New York State Department of Health

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Drinking Water Infrastructure Needs of New York State

November 2008

David Paterson, Governor

Richard F. Daines, M.D., Commissioner

Acknowledgments

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List of Acronyms

CWS	Community Water System
Department	New York State Department of Health
DWINS	Drinking Water Infrastructure Needs Survey
DWSRF	Drinking Water State Revolving Fund
EFC	New York State Environmental Facilities Corporation
FBRR	Filter Backwash Recycling Rule
GWR	Ground Water Rule
IESWTR	Interim Enhanced Surface Water Treatment Rule
LCR	Lead and Copper Rule
LT1ESWTR	Long Term 1 Enhanced Surface Water Treatment Rule
LT2ESWTR	Long Term 2 Enhanced Surface Water Treatment Rule
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
NIPDWR	National Interim Primary Drinking Water Regulations
NYC	New York City
S1DBPR	Stage 1 Disinfection By-Product Rule
S2DBPR	Stage 2 Disinfection By-Product Rule
SDWA	Safe Drinking Water Act
SWTR	Surface Water Treatment Rule
TCR	Total Coliform Rule
TTHM	Total Trihalomethane Rule
USEPA	United States Environmental Protection Agency

Executive Summary

The conservative cost estimate of repairing, replacing, and updating New York's drinking water infrastructure is $38.7 billion over the next 20 years. In 1996, the Drinking Water State Revolving Fund (DWSRF) was created by the federal and New York State governments to provide low interest loans and grants for water system improvement projects. Since that time, New York State has invested almost $2.4 billion in drinking water infrastructure through the DWSRF program.

<u>Despite this level of investment, approximately 95 percent of the projects submitted for inclusion in the DWSRF program remain unfunded due to a lack of available funds.</u>

New York State's DWSRF program has worked diligently to stretch its allocated funds in the most cost effective and efficient way possible by utilizing 3 to 1 leveraging, hardship awards and short-term financings. New York continues to implement improvements to the program with recent changes including the introduction of bond guarantee financing, the promotion of smart growth principles in drinking water project design and streamlining of the application package/procedures. These innovations allow the DWSRF program to consistently provide affordable financing for water system improvement projects.

As a result of these efforts, the New York State Department of Health and Environmental Facilities Corporation (EFC) received the United States Environmental Protection Agency's (USEPA) 2007 DWSRF Award for Sustainable Public Health Protection for showing exceptional creativity in designing projects that promote sustainability and protect public health.

Unfortunately, DWSRF funds can only stretch so far and with limited federal and state assistance available, the burden of maintaining drinking water infrastructure falls on local governments. Many local municipalities have trouble convincing their residents that infrastructure must be managed proactively, including planning for repairs and replacement and charging rates that cover those costs. While many municipalities may have a capital improvement plan for their drinking water systems, they often only look at immediate needs or plan for five to ten years into the future. Except for transportation infrastructure, water and wastewater infrastructure are the largest municipal assets. This report is an initial step toward the development of a sustainable infrastructure funding program at the federal, state and local levels. Adequate drinking water infrastructure funding is a critical component of urban revitalization, smart economic growth, energy efficiency and property tax relief. It is essential for the protection of public health and the environment.

Drinking Water Infrastructure

Overview

Drinking water infrastructure is a term used to describe an entire drinking water system, from the source to the tap. The needs associated with the components of a drinking water system can be broken down into the following five groups: source, treatment, storage, transmission/distribution and other.

Source projects include the installation and rehabilitation of ground water sources (wells) and surface water intakes to ensure an adequate supply of water is available to meet daily demands.

Treatment projects include those needed to reduce contaminants through processes such as filtration, disinfection, corrosion control and aeration. The installation, upgrade or rehabilitation of treatment infrastructure also enables removal of contaminants that can cause chronic health effects or taste, odor and other aesthetic problems.

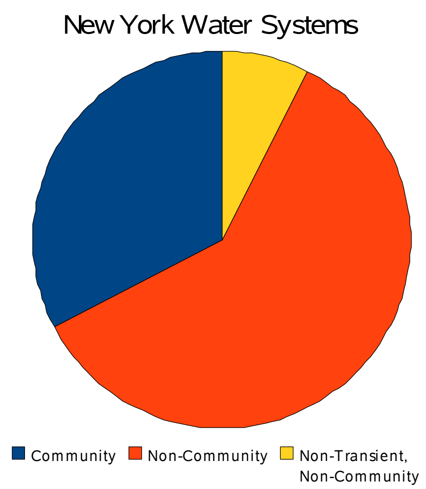
Storage projects construct new or rehabilitate existing raw and/or finished water storage tanks. Construction of new tanks is necessary if the system cannot provide adequate flows and pressure during peak demand periods. Many projects in this category involve rehabilitating existing tanks to prevent structural failures or sanitary defects that can allow microbiological contamination.

