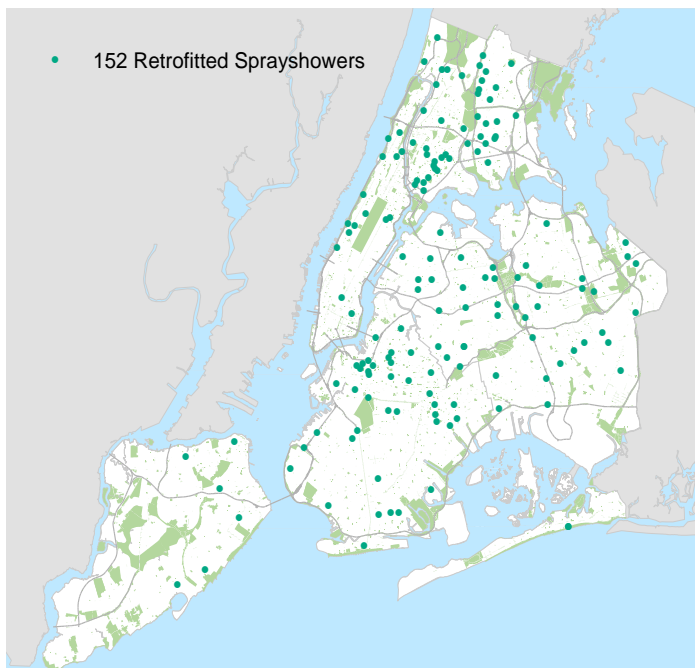


Figure 10 : Parks spray showers retrofitted to date.



Figure 11: Retrofitted Grove Hill Playground Sprayshower

DEP has partnered with the Parks department on a new program called the Community Park Initiative, a program to rehabilitate 35 parks in underserved neighborhoods throughout the 5 boroughs. In addition to designing and installing greenwater infrastructure for stormwater management, DEP has also gotten commitments from Parks to install efficient fixtures and automatic spray showers in any rehabilitated parks.

DEP is continuing to install meters and AMR in parks throughout the city. Currently DEP is working to meter both Central Park and Prospect Park, which will bring metering to two large previously unmetered areas. To date DEP has successfully installed meters and AMR in over 50 parks throughout the city, including multiple meters in large parks. This data helps track consumption, as well as reduce the amount of unknown non-revenue water.

Initiative 4: Save Water in Public Housing

NYCHA is the largest public housing authority in the United States, and consequently, is one of DEP's largest customers. Over one million people live in the 1,100 plus NYCHA owned buildings. Providing specific care for these customers is important, and to that end, DEP has stepped up communications and established partnerships between the two agencies to improve both metering and leak detection.

At the end of 2013, DEP held meetings to discuss protocol when NYCHA has a leak. Rather than go through 311, NYCHA now has direct access to DEP to quickly address issues in the system on their property. In 2014, eight requests have been submitted and quickly responded to by DEP. The works has been so helpful, NYCHA has also reached out about fire hydrant issues through this channel as well.

DEP has worked with NYCHA to move them from frontage billing to the Multifamily Conservation Program (MCP). An important part of this transition requires that meters and AMR devices are installed. NYCHA has identified a number of properties where DEP will partner with them to install large water meters, ranging from two to eight inches. DEP has completed site assessments on 80 developments, and is procuring job order contracts to carry out necessary metering and AMR installations. We will continue to do site assessments through 2015. We are working to replace meters and install AMR in NYCHA properties by June 2016

Initiative 5: Save Water in Universities

DEP is working with the City University of New York (CCNY) to reduce consumption in the third largest university system in the United States. DEP has proposed to reduce consumption of water by .75 MGD over a period of seven years in 21 colleges in the CUNY system. In 2014 DEP entered into an agreement with CCNY to replace more than 800 toilets and urinals in campus 10 buildings. Work began in November 2014 and is expected to be completed by November 2015. To date, all 573 toilets have been replaced and efforts have recently begun to replacing the agreed upon 279 urinals. DEP also worked to meter the facility and will actively track this information and share with CCNY.



