



WATER DEMAND MANAGEMENT REPORT

June 2016 Update



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INTRODUCTION

Through a complex arrangement of dams, reservoirs, tunnels, and aqueducts, the New York City system serves 8.5 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 (DEP) 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 1990s

despite a 19% population increase over the same period. In 2015 average water demand was just over a billion gallons of water a day.

Now in its fourth full year of the program, DEP continues to make progress of reducing water demand by 50 million gallons of water per day through established partnerships and exploring additional water saving projects.

To date, DEP has held numerous water challenges with non-residential customers, launched the Toilet Replacement Program, started demand management plans with wholesale customers, and retrofitted over 400 buildings and over 32,000 fixtures throughout the city.

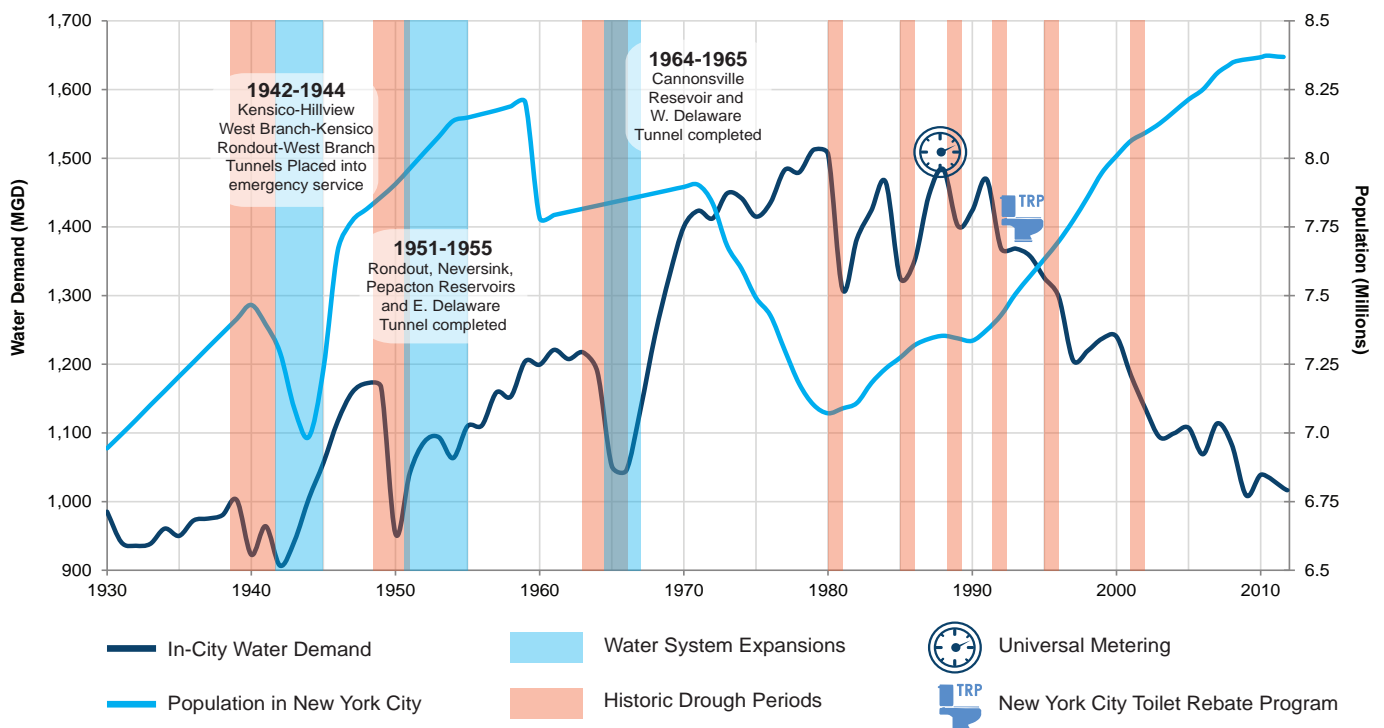
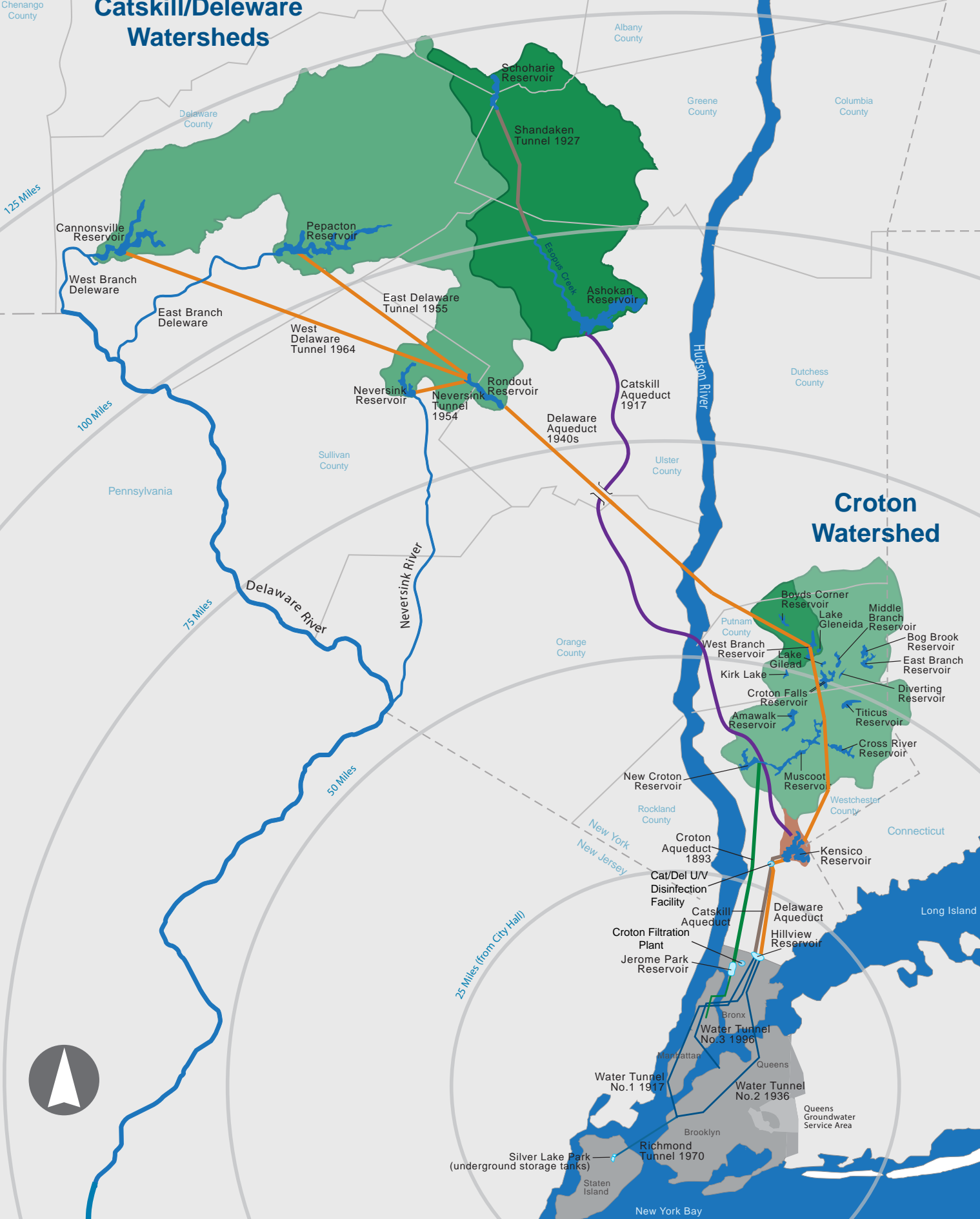


Figure 1: Timeline showing New York City water demand compared with population growth, and other factors affecting overall demand.