The transmission and distribution category includes the installation and rehabilitation of raw and finished water transmission and distribution mains, as well as the replacement of lead service lines, flushing hydrants, valves, meters and backflow prevention devices. Utilities need to install and maintain distribution systems to provide potable water to their customers while preventing contamination of that water prior to delivery. Although treatment plants or elevated storage tanks are usually the most visible components of a water system, most of a system's infrastructure is underground in the form of transmission and distribution mains. Failure of transmission and distribution mains can interrupt the delivery of water leading to a loss of pressure, possibly allowing a backflow of contaminated water into the system. Broken transmission lines also can disrupt the treatment process.

The "other" category reflects needs that cannot be assigned to one of the prior categories. Examples include emergency power generators not associated with a specific system component, computer and automation equipment, and projects for system security (fencing, security cameras, etc.).

New York Water Systems

In New York State there are approximately 10,147 regulated water systems (3,312 community water systems, 6,080 non-community transient water systems, and 755 non-transient non-community water systems), serving a population of approximately 18.2 million people. These figures do not include the significant number of private residential wells being utilized throughout the state.



A community water system is a public water system which serves at least five service connections used by year-round residents or regularly serves at least 25 year-round residents. A non-community water system is a public water system that is not a community water system. A non-transient, non-community water system is a public water system that is not a community water system but is a subset of a non-community water system that regularly serves at least 25 of the same people, four hours or more per day, for four or more days per week, for 26 or more weeks per year.

Drinking Water Infrastructure Life Cycles

Many of the systems mentioned above, including New York City, are nearing or have already exceeded 100 years of age and still utilize some of their original drinking water infrastructure. Various water system components have life cycles which can range from 20 years (pumps, filter media, etc.) to 50 years (storage tanks, treatment plants) to over 100 years (transmission and distribution mains). Climate related factors including snow load, ice formation and freeze/thaw cycles can significantly shorten the useful life of certain water system components. While regular rehabilitation and maintenance can extend the useful life of many water system components, eventually, they will all require replacement.

Other Infrastructure Issues

When water systems' infrastructure needs are evaluated, issues other than the repair or replacement of existing physical infrastructures are assessed. Allowable drinking water contaminant levels are continually lowered as new federal regulations are promulgated and proposed, pushing municipalities to improve their water systems' existing facilities or install new treatment systems. Ever changing international relations continue to illustrate the need for increased security measures (fencing, cameras, etc.) to protect water sources and other infrastructure from potential terrorist activity. Potential growth and economic development are also assessed when making decisions for the future. In addition, significant increases in the cost of energy have led municipalities to investigate ways in which water systems can reduce costs associated with producing water (e.g. energy efficient pumps, reduction of lost water, etc.).

Drinking Water Regulation History

Safe Drinking Water Act

Since the early 1970's, there have been many regulations passed by the federal government in an effort to protect public health and our nation's drinking water resources. In 1974, the landmark Safe Drinking Water Act (SDWA) was passed, giving the USEPA the authority to establish federal drinking water standards for contaminants that have the potential to adversely impact human health.

Between 1975 and 1976, the National Interim Primary Drinking Water Regulations (NIPDWR) were enacted, regulating 22 contaminants including arsenic, lead, mercury and radium. Total Trihalomethanes (TTHM), volatile organic compounds that form when natural organic matter found in source waters react with disinfectants, were regulated in 1979.

While the original SDWA did help to improve drinking water quality, it only covered a small portion of the potentially harmful contaminants threatening public water systems. Congress had intended that the USEPA enact additional drinking water standards quickly, however, the original terms of the SDWA lead to a relatively slow pace of standard setting.

1986 Amendments to the Safe Drinking Water Act

In an effort to strengthen the original SDWA, in 1986, Congress passed amendments to the SDWA, requiring the USEPA to regulate 85 contaminants by 1989. The 1986 amendments also directed the USEPA to enact regulations requiring public water systems served by surface water, or ground water under the influence of surface water, to disinfect and/or filter their water supplies.

