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March 1, 2015

Mr. Thomas Paolicelli
Executive Director
New York City Municipal Water Finance Authority
255 Greenwich Street
New York, NY 10007

Re: New York City Municipal Water
Finance Authority
Fiscal Year 2015 Consulting Engineer's Report

Dear Mr. Paolicelli:

We herewith submit the Fiscal Year 2015 Consulting Engineer's Report on the operation of the Water and Sewer System of the City of New York. This Report addresses the condition and operation of the System as it presently stands, as well as the adequacy of capital and operating programs for Fiscal Years 2015 and 2016.

It is our opinion that the System condition is adequate and that it continues to be managed by the New York City Department of Environmental Protection (NYCDEP) in a professional and prudent manner. The current budget allocations for Fiscal Year 2015 and Fiscal Year 2016 are adequate for the immediate needs of the System and address all legally mandated projects.

It is important to note that much of the data utilized for the analyses conducted by AECOM has been generated by the on-going budgetary process. The budgetary planning will continue past the date of this report and revisions may be made. However, it is our opinion that meaningful observations and conclusions can be made at this time, although the final budget allocations are subject to change based on the outcome of the budgetary process. It is these observations and conclusions that are presented hereinafter.

We have no responsibility to update this report for events and circumstances occurring after the date of this Report.

Very truly yours,

William Pfrang, P.E., BCEE
Consulting Engineer for
Municipal Water Finance Authority

Document # 5422

THE NEW YORK CITY MUNICIPAL WATER FINANCE AUTHORITY

FISCAL YEAR 2015 CONSULTING ENGINEER'S REPORT

PREPARED BY

AECOM

March 1, 2015

Document # 5422

AECOM

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1.0 PURPOSE AND SCOPE OF THE REPORT

The purpose of this report is to provide engineering information pertinent to the condition of the Water and Sewer System (System) serving New York City (NYC) and the use of the proposed capital improvement program (CIP) funds. Since 1983, AECOM (formerly Metcalf & Eddy) has provided engineering services related to the NYC Water and Wastewater Operations Evaluation Study (Study) and has provided services to the NYC Municipal Water Finance Authority (Authority) since 1985. Certain studies and analyses were performed in anticipation of the creation of the Authority and were used in developing the information included in the Municipal Water Finance Authority Official Statements under the captions: "CAPITAL IMPROVEMENT AND FINANCING PROGRAM — Ten Year Capital Strategy, Current Capital Plan and the Capital Improvement Program", "THE SYSTEM — The Water System", and "THE SYSTEM — The Sewer System". AECOM has performed ongoing evaluations of the condition of the System, independently reviewing the capital and operating programs pertaining to water and wastewater, reviewing pertinent studies associated with the long-term development of the System, and interviewing key individuals responsible for managing the activities of the New York City Department of Environmental Protection (NYCDEP).

The report addresses the issues listed below:

- present physical condition of the System,
- Fiscal Year (FY) 2015 capital budget and Fiscal Year 2016 projected capital budget for the System,
- Fiscal Year 2015 expense budget and FY 2016 projected expense budget relative to operation and maintenance of the System,
- overview of the Preliminary Ten Year Capital Strategy for Fiscal Years 2016 to 2025, and
- management of the System.

2.0 METHODOLOGY FOR ANALYSIS

The analyses conducted by AECOM were accomplished utilizing the following methods:

- interviews with representatives of the Authority and NYCDEP,
- selected confirmation inspections of operating facilities and major on-going construction programs,
- review of documentation relative to the ongoing budgetary process, and
- evaluation of other comparable water and wastewater systems and industries.

The budgetary process is ongoing and was not concluded by the time of this report's publication. Observations and conclusions presented herein are therefore based on budget data as it stood at that time. It is our opinion that these observations and conclusions are meaningful with respect to the System. It should be noted, however, that these observations and conclusions are subject to change based on the outcome of the budgetary process.

3.0 THE CONSULTING ENGINEER

AECOM has served the water and wastewater industry for over 100 years and NYC as a consulting engineer for many decades dealing with water supply, water distribution, sewage collection, and wastewater treatment. AECOM is one of the largest consulting engineering firms in the United States and is recognized internationally as a leader in providing services to the water and wastewater industry. AECOM is a global leader in all the markets for which it provides professional technical and management support services including architecture, building engineering, construction services, design/ planning, economics, energy, environment, government, mining, oil/gas, program/cost consultancy, program management, transportation and water/wastewater. With the recent incorporation of URS, AECOM currently has nearly 100,000 employees worldwide and serves clients in more than 150 countries. In 2014, Engineering News Record (ENR) magazine ranked AECOM #1 in the top 500 overall design firm category for the fifth consecutive year.

4.0 THE CONSULTING ENGINEER'S CONCLUSIONS

- In our opinion, the System continues to be managed in a professional and prudent manner with an appropriate regard for the level of service afforded to the users within the available funding.

- NYCDEP capital and expense budget projections for Fiscal Year (FY) 2015 satisfy the current needs for the System including all legally mandated projects, which comprise approximately 18% of the capital budget for FY 2015.

- NYCDEP capital and expense budget projections for FY 2016 satisfy the current needs for the System including all legally mandated projects, which comprise approximately 25% of the capital budget for FY 2016.

- The physical condition of the System receives an adequate rating.

- Staffing levels are approximately 91.5% of current allocations. NYCDEP continues to maximize the efficient use of its staff through re-allocation of current positions and new hires. NYCDEP is working diligently on important staffing issues, including recruitment practices, succession planning and training in order to strengthen NYCDEP staff.

5.0 OVERVIEW OF THE SYSTEM

Description of the System

NYCDEP is charged with the operation and maintenance of a vast system of water and wastewater infrastructure.

The NYC water supply system consists of three upstate watersheds, Delaware, Catskill and Croton that extend as far as 125 miles north of NYC, consisting of 19 storage reservoirs and three controlled lakes, as shown in Figure 1. The Delaware, Catskill and Croton watersheds are designed to supply approximately 50%, 40% and 10% of the NYC's daily water supply, respectively. The Croton system has the ability to increase delivery to 25% of the City's daily water supply if the need arises. NYCDEP also maintains wells in Queens which can provide up to 1% of the NYC's daily water supply. However, the groundwater supply system has not been used since 2007. The average daily in-city water consumption for FY 2014 was 1.005 billion gallons per day (BGD). Upstate water consumption for FY 2014 was 111 million gallons per day (mgd).

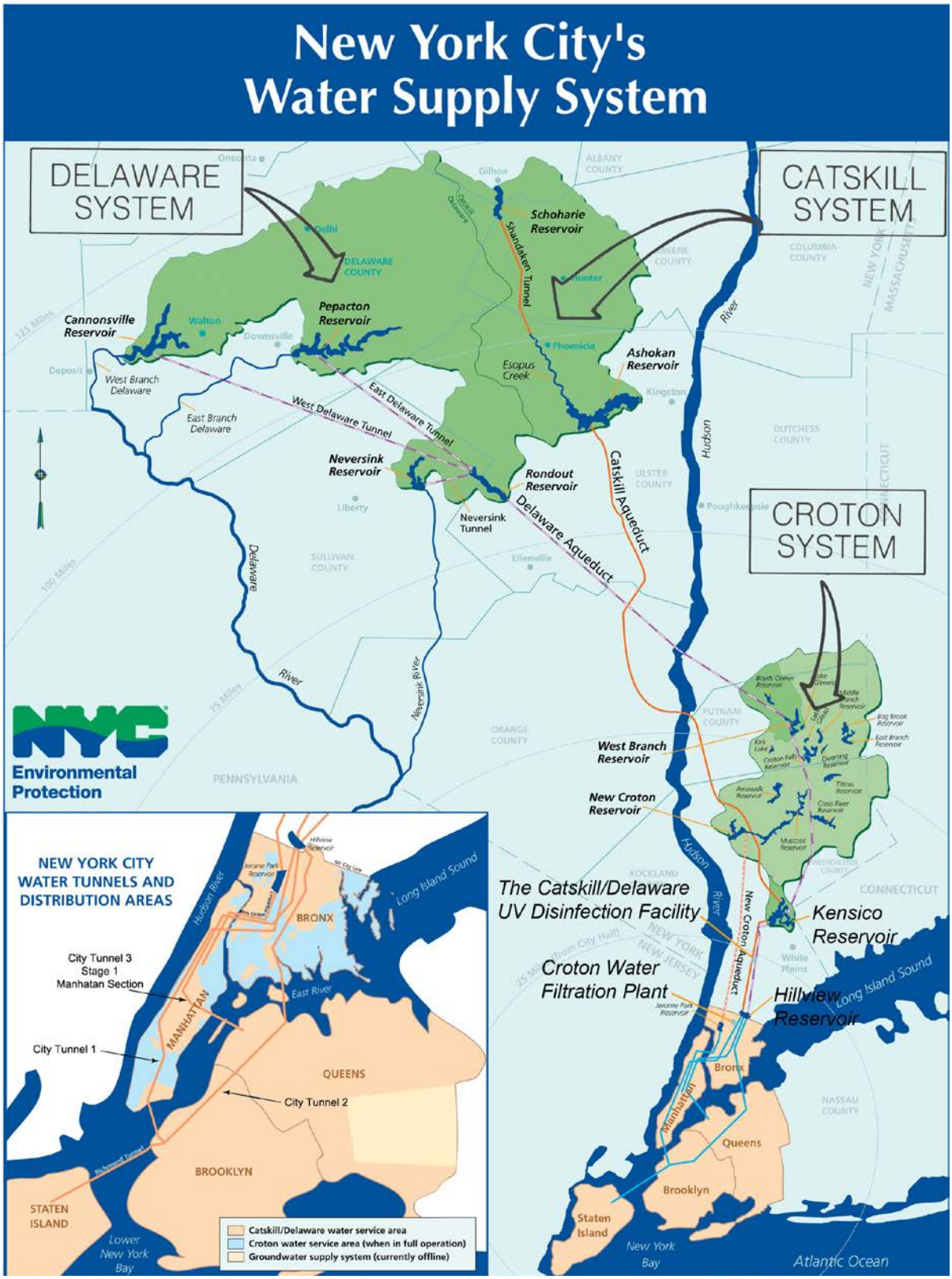


Figure 1: New York City Water Supply System

The water supply is conveyed by gravity from the upstate reservoirs through an extensive system of gravity tunnels and aqueducts. Water supplies from the upstate watersheds are unfiltered. The Croton Water Filtration Plant (WFP), drawing from the Croton System, which is currently undergoing start-up and testing, will come online and send water into the NYC distribution system starting in May 2015. The Catskill/Delaware Ultraviolet (UV) Disinfection Facility, treating water from Kensico Reservoir, commenced operations in the fall of 2012, feeding water to the city through the Hillview Reservoir. Both Kensico Reservoir and Hillview Reservoir serve as balancing reservoirs for the water system, handling the daily and hourly fluctuations of water demand, respectively. Water from Hillview Reservoir is conveyed to the city through three tunnels, City Tunnel No. 1, City Tunnel No. 2, and City Tunnel No. 3, which is partially in operation and partially under construction. The water distribution system from the three city tunnels consists of a grid network of approximately 6,800 miles of pipe, as well as valves, 110,000 fire hydrants, distribution facilities, gatehouses, pump stations, water quality monitoring stations, laboratories and maintenance and repair yards.