Catskill/Deleware Watersheds

Croton Watershed





STRATEGY 1

MUNICIPAL WATER EFFICIENCY PROGRAM

I.S. 27 School in Staten Island

Now in its fourth 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. Many of the individual projects and original goals of the Water Demand Management Plan are now close to completion.

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. As the program continues, we are looking to expand the groups we are working with to include Health and Hospitals Corporations (HHC), Department of Cultural Affairs (DCLA), and Department of Health and Mental Hygiene (DOHMH).

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, including onsite reuse.

DEP will continue to advance wide-ranging efforts that incorporates water efficiency retrofits, education, curriculum development, metering, and water benchmarking to ensure permanent water savings within municipal savings

Initiative 1: Save Water in Wastewater Treatment Facilities

In December 2015 DEP completed it's second Commissioner's Water Challenge with three participating plants, Bowery Bay, Hunts Point and Port Richmond. Two of these plants Bowery Bay and Hunts Point, have both been able to achieve greater than 10% savings year over year, and took steps to make sure these savings are permanent. The two plants combined were able to save 300,000 gpd. In 2016 DEP launched the third water challenge, with Tallman Island, Rockaway and Red Hook Waste Water Treatment Plant participating. It is estimated that these plants could

save 40,000 gpd if all achieve 10% savings.

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.

Last year we saw the successful implementation of Spray Nozzles that are described in the case study on this page. Due to the success of this purchase we are double the number at each plant, completing a second purchase of the nozzles to be used by staff. In addition to this plant-wide investment, DEP has also purchased new seal pumps and repair kits for old seal pump systems that were losing water.

Case Study: Spray Nozzles

During the development of the Water Demand Management Plan, DEP worked to identify large capital projects that would spur water savings at waste water treatment plants. As part of the second Commissioners 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

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		Polymer
Foam Control	Thickeners	Cleaning/Washing	Tanks
	Final Tanks		Sit Washing
	Chlorofume Contact Tanks		Grit Suspension
	Blowers	Miscellaneous	Agitation Water
	Engines		Balance Water (Thickeners)
Cooling Water	Heat Exchangers		Flushing (Centrifuges)
	Centrifuges		Blockage Removal in Pipes
	AC Chilliers		
	AC Condensers		

* For deaning/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

Initiative 2: Save Water in Schools

In the Fiscal Year of 2016, DEP completed the retrofit of 100 schools. DEP has now completed retrofits of 230 schools, which puts us 25 over our anticipated amount at this time. Of the 100 schools, over 6,200 toilets and 2,100 urinals have been replaced. DEP has finalized its list of 100 schools slated for retrofit in fiscal year 2017 and has completed fixture surveys to begin work in the summer of 2016. This work will replace 5,600 toilets and 1,700 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.

DEP furthered its partnership with DOE by co-signing a grant proposal with them for money from the National Wildlife Federation Eco Schools Program. This places sustainability coordinators at the schools who will help the students understand how to reduce energy and water consumption. As part of the grant DOE will add four schools in Greenpoint, Brooklyn to be part of the retrofit program.