To comply with the 1986 amendments, the Total Coliform Rule (TCR) and Surface Water Treatment Rule (SWTR) were enacted in 1989. The TCR revised the maximum contaminant level (MCL) and monitoring requirements for total coliform bacteria while requiring fecal coliform and *E. coli* testing. The SWTR established maximum contaminant level goals (MCLG), a non-enforceable health goal requiring the use of a certain treatment technique, for *Giardia lamblia*, *Legionella*, viruses and turbidity. The SWTR also established disinfection requirements and criteria under which filtration would be required.

The 1986 amendments also led to the 1991 enactment of the Lead and Copper Rule (LCR), which required that water systems establish corrosion control measures, replace lead water service piping and inform water consumers when action levels for lead and copper were exceeded.

1996 Amendments to the Safe Drinking Water Act

The requirements of the original SDWA and the 1986 amendments were very ambitious, making compliance by states and public water systems very difficult due to the aggressive schedules and lack of available water infrastructure funding.

To remedy this situation, in 1996, Congress passed additional amendments to the SDWA. Highlights of the 1996 amendments include: requiring the USEPA to strengthen protection for microbial contamination and disinfection by-products; requiring the USEPA to complete a cost-benefit analysis for proposed new standards; the requirement that water systems prepare and distribute consumer confidence reports; and the requirement that states conduct source water assessments.

However, the most significant part of the 1996 amendments was the establishment of the DWSRF that provides funding to water systems to assist them in efforts to comply with drinking water regulations. The DWSRF is discussed in further detail later in this report.

Disinfection By-Products and Enhancement of the Surface Water Treatment Rule

Promulgated in December 1998 and effective in February 1999, the Stage 1 Disinfection By-Product Rule (S1DBPR) and Interim Enhanced Surface Water Treatment Rule (IESWTR) began complying with the 1996 amendments to the SWTR.

The S1DBPR updated and superseded the 1979 regulations for TTHM's. The rule established maximum residual disinfectant level goals (MRDLG's) and maximum residual disinfectant levels (MRDL's) for three chemical disinfectants: chlorine, chloramine and chlorine dioxide. It also established MCLG's and MCL's for total trihalomethanes, haloacetic acids, chlorite and bromate.

The IESWTR amended the existing SWTR to strengthen microbial protection, including provisions specifically to address *Cryptosporidium*, and to address risk trade-offs with disinfection byproducts. The final rule included treatment requirements for waterborne pathogens (*Cryptosporidium*). In addition, systems were required to continue to meet existing requirements for *Giardia lamblia* and viruses. The rule, with tightened turbidity performance criteria and individual filter monitoring requirements, was designed to optimize treatment reliability and to enhance physical removal efficiencies to minimize the *Cryptosporidium* levels in finished water. In addition, continuous turbidity monitoring was now required for individual filters.

In 2001, the Filter Backwash Recycling Rule (FBRR) was enacted to address the practice of returning filter backwash water to the head of a filtration plant. The FBRR required that all recycled water be returned to a point in the treatment plant which ensures that all of the processes of the filtration system will be employed. It also required water systems that follow this practice to notify the state of such and maintain specific records relating to the backwash recycling.

In 2002, the Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR) was passed to address systems serving fewer than 10,000 persons and build upon the framework established for larger systems in the IESWTR. This rule established *Cryptosporidium* removal requirements for systems serving fewer than 10,000 persons and also required that all new finished water storage reservoirs be covered.

In 2006, the Stage 2 Disinfection By-Product Rule (S2DBPR) was promulgated to reduce potential cancer and reproductive and developmental health risks from disinfection by-products in drinking water, which form when disinfectants are used to control microbial pathogens. This rule required water systems to meet MCL's as an average at representative monitoring locations (not as a system-wide average as in previous rules). The rule targeted systems with the greatest risk and built upon existing rules.

Also in 2006, the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) was passed. This rule bolstered the existing regulations by targeting additional *Cryptosporidium* treatment requirements to higher risk systems and requiring that all finished water storage reservoirs be covered or install treatment for the reservoir discharge.

