



**Environmental  
Protection**

Carter Strickland, Commissioner

# **WATER CONSERVATION PROGRAM**

## **FIVE YEAR UPDATE**

August 2011





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# INTRODUCTION

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The New York City water supply system is an integrated network of 19 reservoirs and three controlled lakes. The system delivers approximately one billion gallons of water per day to over eight million users. With the city's population expected to rise to 9.1 million by 2030, conservation will continue to have an important role in meeting demands for water. It is important to note that, although population growth has increased demand for housing, energy, and transportation, total water consumption has been declining and is lower today than it was 50 years ago.

In 1985 the City Council began requiring installation of meters in new or renovated construction and, in 1987, DEP began installing meters in residential properties. This allowed both DEP and the customers to understand actual consumption. Once bills based on metering were established, customers were able to understand and reduce their consumption. In 1994, DEP continued with its water efficiency efforts and launched the world's largest toilet rebate program in response to increasing water use and wastewater flows in the 1980's.

DEP has continued to work with regulators and other agencies over the years to monitor and support conservation efforts (see the Plan Accomplishments section). Although there is an ample supply of water in the region, DEP continues to use conservation methods whenever they are cost effective and do not conflict with other important agency goals. Although current levels of water consumption are near historic lows, it is important to maintain these gains to prepare for the Delaware Aqueduct repair and increased volatility that may occur due to climate change, and to create additional storage in our sewer system for storm water.

## Distribution System

Water for the distribution system is derived from three upstate reservoir systems (the Croton, Catskill and Delaware Systems). The three upstate water collection systems include 18 reservoirs and three controlled lakes with a total storage capacity of approximately 580 billion gallons. They were designed and built with various interconnections to increase flexibility by permitting exchange of water from one system to another. This feature mitigates localized droughts and takes advantage of excess water in any of the three watersheds.

The distribution system is currently furnishing water to users in portions of four of the eight eligible northern counties. The distribution system provides approximately 85% of the water used in Westchester County and approximately 7.5% of the water used in Putnam, Orange and Ulster Counties.

Approximately 95% of the total water supply is delivered to buildings by gravity. Only about 5% of the water is regularly pumped by DEP to maintain the desired pressure. As a result, operating costs are relatively insensitive to fluctuations in the cost of power. When drought conditions exist, additional pumping is required.



The following tables set forth the capacities and original in-service dates of the System's collecting and balancing reservoirs and distribution facilities based on the City records.

### COLLECTING RESERVOIRS

NAME	AVAILABLE CAPACITY <sup>(1)</sup> (billion Gallons)	ORIGINAL IN-SERVICE DATE
<b>CROTON</b>		
New Croton	19.0	1905
Croton Falls Main	14.2	1911
Cross River	10.3	1908
West Branch	10.1	1895
Titicus	7.2	1893
Amawalk	6.7	1897
East Branch	5.2	1891
Muscoot	4.9	1905
Bog Brook	4.4	1892
Middle Branch	4.0	1878
Boyd's Corner	1.7	1873
Croton Falls Diverting	0.9	1911
<b>Total</b>	<b>88.6</b>	
<b>CATSKILL</b>		
Ashokan	122.9	1915
Kensico	30.6	1915
Schoharie	17.6	1926
<b>Total</b>	<b>171.1</b>	
<b>DELAWARE</b>		
Pepacton	140.2	1955
Cannonsville	95.7	1964
Rondout	49.6	1950
Neversink	34.9	1954
<b>Total</b>	<b>320.4</b>	
<b>Total Available Capacity</b>	<b>580.1</b>	

(1) Capacity above minimum operating level

## BALANCING RESERVOIRS AND DISTRIBUTION FACILITIES

NAME	STORAGE CAPACITY (BILLION GALLONS)	ORIGINAL IN-SERVICE DATE
<b>BALANCING RESERVOIRS</b>		
Hillview	0.9	1915
<b>Total Balancing Reservoirs</b>	<b>0.9</b>	
<b>DISTRIBUTION FACILITIES</b>		
Central Park	1.0	1862
Jerome Park	0.8	1905
Silver Lake (tanks)	0.1	1970
<b>Total Distribution Facilities</b>	<b>1.9</b>	
<b>Total Storage Capacity</b>	<b>2.8</b>	

The following table sets forth the Dependable Yield and storage capacity for each of the water supply systems.

## WATER SYSTEM DEPENDABLE YIELD AND CAPACITY

SYSTEM	DEPENDABLE YIELD (MGD)	STORAGE CAPACITY <sup>(1)</sup> (BILLION GALLONS)
Croton	240	86.6
Catskill	470	140.5
Delaware	580	320.4
Queens Wells	33	2.6
<b>Total</b>	<b>1,323</b>	<b>550.1</b>

<sup>(1)</sup> Capacity above minimum operating level

Delaware system is limited to 520 MGD during drought

The Croton System normally provides approximately 10% of the City's daily water supply and can provide substantially more of the daily water supply during drought conditions. The Croton System consists of 12 reservoirs and three controlled lakes on the Croton River, its three branches and three other tributaries. The water in the Croton System flows from upstream reservoirs through natural streams to downstream reservoirs, terminating at the New Croton Reservoir. The watershed which supplies the Croton System has an area of 375 square miles. It lies almost entirely within the State, approximately 45 miles north of lower Manhattan, with a small portion in the State of Connecticut.

The Catskill System watersheds occupy sparsely populated areas in the central and eastern portions of the Catskill Mountains and normally provide approximately 40% of the City's daily water supply. Water in the Catskill System comes from the Esopus and Schoharie Creek watersheds, located approximately 100 miles north of lower Manhattan and 35 miles west of the Hudson River. The Catskill System is comprised of the Schoharie Reservoir (formed by the Gilboa Dam across Schoharie Creek) and Ashokan Reservoir (formed by the Olivebridge Dam across Esopus Creek) and the Catskill Aqueduct.