Figure 12: Shepard Hall, The City University of New York

Initiative 6: Save Water in Fire Department Facilities

Under the Water Demand Management Plan DEP proposed to reduce consumption of water at the Fire Department facilities by .04 MGD over a period of six years. In Fiscal Year 2013, DEP completed retrofits in 12 of the largest FDNY firehouses (Figure 13), replacing 74 toilets and 27 urinals with high efficiency models.

DEP is still on track to reduce consumption of water at the Fire Department Facilities by .04 MGD over a period of six years. After completing retrofits in FDNY firehouses, DEP is now partnering with the FDNY on the construction of a water reuse system at the Training Academy Facility on Randall's Island. The design of the facility, a 40,000 gallon tank, is 90% complete. DEP expects construction of the facility to begin in the 2015 calendar year.

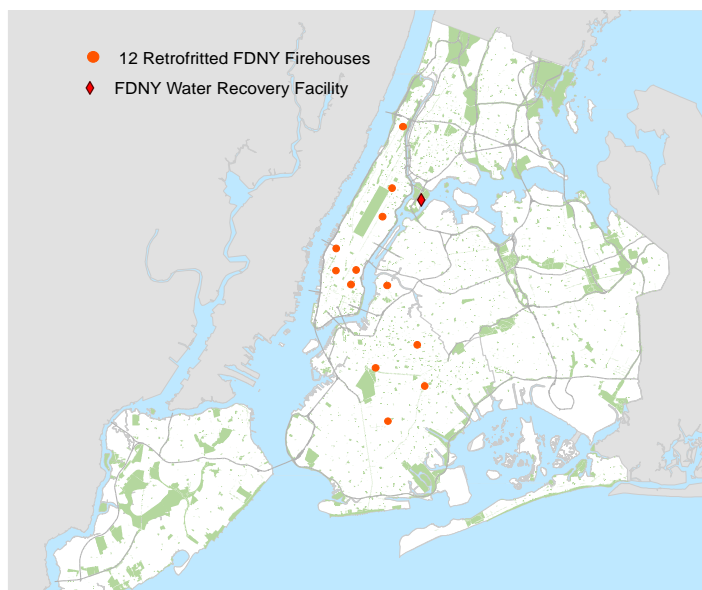


Figure 13: Firehouses retrofitted to date.



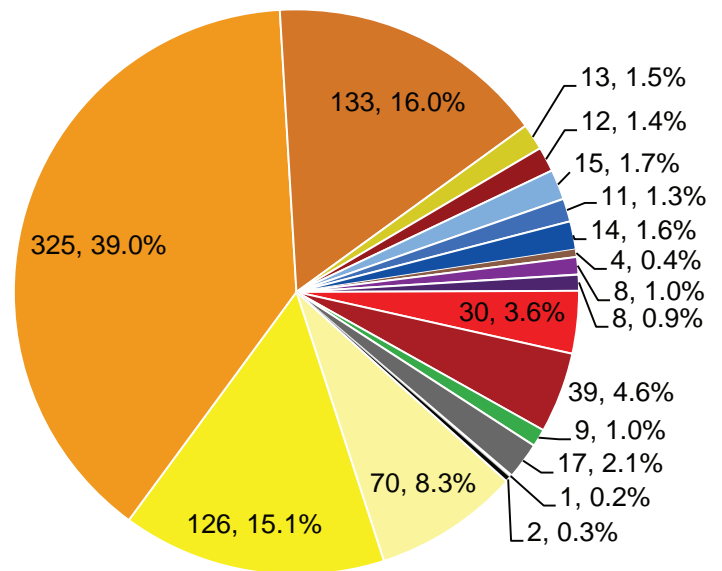
STRATEGY 2

RESIDENTIAL WATER EFFICIENCY PROGRAM

Multi-family buildings in Queens, NY.

As stated in the Water Demand Management Plan, residential properties account for 78% of the city's total water demand (Figure 9). Residential demand is driven primarily by various types of domestic end uses. We have been actively promoting incentives, creating partnerships, and promoting simple housekeeping practices to keep our residential buildings as water efficient as possible.