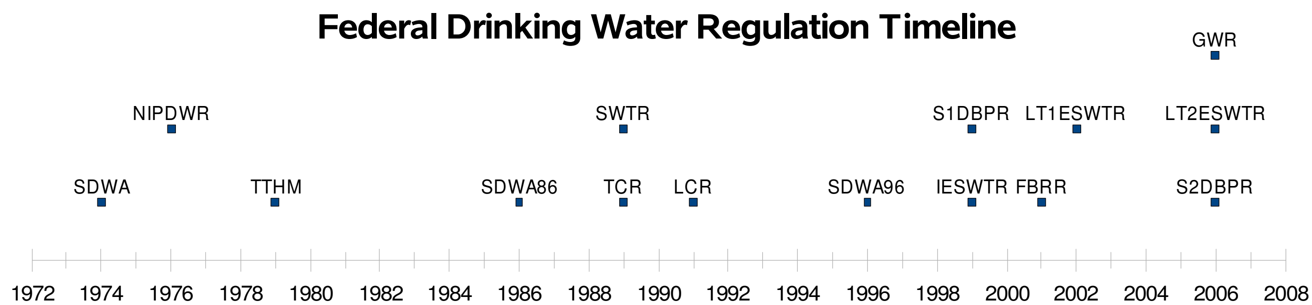
Ground Water Rule

Having dealt with surface water and ground water under the influence of surface water with the SWTR, the USEPA turned their attention to ground water sources and in November 2006 passed the Ground Water Rule (GWR). This risk based rule relies on four programmatic components: periodic sanitary surveys; triggered source water monitoring when a system identifies a positive sample during its TCR monitoring; corrective action and compliance monitoring.

The potential corrective actions available to water systems under the GWR include the correction of all significant deficiencies, the provision of another source of water, elimination of the source of contamination or the provision of treatment for viruses.

Conclusion

The last 30 years have seen a significant increase in the number of drinking water regulations, covering systems of every size and water source. As research technologies change and improve, additional regulations may be enacted as new potential health effects are discovered. The cost of complying with new and increasingly stringent regulations is a challenge that all water systems face.



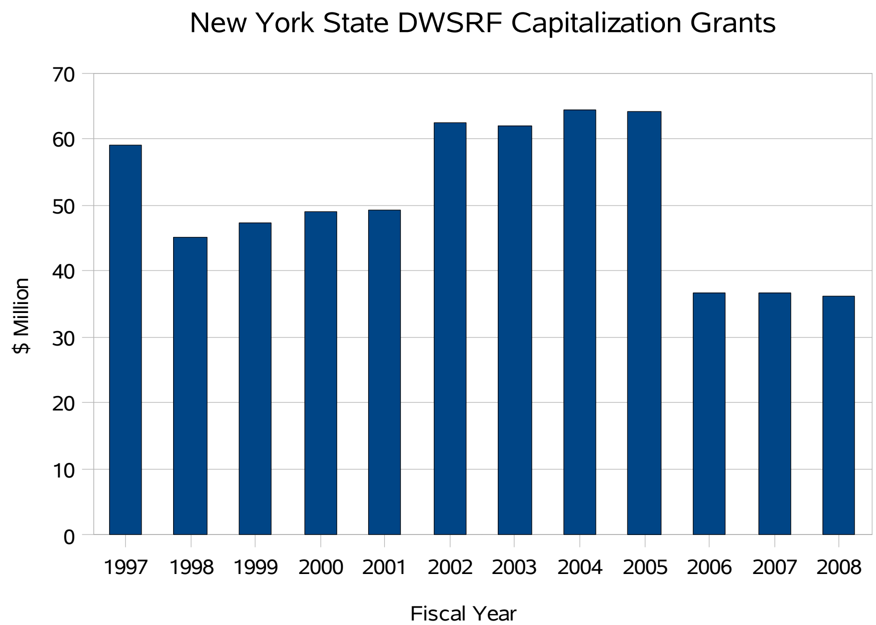
SDWA	Safe Drinking Water Act
NIPDWR	National Interim Primary Drinking Water Regulations
TTHM	Total Trihalomethane Rule
SDWA86	1986 Amendments to the Safe Drinking Water Act
TCR	Total Coliform Rule
SWTR	Surface Water Treatment Rule
LCR	Lead and Copper Rule
SDWA96	1996 Amendments to the Safe Drinking Water Act
IESWTR	Interim Enhanced Surface Water Treatment Rule
S1DBPR	Stage 1 Disinfection By-Product Rule
FBRR	Filter Backwash Recycling Rule
LT1ESWTR	Long Term 1 Enhanced Surface Water Treatment Rule
S2DBPR	Stage 2 Disinfection By-Product Rule
LT2ESWTR	Long Term 2 Enhanced Surface Water Treatment Rule
GWR	Ground Water Rule

Drinking Water State Revolving Fund History

The DWSRF was created in 1996 as a result of New York State's enactment of Chapter 413 of the Laws of 1996 (Clean Water/Clean Air Bond Act, "Bond Act") and passage of the 1996 Amendments to the Safe Drinking Water Act (Public Law 104-182) by the U.S. Congress. The DWSRF provides a financial incentive for municipally and privately owned public water systems to undertake needed drinking water infrastructure improvements (e.g., treatment plants, distribution mains, storage facilities). This program provides below market rate financing for the construction of certain eligible public water system projects. As financing is repaid, money is made available for new financing - a true revolving fund. For communities with demonstrated financial hardship, interest rates can be reduced to zero percent. The program is administered jointly by the Department and the EFC.