The Delaware System, located approximately 125 miles north of lower Manhattan, normally provides approximately 50% of the City's daily water supply. Three Delaware System reservoirs collect water from a sparsely populated region on the branches of the Delaware River: Cannonsville Reservoir (formed by the Cannonsville dam on the West Branch of the Delaware River); Pepacton Reservoir (formed by the Downsview



Dam across the East Branch of the Delaware River); and Neversink Reservoir (formed by the Neversink Dam across the Neversink River, a tributary to the Delaware River).

In addition, wells in Queens can supplement the City's daily water supply. The wells could be used to provide more of the daily supply during drought conditions. Unlike the rest of the City's water supply, which is a surface and gravity-supplied system originating in a network of upstate reservoirs; well water is pumped from extensive underground aquifers. The acquisition of wells in Queens from Jamaica Water in 1996 represented the first new water supply source for the City since the 1960s when the Delaware surface water system initially came on line.

Current demand and flow projections show that if conservation programs, including metering, toilet replacement, hydrant locking, leak detection, and public information, remain effective there will be no predicted need for the City to find additional long-term water supply sources to meet normal demand.

Croton System water is delivered from the New Croton Reservoir by the New Croton Aqueduct to the Jerome Park Reservoir in the Bronx. From Jerome Park Reservoir and from direct connections to the New Croton Aqueduct, trunk mains carry water to the service area.

The Catskill and Delaware Aqueducts convey water from Ashokan Reservoir and Rondout Reservoir to Kensico Reservoir and then to Hillview Reservoir in Yonkers. Both Kensico and Hillview Reservoirs serve as balancing reservoirs. Water from the Catskill and Delaware Systems is mixed in the Kensico Reservoir, and is conveyed to Hillview Reservoir where water enters Tunnels 1, 2 and 3. Trunk mains carry water from tunnel shafts and from the distribution facilities (Jerome Park and Hillview Reservoirs and Silver Lake Tanks) to the service area.

## Rondout-West Branch Tunnel

DEP regularly assesses the condition and integrity of the System's tunnels and aqueducts to determine the extent and effect of water loss. In particular, since the early 1990s, DEP has monitored the condition of the Rondout-West Branch Tunnel, which comprises a portion of the Delaware Aqueduct. The Rondout-West Branch Tunnel carries water 45 miles from the Delaware System under the Hudson River and into West Branch Reservoir. It has a capacity of 900 MGD and normally contributes 50% of the City's water supply. It has the highest pressures and the highest velocities in the distribution system. In addition, a portion of the tunnel crosses a fractured rock formation, which is potentially subject to greater stress than the deep rock tunnels located in the City. As a result of DEP's flow tests, visual observations and other analyses, it has been determined that approximately 15 MGD to 36 MGD of water is being lost from the tunnel and is surfacing in the form of springs or seeps in the area.

DEP has initiated the engineering work to determine the nature and extent of repairs which may be necessary to remedy the water loss. DEP intends to make the necessary repairs. The costs to perform such repairs could be substantial depending on the nature of the required repair. To perform the repair work, the tunnel will have to be shut down and de-watered. During any such period, it will be necessary for the City to increase reliance on its other water supplies, and to implement more stringent measures to encourage conservation and decrease demand. In general, the Delaware System continues to demonstrate a high degree of reliability after 55 years of continuous service.

Nevertheless, DEP considers it prudent to conduct regular tunnel and aqueduct inspections and surveys to detect any problems that might arise so that corrective actions can be taken if needed.

DEP has begun to evaluate additional strategies and projects for improving dependability of water supplies, which could entail the development of additional or interim supplies and demand reduction measures to

meet demands during periods of extended facility outages due to planned or unplanned inspection, repair or rehabilitation. DEP intends to evaluate various alternative projects which, when combined, could allow for any portion of the distribution system to be taken out of service for a period of up to one year. Elements of that plan may include: interconnections with other neighboring jurisdictions; increased use of groundwater supplies; increased storage at existing reservoirs; withdrawals and treatment from other surface waters; hydraulic improvements to existing aqueducts; and additional tunnels.

## Tunnel 1

From Hillview Reservoir, water from the Catskill and Delaware Systems is delivered into the City by a circular, cement-lined, pressurized, bedrock tunnel that narrows in diameter from 15 to 11 feet. Tunnel 1 is 18 miles in length and extends south from Hillview Reservoir through the West Bronx to Manhattan and Brooklyn. Tunnel 1 is 200 to 750 feet underground and thus avoids interference with streets, buildings, subways, sewers, pipes and other underground infrastructure. These depths are necessary to ensure substantial rock covering necessary to withstand the bursting pressure of the water inside and to ensure water tightness. Tunnel 1 has a capacity of approximately 1,000 MGD. Shafts placed along the tunnel connect with surface mains which deliver water to the distribution system.

## Tunnel 2

The second tunnel also delivers Catskill and Delaware System water from Hillview Reservoir. It is a circular, cement-lined, pressurized, bedrock tunnel, 200 to 800 feet below the street surface and 15 to 17 feet in diameter. Tunnel 2 extends south from Hillview Reservoir, east of Tunnel 1, through the Bronx, under the East River at Rikers Island, through Queens and Brooklyn, and connects with Tunnel 1 in Brooklyn. Tunnel 2 has a capacity of more than 1,000 MGD and is 20 miles in length. Shafts placed along the tunnel connect with surface mains which deliver water to the distribution system.

## Richmond Tunnel

Connecting to Tunnel 2 in Brooklyn is the ten-foot diameter, five-mile long Richmond Tunnel, which was completed in 1970 and carries water 900 feet beneath Upper New York Bay to Staten Island. The Richmond Tunnel, the Richmond Distribution Chamber, the Richmond Aqueduct and the underground Silver Lake Tanks were designed to improve the water supply facilities of Staten Island. The underground storage tanks (among the world's largest) have a combined capacity of 100 million gallons and replaced the Silver Lake Reservoir.