The NYCDEP wastewater system is comprised of fourteen in-city Wastewater Treatment Plants (WWTPs) that discharge into receiving bodies surrounding NYC, as indicated in Figure 2 and is operated by the NYCDEP Bureau of Wastewater Treatment (BWT). There are eight upstate WWTPs and one community septic system that are operated by NYCDEP Bureau of Water Supply (BWS) to protect the NYC watersheds. The NYC WWTPs have a capacity of 1.8 BGD and they are currently treating approximately 1.3 BGD of municipal wastewater and a portion of combined sewer flow during wet weather events. The NYC sewer system is divided into 14 drainage areas, which correspond to each of the WWTPs. The NYCDEP in-city WWTPs provide physical, chemical and biological treatment of the wastewater flows to achieve secondary treatment standards. As indicated in Figure 2, some of the WWTPs are being upgraded to provide Biological Nitrogen Removal (BNR). Some are currently in BNR operation, while others are in the design or construction phase. The sewer system is comprised of approximately 7,500 miles of sewer pipes of varying size and material, which are classified as sanitary, storm or combined sewers. Much like many other older cities, the NYC collection system consists primarily of combined sewers (approximately 60% of NYC land area is served by combined sewers), which means during a wet weather event wastewater, rainwater and surface water runoff is collected into the combined sewers. Most of the flow is sent to the WWTPs while excess flow discharges to the receiving water as combined sewer overflow (CSO). There are approximately 490 sewer regulators and outfalls and four CSO retention facilities (Paerdegat Facility, Alley Creek Facility, Spring Creek Facility, Flushing Bay Facility) that provide screening, settling and storage of the CSO flow before discharging. The stored flow is then sent to the WWTPs when possible. Additional NYCDEP infrastructure that supports the wastewater system includes 96 wastewater pump stations, 148,000 catch basins, laboratories, eight sludge dewatering facilities (six dewatering facilities currently active) and inner-harbor vessels which transport sludge between facilities.

Figure 2: New York City Wastewater Treatment Plants

6.0 MANAGEMENT OF THE SYSTEM

Organizational Structure

In February 2014, Mayor de Blasio announced that Emily Lloyd would be returning as the Commissioner of the NYCDEP. Commissioner Lloyd returned in March 2014.

NYCDEP is organized into seven functional areas: (1) Utility Operations, (2) Capital Program Delivery, (3) Sustainability and Regulatory Compliance, (4) Financial Management, Administration and Customer Service, (5) Legal Affairs, (6) Police and Security and (7) Executive.

- The Utility Operations consist of the three operating Bureaus: Bureau of Wastewater Treatment (BWT), Bureau of Water Supply (BWS) and Bureau of Water and Sewer Operations (BWSO). The Deputy Commissioner of each operating Bureau reports directly to the Commissioner. The key responsibilities of each unit in the Utility Operations are:

    - BWT is responsible for the operation and maintenance of the fourteen in-city WWTPs, the City's 96 wastewater pump stations, interceptor regulators, sludge dewatering facilities, fleet of marine vessels, laboratories, and the control of discharges from combined sewer overflows. BWT has undergone organizational restructuring to implement greater efficiencies at WWTP operations. Seven Area Facility Managers (two WWTPs per Facility Manager) provide senior leadership in the operation of the fourteen wastewater treatment plants. Working with the Chief Operators of the individual plants, the Area Facility Managers provide overall operational consistency. Each Area Facility Manager has an assigned Maintenance Facilitator who coordinates maintenance operations. Three Performance Analysts, who are experienced process engineers, have been assigned to the wastewater treatment plants.

    - BWS is responsible for managing, operating, maintaining and protecting the City's upstate water supply system to deliver a sufficient quantity of high quality drinking water. The Bureau conducts extensive monitoring of water quality, both within the City's distribution system and throughout the upstate watersheds. BWS is also responsible for the management, operation and maintenance of the CAT/DEL UV Disinfection Facility. The Bureau is responsible for the overall management and implementation of the provisions of the City's Watershed Protection Program and for complying with the City's Filtration Avoidance Determination (FAD) program.

    - BWSO is responsible for the operation and maintenance of the City's drinking water distribution, wastewater collection systems, and Bluebelts, the natural alternative to storm sewers. BWSO field operations provide: (1) that residences and businesses will have an adequate supply of potable water, (2) that there will be sufficient water for fire protection, and (3) that the wastewater collection system is properly functioning. BWSO will also be responsible for the management, operation and maintenance of the Croton WFP when the new facilities go into service. In the near future, BWSO will also assume the responsibility of the operation and maintenance associated with the Green Infrastructure (Green Jobs).

- Capital Program Delivery is executed by the Bureau of Engineering, Design, and Construction (BEDC). BEDC is responsible for managing the design and construction of capital improvement projects, including major water transmission facilities, water treatment facilities, wastewater treatment and disposal facilities, wastewater pumping stations stormwater/CSO facilities. BEDC has implemented several significant improvements to overall business practices, increased efficiencies and implemented standardization in cost estimating, project scheduling, project delivery, contract structure and change order procedures. The Project Management Information Systems (PMIS) continues to make project management more efficient by tracking cost and project schedule performance. BEDC in-house design and construction management groups continue to improve project delivery for various NYCDEP projects. A Sustainability Group has been developed within BEDC. This new group has adopted Envision™, a new sustainability certification rating system, to perform triple bottom line evaluations on selected BEDC projects. BEDC is now using E-Builder, an electronic program management tool to track projects.

- The Bureau of Sustainability at NYCDEP is responsible for the development and implementation of environmental policy and strategy, including water and air quality, the noise code, and other quality of life issues. The Group includes the Office of Green Infrastructure (OGI), Bureau of Environmental Planning and Analysis (BEPA) and Bureau of Environmental Compliance (BEC). An Office of Green Infrastructure has been established to support and implement the Green Infrastructure Plan. This group continues to work closely with the NYC Department of Design and Construction (DDC). BEPA is responsible for conducting environmental reviews for NYCDEP, providing technical assistance for the preservation of natural resources, conducting long range planning (population/ employment, consumption and demand/flow), conducting strategic planning to help ensure appropriate forecasting, trend analysis, regulatory review, scientific modeling, and research. BEPA is also continuing the work of the climate change task force and resiliency studies, and helping NYCDEP plan for the new growth stimulated by rezoning throughout the City. The Office of Energy is also part of BEPA and is responsible for the consolidation of energy issues and initiatives from all NYCDEP bureaus. The Office of Energy will perform planning and strategy, along with energy policy decisions and program implementation of NYCDEP energy projects. BEC is made up of the Division of Air & Noise Policy, Permitting and Enforcement and the Asbestos Control Program. BEC is responsible for responding to air and noise code complaints, maintaining the database of facilities containing hazardous and toxic material, overseeing remediation of hazardous waste municipal landfills, managing investigation of contaminated sites and responding to hazardous material emergency incidents. The Sustainability Group is also responsible for implementing PlaNYC initiatives throughout the agency, and will also develop long-term strategies to meet the NYCDEP's water quality goals.

- The First Deputy Commissioner oversees the financial management, administration and customer service for NYCDEP. Under the First Deputy Commissioner, the Chief Financial Officer oversees the Budget Office; Agency Chief Contracting Office; Asset Management; Management Analysis, Planning and Auditing; Facilities Management and Construction; Strategic Sourcing; and Engineering Audit. The First Deputy Commissioner is also responsible for the Bureau of Customer Service; Organization Development; Human Resources; Labor and Discipline; Environmental Health & Safety (EH&S); Information Technology; Fleet Services; and Records and Archives Management.

- The Legal Affairs Department is responsible for handling NYCDEP's legal matters.

- The Bureau of Police and Security is responsible for protecting the City water supply and the associated critical infrastructure from terrorism, pollution and crime.

- The Executive Level includes the Commissioner, Chief of Staff, Communications, Bureau of Public Affairs, and Green Policy.

7.0 CAPITAL IMPROVEMENT PROGRAM (CIP)

7.1 Overview

Budgeting is a lengthy and comprehensive process, especially for an agency operating such a large and complex system as is the responsibility of the NYCDEP. NYCDEP budgeting is an ongoing iterative process that takes into account legal mandates, mayoral initiatives such as PlaNYC, state of good repair (SOGR) projects to maintain permit compliance, capacity issues, dependability, environmental, health, and safety (EH&S) compliance requirements, localized community drivers, climate change adaptation and resiliency, and other facility improvements. Project schedules, cost estimate updates, technical issues, regulatory updates, emergency events, reoccurring events and legal issues may impact project prioritization and the overall budgeting process. NYCDEP is continuously evaluating its highest priority issues to determine its most important funding needs.

The NYCDEP CIP consists of the Ten-Year Capital Strategy, along with the Four Year Current Capital Plan, which is updated quarterly. The Ten Year Strategy is updated every two years. The Preliminary Ten Year Capital Strategy for FY 2015 through FY 2025 was released on February 9, 2015 and is the document considered herein. This review includes the budget for FY 2015, which ends on June 30, 2015, and the budget for FY 2016, which begins on July 1, 2015. AECOM has reviewed the Preliminary Ten Year Capital Strategy and met with key individuals responsible for budgetary planning to provide an assessment of its adequacy. The Mayor will issue the Executive Budget in April 2015. Our findings are summarized in the following paragraphs.