Sections 1452(h) and 1452(i)(4) of the SDWA direct the USEPA to conduct an assessment of drinking water infrastructure needs every four years. The results of the Drinking Water Infrastructure Needs Survey (DWINS) are then used to allocate DWSRF monies to the states. The Department is responsible for coordinating the DWINS for New York State, and upon completion of the data collection and evaluation period, USEPA submits a final report to the United States Congress.

Since the start of the DWSRF program, the state has received approximately $612.5 million in DWSRF capitalization grants from the federal government and contributed an additional $355 million in match dollars. In 2008, New York received $36.2 million from the federal government for the DWSRF program, down from $59.2 million in 1997.



Despite receiving only $967.5 million over the last 12 years, New York State's DWSRF program has successfully leveraged those funds and provided approximately $2.38 billion in financing to 330 water systems. This financing includes low interest loans, State Assistance Payment grants totaling $90 million, and Federal Assistance Payment grants totaling $151.5 million.

Although the DWSRF program has been very successful in providing funding for water system improvement projects, the majority of the projects which apply to the DWSRF can not be reached for financing due to lack of funds, indicating that the financial need is significantly higher than the DWSRF alone can provide.

Data Sources, Evaluation and Extrapolation

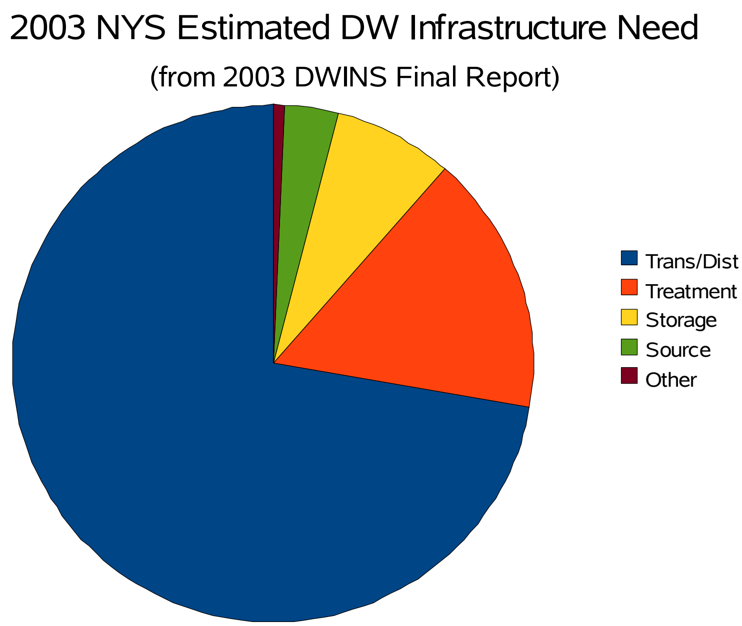
Data Sources

In preparing this report, the Department used existing drinking water infrastructure needs data, primarily from the USEPA's DWINS reports. The majority of the data contained in this report originates from the 2003 DWINS Final Report and the data collected for the 2007 DWINS effort.

Prior surveys were conducted in 1995, 1999, 2003 and 2007. The results of the first three DWINS are available for public review (http://www.epa.gov/safewater/needssurvey/index.html), with the 2007 DWINS report due to be presented to Congress in February 2009.

Evaluation

The 2003 DWINS reported the National and New York State drinking water infrastructure needs at $276.8 billion and $14.8 billion, respectively, for the 2003 to 2023 time period. Categorically, New York State's $14.8 billion need was comprised of $10.7 billion for transmission/distribution, $2.4 billion for treatment, $1.1 billion for storage, $0.5 billion for source and $0.1 billion for other.



While the DWINS does look at needs over a 20-year period, the programmatic and project/cost documentation restrictions in place during the data collection period exclude many valid projects and costs which water systems must pay, therefore presenting a conservative and constrained cost estimate.

To develop drinking water infrastructure needs, this report removes those restrictions to include projects and costs that were ineligible to be included or were previously underreported in the DWINS.