## Tunnel 3

A new water tunnel, Tunnel 3, connecting the reservoir system to the City is presently under construction to increase pressure/flow to meet a growing demand in the eastern and southern areas of the City, permit inspection and rehabilitation of Tunnels 1 and 2, and provide water delivery alternatives to the City in the event of disruption in Tunnel 1 or 2. Tunnel 3 is being built in four stages. Stage 1 is already in service; the Manhattan portion of Stage 2 will be in service in 2013, and shaft work is already underway to create the connections necessary to feed the distribution system that Tunnel 3 is being built to support. Tunnel 3 has been under construction since 1970.

## Kensico-City Tunnel

The Kensico-City Tunnel will extend from the Kensico Reservoir to the Van Cortlandt Valve Chamber, south of Hillview Reservoir.

The water distribution system consists of a grid network of over 6,200 miles of pipe, as well as valves, fire hydrants, distribution facilities, gatehouses, pump stations, and maintenance and repair yards. Approximately 32% of the pipe in the System was laid before 1930, 37% between 1930 and 1969, and the remainder thereafter.

Various facilities provide storage to meet the hourly fluctuations in demand for water throughout the City, as well as any sudden increase in draft that might arise from fire or other emergencies. With the exception of some communities in the outlying areas of the City which may experience low pressure service during peak hours in summer months, the water distribution system provides generally excellent service.

## Wastewater System

The sewer system is divided into 14 drainage areas corresponding to the 14 Waste Water Treatment Plants (WWTPs) and includes over 7,400 miles of sewer pipes of varying size which are classified as one of three types: sanitary, storm or combined. Sanitary sewers accommodate household and industrial waste. Storm sewers carry rainwater and surface water runoff. In addition to the sewage pipes, the sewer system includes catch basins and seepage basins to prevent flooding and sewer backups.

The sewer system is comprised of a number of sewer facilities built to varying standards. Different materials and methods of construction were used resulting in different life cycles. Approximately two-thirds of the City's sewer pipe is made of vitreous clay. Significant mileage of sewer pipe is composed of other building materials including cement, reinforced concrete, iron and brick. Some pipe in the collection system was installed before 1870, and approximately 15% of all sewer pipe in the collection system is over 100 years old. The facilities related to the treatment of sewage include water pollution control plants, a combined sewer overflow treatment plant, wastewater pump stations, laboratories, sludge dewatering facilities and inner-harbor vessels which transport sludge between facilities. Sludge is a by-product of the sewage treatment process. Sludge that is treated through the sewage treatment process (or biosolids) is acceptable for land-based beneficial use either directly or after additional provisions such as composting, lime stabilization or thermal pelletization.

Reduction of Combined Sewer Overflows (CSO) is an important goal of the agency, as well as reduction of treated flow during dry weather. The immediate approach to both these issues is conservation, through voluntary changes in user behavior, through education and the effect of actual use charges based on metered water usage, leak detection, repair and increased use of newly designed low-flow water use fixtures.

# SUMMARY

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This document is to update the current Water Conservation Program first issued by the New York City Department of Environmental Protection (DEP) in December 2006. This document contains detailed information on the history and operation of the water supply and wastewater treatment systems as well as historic information on water conservation efforts. The program explains objectives, proposals, estimated savings, measurements, milestones, and methods of documentation.

The program did not substantially change from its components outlined in the 2006 version. The Annual Water Conservation Report submitted in June, 2011 has been reformatted to separate the Water Conservation Program into the following six major components:

## 1 Automated Meter Reading

DEP began the installation of a citywide fixed-network AMR system in August 2008 with the start of installation work for Data Collection Units (DCU) around the city as part of New York City Department of Information, Technology and Telecommunication's NYCWiN citywide wireless system. Replacement of most pre-1998 water meters and installation of the AMR devices or Meter Transmission Units (MTUs) on all water meters began the first week of March 2009 with substantial completion expected by the end of 2011. By the end of 2009 DCU coverage of all boroughs with the exception of Staten Island was complete and 180,700 MTUs had been installed, 2% ahead of schedule. As this report was being written in May 2011 the project passed the 80% completion mark. DEP began offering website access to customers of their consumption data during summer 2010 and an email Leak Notification service in late 2010.

## 2 Water Use Rules

New water supply rules took effect on June 22, 2009. The changes address several water quality and leak prevention issues in addition to a number of technical and procedural changes. Another round of updates and revisions are under way in 2011.

## 3 Water Efficiency Programs

DEP implements a number of programs to promote efficient use of water and detect, target, and fix leaking components in the water system. System specific programs, such as leak notification, management programs are designed to monitor the distribution and open hydrant emergency response system. In addition to the water saving kits and residential surveys, new requirements, such as the "Green Codes" and Local Law 86 are making buildings more water efficient. Some components of the water efficiency programs are measurable and quantifiable. These metrics will be tracked in upcoming updates.

## 4

### Water Reuse Programs

Several properties in NYC have implemented water reuse initiatives and have taken advantage of the Comprehensive Water Reuse Program rate, which provides for a discounted water and sewer rate in mixed use or residential buildings. Additionally, state and local guidance has become available or is in the process of being developed.

## 5

### Education Programs

DEP's Bureau of Communications and Intergovernmental Affairs (BCIA) continues to conduct a variety of education and public outreach programs on water and water efficiency directed at both students and adults.

## 6

### Tracking and Projecting Water Demand

DEP's Bureau of Environmental Planning and Analysis (BEPA) tracks and analyzes current and past water consumption trends, which are largely based on the consumption data dating from 2001 to the present. Consumption is estimated for each available borough, block and lot and verified through various analytical methods. As a part of this effort, BEPA also tracks this data against water supply, distribution, and wastewater flows.

This data is used in conjunction with various planning efforts within the agency, such as emergency preparedness, study of DEP's rate structure, and projecting future water use.