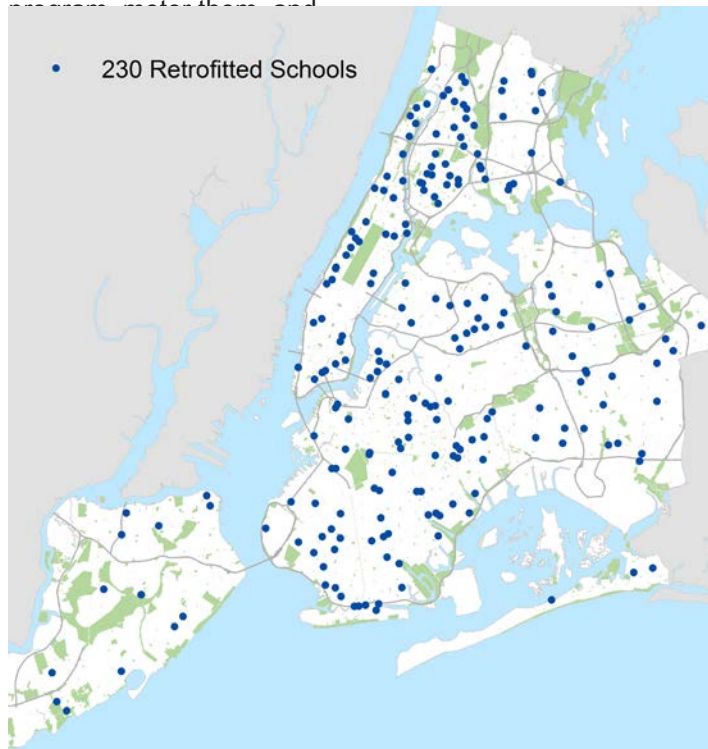


Figure 4: New York City Schools Retrofitted to date



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

help ensure that all four schools see a 5% reduction in water use over the period of the grant.

DEP began recycling all of the porcelain from the replaced fixtures in July of 2015. In the fiscal year of 2016 over 8,000 fixtures will be recycled and beneficially reused in both an oyster reef restoration project in Jamaica Bay as well as substrate fill for green infrastructure rain gardens being constructed in Brooklyn and Queens. DEP will be documenting these reuses and will include these examples as more in depth case studies in a future demand management reports.



Figure 6: Crushed Porcelain

Case Study: 30th Annual Art and Poetry Contest

The Wonderful Ways of Water

*Down the mountains and into the rivers,
Underneath the ice when the weather makes you
shiver.*

*We need water to survive,
To live all powerful and thrive.*

Poem by Ashley from Irwin Altman M.S. 172 Queens



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

DEP held its 30th Annual Water Resources Art and Poetry Contest from January through May 2016. This year, 1,800 students (grades 2-12) from New York City and Watershed communities created more than 1,600 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 100 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 1,600 submissions, a group of judges selected 66 students as this year's DEP Water Champions. This year's competition marked an all-time record for student participation. Submitted entries reflected an appreciation for New York's water resources, wastewater treatment systems, and the impor-

tance of water conservation. In addition, through the art and poetry submitted, students expressed themselves creatively about healthy marine ecosystems and their role in protecting and enhancing harbor water quality.

On May 19, Water Ambassadors and Water Champions were honored at DEP's 30th Annual Water Resources Art and Poetry Celebration. Held at Manhattan Community College's Tribeca Performing Arts Center, the celebration ceremony was hosted by DEP Deputy Commissioner Eric Landau, and included remarks from Patrick Dougher, Program Director at Groundswell. This year's celebration also included a special performance by Tem Blessed, multi-talented musician, artist and poet.



Figure 8: Art Submittal from Luyi from Brooklyn Technical High School



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

The summer of 2015 saw the largest number of completions of sprayshower sites, with 190 sites completed between June and November. These sites represented goals set in 2 different calender goals, and bring us to 340 completed sites. The remaining 60 sites will be retrofitted in the summer of 2016. DPR included ongoing inspections of sprayshower sites in to their regular operations and are prepared to keep maintenance up on these properties.

DEP is searching for additional reduction in consumption of .026 MGD working with the DPR to retrofit DPR owned recreation centers. DPR completed the retrofit of 5 recreation centers in the summer of 2015. Part of this retrofit was the installation of waterless urinals, the first time parks has installed such devices on their property.