Regarding FY 2015

The Preliminary Plan FY 2015 budget is set at approximately $2.69 billion. Approximately 18% of FY 2015 funding supports mandated projects, consisting primarily of green and grey infrastructure projects, filtration avoidance determination (FAD) requirements and the 26th Ward WWTP wet weather stabilization upgrades. Additional mandated projects include the total residual chlorine (TRC) program, Croton WFP including park projects, citywide repairs of intercepting sewers and CSO reduction sewer system improvements. NYCDEP has indicated that all legally mandated projects are fully funded in FY 2015. Significant funding is also included in FY 2015 for Water for the Future program (Rondout-West Branch tunnel by-pass construction, repairs and water supply augmentation), water distribution system and wastewater collection sewer work, Gilboa Dam reconstruction, wastewater treatment plant SOGR projects, water supply infrastructure SOGR projects, emergency contracts for water and sewer work, high level storm sewers and Bluebelt land acquisition and construction. The Rondout-West Branch by-pass tunnel repair construction is the largest construction contract in FY 2015.

Regarding FY 2016

The Preliminary Plan FY 2016 budget is set at approximately $2.18 billion. Approximately 25% of FY 2016 funding supports legally mandated projects, such as CSO projects (grey and green infrastructure), storm sewer build-out, FAD requirements and the TRC program. NYCDEP believes that all legally mandated projects will be fully funded in FY 2016. Significant funding is also included in FY 2016 for Water for the Future water supply augmentation, emergency contracts for water and sewer work, high level storm sewers and City Tunnel No. 3 connections. Additional funding in FY 2016 is provided for water distribution system and wastewater collection sewer work), wastewater treatment plant SOGR projects Bluebelt initiatives, water supply infrastructure SOGR projects.

Regarding the Ten Year Capital Strategy for FY 2015 to FY 2025

The Preliminary Ten Year Capital Strategy for FY 2015-2025 consists of about $15.48 billion in funding. Approximately 23% of the total funding for FY 2015-2025 is dedicated to mandated projects, which is consistent with the recent trend of decreasing NYCDEP mandated projects, as shown in Figure 3. As shown in Figure 3, for FY 2008 through FY 2010, the overall budget consisted of a high percentage of mandated project costs due to the construction of the Croton WFP, UV Facility, and the Newtown Creek WWTP Upgrade projects. The majority of the mandated projects in FY 2015 consist of green and grey infrastructure and FAD requirements. The portion of mandated projects has been decreasing in the later part of the outer years of the Ten Year Capital Plan. As a consequence, the majority of the capital improvement program must be planned and budgeted based solely on its importance to the overall System and NYCDEP prioritization as determined by NYCDEP, such as the Water for the Future program. However, as discussed later in this report, the mandated CSO Program may require additional funding beyond the ten year planning horizon of this budget cycle. Although it is not anticipated that there will be as many large mandated projects occurring simultaneously as in FY 2008-FY2010, there is a potential for additional mandated projects in the future.

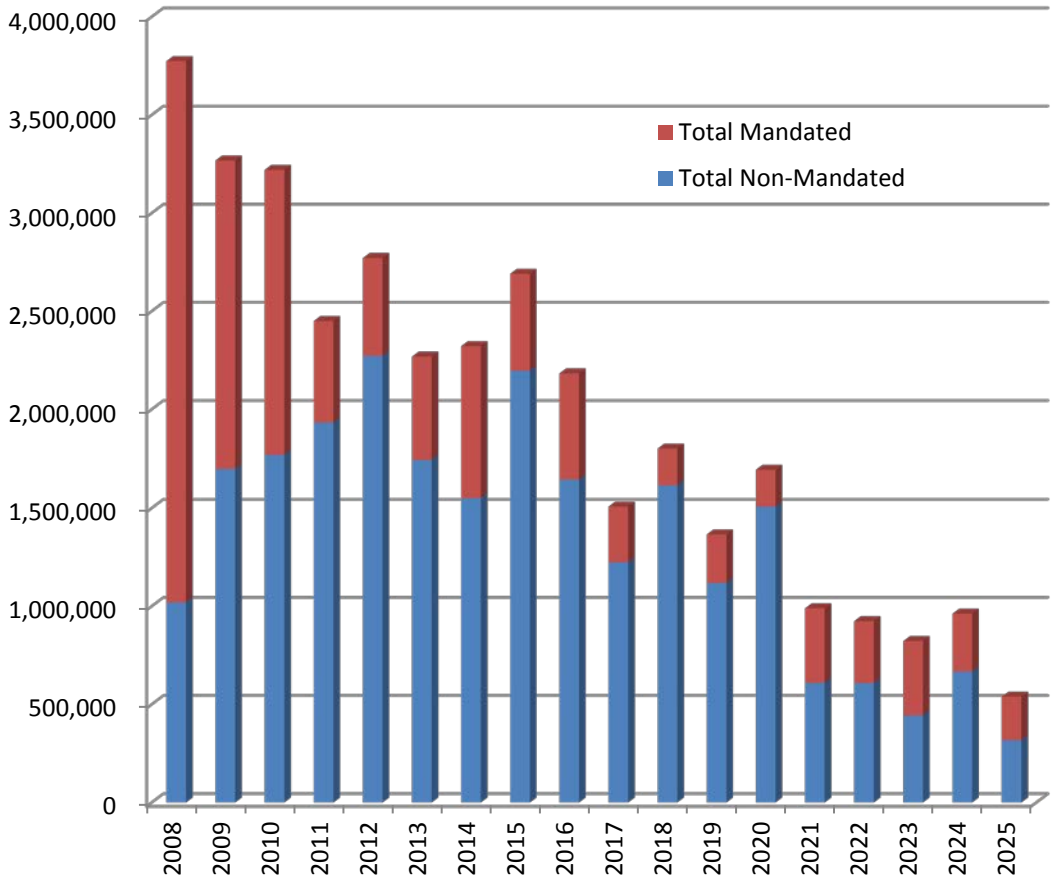


Figure 3: NYCDEP Historical and Projected Budgets

As in most US cities, the NYCDEP infrastructure is aging. Therefore, it is necessary to refurbish or replace infrastructure in a planned manner to cost effectively minimize risk of failure. The NYCDEP has refined and implemented their Asset Management program significantly in order to set priorities for the continued refurbishment of its physical assets. The Asset Management program provides a uniform methodology for a comprehensive evaluation of capital assets throughout the System and allows a systematic approach to maintain and upgrade physical assets so that capital improvements can progress in an orderly manner.

Currently, the non-mandated improvements include significant funding for the Water for the Future program, SOGR projects, and water distribution system and sewer projects. Approximately 24% of the FY 2015 budget is allocated for Water for the Future program which is a significant investment in the reliability and safety of the NYC water supply and transmission. Approximately 17% of the total funding for FY 2015-2025 is dedicated to the accelerated sewer work and sewer build-out. Approximately 30% of the total funding for FY 2015-2025 is dedicated to the SOGR projects. NYCDEP is making significant strides in dedicating funds to the SOGR projects across all bureaus and this effort should continue in the future.

NYCDEP will continue to be a strong advocate for prioritizing water quality projects and the affordability issue. NYCDEP is a member of the National Association of Clean Water Agencies (NACWA) Money Matters Task Force and continues aggressive discussions with regulators. NYCDEP is working collaboratively with the U.S. Conference of Mayors on affordability in utility planning and evaluating EPA's Affordability Criteria.

7.2 System-wide Programs

Climate Change Adaptation and Resiliency

NYCDEP has been planning and evaluating climate change adaptation requirements for the past several years, well before Superstorm Sandy impacted the NYC area. Adaptation refers to those actions that must be taken to allow NYCDEP facilities to meet their intended functions when considering increased sea levels and more intense storm events. In May 2008 NYCDEP released its Climate Change Program Assessment and Action Plan. Following its release, the NYCDEP began studying the effects of climate change on the City's stormwater/wastewater collection system in more detail to determine what level of infrastructure and policy modifications are necessary to alleviate potential damage from larger, more frequent storm events and rising sea levels. In May 2010, the NYC Panel on Climate Change released a report entitled Climate Change Adaptation in New York City: Building a Risk Management Response, which among other important information, includes climate trends and projections for NYC, which NYCDEP has used for analysis and planning. In addition, BEPA completed a two-year pilot study to develop an adaptation and optimization strategy to minimize global climate change risks for NYCDEP infrastructure using one WWTP (Hunts Point) and one drainage area (Flushing Bay).

When Superstorm Sandy significantly impacted the New York City area in October 2012, NYCDEP made a clear decision to continue to strengthen its work on climate change adaptation and resiliency. In December 2012, the Mayor's Office formed the Special Initiative for Rebuilding and Resiliency (SIRR). In June 2013, NYC released a comprehensive document entitled *A Stronger, More Resilient New York* which covered citywide infrastructure impacts and community rebuilding and resiliency plans. Subsequently, NYCDEP released the *NYC Wastewater Resiliency Plan, Climate Risk Assessment and Adaptation Study* in October 2013. This Plan is a comprehensive assessment of wastewater facilities at risk from future storms with proposed measures to protect critical equipment to reduce the risk of damage and loss of service. The study evaluated infrastructure at the NYCDEP WWTPs and wastewater pump stations to identify and prioritize facilities most at risk for flood damage. The framework used for this study consisted of climate analysis, risk analysis and adaption analysis. The possible adaptation strategies ranged in varying degrees of resiliency, effectiveness and cost. The study presented a cost of $315 million to harden pump stations and wastewater treatment facilities to reduce the risk of damage in future storms. Prioritizing the resiliency capital projects is an important step in the planning process. The criteria used for prioritization of projects and needs included operational, environmental, social and financial metrics. As facilities are being upgraded the results of this study will be reassessed with detailed site analyses during the design. NYCDEP has secured $156 million through the Storm Mitigation Loan Program (SMLP) for some of the resiliency projects. In order to secure the funding, NYCDEP BEDC has established a Program Management team and contracting mechanisms to achieve the SMLP's aggressive contracting timelines.

NYCDEP has adopted a new design standard to account for the critical flood elevation with the Flood Emergency Management Agency (FEMA) 100-year flood elevation plus 30 inches to account for sea level rise. There are some exceptions to this design standard. NYCDEP is currently developing a "Design Guideline Reference Document". As part of the study, Storm Surge Guidance was also developed for all 14 NYCDEP WWTPs to assist NYCDEP staff in preparations in advance of another storm.