The above categories allow DEP to track the efforts which are both internal and external, in which DEP has provided leadership or support roles that result in meaningful conservation measures. Additional components of the program that are still in development are the Voucher-Based Fixture Incentive Program, and Performance Based Competitive Bids for Demand Reductions. Additionally, DEP is developing strategies for public building fixture replacements and end of frontage billing.

# PROGRAM UPDATE

## 1 Automated Meter Reading

DEP is automating its water meter reading capabilities to increase billing accuracy and provide customers with the tools they need to better manage their water usage. This is an important component of the overall Conservation Program,

The Automated Meter Reading (AMR) system consists of small, low-power radio transmitters connected to individual water meters that send daily readings to a network of rooftop receivers throughout the city. In most cases, the transmitters will be placed where water meter remote receptacles are currently located. The AMR receivers will be part of the Department of Information Technology and Telecommunications' (DoITT) New York City Wireless Network (NYCWiN).

DEP began to install rooftop Data Collection Units (DCUs) in August 2008 and was 80% complete by the end of 2009. As of June 2011, network completion was 92% with most of the remaining DCUs to be installed in central Staten Island during Fall 2011. The network provides close to double redundancy so coverage has been provided for almost all of Brooklyn, Queens, the Bronx, and Manhattan.

Wide-scale installation of the transmitters (MTUs) on water meters, and the replacement of approximately 50% of pre-1997 small meters, began on March 5, 2009, in Brooklyn and Queens, in mid-March 2009 in Manhattan, early April 2009 in the Bronx, and July 1, 2009 in Staten Island. By mid-2011 666,900 MTUs had been installed (80%) and work is proceeding at about 800-1,000 MTUs per day.

The system generates a 98% actual read rate with the remaining 2% attributable mostly to installation errors, defective MTUs and meters that will be corrected. Most MTUs are programmed to read the meter and transmit the read four times a day. Meters two inches and larger are being read once an hour and transmitting four times a day. Installation of the AMR system will not only improve customer service and collections but will increase the volume of water use data by orders of magnitude. DEP will move from having meters read four times a year with an 85% actual read rate overall, to four times a day (for most customers) or hourly (for larger customers) with a 98% actual read rate.

DEP is making efforts to install MTUs in apartment buildings that are physically metered but are still billed under the flat-rate or frontage system so the building owners or managers can better understand their water use. Those buildings were 90% complete by mid-May 2011.

DEP began making AMR readouts available to customers through its website during summer 2010.

Left: Older meters were read up to four times a year.

Right: The Automated Meter Reader transmits real time data several times a day.





## 2 Water Use Rules

Keeping the water use rules relevant by updating technical and procedural aspects is an important aspect of the Conservation Program. DEP completed revisions in Rules of the City of New York (RCNY) Title 15 Chapter 20, “Rules Governing the Supply and Use of Water” which took effect on June 22, 2009. The proposed changes related to water conservation and quality include the following requirements:

1. Any lead or galvanized metal service pipe be completely replaced, rather than repaired, if it leaks. This is aimed at speeding the replacement of these types of services both for water quality purposes and to reduce distribution system losses.
2. Water meters, service pipes and associated valves and fittings be manufactured of a “no lead” alloy.
3. Public fountains and sprays must have automatic shutoffs.
4. A requirement that the water service pipe to a vacant building be disconnected after one year of vacancy and empowerment of DEP to perform the work and charge the owner if the owner does not act. This is aimed at reducing leakage from service pipes.

DEP began internal study for a new round of rule changes in 2010 and expects to conduct a public hearing process in 2011. While most of the likely changes concern technical specifications related to water meters and the new AMR system, expansion of the requirement for individual metering of new condominiums and optional individual metering of larger condominiums is a conservation-related issue raised for discussion.

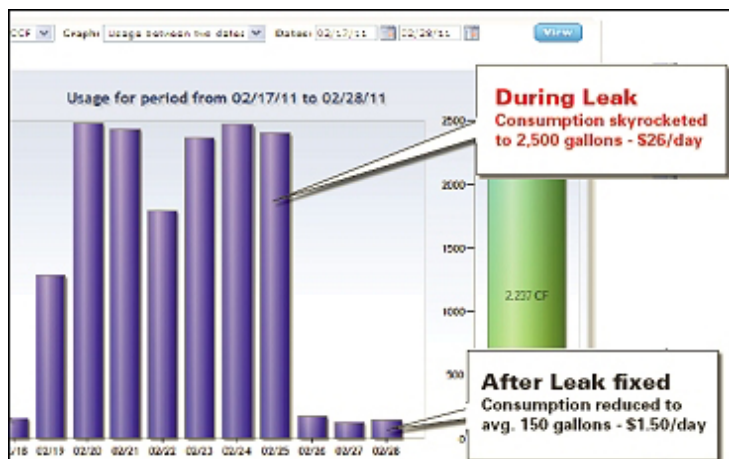


Public fountains and sprays are required to have automatic shutoff.

## 3 Water Efficiency Programs

### Leak Notification Program

The Leak Notification Program is a new initiative that allows DEP to proactively alert customers to potential water leaks on their property. In late 2010 DEP began to introduce a leak notification service for one-to-three family properties covered by the AMR system. The program gives customers the opportunity to sign up online to receive email notifications when their water use increases significantly over a period of several days, enabling homeowners to quickly respond to potential leaks and fix them before they become a serious billing problem.



Field crews are assigned to monitor leaks in each borough.

### Leak Management

DEP's Bureau of Water and Sewer Operations (BWSO) investigates infrastructure leaks and replace water mains as necessary. DEP has around the clock response teams and leak detection crews that use cutting edge technology to locate and repair leaking valves and pipes. Additionally, the same leak detection crews respond to customer complaints, which result in significant water savings of approximately 6%.