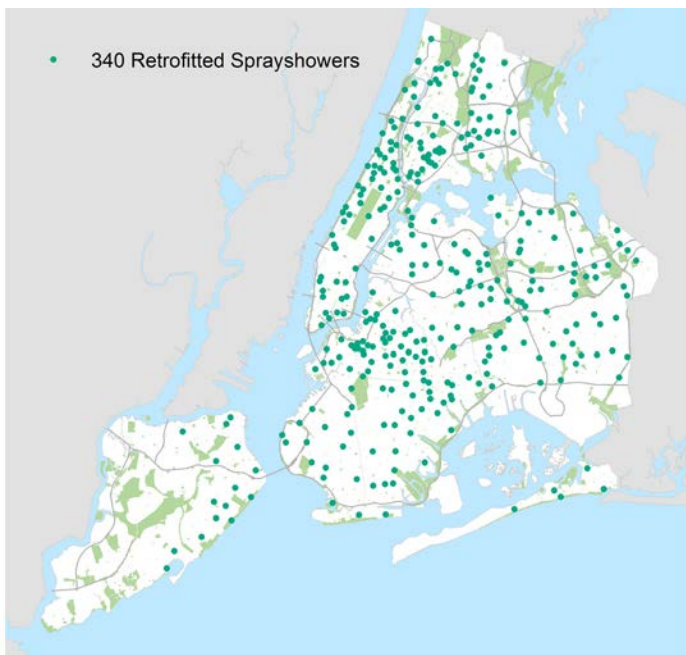


Figure 10 : Parks spray showers retrofitted to date.



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 sprayshowers 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 100 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 2015, six 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 2017.

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 2016. DEP also began an agreement with Lehman College of the CUNY system to replace 230 toilets and 120 urinals on their campus, that work will begin in July of 2016 and take about a year to complete.



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).

DEP anticipates to get the majority of reduction from FDNY by installing a water reuse system at their Randall's Island Training Facility. The water reuse system is to recycle water they use to test and calibrate fire engine hoses and pumps. The design was complete, construction budget updated and we expect the work to begin in the fall of 2016 with a one and half year construction timeline, well before the shutdown of the Delaware Acqueduct.

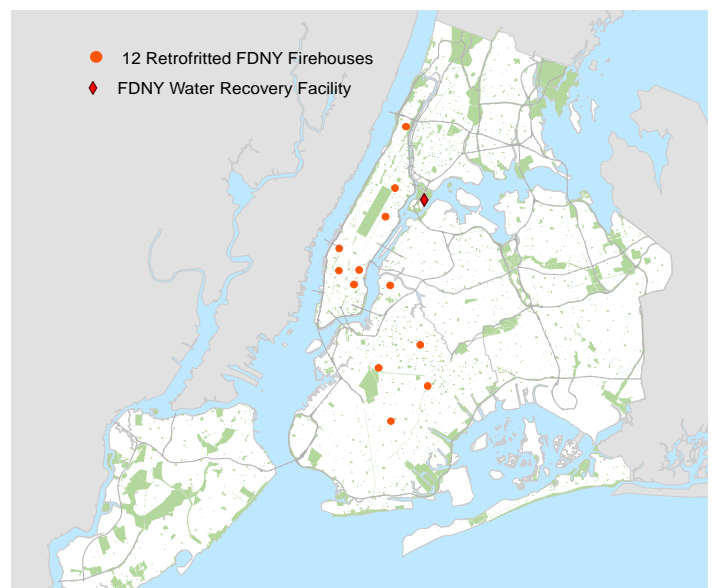


Figure 13: Firehouses retrofitted to date.