- One Family Dwellings
- Two-Three Family Dwellings
- Multi-Family Buildings
- Mixed Residential & Commercial Buildings
- Residential Institutions
- Hotels
- Hospitals & Health
- Public Facilities & Institutions
- Educational Structures
- Parking Facilities
- Light Industrial & Manufacturing Buildings
- Heavy Industrial & Manufacturing Buildings
- Stores
- Office Buildings
- Open Space & Outdoor Recreation
- Transportation & Utility
- Vacant Land
- Miscellaneous & Missing Land Use



Total Water Usage: 835 million gallons per day

Figure 14: Total water usage in New York City by land use (This does not include unaccounted for water, which is approximately 21%).

Initiative 1: Save Water through Toilet Replacement Program Phase I

Phase I of the Toilet Replacement Program was launched June 2014 to a pilot group of 1,000 residential customers working to meet the requirements established by the Multi-family Conservation Program (Figure A), the remaining qualified residential customers were contacted in July 2014. All qualified customers received a letter inviting them to participate in the program by logging into their My DEP Accounts and submitting a voucher application through the Toilet Replacement Program Website Portal. Program participants receive a voucher for \$125 per toilet that can be taken to one of the five participating wholesale plumbing supply vendors located throughout New York City. Toilets purchased using the voucher must be rated 1.28 gallons per flush by appropriate national standards and be Maximum Performance Tested with a score of at least 600 grams.

Through 2014, 170 voucher applications have been submitted for the Phase I of the Toilet Replacement Program via the program Website Portal, with the potential to replace over 2,000 toilets. The various outreach efforts undertaken since the launch of the program include: presentations at owners associations, meeting with co-op boards and building management companies, additional informational mails in multiple languages, and in-person sign-up events at each of the TRP authorized plumbing fixture vendor locations. With the program schedule to end June 30, 2016 an aggressive outreach schedule for the remaining 12 months of the program was developed with implementation beginning mid-June 2015. Outreach activities for the last 12 months of the program include: four deadline warning letters, targeted co-op/condo deadline letters, in-person sign-up events at the TRP authorized plumbing fixture vendor locations, meetings with building owner associations and building management companies. It was estimated that Phase I of the Toilet Replacement Program would reduce citywide demand by 10 MGD; actual savings estimates will be provided in the 2015 Water Demand Management Plan update.

Currently, only toilets replaced under the Municipal Water Efficiency Program in NYC Public Schools are being crushed and stored. DEP has plans with DSNY to designate a 1 acre area of Fresh Kills landfill for a larger crushing facility sized to handle the fixtures disposed as part of Phase I of the Toilet Replacement Program.

Initiative 2: Save Water through the Toilet Replacement Program Phase II

Phase II of the Toilet Replacement Program continues to be evaluated by the department. In order to move forward with this program, a fixed rate component has to be in place. The department will be initiating a fixed rate study in the Fall of 2015.

Initiative 3: Save Water through the NYC Build it Back Program

DEP has been working with the NYC Build it Back Program and assisting with program management. To date More than 22,000 New Yorkers have already registered for the NYC Build It Back Program. This partnership gives DEP the opportunity to assist an ongoing program through promoting water savings in homes affected by Hurricane Sandy while making a substantial impact toward broader water conservation goals. To date over 1,300 reconstruction projects have started, with over 700 completed. These new homes are more water efficient than the previous structures. This program has the potential to save .8 MGD.

Initiative 4: Save Water through Residential Water Surveys and Home Water Saving Kits

DEP has offered the service of complementary household water surveys, conducted by its contractor Honeywell, to building owners, to promote water conservation at their properties. In these surveys, Honeywell helps the building owners identify opportunities for water savings, as well as any leaks which may exist. In 2014, on behalf of DEP, Honeywell conducted surveys in 2,550 apartment buildings and single family homes and in a total of 17,061 individual apartments. This program has been shown to save 0.4 MGD through reported leaks and other corrective measures, and expect to continue to realize savings through offering this service.



STRATEGY 3

NON-RESIDENTIAL WATER EFFICIENCY PROGRAM

Babbo Restaurant, Manhattan, NY.