Climate change adaptation evaluations are also taking place for other parts of the system. BWS is focused on climate change impacts on the water supply side though the use of Operation Support Tool (OST) models, the watershed protection program and improving flexibility in operations with increased water supply interconnections. NYCDEP's 2010 Green Infrastructure Plan outlined a comprehensive approach to stormwater management. The plan is based on implementing city-wide green infrastructure improvements to reduce the volume of stormwater that reaches the engineered stormwater collection system. NYCDEP maintains strong involvement with the climate change science community on the City, national and international level.

The New York City Panel on Climate Change (NPCC) is an independent body that advises the City on climate risks and resiliency. In February 2015, Mayor de Blasio announced the release of the NPCC 2015 report entitled *Building the Knowledge Base for Climate Resiliency*. This report provides climate projections for temperature, precipitation and sea level rise through year 2100. The Panel recommends setting up a climate change monitoring system, so that resilience measures can be adapted as changes continue to evolve in the future.

Climate change adaptation is a challenge facing all water and wastewater utilities, and should be considered in short-term and long-term utility planning. There is uncertainty inherent in climate science due to the magnitude, variability, timing and frequency of localized events and their impacts on the system. However, despite the uncertainty of climate change prediction, rational capital investments must be considered to protect NYCDEP facilities. NYCDEP will continue to transition from study/planning to implementation phase for climate change adaptation and resiliency in a systematic prioritized approach. Due to the implementation of revised design standards, NYCDEP is incorporating resiliency into projects that are currently in the planning or design stage. The *NYC Wastewater Resiliency Plan, Climate Risk Assessment and Adaptation Study* has provided a framework to prioritize and package projects that are ready to be implemented with outside sources of funding.

PlaNYC: NYCDEP Sustainability Initiatives

In 2014, an annual PlaNYC Progress Report was issued by Mayor DeBlasio's Mayor's Office of Long-Term Planning and Sustainability and the newly-formed Mayor's Office of Recovery and Resiliency. This plan focused on five key target areas of the City's environment – air, land, water, energy and transportation. In April 2015, it is anticipated that Mayor DeBlasio will release a PlaNYC Update Report (the four-year PlaNYC update), which will provide an update on the comprehensive sustainability plan for New York City's future.

Along with resiliency as discussed above, greenhouse gas reduction and energy planning are being incorporated into NYCDEP's planning and design projects.

Greenhouse Gas Reduction Requirements. As part of PlaNYC, the City committed to reducing its municipal greenhouse gas emissions by 30% below FY 2006 levels by FY 2017. Mayor DeBlasio recently released *One City: Built to Last* in September 2014 with further aggressive reductions of greenhouse gas emissions and carbon management. New York City Office of Sustainability (formerly the Mayor's Office of Long Term Planning and Sustainability) committed to an 80 percent citywide reduction of 2006 base year levels in green-house gas emissions by 2050 (also known as 80 by 50). Also an interim goal of 35% reduction of green-house gas emissions from 2006 base year levels in municipal government operations is required by 2025.

NYCDEP is initiating a study to determine how DEP will contribute to the City's overall 80 by 50 GHG reductions. The study will evaluate carbon management and net energy neutrality of the NYCDEP operations. In order for the NYCDEP to become net energy neutral, a cost effective analysis is required to evaluate energy efficiencies, energy generation and renewable energy initiatives. The results of this study will form NYCDEP's strategic plan to achieve energy neutral operations.

Energy Planning. With new systems and facilities coming on-line, it is in the best interest of the NYCDEP to assist in the planning of reliable sources of power, both from conventional and renewable sources. NYCDEP's Office of Energy coordinates with the operating bureaus and engineering group to evaluate and implement NYCDEP energy initiatives. As NYCDEP's largest WWTP, Newtown Creek produces an excess of anaerobic digester gas (ADG) that is typically flared in its flare towers. As part of the Newtown Creek/National Grid Partnership, NYCDEP will send ADG to a processing facility, where the ADG will be converted to pipe-line quality gas, which will then be added to National Grid's natural gas supply. The processing facility is currently under design. This project will improve local air quality, reduce City-wide greenhouse gas emissions, utilize a renewable energy resource, and increase City-wide natural gas supply. Newtown Creek WWTP has been accepting food wastes from NYC public schools and the green markets in collaboration with Waste Management, Inc. The food waste is added to the digesters to increase the production of ADG. NYCDEP recently completed a one-year monitoring and testing study under a grant from New York State Energy Research and Development Authority (NYSERDA) to evaluate the food waste addition for co-digestion to Newtown Creek digesters. Due to the success of that study, NYCDEP is initiating a more comprehensive three-year demonstration project in collaboration with NYSERDA, WERF, Bucknell University and Manhattan College. Going forward Newtown Creek may receive 50 – 250 tons per day (tpd) of commercial food waste throughout New York City from Waste Management, Inc. The goal would be to achieve 500 tpd of food waste sent to Newtown Creek for co-digestion. The food waste co-digestion and the excess ADG sent to National Grid projects at Newtown Creek serve as a model for integrating renewable energy in a dense urban environment.

Other energy projects that NYCDEP is implementing are cogeneration facilities, hydropower and solar panels at NYCDEP facilities. Cogeneration at North River WWTP is proceeding. Cogeneration at other WWTPs is being evaluated. In September 2014 NYCDEP received a Federal Energy Regulatory Commissioner (FERC) license for the installation of a 14 megawatt facility consisting of four hydro-electric turbines in the upstate watershed at NYCDEP Cannonsville Reservoir and Dam to harness hydro power. NYCDEP's main concerns are dam safety, maintaining operational control over the dams and the ability to meet flow management agreements. NYCDEP is evaluating alternative licensing arrangements with New York Power Authority (NYPA) for the best delivery mechanism for power generation without impacting water supply operations. The Ten Year Capital Strategy includes $92 million in funding for the development of hydropower at Cannonsville Reservoir and Dam. There is an expected annual revenue generation of $2 million for the hydropower generation, depending upon demand and the market price of electricity.

Asset Management

In early FY 2016, NYCDEP is planning to update its asset management program to include additional inspections of facilities, updating the database with current projects that are underway and current status of facilities, scoring of assets and then translating into additional business cases. The Asset Management program will provide updates on a 5-year cyclical basis.

NYCDEP asset management program includes the majority of the water and wastewater infrastructure. The results of the asset management program have been used in the development of the funding needs for the state of good repair for the 10-Year Current Capital Strategy. This ongoing effort is based upon a collaborative approach between the operating bureaus so that all stakeholders have input throughout the process. Business case project prioritization is based upon a scoring of the following criteria: physical condition, performance/process condition, regulatory/environmental, service level/reliability, efficiency/energy, O&M and hazard, community, public image and financial. All potential projects receive a numerical rating. NYCDEP will perform continuous real time updating of the status of the many NYCDEP physical assets to reflect completion of improvement projects and condition survey updates for operating assets. The capital program for the state of good repair projects is determined based upon the highest numerically rated projects within the available funding. The principles of asset management have been effectively applied to many water and wastewater

utilities worldwide and the NYCDEP's progress in asset management is a positive development. It is anticipated that NYCDEP will continue to build their asset management program to include operations and maintenance data to achieve a full comprehensive formalized Asset Management program for all assets.

7.3 Capital Program Accomplishments

There are a number of capital program accomplishments during the past year that are noteworthy. These items play an essential role in the development and advancement of the CIP, and providing for prudent and professional management of the System.

- The Water for the Future by-pass tunnel construction contract documents have been prepared and advertised for bidders. Bids are anticipated at the end of March 2015.

- The rehabilitation of the Gilboa Dam was completed in October 2014, two years ahead of schedule.

7.4 Capital Improvement Program Highlights for the Water System (Supply, Treatment, and Conveyance Programs)

The Water for the Future program consists of two main components – fixing the Delaware Aqueduct in two areas where significant leaking has been noted (installing a by-pass tunnel and making repairs) and supplementing NYC water supply during the period when these water transmission elements are out-of-service for repair. Background and details of these components are included below. The Water for the Future program is a comprehensive program that requires thorough coordination throughout the entire NYCDEP. A strong organizational structure is in place within BEDC and across all operating bureaus (with designated liaisons) and executive management, to continue with the planning, design, construction, implementation and risk management of the Water for the Future program due to the magnitude and complexity of the program. There is approximately $1.03 billion in funding in the Preliminary Ten Year Capital Plan for the Water for the Future program, which consists of $606 million for the by-pass tunnel and repairs and $424 million in water supply augmentation projects (when the Delaware Aqueduct is not in service for by-pass connection). NYCDEP anticipates receiving bids for the tunnel construction contract Spring 2015. Engineering studies conducted during the progression of the project development have identified program improvements that will result in shorter shutdown periods and less required water supply augmentation which has reduced the overall program cost. In October 2014, NYCDEP released the draft scope for a second environmental impact statement (EIS) that will assess the upstate repair projects that are part of the Water for the Future program.

Since the early 1990s, NYCDEP has closely monitored the Rondout-West Branch (RWB) Tunnel portion of the Delaware Aqueduct that has shown evidence of deterioration (water leaks) due to the geology in that area. NYCDEP has performed a series of tunnel leak investigations including geological investigations, tunnel flow monitoring, well monitoring, surface expression monitoring, automated underwater vehicle (AUV) investigations, and a series of dives and investigations at Shaft #6. NYCDEP performed another AUV and remote operated vehicle (ROV) investigation in Fall 2014 to continue to monitor the conditions in the tunnel and confirm design assumptions. After evaluating several repair alternatives, NYCDEP decided on a comprehensive plan to build a two and a half mile bypass tunnel around the leaking (deteriorated) section in the area of Roseton, NY and to perform repairs of the concrete liner in upstream areas near Wawarsing, NY. In 2013, NYCDEP began construction of two new shafts, Shaft 5B (in the Town of Newburgh) and Shaft 6B (in the Town of Wappinger) which is required for the construction of the bypass tunnel. The construction of the two vertical shafts is ongoing (BT#1). The bypass tunnel design is complete and the contract documents are out for bid. NYCDEP's schedule for the repair consists of beginning the tunnel construction contract (BT#2) in the summer of 2015. The connection of the bypass tunnel with the existing

aqueduct is planned for 2022. This connection will require taking the Delaware Aqueduct out of service and dewatering the aqueduct. NYCDEP has conducted emergency planning for the RWB tunnel involving NYC, NYS Office of Emergency Management (OEM) and surrounding County agencies.