### Open Hydrant Emergency Response

DEP's BWSO has a field team dedicated to monitoring unauthorized fire hydrant use and closing full flowing hydrants, particularly during the summer peak days. On days where temperatures reach over 90° F, this can result in significant water losses and pressure drops. During high peak days, DEP proactively installs spray caps in locations with a history of unauthorized hydrant use. Additionally, this year, DEP enhanced its Fire Hydrant Abuse Prevention Program (see page 18 of Education Programs for details).

DEP works with FDNY to make sprinkler caps available to the public for relief from heat and to reduce flow.





## Water Saving Kits and Residential Surveys

DEP continues to offer free water saving kits to homeowners as well as free walk-through surveys of private homes to identify leaks and install low-flow showerheads, faucet aerators, and toilet displacement bags.

## Meter Repair and Replacement Program

Water meters register at a slower rate as they age. The exact age when replacement makes sense may depend on the physical age of the meter, the amount of water that has flowed through the meter over the years, water quality, the type of meter and the manufacturer. Cost of access to a building to perform the replacement work is also a consideration. For meters that are less than 1 inch in size, it appears that replacement is cost effective 18-22 years after initial installation. As reported in the metrics table, DEP routinely replaces meters each year.

## Green Codes

Mayor Bloomberg, Council Speaker Quinn and the U.S. Green Building Council sponsored a wide-ranging review of the city's Building Code to meet environmental and green building goals. The cooling system amendment which prohibits the use of potable water for most once-through cooling systems went into effect January 1, 2011, as did an amendment that requires alarms and sub-meters to detect water leaks and monitor usage on water equipment.

Two other changes will become mandatory July 1, 2012: one that lowers the maximum water consumption flow rate or quantity for certain plumbing fixtures and allows the installation of dual-flush toilets; and a law requiring drinking fountains in commercial buildings to have a separate faucet designed to fill a container with water.

The code changes apply to new construction and the repair or replacement of existing structures and fittings.

## Local Law 84 and Benchmarking for City Buildings

As of May 1, 2010 city buildings are required to be benchmarked in coordination with the Department of Citywide Administrative Services (DCAS) with respect to energy use, and with DEP with respect to water use. Benchmarking of water use is not required unless the building was equipped with automatic meter reading equipment by DEP for the entirety of the previous calendar year.

## Local Law 86 and LEED® Rating Systems

Local Law 86 (LL86) of 2005, the NYC green building law, was enacted on October 3rd, 2005. The requirements of LL86 may apply to projects where construction is directly managed by city agencies as well as to projects managed by non-city entities, such as cultural organizations, state agencies and private developers, that receive a certain amount of city funding. These projects must achieve at a minimum 20 to 30% potable water use reduction below the standards of the U.S. Environmental Protection Agency Energy Policy Act of 1992 (EPA Act 1992) as well as a minimum Silver rating under the US Green Building Council's Leadership in Energy and Environmental Design (LEED®) rating systems program.

Office buildings can achieve a LEED Water Efficiency (WE) credit 3.1 for 20% water reduction through the use of low flow plumbing fixtures on efficient buildings. More efficient buildings can achieve WE credit 3.2 for 30% water reduction. For landscaping and irrigation, a LEED WE Credit 1.1 can be achieved for reducing

potable water used for building irrigation by 50%. Ultra efficient and innovative buildings could obtain the additional WE credit 1.2 for reducing the potable water for irrigation by 100%.

## Ongoing Program Metrics for 2010

### Water Surveys and Conservation Kits

Private Home Water Surveys	4,808
Apartment Surveys	24,308
Small Commercial Water Surveys	734
Home Water Saving Kits Distributed	1,423
Estimated Water Savings (MGD)	2.4

### Water Mains

Water Mains Surveyed (Miles)	3,696
Water Mains Replaced (Miles)	19.98
Estimated Water Savings (MGD)	4.62

### Hydrants

Hydrants Repaired	14,378
Hydrants Replaced	1,309
Hydrants Maintenance	2,455

### Water Meters

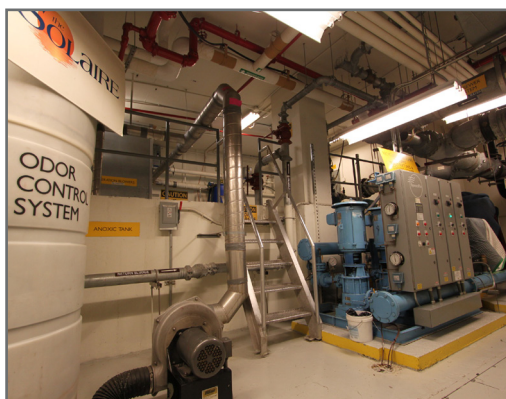
Meters Installed (Unmetered Properties)	256
Meters Replaced	1,870

## 4 Water Reuse Programs

### Comprehensive Water Reuse Program

On July 1, 2004 the New York City Water Board created the Comprehensive Water Reuse Program (CWRP) rate which provides for a discounted water/sewer rate for mixed use or residential buildings that recycle water using a “blackwater” or “greywater” recycling system as well as meeting fixture and appliance efficiency requirements. One year later the qualifications for the rate were expanded to buildings which recycle blackwater or combinations of greywater and stormwater or greywater and district steam condensate.

Water reuse system at the Solaire



There are several buildings in New York City that have taken advantage of this water rate incentive and include:

- The Solaire Building, Battery Park City, Manhattan, NY
- The Helena Building, 601 West 57th Street, Manhattan, NY
- Goldman Sachs, 200 Water Street, Manhattan, NY
- The Visionaire Building, Battery Park City, Manhattan, NY
- The Tribeca Green Building, Battery Park City, Manhattan, NY

At least two other properties have installed water cycling systems but either did not apply for or did not qualify for the CWRP

- Queens Botanical Garden Visitor and Administration Building, 43-50 Main Street, Flushing, Queens, NY
- Riverhouse Building, 1 Rockefeller Park, Manhattan, NY

## New York State Reuse Guidance

In November of 2010, the DEC released “Potential Reuses of Greywater and Reclaimed Wastewater in New York State.” As stated in the 2011 PlaNYC update, the New York State DEC is expected to release a report to guide regulatory decisions on reuse in the near future, and NYC would work within the State’s comprehensive standards to encourage reuse, remove barriers in local building codes, conduct cost/benefit analysis, establish long-term compliance management and maintenance requirements, and, where appropriate, provide incentives.