Our efforts in the non-residential sector have focused on establishing partnerships aimed at developing informed, mutually-beneficial policies that incentivize water efficiency, reuse and alternative water use. To date, large private industry groups which manage large individual properties in New York City have formed the backbone of the non-residential water efficiency efforts.

Initiative 1: Save Water through Voluntary Partnerships

With the successful completion of the Mayor's Water Challenge to Hotels in June 2014, DEP moved right into planning of the next Water Challenge Program. In September of 2014 the DEP partnered with the US EPA, Con Edison, the New York City Chapter of the New York State Restaurant Association, NYSERDA and Alliance for Water Efficiency to develop a NYC Water Challenge to Restaurants. This public-private partnership challenges a select group of thirty NYC restaurants to reduce their annual water

consumption by 5%. Throughout the duration of the challenge, which kicked-off in December 2014, NYC DEP and participating restaurants work together to identify and realize water savings. There are four key components of the Water Challenge: development of a water conservation plan, four conservation workshops, monthly reports and recognition of achievements through press releases. This year the Water Challenge Workshops are particularly noteworthy as DEP has been able to highlight several partner programs available to restaurants, which offer capital assistance or rebates, through Con Edison and NYSERDA programs.

Participating restaurants have successfully established baseline analytics of their spaces water consuming trends. Many have also analyzed their restaurants energy consumption. Most are auditing their kitchen spaces for low-cost upgrades that reduce water, and in some cases energy use. Some are even endeavoring into more ambitious re-designs and upgrades that can reuse grey-water throughout the space or capture rain-water for irrigation. To date, participating restaurants have realized water consumption savings as compared to previous baseline months.

Initiative 2: Save Water through Cost Sharing

DEP will be unveiling a new cost sharing program before the end of 2015 which will incentivize water reuse. Benefits from incentivizing water reuse and alternative use extend to the deferred capital costs of large-scale water, wastewater, and stormwater infrastructure, reduced loadings to sewers and water bodies, improved environmental stewardship, and increased capability to manage demand on the water supply system. The program will be designed to target water efficiency in both the residential and the non-residential sectors.

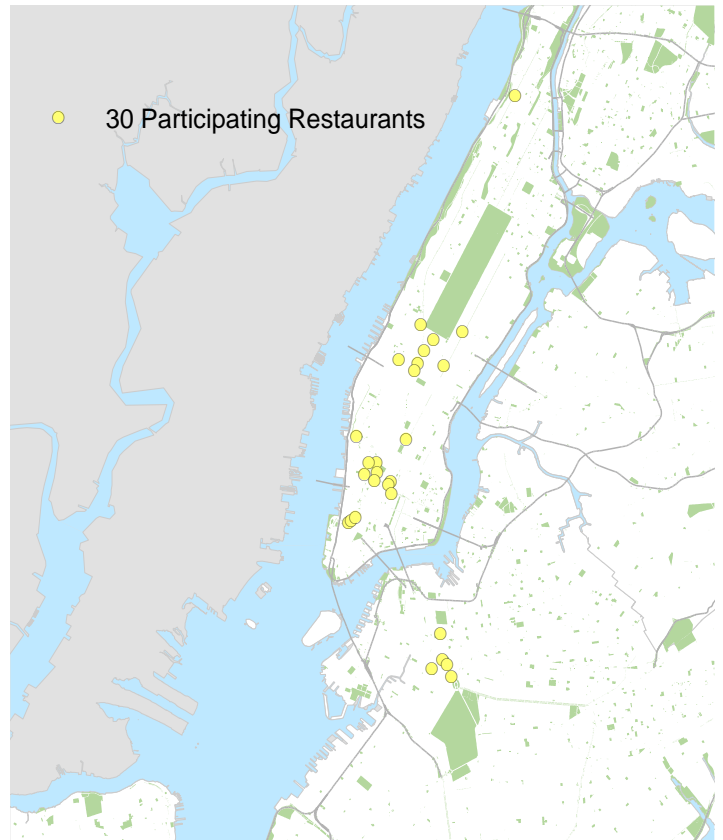


Figure 16: Restaurants participating in the NYC Water Challenge



Figure 15: Havana Central a Mayor's Water Challenge participant.