The NYCDEP has been evaluating strategies for water supply augmentation to meet the demands of the system when water supply system components are out-of-service, either planned or unplanned. Several projects are funded in the Preliminary Ten Year Capital Plan to provide operational flexibility for NYCDEP to provide safe, reliable additional water supply when the Delaware Aqueduct is shutdown to connect the bypass tunnel to the existing tunnel and to make the other repairs. NYCDEP is currently planning for one shutdown while the new bypass tunnel is being connected to the existing tunnel. Shutdown of the Delaware Aqueduct is based upon hydrological conditions which the Water for the Future program has evaluated through modeling. NYCDEP is currently planning to implement the following water supply augmentation projects which would be in place before the tunnel is taken out-of-service: demand management measures, optimization of the Upper Catskill Aqueduct to increase its capacity, reactivation of the Queens groundwater system.

In 2013, NYCDEP completed a Water Demand Management Plan that identifies five key strategies for managing water demand, which consists of: the Municipal Water Efficiency Program, the Residential Water Efficiency Program, the Non-Residential Water Efficiency Program, Water Distribution System Optimization and Water Supply Shortage Management. NYCDEP's near term goal is to reduce demand by 50 mgd through these five strategies. NYCDEP anticipates a 5% overall reduction of water consumption citywide by 2020 due to planned water demand management program. NYCDEP is currently in the development phase of an Upstate Water Conservation Program, which will help lower water demand for non-New York City communities consuming city water. The replacement of large meters, water meters in city-owned buildings and conservation measures are funded at $83 million in the Ten Year Capital Plan.

A project to repair and rehabilitate the Upper Catskill Aqueduct (from Ashokan Reservoir to Kensico Reservoir) is funded at $146.3 million in the Ten Year Capital Plan. This project includes full inspection, implementation of mechanical and structural upgrades, and removal of the biofilm with chemical addition to increase the capacity to its historical flows. It is anticipated that 40 mgd of additional capacity in the Catskill Aqueduct will be available after this project.

Increasing the use of the groundwater supply by rehabilitation of the Queens Groundwater System (formerly the Jamaica Water Supply) has been identified as a project to supplement NYC water supplies with an additional 33 mgd of water supply. Groundwater rehabilitation with physical and chemical treatment of groundwater wells is funded at $143 million in the Ten Year Current Capital Plan. The Facility Plan for the groundwater wells has been completed and the project is moving into design phase.

Additional water transmission projects are underway to increase the reliability and flexibility of water supply operations. The construction completion of the interconnection of the Delaware Aqueduct with the Catskill Aqueduct at Shaft #4 is anticipated in summer of 2015. The upgrades at the Croton Falls Pump Station and the Cross River Pump Station provide conveyance flexibility to NYCDEP and would provide the ability for Croton water to be supplied to the Delaware Aqueduct, if required in emergencies.

Catskill/Delaware Water Supply System Filtration Avoidance

NYCDEP continues to operate under the 2007 Filtration Avoidance Determination (FAD) for the Catskill/Delaware systems. The 2007 FAD consists of a watershed protection program for 2007-2017, consisting of two five-year periods. The United States Environmental Protection Agency

(USEPA) transferred primacy to the New York State Department of Health (NYSDOH) after the 2007 FAD was issued.

In May 2014, NYSDOH issued the mid-term revisions to the 2007 FAD. The revisions to the FAD pertain to the flood response in the watersheds due to Tropical Storms Irene and Lee flooding. Additional FAD programs include flood hazard mitigation for the stream management program, a new project for relocating businesses and critical community needs, and the residential flood buy-out program. The continuation of new and existing FAD programs is funded in the Preliminary Ten Year Current Capital Plan at a level of approximately $261 million. Under the mid-term FAD revision, an additional $50 million in funding for the continuation of the land acquisition program (LAP) and an additional $15 million for the flood buy-out program was included. Funding for some of the FAD programs has moved from the capital budget to the expense budget. FAD programs funded in the expense budget for FY15 total $42.7 million. Additional capital funding will be required to support the next FAD program. NYCDEP plans to submit the required five-year update to water quality and program updates to NYSDEC in March 2016. NYCDEP and NYSDOH will then begin discussions for the next FAD.

NYCDEP's OST model links water quality and water quantity models, uses near real-time data for reservoir levels, stream flows entering reservoirs, snowpack and water quality in streams and reservoirs, and it includes National Weather service forecasts. NYCDEP has held workshops for technical review of the OST modeling and monitoring system by leading water supply experts, water scientists, academics and engineers. Full implementation of NYCDEP's OST occurred in January 2014. NYCDEP has convened an expert panel with the National Research Council (NRC) that will evaluate the OST model and its applications.

Kensico Eastview Connection (KEC2) Tunnel

NYCDEP has completed preliminary studies to evaluate options to improve redundancy and increase operational flexibility to allow additional flow to be conveyed from the Kensico Reservoir for treatment at the CAT/DEL UV Facility. NYCDEP assembled an expert panel to evaluate the options, which included the pressurization of Catskill Aqueduct. NYCDEP has decided to move forward with design of a new tunnel, Kensico Eastview Connection (KEC2) Tunnel. Funding of $511 million is included in the Ten Year Capital Plan for construction. However additional funding will be required. NYCDEP continues to evaluate project schedule as the sequencing of KEC2 may impact other water system projects.

Dam Safety

In October 2014 the $138 million reconstruction of Gilboa Dam was completed. These full long-term rehabilitation upgrades for the Gilboa Dam brought the dam into compliance with the NYSDEC dam safety guidelines. The remaining upgrades at Gilboa Dam include a new low level outlet, rehabilitation of the Shandaken Tunnel Intake Chamber, masonry reconstruction, drainage shaft and site restoration. Approximately $250 million is funded in the Ten Year Capital Plan for the remaining work at Gilboa Dam.

An additional $125 million is allocated to several dams and associated facilities for state of good repair upgrades throughout the NYC watershed. NYCDEP has installed additional monitoring equipment at several upstate dams to enhance the monitoring capacity during and after storms. In addition to capital programs, NYCDEP maintains an inspection and maintenance program to support dam safety. NYCDEP continues their dam inspection program using engineering contracts and in-house NYCDEP inspectors. NYCDEP operates and maintains a safe dam system based on capital upgrades, inspection and maintenance program, and emergency action plans.

Croton Water Filtration Plant

NYCDEP and contractors began start-up and testing of Croton Water Filtration Plant (WFP) in December 2013. The Croton WFP has a maximum capacity of 290 mgd and is divided into Plant A and Plant B. The water treatment processes at the Croton WFP consist of chemical addition, dissolved air flotation (DAF), and filtration followed by UV disinfection.

NYCDEP and the regulators completed negotiation for the operation of the Croton WFP, transmission of production water into water distribution system and the schedule for completion. The Third Supplement to the Croton Filter Consent Decree became effective September 2014. The start date for operations to send treated water into distribution is May 17, 2015. Under the revised Consent Decree, NYCDEP will be required to pay $65 million in penalties if the new milestone for commencement of operations is not met. NYCDEP is currently on schedule to meet the May 15, 2015 milestone.

Approximately $78.92 million is included in the CIP for the remaining facilities associated with the Croton WFP, which includes the off-site facilities, the permanent Mosholu Golf Club House and construction change orders. Funding of approximately $43.71 million is included in the CIP for payments to the Parks Department in connection with the Croton WFP. NYCDEP evaluated alternatives to provide standby power for the Croton WFP to increase dependability if there was a major power outage. The additional facilities for standby power are currently not funded in the Croton budget. Standby power is not a requirement for starting-up the Croton WFP.

NYCDEP completed inspection and rehabilitation of the New Croton Aqueduct (NCA) in 2013. A major component of the NCA work was the connection of the Aqueduct to the Croton WFP by installing a plug to redirect flows from Jerome Park Reservoir to the Croton WFP. The NCA is funded with $42,000 in FY 2015 of the Preliminary Capital Plan.

City Tunnel No. 3, Stage 2

City Tunnel No. 3 Brooklyn/Queens activation has been deferred. The design and construction of Shaft 17B and 18B required for activation of City Tunnel No. 3, Brooklyn/Queens leg are currently not funded in the Ten Year Capital Plan. Funding of $152.8 million is included in the budget for trunk water main connections to the City Tunnel No. 3. Funding for Brooklyn/ Queens activation of Tunnel #3 will be required in a future budget cycle. NYCDEP continues to evaluate future long-term planning for the overall coordination of CT#1, CT#2 and CT#3 in order to provide critical redundancy and reliability for water conveyance to NYC.

Hillview Reservoir

The Hillview cover has been required by federal regulations administered by USEPA and an Administrative Consent Order with NYSDOH, which includes a schedule for installation. NYCDEP and USEPA executed a revised Administrative Order in May 2010, which provided an extension of time for construction of the Hillview cover. According to the current order, the site preparation construction contract is required to start by January 31, 2017, construction start for the East Basin cover is required by December 31, 2018, and construction completion of the cover by May 31, 2028. This revised Order also allowed NYCDEP to submit an additional time deferral request. In October 2010, NYCDEP requested an additional six years, due to planned water system projects that would not permit Hillview cover construction simultaneously. In February 2011, NYCDEP received a letter from the United States Department of Justice (USDOJ) indicating that this issue had been referred to them.

In August 2011, USEPA announced that it is reviewing the Long Term 2 Enhanced Surface Water Treatment Rule (LT2) requirements for controlling microbial risks, including covering reservoirs, such

as Hillview Reservoir. USDOJ and the City have agreed to defer negotiations over revised dates until USEPA completes its review. NYCDEP anticipates USEPA to make a determination in 2016 on a revised SWTR based on sound science. NYCDEP is currently in compliance with the Administrative Order; however, NYCDEP has notified the regulators that the first few milestones of the current Order will not be met. NYCDEP submitted a proposal to the USEPA in the Spring of 2012, and it is under review. NYCDEP maintains an ongoing dialogue with the regulators regarding a cover avoidance. NYCDEP continues collecting water quality data and providing the data to regulators to support NYCDEP's position that a cover is not warranted.

There is no funding for construction of the Hillview cover in the Ten Year Capital Plan. Depending upon the outcome of the USEPA review and the discussions regarding the additional time extension, funding may be required in a future budget planning period.