Extrapolation

The DWINS obtains data via questionnaires completed by the water systems. Rather than send questionnaires to every qualifying water system, questionnaires are sent to a representative sample of a state's water systems serving more than 3,300 people, stratified by water source (surface, ground, or purchased) and system size (medium or large). The water system sample includes all water systems with a population of 100,000 or greater. Once the data has been collected, the USEPA extrapolates the results of these surveys to produce a need estimate for all water systems statewide.

A national sample of small systems, those serving less than 3,300 people, received on-site visits from USEPA contractors to gather data for small system needs. The data for small system needs will be presented in a separate section of the DWINS report and is discussed below.

Not all projects accepted for inclusion in the DWINS have documented cost estimates associated with them. In those cases, the USEPA utilizes cost models, using the data collected for the Needs Survey as well as other outside sources, and assigns a cost to the project to put towards the state's bottom line. Having now completed four Needs Surveys, the Department can confidently state that the majority of the projects submitted for inclusion in the DWINS do not have a cost document and will require modeling.

The data collection period for the 2007 DWINS closed in late 2007. The Department collected data from 65 water systems, including New York City, totaling approximately 1,500 separate water system improvement projects. Based on the projects accepted by the USEPA, including those with and without cost documentation, the Department's preliminary estimate of New York State's 2007 DWINS is at minimum $12.4 billion. **However, this estimate does not include costs to be modeled by the USEPA or the extrapolation of the DWINS sample to represent all of New York State's water systems, and therefore, the Department expects New York State's needs in the 2007 DWINS final report to be significantly higher.**

New York City accounts for approximately $10.7 billion of the $12.4 billion estimated DWINS need, leaving approximately $1.7 billion from the remaining 64 systems in New York State's DWINS water system sample (approximately $26.56 million per system).

According to June 2008 SDWIS data, New York State contains 311 Community Water Systems (CWS), serving more than 3,300 people. Subtracting the 65 CWS from the DWINS sample leaves 246 CWS which were not included in the 2007 DWINS and will have their needs modeled by the USEPA. Using the $26.56 million per system number from above, DOH estimates this modeled need to be $6.5 billion, bringing the total non-NYC DWINS need to $8.2 billion.

Small System Infrastructure Needs

The estimates above only include CWS's that serve more than 3,300 people. With roughly 3,000 CWS's within New York State serving fewer than 3,300 people, the infrastructure needs of small systems can not be ignored. Small systems face the same drinking water infrastructure challenges as larger systems, but with fewer users available to pay for improvements, the high per user cost of maintaining and improving the water system renders the projects impossible without outside financial assistance.

The Department was not directly involved in the small system data collection effort for the 2007 DWINS, making it difficult to estimate the infrastructure need. For the purposes of this report, the Department will utilize the $2.0 billion small system infrastructure need as reported in the 2003 DWINS final report to Congress.

New York City Infrastructure Needs

Population and Average Daily Demand

At more than 150 years old, with an average daily demand of approximately 1.2 billion gallons per day, New York City is one of the oldest and largest water systems in the world. The U.S. Census Bureau's 2006 population estimate for New York City is 8.2 million people, which represents more than 40 percent of the population of New York State.

Existing Water Supply Source and Infrastructure

The majority of the City's drinking water comes from three surface water supplies - the Croton, Catskill and Delaware systems - which are comprised of a network of 19 reservoirs and three controlled lakes in a 1,972 square-mile watershed that extends 125 miles north and west of the City. Water is delivered by gravity from reservoirs within each of these systems through a series of aqueducts and tunnels. In addition to the surface water supply, The City operates a groundwater system that supplies fewer than 100,000 people in southeastern Queens.

The Croton System, placed into service in the 1890's, is the oldest of the three surface water systems and normally provides approximately 10 percent of the City's daily water needs. The Croton System consists of twelve reservoirs and three controlled lakes located directly north of the City in Westchester and Putnam counties. The water from upstream reservoirs flows through natural streams to downstream reservoirs terminating at the New Croton Reservoir. Water is conveyed from the New Croton Reservoir to Jerome Park Reservoir in the Bronx through the New Croton Aqueduct, a 33 mile long tunnel.

The Catskill System, which provides approximately 40 percent of the City's daily water supply, collects water from the Esopus and Schoharie Creek watersheds in the eastern Catskill Mountains. Water from these two watersheds is stored in the Schoharie and Ashokan Reservoirs. Water from the Schoharie Reservoir is diverted through the 18 mile long Shandaken Tunnel to the Esopus Creek and ultimately into the Ashokan Reservoir. From here, water is conveyed to the City through the Catskill Aqueduct. The Catskill System was placed into service in 1915.