## New York City Plumbing Code

Appendix C of New York City Department of Buildings (DOB) Plumbing Code provides plumbing code requirements for water conservation systems and water recycling (reuse) systems. The “blackwater” and “greywater” systems requirements are outlined for installation, storage, filtration, disinfection, make-up water, overflow, drainage, venting, coloring, and identification. This code is currently under revision by an interagency committee.

### Rain Barrel Giveaway Program

The Rain Barrel Giveaway Program was launched in September 2010. DEP distributed 1,000 rain barrels in the spring and summer of 2008 and 2009 in Queens and Brooklyn. In 2011, a total of 1,000 free rain barrels were distributed in the Bronx, Brooklyn, Queens and Staten Island to single- and two-family homeowners. The rain barrels connect directly to the existing downspout to collect water for watering lawns and gardens, which often account for up to 40% of a household’s summer water consumption in areas with single-family homes. Using the stored water can reduce the demand on the city’s water supply during the summer’s hottest days. Rain barrels also help reduce localized street flooding, stormwater runoff that enters the city’s sewer system and the demand on the city’s drinking water system during drought conditions.





## 5 Education Programs

In order to help educate the public and raise awareness about water conservation, DEP has developed, through its Bureau of Communications and Intergovernmental Affairs (BCIA), a comprehensive public education and outreach program. This program has been running for many years and has several integrated components that address a wide range of topics through a multiple media approach, as described below. Furthermore, any future programs directed at demand and use reductions will be tied to the implementation of a major public information campaign on the value of water and water infrastructure such that any inconveniences, costs and sacrifices can be seen in the context of their civic benefit.

### School Programs

DEP continues to develop and implement education programs to help make young people and adults aware of the importance of New York City's water resources. DEP provides opportunities to learn about water supply, wastewater treatment, and stewardship activities at the new Visitor Center at Newtown Creek, and through inquiry-based lessons, staff development workshops for teachers and administrators, printed materials, assistance for curriculum development, and student research projects. DEP continues to administer its annual Water Resources Art and Poetry contest for K-12 students.



Mingdong, Herbert H. Lehman HS, Bronx



John, PS 144, Queens

## Public Events

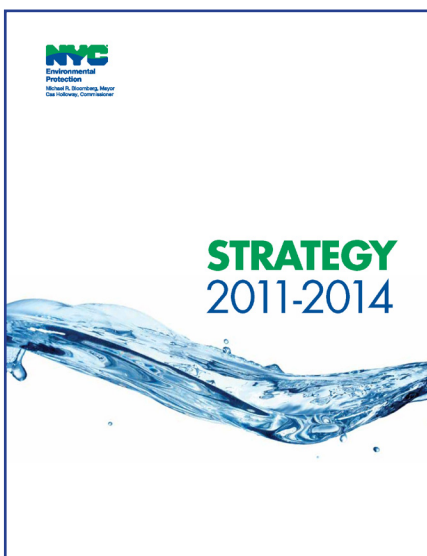
In 2010, DEP continued to participate in public events including table top displays and outreach at fairs, festivals, and concerts. Other events included displays and outreach at greenmarkets and farmers markets, NYC Fashion Week and the “Clean Streets = Clean Beaches” events. In April 2010, DEP opened the Visitor Center at Newtown Creek, located at the Newtown Creek Wastewater Treatment Plant in Greenpoint, Brooklyn. The Visitor Center is an important resource for young people and adults to learn about New York City’s water systems. In 2010, DEP also hosted professional development workshops for formal and non-formal educators through the Summer Science Discovery Institute, Bronx River Alliance, and the Queens Museum of Art, where participants learned about creative ways to incorporate the study of water resources into their curriculum using activities focusing on the NYC water supply system and the importance of conserving water.

### HEAT Team

The Hydrant Education Action Team (HEAT), which was initiated in 2007 to address the problems associated with the illegal use of fire hydrants. The program targets those communities that historically have the highest number of open fire hydrants. Manhattan Community Board 12 (Washington Height/Inwood), Bronx Community Board 4 (Concourse) and Bronx Community Board 5 (Fordham). The Street Teams distribute HEAT flyers and posters to provide the community with important information about the dangers of illegally open hydrants. During this process, the Street Teams promote the use of sprinkler caps and educate the community on their importance and where to obtain them. The teams suggest alternative methods of staying cool, such as going to a local park or pool. Community awareness not only gives everyone a chance to learn about the HEAT mission, but to experience it as well. By having people in the community take part in these activities, they also become stakeholders. Additionally, DEP is making the public aware that opening a hydrant without a spray cap can result in fines of up to \$1000, imprisonment for up to 30 days, or both.

## Publications

The wide array of DEP environmental education related material will continue to be produced and updated, as necessary, for distribution to students and teachers at public events, and on the DEP website.

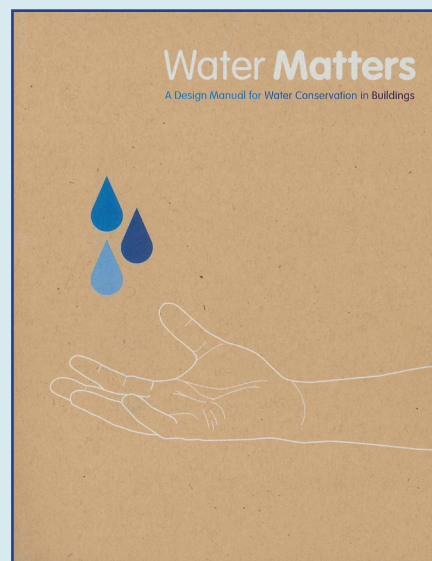




## Water Conservation Manual

In 2011, the NYC Department of Design and Construction (DDC) has released a water conservation manual, *Water Matters: A Design Manual for Water Conservation in Buildings*. This manual is primarily concerned with water aspects of the sustainable design, construction and operation of City buildings controlled by the DDC.