Funding is included in the Ten Year Capital Plan for state of good repair upgrades planned at Hillview Reservoir. Approximately $366.5 million is included for the modification of chambers at Hillview Reservoir. An additional $93,000 is included in the budget for the Hillview Chlorination Building to complete chemical delivery improvements and building security. Approximately $151,000 is included for funding of the Hillview Monitoring building. Approximately $3 million is included for seepage control and slope stability for the Hillview Dam.

7.5 Capital Improvement Program Highlights for the Wastewater and Stormwater System

Combined Sewer Overflow (CSO) Program/Green Infrastructure Plan

The 2012 CSO Consent Order Modification incorporates a hybrid approach of green and grey infrastructure control strategies. The modified Consent Order is based upon an adaptive management approach to solving the CSO water quality issues which incorporates the Green Infrastructure (GI) Plan. The CSO Order contains milestones and schedules governing the planning, design and construction of a significant number of projects for NYCDEP's Citywide CSO Program. As required by the Order, NYCDEP will develop ten waterbody-specific Long Term Control Plans (LTCPs) for NYC tributaries, in addition to one citywide LTCP to reduce CSOs and improve water quality in NYC's waterbodies and waterways. The goal of each LTCP is to identify appropriate CSO controls necessary to achieve waterbody-specific water quality standards, consistent with the Federal CSO Policy and the water quality goals of the Clean Water Act (CWA).

Green infrastructure is an approach to wet weather management that is cost-effective, sustainable and environmentally friendly. Several cities across the country have implemented green infrastructure for wet weather management and water quality control issues. The overall goal of NYC's Green Infrastructure Plan, which NYCDEP released in September 2010, is to capture the first inch of rainfall on 10% of the impervious areas in combined sewer watersheds through detention or infiltration over the 20-year horizon. The Green Infrastructure Plan presents a savings of approximately $2.4 billion over twenty years with implementation of green infrastructure compared to the all-grey infrastructure strategy (tanks, tunnels and WWTP expansions). The modified CSO Consent Order calls for $187 million in green infrastructure within four years to meet the first milestone by December 31, 2015, which is capturing the equivalent of stormwater generated by one-inch of precipitation on 1.5% of impervious areas citywide. The NYCDEP is making significant progress to meet this first milestone with the installation of several thousand effective right of way (ROW) bioswales throughout the City. Standard designs have been approved for the ROW bioswales. NYCDEP released its Green Infrastructure Annual Report in April 2014. By June 30, 2016, NYCDEP is required to develop and submit to NYSDEC CSO performance metric. Implementation of this plan requires significant coordination among several city agencies and this effort is ongoing with the Green Infrastructure Task Force. In collaboration with other city agencies NYCDEP has built several demonstration projects for a variety of land uses, such as blue roofs/green roofs, porous pavement, tree pits, street side swales, green streets, constructed wetlands, and rain barrels. In August 2014, NYCDEP submitted a post

construction monitoring report for the three GI demonstration areas – Hutchinson, 26th Ward and Newtown Creek. The Green Infrastructure Grant Program will continue for the private sector in 2015 for green infrastructure projects such as right of way bioswales, blue roofs, green roofs and porous pavement on private property and in sidewalks in combined sewered areas.

NYCDEP continues to seek resolution of the first LTCP (Alley Creek) disapproval with NYSDEC. The Alley Creek LTCP was originally submitted to NYSDEC in July 2013, and then a revised Alley Creek LTCP was submitted in November 2013. In December 2013, NYSDEC disapproved the LTCP for Alley Creek. In February 2014 NYCDEP filed an Article 78 to petition the NYSDEC determination of disapproval. Along with filing the Article 78, NYCDEP continues to try to resolve disagreements on the Alley Creek LTCP with NYSDEC. NYCDEP submitted another revised Alley creek LTCP in June 2014. NYCDEP has submitted the Westchester Creek LTCP in June 2014, the Hutchinson River LTCP in September 2014 and the Flushing Creek LTCP in December 2014. NYCDEP is proceeding with the remaining seven LTCPs, as they have staggered submittal dates over the next few years, through June 2017.

In December 2014, NYSDEC announced its intention to change water quality standards for fecal coliform applicable for Class I and Class SD waters in New York City, so that they are suitable for primary contact recreation. This proposed rule could have financial impacts for compliance with the proposed water quality standards. Public comments to the proposed rule are due in March 2015.

The Ten Year Capital Plan includes approximately $878 million in funding for green infrastructure and approximately $1.565 billion is included for grey infrastructure for a combined funding of $2.44 billion in capital projects for implementation of the CSO Program. Funding for disinfection facilities at Alley Creek, Hutchinson River and Flushing Creek are included in the Ten Year Plan. Additional funding will be required in the beyond the Ten Year Plan or depending upon the outcome of the ongoing LTCPs and ongoing negotiations with NYSDEC.

Cogeneration Facility at North River WWTP

A project for a Cogeneration Facility at North River WWTP was developed as a sustainability project to meet the needs of PlaNYC GHG emissions and achieving a SOGR to replace the main sewage pumps and engine blowers that are near the end of their useful life. The North River WWTP Cogeneration Facility is funded in the Ten Year Capital Plan at a level of $181.9 million. This project is made up of several smaller projects, which are in different stages of design and bidding. Additional funding of $36 million is available from PlaNYC for the design and construction of this project. This project consists of replacing the main sewage pump drives, the aeration blowers, and the aeration blower drives. The new cogeneration facilities will provide new gas driven engines and generators which will electrically drive the main sewage pumps and the nine high speed turbo aeration blowers. Upon further completion of the design, all major facility improvements will be fully defined so that the capital improvement budget requirements can be fully confirmed. When completed, the cogeneration system will provide all the electrical and heat energy necessary to operate the North River WTP.

Citywide Nitrogen Removal Program

The Upper East River WWTPs (Hunts Point, Bowery Bay, Tallman Island, and Wards Island WWTPs) and the 26th Ward WWTP have been undergoing BNR upgrades as required by the Nitrogen Consent Judgment for the Phase I Facility Plan. Bowery Bay WWTP completed construction for the Phase I nitrogen removal upgrades and started operation of biological nitrogen removal in June 2012. Hunts Point WWTP completed construction in the Summer of 2010. Wards Island WWTP completed construction and started operation in March 2013. NYSDEC certified completion of the BNR upgrades at the Tallman Island WWTP and NYCDEP started BNR operation in 2014.

26th Ward WWTP completed construction for the Phase I nitrogen removal upgrades and started operation of biological nitrogen removal in December 2010. NYCDEP and NYSDEC entered into an agreement to upgrade the Jamaica WWTP to reduce nitrogen discharges. A Stipulation and Order Modifying the Nitrogen Consent Judgment became effective October 2009, which added nitrogen removal upgrades at the Jamaica WWTP. Jamaica WWTP began BNR operations in December 2014, one month ahead of the BNR milestone. NYCDEP, NYSDEC and Natural Resources Defense Council (NRDC) entered into a Jamaica Bay Agreement which addresses nitrogen removal upgrades at Rockaway WWTP and Coney Island WWTP, construction milestones for the Jamaica Bay WWTPs interim nitrogen effluent limits for Jamaica Bay and the funding of an environmental benefits project for the saltwater marsh restoration in Jamaica Bay. Funding is currently included in the CIP for the nitrogen removal upgrades at Coney Island and Rockaway at a combined level of $22.5 million. NYCDEP is evaluating alternatives for future use and operations at the Rockaway WWTP facility. Pending the outcome of these evaluations additional funding will be required for BNR upgrades at Rockaway WWTP.

Glycerol has been selected as the supplemental carbon source for additional nitrogen removals. The carbon addition for Hunts Point WWTP is operational. Construction of supplemental carbon facilities for the remaining UER WWTPs (Bowery Bay, Tallman Island and Wards Island WWTPs) and Jamaica Bay WWTPs (26th Ward and Jamaica WWTPs) that require carbon addition for Phase II BNR is ongoing. Construction completion for these carbon facilities is required by July 2016.

Newtown Creek WWTP Upgrade Program

In May 2011, NYCDEP certified that the Newtown Creek WWTP meets the effluent discharge requirements of the Clean Water Act, well in advance of the Consent Judgment milestone of May 2013. NYCDEP was unable to meet a construction milestone in September 2012 due to problems with faulty Main Sewage Pumps (MSP) installed as part of the contract. NYCDEP provided a notice of *force majeure* to NYSDEC since it was determined that the failures were due to errors in pump design and manufacture. NYCDEP and NYSDEC continue to negotiate a revised new milestone for the MSPs installation ay Newtown Creek.

Total Residual Chlorine (TRC)

The State Permit Discharge Elimination System (SPDES) permits for each of the fourteen WWTPs calls for an interim effluent limit for total residual chlorine of 2.0 mg/l. This interim limit will stay in effect until construction completion of facilities required to achieve compliance with the final water quality based effluent limits. The SPDES permits also include a schedule of compliance for each plant to make improvements to further reduce residual chlorine. The final effluent limit has not yet been determined by NYSDEC. In May 2011, due to a number of issues NYCDEP submitted a proposal for permit modification to the TRC compliance schedule requesting additional time to complete these projects. NYSDEC issued an Administrative Complaint due to missed milestones. NYCDEP responded to the Administrative Complaint in January 2014. NYCDEP is continuing to work with NYSDEC on resolution of this matter. The draft SPDES released in June 2013 by NYSDEC included more stringent TRC limits at the plants that could result in more costly projects to achieve the TRC limits. NYCDEP provided extensive comments on the draft SPDES permit including concerns with the TRC limits in the permits.

There is $169.4 million in the Ten Year Capital Plan for the TRC program for dechlorination facilities at some of the WWTPS and continued water quality monitoring program at the other WWTPs. Additional funding may be required in later years of the Ten Year Plan for continued implementation of the TRC Program, pending ongoing regulatory discussions regarding the TRC Program.

Rockaway WWTP

Due to several factors including low wastewater flows at the Rockaway WWTP along with the Hurricane Sandy impacts to the plant, NYCDEP has been evaluating alternatives for future operation of the Rockaway WWTP. NYCDEP completed a Facility Plan for Rockaway WWTP in 2014 which analyzed alternatives for future Rockaway WWTP operations. The evaluation considered maintaining wastewater treatment options at the existing Rockaway WWTP or consolidating flows to 26th Ward WWTP. Significant SOGR upgrades, BNR upgrades and resiliency measures are required at Rockaway WWTP to maintain continuous operation. Two consolidation plans were evaluated to transfer the wastewater flows to 26th Ward WWTP across the Jamaica Bay: horizontal directional drilling (HDD) with open cut conveyance and tunneling under the Jamaica Bay with tunnel boring machine (TBM). A pumping station would be required for the consolidation options. The Facility Plan underwent a Value Engineering workshop in December 2014. This project has also undergone an Envision™ triple bottom line evaluation. NYCDEP continues to evaluate alternatives to determine the best solution for future Rockaway wastewater flow. Approximately $35 million is included in the Ten Year Capital Plan for SOGR needs at Rockaway WWTP. Once a decision has been determined for future operations, significant additional funding will be required for Rockaway flows.