The Delaware System, the newest component of the City's water supply system, provides approximately 50 percent of the City's daily water supply. Three reservoirs - the Cannonsville, Pepacton and Neversink - collect water from the two branches and one tributary of the Delaware River. These reservoirs feed eastward through separate rock tunnels to Rondout Reservoir where the Delaware Aqueduct begins. The Delaware Aqueduct conveys water to the City through an 85-mile long concrete-lined, pressurized bedrock tunnel. The Delaware System was placed in service in stages: Delaware Aqueduct in 1944, Rondout Reservoir in 1950, Neversink Reservoir in 1954, Pepacton Reservoir in 1955 and Cannonsville Reservoir in 1964.

The City's water distribution infrastructure consists of two distribution reservoirs. Jerome Park Reservoir in the Bronx serves the Croton System, and Hillview Reservoir in Yonkers serves the Catskill/Delaware system. From Hillview Reservoir, water from the Catskill/Delaware System is delivered into the City by three concrete-lined, pressurized bedrock tunnels. City Tunnel No. 1, placed in service in 1917, extends from Hillview Reservoir through the west Bronx to Manhattan and Brooklyn. City Tunnel No. 2 extends through the Bronx, Queens and Brooklyn where it connects with City Tunnel No. 1. Construction of a third water tunnel is in progress. The first 13-mile section that runs from Hillview through the Bronx, down Manhattan across Central Park and into Queens went into service in 1998. Connecting to City Tunnel No. 2 in Brooklyn is the Richmond Tunnel, which carries water to the 100 million-gallon underground Silver Lake Tanks on Staten Island.

The City Tunnels supply a grid network of water mains ranging in size from 6 to 84 inches in diameter. This network consists of 6,890 miles of water main, 217,477 valves and 109,100 fire hydrants.

Age of Critical System Components

Many of the City's critical water system components have reached or exceeded their design life and must be repaired or replaced. Maintaining and repairing an aging and complex water system such as the one in New York City presents many unique challenges. For example, the Catskill and Delaware Aqueducts have been in continuous service for more than 90 and 65 years, respectively. Taking either of the Aqueducts out of service for maintenance would reduce the available source capacity by more than 500 million gallons per day, making repair of the Aqueducts almost impossible.

Current Water System Expenditures

The New York City water system consists of more than 6,800 miles of distribution mains, numerous storage tanks and pump stations, water meters and other water system components. Keeping such an expansive water system running on a day to day basis is quite costly, with the City's water system capital budget ranging from $2 billion to $3 billion annually.

In addition to the projects needed to maintain daily operations, the City is in the beginning stages of three substantial water system improvement projects: the Catskill/Delaware Ultraviolet Disinfection facility, the Croton filtration plant, and the Kensico-City Tunnel. The cost of these three projects alone exceeds $7 billion.

System Dependability and Redundancy

As New York City works to maintain its existing infrastructure, it must also look ahead to the long term viability of the water system. The dependability of a water supply which serves more than 8 million people every day is a very important aspect of facility planning which the City has been exploring. Anticipated projects include those to provide redundancy for the Catskill and Delaware Aqueducts, increase capacity of the ground water system, and the use of aquifer storage and recovery wells.

New York City Estimated 20-Year Capital Infrastructure Need

The Department works closely with New York City to adequately address capital water project needs for the next 20 years and beyond. Those projects include: the Catskill/Delaware UV and Croton filtration plants; groundwater rehabilitation and development; storage tank and pump station rehabilitation; Catskill and Delaware Aqueduct rehabilitation, the completion of the Kensico-City Tunnel; distribution main replacement and rehabilitation; lead service line replacement; water meter rehabilitation; and water system dependability/redundancy projects (construction of a new aqueduct, additional groundwater development, etc.).

Based on our familiarity with the short- and long-term challenges facing the New York City water supply system, and the projects being currently undertaken or in the exploration phase, the Department estimates New York City's 20-year capital need to be in excess of $28 billion.

Infrastructure Needs for Dams

Dams provide many benefits including water supply for drinking, irrigation and industrial use; hydroelectric power; recreation; flood control and navigation. As with other components of water system infrastructure, dams require maintenance and rehabilitation to ensure proper operation. Neglecting these vital pieces of infrastructure can lead to dam failures, which in turn can cause economic loss, environmental damage and even loss of life. Age, inadequate maintenance and adverse weather conditions are leading factors which can contribute to dam failure.