The manual offers guidance on plumbing fixtures, mechanical, plumbing and energy systems, optimum performance, owner furnished equipment, fire protection, and new technologies to achieve water saving goals.



## Water Conservation Seminars for Building Managers

DEP and the Department of Housing Preservation and Development (HPD), as well as other organizations co-sponsor a series of three-hour seminars on water conservation, water/sewer billing and the transition to metered billing. The classes are free.

The seminars cover:

- Basics of water/sewer billing (flat-rate and metered billing)
- Transition to metered billing
- How to measure and account for water/sewer costs
- Toilets, showers, boilers, hot water heaters and other equipment
- Managing and account for water use

The seminar presentation can be downloaded from DEP website.

## Website

DEP website addresses water conservation in institutional, regulatory, and public education programs throughout its content and across all of the target audiences. The public education component of the web-site enhances the myriad of DEP public education programs by providing easy internet access to event schedules, educational materials for teachers and students, downloadable promotional information such as flyers and posters, reading lists, project descriptions, and the host of information associated with DEP Public Education Programs. A direct link to Conservation outreach materials and water saving tips can also be found on DEP's website.

## Social Media

DEP has started Facebook, Twitter, and Flickr accounts to communicate with the general public about NYC water related news and issues.



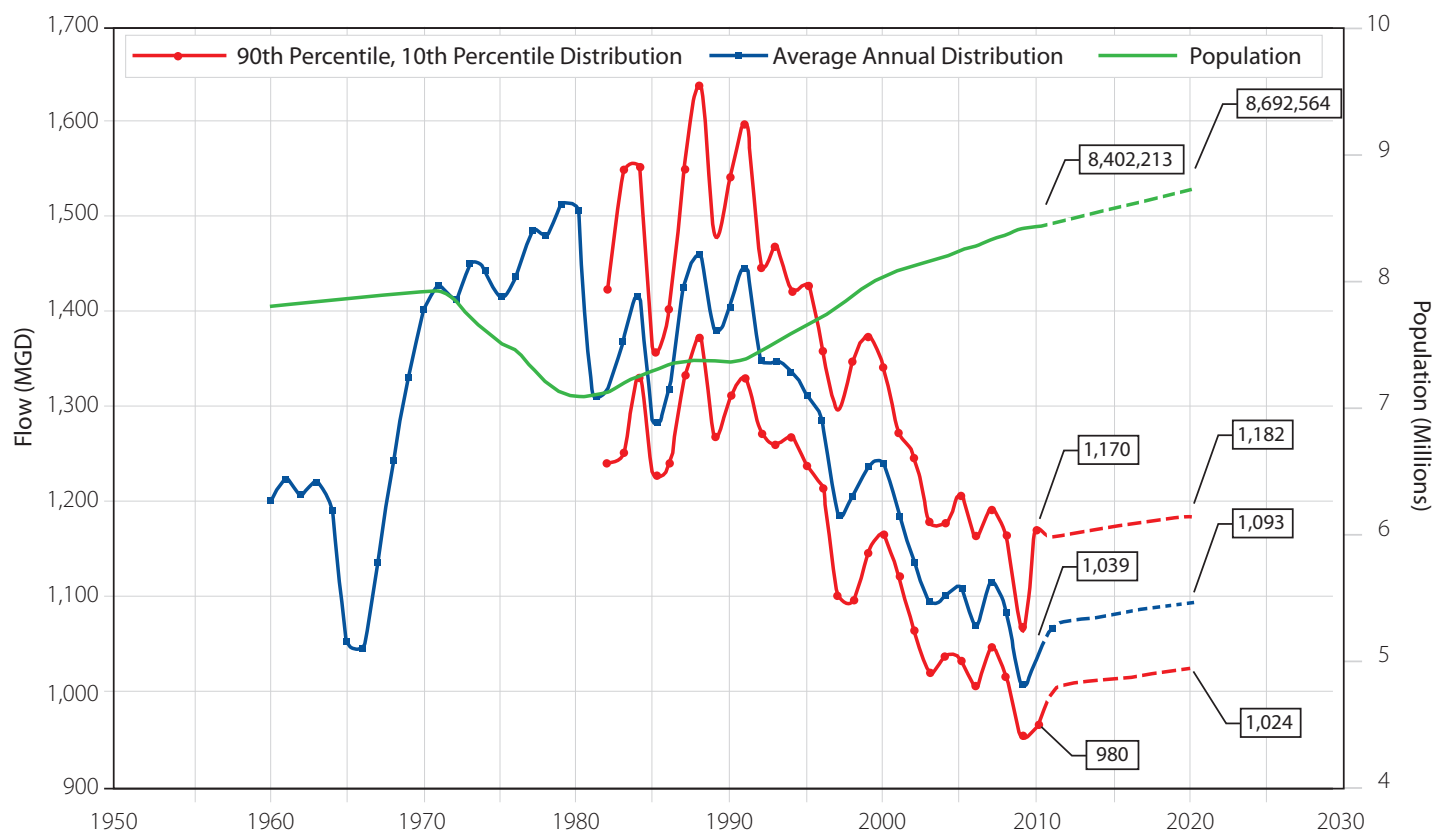
## 6 Tracking and Projecting Water Demand

New York City water consumption has continued to decline despite increases in population as shown in figure below (2009 water consumption was 1,008 mgd, lowest since the drought of record). Some of this is attributed to colder 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, dependability, assessing the effects of new growth and rezoning, and understanding the effects of water demand on agency operations. DEP uses technologies such as Microsoft SQL Server, SAS, and ESRI ArcGIS to create statistical and GIS models.