The NYC Water Challenge will conclude at the end of November 2015. An award ceremony will be held in December of 2015 to recognize the restaurants that managed to meet or exceed the 5% reduction goal. The results and lessons learned from this challenge will be published as a booklet titled NYC DEP's Restaurant Managers Guide to Water Efficiency, which will be available among the DEP's non-residential educational resources.

DEP is currently assessing whether there is enough interest to pursue a public-private partnering arrangement with the NYC hospital industry for the 2016 Water Challenge. The plan is to collect data on interested facilities through the third and fourth quarters of 2015 with the official start date of January 1, 2016.



STRATEGY 4

WATER DISTRIBUTION SYSTEM OPTIMIZATION

Crew addressing a service line leak

Through the Universal Metering Program, DEP and its customers have been able to monitor water usage, detect inefficiencies, and track water demand citywide. The infrastructure that provides water to our customers every day is massive and primarily underground, hidden from view. Mains and service connections that range in size from one to 96 inches carry water from three main in-city tunnels to the city’s residences, business, and institutions. This massive infrastructure must be continually monitored, maintained, repaired, and eventually replaced. DEP continues to search for ways to improve our water system and to ensure that New Yorkers are receiving top quality water in the most sustainable way.

Initiative 1: Optimize the Leak Detection Program

In 2014, DEP surveyed 3,416 miles of water mains for leaks; as a result of leaks proactively found and repaired, DEP estimates that 1.04 million gallons of water per day were saved.



Figure 17: Digital correlator



Figure 18: Sonar hearing detection for leaks

In addition, DEP continues to implement a more strategic approach to leak detection. In this approach, local, borough-based teams properly trained in leak detection efforts target specific areas known to be served with older network mains that are more likely to need both preventive and corrective maintenance. These teams are able to respond rapidly to any identified problems, as opposed to the slower response times experienced in many locations when DEP relied upon one consolidated resource center. Leaking and/or vandalized fire hydrants can also result in significant water waste, as an illegally opened fire hydrant can release more than 1,000 gallons per minute and drop pressure. In 2014, DEP repaired 11,075 hydrants, replaced 1,588, and provided other maintenance services to 9,072 more.

Initiative 2: Optimize Pressure Management

DEP has been working to improve maintenance in the pressure zones within the water distribution system. Water main break increased by 7%, mostly due to extremely cold weather this past winter. The average of less than 7 breaks per 100 miles of pipe in 2014 was still well below the accepted industry average of 25 breaks per 100 miles annually.

Last year DEP completed 5,722 preventive maintenance inspections/ calibrations on pressure regulating valves. We then overhauled 82 of the 492 pressure regulating valves citywide. Four additional pressure zones were established in Staten Island which will allow more efficient distribution of pressure throughout the borough. The activation of City Water Tunnel No. 3 also provided 14 new pressure regulating valves for increased pressure control, 5 of which were activated in 2014

Initiative 3: Replace Large Meters and Optimize Metering and AMR

Of the City's 850,000 meters, approximately 70,000 are considered large water meters (2 inches and larger). Maintaining reliable water meters is critical given that city consumption is 1.1 billion gallons per day. 70,000 large meters represent \$1.1 billion, or roughly one third of all of DEP's revenue. These particular meters are critical points in DEP's billing system, and have been targeted for both replacement and optimization. In 2014, a total of 11,824 large meters were replaced.

In addition, as of the end of 2014, DEP has substantially completed the installation of AMR devices, which now account for some 835,000 service connections. At the start of the AMR program, DEP had an estimated billing percentage of 17.4%. By December of 2014, this fell to 3.2%, an 82% reduction.



Figure 19: Meter Reading Facility



STRATEGY 5

WATER SUPPLY SHORTAGE MANAGEMENT

Ashokan Reservoir

New York City has experienced approximately nine drought periods of record over the last 75 years. Over time, water efficiency and conservation measures have become increasingly important during drought periods. Water shortage relief efforts have played a significant role in reducing demand when water supply has been limited. In order to ensure a coordinated and rapid response to water supply shortage conditions, DEP has developed and implemented standard operating procedures and water use restrictions for periods of shortage. As our water supply infrastructure ages and as climate and weather patterns become more difficult to predict and increasingly severe in magnitude, DEP re-evaluated existing water use restrictions in 2013 and had been working to adapt them to address the changing landscape of current and future conditions.