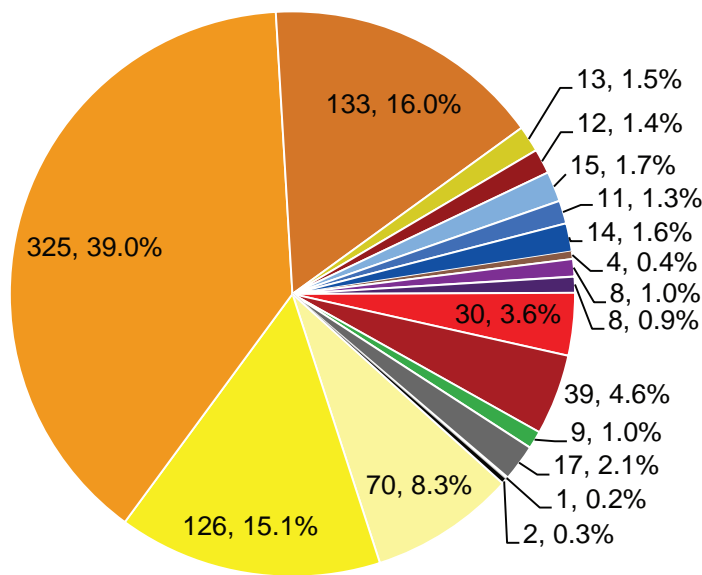
STRATEGY 2

RESIDENTIAL WATER EFFICIENCY PROGRAM

Multi-family buildings in Manhattan, NY.

As stated in the Water Demand Management Plan, residential properties account for 78% of the city's total water demand (Figure 14). 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 Multifamily Conservation Program, 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.

Since 2014, 1,130 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 133,000 toilets. Of these over 772 vouchers have been redeemed for the replacement of 9,040 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. 2015 saw a major increase in activity in the TRP program, over 80% of all fixtures have been redeemed since January 2015. Due to recent success of the program, we have moved the original deadline of June 30th, 2016, and extended it to December 31st, 2016. This allows our staff to continue reaching out to people in the first phase of the program.

We also hope to set up an inhouse sign up desk at DEP headquarters that would allow building owners to come in and seamlessly go through the process of filling out the appropriate paperwork to receive and redeem their vouchers.

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.

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 2015, on behalf of DEP, Honeywell conducted surveys in 2,667 apartment buildings and single family homes and in a total of 15,297 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

Sloan Memorial Kettering Hospital

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

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 challenged a select group of thirty NYC restaurants to reduce their annual water. DEP concluded its Water Challenge to Restaurants in September of 2015. This challenge was successful with 10 of the 30 restaurants being able to reduce consumption by at least 5%. Together, all of the winning restaurants saved 2.6 million gallons in New York City's 2015 water consumption.

These restaurants successfully established baseline analytics of their water consuming trends. Many have also analyzed their restaurants energy consumption. Most auditing their kitchen spaces for low-cost upgrades that reduce water, and in some cases energy use.

DEP launched the 2016 Water Challenge to Hospitals on January 1, 2016. Each hospital will work to reduce their campus wide monthly average water consumption by 5 percent and which can save approximately 2.2 million gallons of water per month. Participating hospitals include: New York Presbyterian-Queens, Memorial Sloan Kettering Cancer Center, and NYC Health + Hospitals/Harlem. The participants represent a mix of public and private hospitals that provide inpatient care, teaching and research services. These three hospitals represent a range of types that are found in New York City, from Harlem Hospital which focuses on patient care, and Memorial Sloan Kettering which has research centers. The lessons learned from the New York City Water Challenge to Hospitals will be utilized by DEP to develop a best practices guide for water management in area hospitals.

Initiative 2: Save Water through Cost Sharing

DEP will be unveiling a new cost sharing program before the Su of 2016 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 15: Havana Central a Restaurant Water Challenge participant.

Participating hospitals are equipped with water meters and AMR devices which track water consumption in near real time. The hospitals will use 24 months of water consumption data to establish a baseline profile and track their progress in reducing water consumption and DEP will develop a toolkit of resources to help them meet their targets efficiently. Water reduction strategies may include good housekeeping techniques, such as finding and repairing leaks, and developing literature that encourages staff members to practice water conserving behavior. Physical upgrades will also be explored, such as the replacement of inefficient plumbing fixtures and the adoption of new technologies that use water minimally, or reuse it to the extent possible.