According to the New York State Department of Environmental Conservation's Dam Safety Section, there are approximately 511 dams throughout New York State which are utilized for water supply purposes. More than 70 percent of these dams are greater than 50 years old, with many dams having been constructed more than 100 years ago.

To estimate a rehabilitation cost for New York's water supply dams, the Department relied on a December 2002 estimate by the Association of State Dam Safety Officials, which stated that approximately $36.2 billion is needed to rehabilitate the approximately 79,000 dams located throughout the United States. This estimate equates to approximately $458,000 per dam. Utilizing the $458,000 per dam rehabilitation cost and removing New York City's Gilboa Dam (discussed below) from the list of New York's 511 water supply dams yields an estimated water supply dam rehabilitation cost of $233.6 million.

In late 2007, the New York City Department of Environmental Protection completed a $24 million stabilization project for the Gilboa Dam, which was constructed in 1926 and is part of the City's water supply system. This project installed a debris broom across the Schoharie Reservoir, removed a large notch from the top of the dam to lower water levels and decrease pressure on the dam, installed four large siphons over the dam to increase the volume water which can be drained from the reservoir, and installed 80 anchoring cables to the top and front of the dam to help hold the dam in place. With the stabilization of the dam now complete, beginning in 2008 the Gilboa Dam will undergo a $300 million full-scale reconstruction to bring it up to new dam construction standards.

Using the $233.6 million estimate from above and the $300 million Gilboa Dam reconstruction cost, the Department estimates that approximately $533.6 million is needed to rehabilitate New York State's water supply dams.

20-Year Estimate of Drinking Water Infrastructure Needs in New York

Data Category	Estimate of Needs
2007 DWINS estimate for non-NYC community water systems serving more than 3,300 people (raw data)	$1.7 billion
2007 DWINS estimate for non-NYC community water systems serving more than 3,300 people (estimated and extrapolated)	$6.5 billion
2003 DWINS estimate for community water systems serving less than 3,300 people	$2.0 billion
New York City (2007 DWINS estimate plus estimation and extrapolation)	$28.0 billion
Infrastructure Needs for Dams	$0.5 billion
Total Preliminary Estimate	**$38.7 billion**

Private Residential Water Infrastructure

While extensions of public water supply to serve areas with private well contamination are DWSRF eligible projects, private residential well replacement projects are not, and therefore, were not included in the total need shown above. With an estimated 1.5 million private residential wells in existence in New York State, the needs of New York State residents served by private wells can not be ignored. With well pumps having a design life of 15 to 20 years before needing full or partial replacement, almost all of the private well pumps in the state will require rehabilitation or replacement over the next 20 years. Assuming that 80 percent of the private well pumps will require replacement at an average cost of $1,500 per pump, the total estimated need is approximately $1.8 billion for private wells.

Drinking Water Funding Sources

With almost $2.4 billion in low interest loans and grants awarded since 1996, the DWSRF is the leading source of drinking water infrastructure improvement funds. Other sources, such as the New York State Office of Community Renewal and the U.S. Department of Agriculture Rural Development program, are also available to provide funding for drinking water system improvements. Water systems are encouraged to contact all potential funding sources in an attempt to put together the most attractive funding package they can present to the public. Information on all of these programs can be found on-line at: www.nycofunding.org.

Conclusion

The importance of modern, reliable and efficient water treatment systems is self evident. The health of our communities, the protection of our waterbodies, the prospects for energy savings, and future economic growth and development, are linked to our ability to maintain, and as necessary, upgrade these facilities. As described in this report, however, aged systems are failing, and municipalities do not have the funds to adequately repair and replace the necessary infrastructure. There is no disputing that the cost of ensuring the operation of New York's water systems is larger than what local governments and the state can address on their own. Clearly, there is a compelling need for a more comprehensive and sustainable water infrastructure funding program, yet insufficient mechanisms exist to provide that funding. The federal government has provided assistance through the DWSRF program, but significant additional investment from the federal government to the states and local governments is needed for this purpose.

This report was intended to provide a general overview of the state's water infrastructure needs, identify the factors that have led to the current problem, and establish a context for assessing and determining the steps needed to address our water infrastructure needs. This report should serve as a foundation for New York's efforts to attack this issue and as a first step in the critical process of establishing a sustainable water infrastructure funding program. In the short term, the Department, in conjunction with EFC, will continue to research and compile information to support those efforts. It is clear, however, that this is not only a massive financial problem, but it is also a complex and difficult engineering, planning and environmental undertaking. The Department looks forward to working with the Governor and the Legislature to continue to address this important issue.

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