Initiative 1: Establish City Agency Responsibilities

When the technical study was completed in 2014, DEP coordinated with the Office of Emergency Management (OEM), and other city agencies to brief them on outcomes of the study and upcoming changes to the Water Shortage Rules as a result of the study. In collaboration with OEM, DEP contacted each of the required agencies to confirm that standard operating procedures for demand management under water supply shortage conditions have been reviewed, updated and are in place.

DEP has also worked with OEM to develop the Hazard Mitigation Guide (2014) which includes a detailed water shortage risk profile. This guide was designed to be accessible to NYC public officials and the public.

Initiative 2: Develop a Communications Strategy

If water shortage is triggered during the shutdown of the Delaware Aqueduct, DEP will develop a water supply shortage public information and education campaign which will include hard copy materials to be distributed and mailed, as well as electronic communications such as DEP websites, email distribution lists, and 311 services. DEP will develop this campaign towards the end of the Water Demand Management Plan implementation, in a three or four year time frame.

Initiative 3: Adopt Water Shortage Rates

DEP is completed a rate study which covers the various options for establishing a framework for setting and implementing a water shortage rate in the event of a water supply shortage that is consistent with the provisions in the current Drought Emergency Rules

The proposed water shortage rate will have to be compatible with DEP's billing system. Over the next year, DEP will commence making rate recommendations to the Water Board for the next rate schedule revisions process.

Initiative 4: Update Rules and Plan to Allow for Planned Infrastructure Repairs

DEP is in the process of amending the "Drought Emergency Rules" (15 RCNY Chapter 21) to address water shortage emergencies due to circumstances other than natural conditions (e.g., infrastructure repairs), as well as add, remove, and change certain water use prohibitions during the different stages of water shortage emergencies to better reflect DEP's current understanding of citywide water use. Changes may include: authorizing DEP to impose water use restrictions for reasons other than natural conditions; revising water use restrictions during a water emergency based on updated information on water use; amending the definitions section; clarifying the criteria and the process for applying for exemptions from water use restrictions; authorizing the Commissioner to recommend and request that the Water Board adopt an water shortage rate that encourages water

conservation during a water shortage emergency; amending signage requirements during water shortage emergencies; and changing restrictions for certain activities during different stages of a water shortage emergency.

Water Supply Shortage Rules are under review. The revisions are now being considered for a larger effort and environmental review process for in-city water supply resiliency project, which may change the original schedule for adoption of these rules. Once the rules are final and adopted, DEP will update the Water Supply Shortage Plan to reflect changes in the Rules.

Initiative 5: Provide Customers with Easy and Timely Access to Water Usage Data

DEP is working to give customers more information on their water consumption. Giving consumption information to customers empowers them to spot inefficiencies such as leaks quickly via the My DEP Account web portal.

More than 324,000 customers have signed up for My DEP Account where customers can view their water usage, bills, and payment history online. Small customers can view four meter readings a day, while larger customers can see their readings on an hourly basis. This information allows customers to monitor their consumption and be more aware of their consumption patterns.

DEP has also included an option in My DEP Account that allows customers to receive a leak alert if their consumption triples for five consecutive days. This alert helps customers identify leaks and fix them, saving them water and money. Over 220,000 customers have signed up for leak alerts. Larger customers can customize their leak parameters.



Scarsdale, NY

Photo: June Maria (Flickr)

STRATEGY 6

Wholesale Customers Water Demand Management

Initiative 1: Water Demand Management Plans for 10 largest customers

DEP has signed demand management planning agreements with six of the 10 largest wholesale customers it supplies water to outside of New York City. The 10 largest wholesale customers north of New York City consume over nine percent of the water distributed by the New York City Water Supply System. These 10 customers are: The City of Yonkers, United Water of Westchester, Westchester Joint Water Works, the City of Mount Vernon, Westchester Water District 1/White Plains, Northern Westchester Joint Water Works, the Town of Greenburgh, the Village of Scarsdale, the Town of New Windsor, and the Village of Ossining. These ten customers have been offered assistance to develop demand management plans for their water systems. The development of demand management plans identifies system profile and demand uses, as well as measures that will lead to a 5% reduction in annual consumption for the customer.