We will be hosting four work-shops with industry professionals, tracking and sending water consumption data each month. In addition, because of the large campus footprint of each participant, we will work to do an audit and demand management plan for each hospital, to further commit to water savings beyond the challenge.



Figure 16: Hospitals participating in the NYC Water Challenge



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 2015, DEP surveyed 3,567 miles of water mains for leaks; as a result of leaks proactively found and repaired, DEP estimates that 3.74 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 2015, DEP repaired 9,374 hydrants, replaced 1,588, and provided other maintenance services to 8,725 more.

Initiative 2: Optimize Pressure Management

DEP has been working to improve maintenance of the pressure zones within the water distribution system. In CY2015, the number of breaks per 100 miles was 7.9, slightly above the city's 10 year average of 7.0, but 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.

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 2015, a total of 9,906 large meters were replaced.

In addition, as of the end of 2015 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 2015, this fell to 3.2%, an 82% reduction.



Figure 19: Meter Testing 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 has 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. DEP made a recommendation to adopt the rate, the Water Board requested that rate should be adopted.

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.



STRATEGY 6

Wholesale Customers Water Demand Management

New Paltz, NY

Photo: Daniel Case (Wikipedia)

Initiative 1: Water Demand Management Plans for 10 largest customers

DEP has signed demand management planning agreements with nine of the 10 of the larger wholesale customers it supplies water to outside of New York City. These 10 customers are: United Water of Westchester (now Suez Westchester), Westchester Joint Water Works, the City of Mount Vernon, the Town of Greenburgh, the Village of Scarsdale, the Town of New Windsor, and the Village of Ossining, Village of Tarrytown, City of Newburgh, and the Village of New Paltz. These ten customers have been offered assistance to develop demand management plans for their water systems.

We have been working throughout 2015 to get closer to creating the water demand management plan for each of these customers, which will focus on reducing each of their consumption by 5% of a 3 year timeframe. DEP has completed the Village of Ossining plan which is now on the DEP website.

Initiative 2: Implement Planned Demand Management Measures

In addition to creating water demand management plans, DEP has worked to hammer out inter government agreements to get commitments to water reduction of these customers.

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. 2015 average water consumption was 1,009 MGD, lower than the drought of record. 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 FY15 New York City per capita daily consumption is close to 71 gallons per capita per day (gpcd). Meter-billed consumption is even lower, approximately 65 gpcd. Gpcd values are calculated based on consumption volumes and 2009-2013 US Census American Community Survey data.

Land use	per capita all types	per capita billed
1. Tax Class 1 One Family Dwellings	63	62
2. Tax Class 1 - Other (Two-Three Family)	60	59
3. Multi-Family Buildings	73	60
4. Mixed Residential & Commercial Buildings	87	82
All Residential	71	65

Figure 20: FY14 Residential Per Capita Water Consumption

AWWA WLCC Free Water Audit Software: Water Balance		Water Audit Report For:		Report Yr:	
Copyright © 2010, American Water Works Association. All Rights Reserved.		WAS v4.2		Environmental Protection	
				FY15	
Own Sources (Adjusted for known errors)	Water Exported 0.000	Authorized Consumption 289,119.437	Billed Authorized Consumption	Billed Metered Consumption (inc. water exported)	Revenue Water
	Water Supplied 347,766.500		283,961.664	194,686.152	283,961.664
Water Imported 0.000		Water Losses 58,647.063	Unbilled Authorized Consumption	Unbilled Metered Consumption	Non-Revenue Water (NRW)
	5,157.774		810.692		
		Apparent Losses	Unbilled Unmetered Consumption	63,804.836	
		13,766.973	4,347.081		
		Real Losses	Unauthorized Consumption		
		44,880.090	3,477.665		
			Customer Metering Inaccuracies		
			10,289.308		
			Systematic Data Handling Errors		
			0.000		
			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