Bluebelts

NYCDEP has been developing Bluebelt sites in Staten Island since the 1990s. Bluebelts are an innovative stormwater drainage system made up of manmade and natural wetlands, streams and ponds. NYCDEP plans to expand the program to park property sites in Queens and the Bronx. NYCDEP anticipates awarding a contract in Spring 2015 to build additional Bluebelts in the Mid-Island region of Staten Island. Approximately $535 million is included in the Ten Year Capital Plan to expand the Bluebelts for stormwater management.

7.6 Accelerated Underground Infrastructure

Water Mains and Sewer Projects

Significant additional funding has been allocated in the Ten Year Capital Plan for the acceleration of underground construction work including water main replacement, sewer replacement and sewer-build-out. NYCDEP anticipates working with DDC to address areas with recurring problems and replacement of the oldest assets, when possible. NYCDEP is also working on the drainage plans and storm sewer build-out in southeast Queens. Funding of approximately $2.7 billion has been allocated over the Ten Year Capital Plan for accelerated water main replacement, sewer replacement and sewer build-out.

An Underground Infrastructure Working Group was established in 2014 to provide close collaboration of city agencies and private utilities to perform necessary upgrades to aging underground infrastructure and install and construct new underground infrastructure. NYCDEP is working diligently with other city agencies and private utilities to coordinate underground construction projects, accelerate the pace of improvements and make improvements to emergency response.

7.7 Potential Water and Wastewater Projects Beyond Current Capital Plan

Kensico-City Tunnel (KCT)

Due to other priority needs of the water conveyance system, KCT is not in the NYCDEP current financial planning period and therefore, there is no funding included in the CIP. The proposed tunnel would extend from the Kensico Reservoir to the interconnecting valve chamber of City Tunnel No. 3, Stage I, south of Hillview Reservoir. Preliminary KCT construction costs are estimated between $4 and $6 billion, depending upon specific routing, shaft locations and connections.

Nitrogen Removal in the Harbor Estuary

The New York/New Jersey Harbor Estuary Program (HEP) is a National Estuary Program that has been sanctioned by the USEPA to restore the waters of the Lower Harbor Estuary and the tidally influenced portions of all rivers and streams that empty into the Estuary. The HEP was convened as a partnership of federal, state, and local governments; scientists; civic and environmental advocates; the fishing community; business and labor leaders; and educators (called the Management Conference). NYCDEP submitted a report to USEPA in 2007 that evaluated the capital investment cost of upgrading four WWTPs (Owls Head WWTP, Red Hook WWTP, North River WWTP, and Port Richmond WWTP) to provide nitrogen and carbon removal at four different levels of treatment. The water quality impacts on the Harbor Estuary are now being evaluated by USEPA for the various levels of treatment. Through this methodology, it is expected that USEPA and the Management Conference will determine which treatment upgrades, if any, will be required for NYC. Funding is not in the Ten Year Capital Plan for HEP-related upgrades. Upon completion of the HEP studies and based upon negotiations with USEPA, funding may be required in a later planning period.

8.0 PERFORMANCE OVERVIEW

Water Conservation

Figure 4 presents the annual water demand for more than the last 20 years. Water conservation measures taken by NYCDEP in the 1990s have resulted in a steady reduction in the overall water demand. More recent declines in water consumption have been noted most likely due to conservation measures, metering, economic downturn and weather patterns.

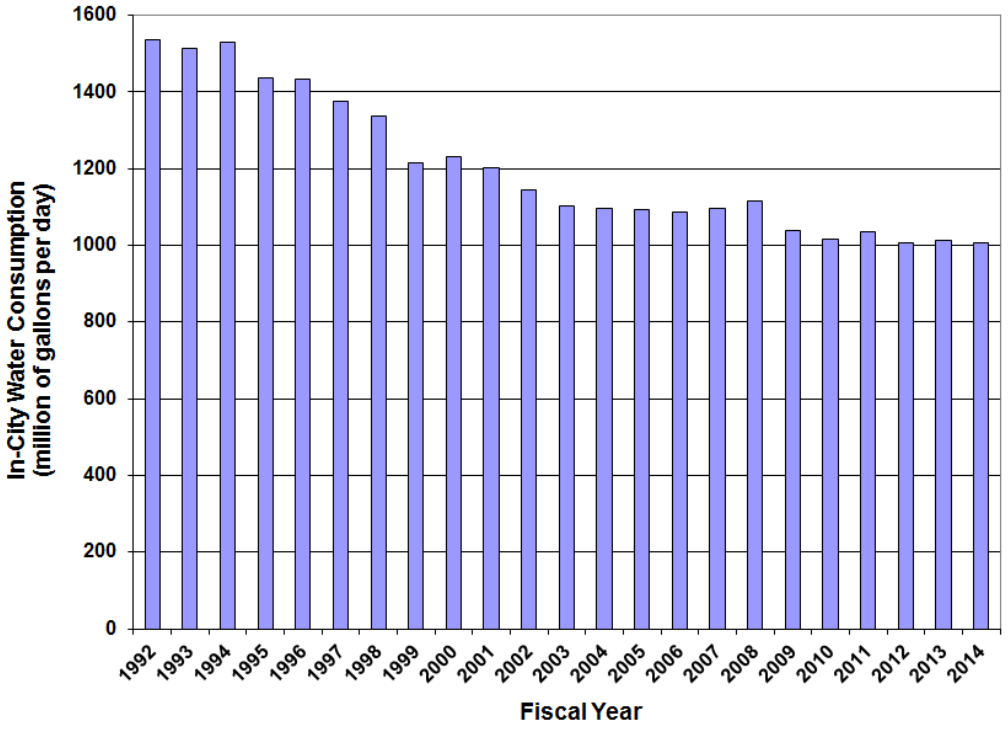
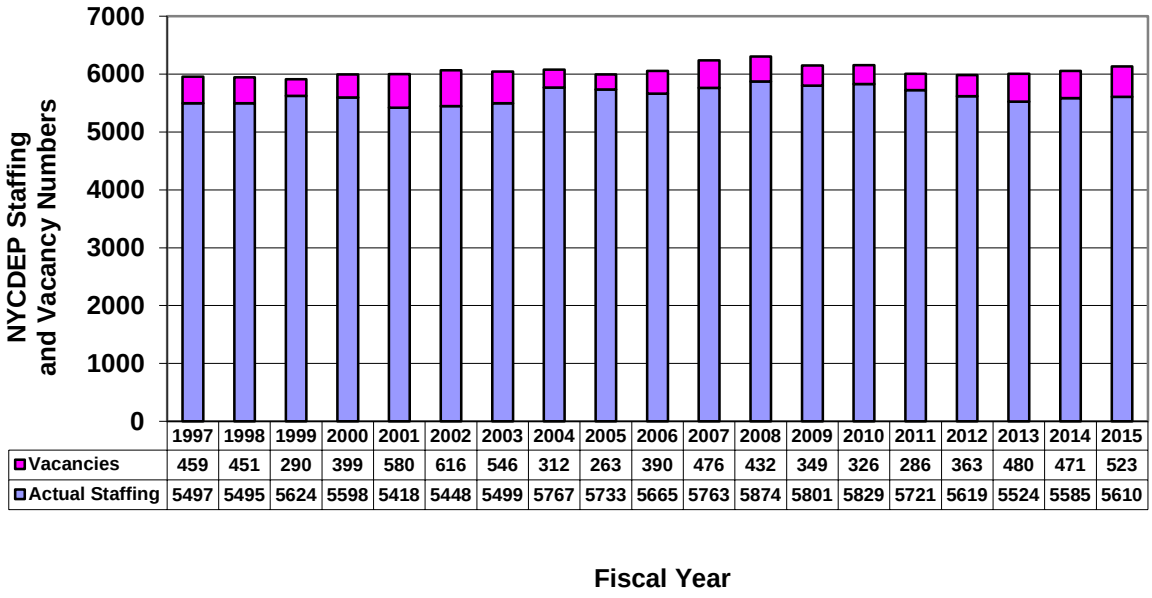


Figure 4: New York City Average Daily Water Demand in Million Gallons per Day (mgd)

System Staffing Levels

Approved positions for the System presently stand at 6,133 for FY 2015 and vacancies currently stand at 523. This reflects an increase in budgeted headcount and an increase in vacancies compared to FY 2014, as shown in Figure 5. Successful improvements for the recruitment and personnel procurement process have occurred with the creation of Organizational Development position within NYCDEP's management. NYCDEP has seen improvements in attracting highly skilled and qualified staff. NYCDEP Organizational Development is also developing and implementing succession planning. NYCDEP maintains a strong diverse workforce. Recruitment, training and succession planning are essential as 55% of the 5,610 employees in the NYCDEP workforce are eligible for retirement in the next 10 years.



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Vacancies	459	451	290	399	580	616	546	312	263	390	476	432	349	326	286	363	480	471	523
Actual Staffing	5497	5495	5624	5598	5418	5448	5499	5767	5733	5665	5763	5874	5801	5829	5721	5619	5524	5585	5610

Figure 5: NYCDEP – Staffing and Vacancy Levels FY 1997-2015

Operational Performance Indicators

There are many operational parameters that can be reviewed to assess the effectiveness of operating programs. NYCDEP continues to use H2OStat metrics to improve operational efficiencies, drive performance management and increase accountability and transparency across the agency. Since the inception of the H2OStat program, NYCDEP continues to experience positive results with improved performance. Several performance indicators for water and sewer operations are summarized below.

There were 513 water main breaks reported in FY 2014, which translates to 7.3 breaks per 100 miles of main. The number of water mains in FY 2014 has increased compared with the last few years, most likely attributed to colder temperatures experienced in the winter months (see Figure 6). NYCDEP BWSO operations continue a preventative maintenance program to target pressure reducing valves by exercising valves and inspecting regulators to help prevent the occurrence of water main break, costly repairs, leaks and disruption of service. Although an increase in the number of water main breaks occurred in FY 2014, NYCDEP continued to restore water to residents within an average of 4.4 hours after confirming the break. The range of water main breaks that NYC has recently experienced is below that of other municipalities in the United States.