Initiative 2: Implement Planned Demand Management Measures

The six customers who are currently working with DEP and a water demand management consultant to develop demand management plans are: the Town of New Windsor, United Water of Westchester, Westchester Joint Water Works, the City of Mount Vernon, the Town of Greenburgh, and the Village of Scarsdale.

Once the wholesale customers have completed their demand management plans, DEP will work to implement the measures identified in the plans to achieve a 5% reduction in consumption over a three year time frame. Implementing measures that would lead to a reduction of five percent in the consumption of these combined 10 customers would lead to a reduction in consumption of 5 MGD. As the 10 largest customers account for 90% of the total upstate wholesale consumption, or approximately 101 MGD per day, achieving a 5% reduction in this consumption by 2019 would give DEP a reduction in consumption of 5 MGD.



WATER DEMAND TRACKING

New York City water consumption has continued to decline despite increases in population as shown in the figure 1 in the introduction. 2014 average water consumption was 996 MGD, lowest since the drought of record, as well as the first average below 1 billion gallons in recent history. Some of this is attributed to cooler and wetter summers in more recent years. It is reasonable to assume that water usage will remain stable or even continue to decline over the near term due to increasing rates and customers' ability to better track usage via AMR. Volumetric meter-based billing is a water conservation pricing mechanism and water use can be expected to decrease in response to the increasing cost of water. This overall trend could be affected by a number of factors including year-to-year temperature swings and potential droughts, which tempers consumption through restrictions.

DEP uses water demand analysis and projections for many purposes including water supply and wastewater infrastructure planning, revenue analysis, affordability studies, assessing the effects of new growth and rezoning, and

understanding the effects of water demand on agency operations. In 2013, DEP began using the AWWA water audit software to assess system water balance. Figure 20 below includes the results of the balance.

DEP also continues to track per capita consumption of water every year. Due to the nature of New York City as a business district and tourist destination, dividing water consumption by population doesn't necessarily capture normal per capita consumption. Through tying our consumption data with local population data, DEP finds that FY14 New York City per capita daily consumption is close to 76 gallons per capita per day (gpcd). Meter-billed consumption is even lower, approximately 66 gpcd. Gpcd values are calculated based on consumption volumes and 2009-2013 US Census American Community Survey data.

Land Use Class	FY14	
	All Billing Types	Meter-Billed Accounts
1. Tax Class 1, One-Family Dwellings	65	64
2. Tax Class 1, Two- & Three-Family Dwellings	63	61
3. Multi-Family Buildings	81	61
4. Mixed Residential & Commercial Buildings	89	82
All Residential Development	76	66

Figure 20: FY14 Residential Per Capita Water Consumption

AWWA WLCC Free Water Audit Software: Water Balance		Water Audit Report For:		Report Yr:	
		NYC Department of Environmental Protection		FY14	
Own Sources (Adjusted for known errors) 348,603	Water Exported 0	Authorized Consumption 294,705	Billed Authorized Consumption 289,422	Billed Metered Consumption (inc. water exported) 199,401	Revenue Water 289,422
	Water Supplied 348,603		Unbilled Authorized Consumption 5,282	Billed Unmetered Consumption 90,022	
Water Losses 53,899		Apparent Losses 14,029	Unbilled Metered Consumption 925	Unauthorized Consumption 3,486	
	Real Losses 39,869		Unbilled Unmetered Consumption 4,358		Customer Metering Inaccuracies 10,543
				Systematic Data Handling Errors 0	
Water Imported 0			Leakage on Transmission and/or Distribution Mains Not broken down		
			Leakage and Overflows at Utility's Storage Tanks Not broken down		
			Leakage on Service Connections Not broken down		

Figure 21: FY14 AWWA Water Balance