Upcoming work initiatives include integrating the 2010 US Census data, tracking top water users, and further understanding the unaccounted-for water (UAW). For FY11 analyses, DEP will adopt International Water Associating (IWA) - American Water Works Association (AWWA) standards for balancing system inputs, distribution, and losses.

### In-City Water Demand Projections





# PROGRAM ACCOMPLISHMENTS

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## Installation of Locking Hydrant Caps

**1993:** DEP began installing locking caps on approximately 40% of the fire hydrants in the city.

## Accelerated Water Metering

**1985:** New York City passed Local Law 53/1985 to required metering of all new residential construction and metering during substantial renovation of residential properties.

**1985:** The New York City Water Board established a requirement of metering as a condition of receiving water and sewer service from the city. Penalties were established for failing to meter and in 1999 and 2000 DEP issued notices to unmetered properties requiring them to either install a meter or be subjected to a 100% surcharge on their annual flat-rate water/sewer bill. Initially, about 35,000 properties were surcharged but that number decreased to about 8,200 by the end of 2009.

**1988:** DEP issued the first in a series of meter installation contracts that bring the city to almost 90% metered by 1998.

**2003:** DEP issued the first of an ongoing series of systematic large meter replacement contracts.

**2007:** DEP and NYC DoITT issue an RFP for a citywide AMR system.

## City-Wide Conservation Program (Toilet Rebate Program)

**1994 – 1997:** DEP conducted a citywide Toilet Rebate Program that replaces 1.3 million toilets and reduced consumption by approximately 90 MGD.

## NYCHA Toilet Replacements

**1993 – 2005:** The New York City Housing Authority replaced toilets in all developments in the Newtown Creek, Wards Island and North River drainage areas and replaced toilets in city or state developments during DEP's Toilet Rebate Program.

## Quarterly Water/Sewer Billing

**1995:** DEP assumed responsibility of water/sewer billing from the Department of Finance and commissioned a new billing system that instituted quarterly billing for all metered customers. In 2011 DEP began working on the new billing system.

## Rate Study

**2008-2009:** The Water Board hired a consultant in 2008 to examine advantages and disadvantages of several conservation rates, examine practical issues that must be addressed to implement a stormwater rate and research possible incentives for green infrastructure. The study benchmarked NYC's rate structure against other municipalities across the country, researched the types of stormwater, fixed/variable, and other rate structures implemented elsewhere, and identified data needs required to more fully understand the implications of potential implementation in NYC. The study was released in late 2009 and can be found through DEP's website.

# NEXT STEPS

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## Voucher-Based Fixture Incentive Program

DEP is planning a limited voucher-based toilet replacement program currently scheduled for 2014-2015.

Software to allow online applications for both the Multifamily Conservation Program (MCP) and the toilet replacement vouchers was designed in 2008-2009. A first phase will target high-consumption apartment buildings. If continuation or expansion of the effort is desired as part of Water for the Future (Roundout West Branch repair) Program, the software can be modified to accommodate an expansion. This limited program has the potential of yielding water saving of 9-12 MGD.

## Large Meter Replacements

The goal is to replace or rebuild meters three inches and larger to recover lost revenues and prepare for both emergency and non-emergency implementation of new rate structures.

DEP has begun a systematic effort to replace the city's 30,000 largest meters on regular industry recommended cycles over the next 10 years. This effort will increase the number of large customers on metered billing and does not necessarily translate to direct water savings, but will yield additional revenue and more accurate reporting. Accurate billed water readings could send price signals to encourage more efficient use of water. A draft RFP is currently being written to develop a comprehensive project schedule and project management strategy.

## Performance Based Competitive Bids for Demand Reductions

DEP issued a Request for Expressions of Interest (RFEI) in 2007 and received some conceptual support and comments from engineers and developers. A draft RFP is currently being written for a pilot project. An RFP will be prepared during 2012 for possible use in a pilot solicitation. This program can water savings of approximately 0.5-4 MGD.

## Public Building Fixture Replacements

This program would replace toilets, urinals and possibly other fixtures in city-owned buildings, starting with schools but possibly extending to other occupancy types. This program is very cost effective since there are no revenue losses. The water savings are estimated to be between 2 and 5 MGD. To insure completion by 2017 survey and design work need to begin by early 2012 and construction by late 2014. This initiative would be consistent with PLANYC Water Conservation Initiative 13.

## End of Frontage Billing

The New York City Water Board currently plans to end traditional flat-rate water/sewer billing on July 1, 2012. At that time as many as 20,000 apartment buildings (half of which are New York City Housing Authority (NYCHA) developments) will have made a decision to move either to metered billing or to the MCP rate which carries specific water conservation requirements, such as fixture replacements and installation of a meter. This transition has the potential of water savings of 6-12 MGD.

# ABBREVIATIONS & ACRONYMS USED IN THIS REPORT

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AMR	Automated Meter Reading
BMP	Best Management Practices or Green Infrastructure
CIP	Capital Improvement Plan
CSO	Combined Sewer Overflow
CWRP	Comprehensive Water Reuse Program
CY	Calendar Year
DCU	Data Collection Unit (AMR)
DDC	Department of Design and Construction
DEC	New York State Department of Environmental Conservation
DEP	New York City Department of Environmental Protection
DoITT	New York City Department of Information Technology and Telecommunications
DRBC	Delaware River Basin Commission
FY	Fiscal Year (July 1 – June 30)
GCPD	Gallons per Capita per Day
HCF	Hundred Cubic Feet
HPD	New York City Department of Housing Preservation and Development
LF	Linear Feet
MGD	Millions of Gallons per Day
MTU	Meter Transmitter Unit (AMR)
NYCHA	New York City Housing Authority
RCNY	Rules of the City of New York
RFEI	Request for Expressions of Interest
RFP	Request for Proposals
RWS	Residential Water Survey
SCA	School Construction Authority
WWTP	Wastewater Treatment Plant

# Contact People for Issues in this Report

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