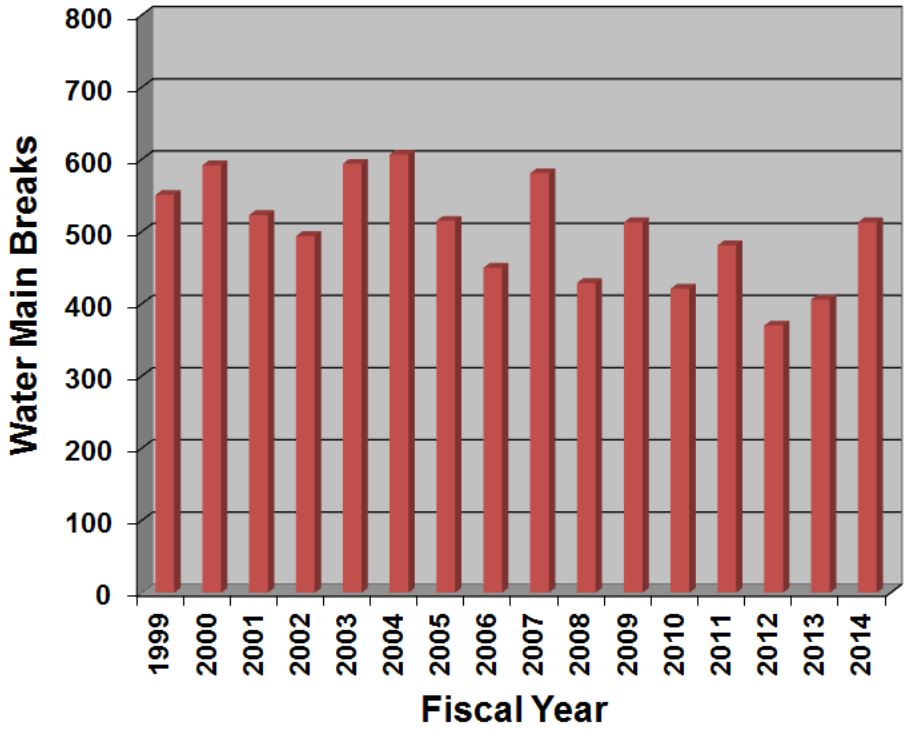


Figure 6: Total NYCDEP Water Main Breaks per Fiscal Year

Approximately 0.44% of total fire hydrants were broken and inoperative in FY 2014, slightly more than last year but less than previous years. The average time to repair or replace high priority broken or inoperative hydrants (as determined by the Fire Department) by NYCDEP was 3.1 days in FY 2014, which is less that the target time. Approximately 31% of catch basins were surveyed and inspected in FY 2014. The total number of catch basins that were cleaned by NYCDEP in FY 2014 is 29,730.

NYCDEP received 11,639 sewer backup (SBU) complaints in FY 2014. As shown in Figure 7, SBUs have decreased significantly since 2009. Response time for SBUs was 3.9 hours on average, which is lower than the past several years and well below the target of 7 hours. NYCDEP has found that the significant majority of confirmed sewer backups can be attributed to fats, oils and grease (FOG) buildup in the sewers. NYCDEP has continued to implement and expand aggressive operational and public outreach initiatives to address this problem.

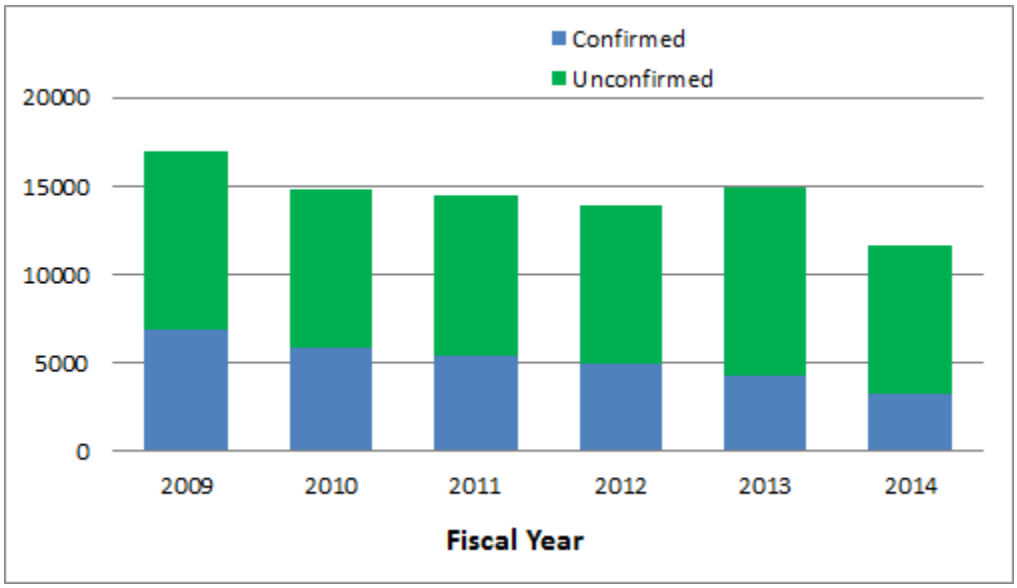


Figure 7: Sewer Backup (SBU) Complaints

NYCDEP uses a data-driven risk management approach to operate and maintain the sewer system, targeting specific locations with reoccurring problems. A group within BWSO addresses the Capacity, Management, Operations, and Maintenance (CMOM) program and related issues with specific Standard Operating Procedures (SOPs) in place. The Sewer Operations and Analysis Program (SOAP) at NYCDEP allows for a more proactive rather than reactive approach. This group analyzes areas with reoccurring problems to determine the cause of the problem and then determines a remediation plan (degreasing, cleaning, repair, replacement). BWSO's top priority remains their core work which consists of televising of sewers, sewer cleaning, catch basin reconstruction and cleaning, hydrant repair, installation of new water mains. NYCDEP BWSO continues training with the hands-on water and sewer training facility with a full-scale model street including sewer, catch basins and hydrants. This facility continues to be used for new staff to train water repair, sewer repair, water maintenance and sewer maintenance, as well as continuing education and further training for existing staff.

Operational and Maintenance Program Significant Accomplishments

UV Operations. The Cat/Del UV Facility has been in operation since October 2012. NYCDEP BWS Operations staff successfully took over 100% control of the facility on June 15, 2013. The facility is operated and maintained with approximately 52 NYCDEP BWS staff. The UV facility is the largest UV water disinfection facility in the world and consists of fifty-six 40 mgd UV disinfection units. It is currently receiving all Cat/Del waters and it is designed to disinfect 2.4 billion gallons per day. NYCDEP is required to provide a monthly water supply operations and treatment report for the UV Facility to USEPA, NYSDOH and New York City Department of Health and Mental Hygiene (DOHMH). In December 2014 NYCDEP received an agreement from NYSDOH to lower the UV dosage.

Operational Excellence. Operational Excellence, also known as OpX, continues to find efficiencies in overall NYCDEP operations and maintenance that provides recurring cost savings to the NYCDEP. This program addresses all aspects of O&M, such as procurement, chemical usage, fleet management, energy usage, staffing/organizational changes and plant operations. It was initiated by NYCDEP in November 2011 and consisted of two phases over a four-year period. Phase 1 report, issued in June 2012, summarized the six-month diagnostic phase involving all aspects of NYCDEP

operations. Phase 2 consists of the implementation phase over a four year period. Seventeen months remain on the Op,X contract. A total of $100 million in annualized savings have been implemented based upon the OpX program.

Drinking Water Quality. NYCDEP recently released the *New York City 2014 Drinking Water Supply and Quality Report*. NYCDEP conducts significant monitoring of the source water and in-city water quality. In calendar year 2014, NYCDEP collected more than 30,000 samples from the in-city distribution system and performed approximately 347,000 analyses, meeting all state and federal monitoring requirements. In addition, NYCDEP collected 14,400 samples and performed 190,000 analyses from the upstate watersheds. Microbiologists, chemists and other scientists with the BWS test water from key locations across the watershed and the City at NYCDEP laboratories.

Harbor Water Quality. NYC has been collecting and maintaining records of water quality data for over 100 years. The New York Harbor Water Quality Survey currently consists of 72 sampling station harborwide. The number of water quality parameters measured has also increased from five in 1909 to over 20 at present. NYCDEP will increase the number of monitoring sites throughout the harbor and at the mouth of key tributaries to 85 sites in order to assess the effectiveness of the NYCDEP stormwater management and CSO control projects.

The water quality in the harbor has continued to improve as a result of the maintenance and operation of the wastewater treatment plants and the combined sewer overflow programs. Figures 8 and 9 below demonstrate the improvements in water quality over the past 35 years as indicated by the increased dissolved oxygen concentrations and reduced Fecal Coliform counts. In FY 2014, 91% of the harbor survey stations met the fishable standard of 5 mg/L for dissolved oxygen.

The percentage of wastewater treatment plant effluent that met federal standards in FY 2014 was 99.6 %.

Permit Updates. NYSDEC issued draft SPDES permits to the 14 WWTPs for public review on June 26, 2013. NYCDEP provided extensive comments on October 3, 2013 addressing several significant issues that NYCDEP has with the draft SPDES permits. NYCDEP and NYSDEC continue to negotiate the SPDES permits.

NYSDEC issued a draft municipal separate storm sewer system (MS4) permit for NYC for public review and comment on February 5, 2014. Public comment period was extended until April 2014. It is expected that NYSDEC will issue NYCDEP a MS4 permit or hold an administrative hearing in March 2015. A portion of New York City has separate sanitary sewer systems. Until now the provisions for separate sanitary sewers were included in the SPDES permits; however, NYSDEC has decided to issue a new citywide MS4 permit to NYC. NYC is the permit holder since the MS4 requirements covers many City agencies. However, NYCDEP coordinates all required activities under the permit. In October 2013, an Executive Order was signed addressing coordination and implementation of stormwater controls and MS4 permit requirements for NYCDEP and other NYC agencies. The MS4 permit requires NYC to submit a Stormwater Management Program (SWMP) Plan within three years of the effective date of the permit. Among other requirements, NYC must also submit a fiscal analysis of the capital, operating and maintenance costs necessary to meet the requirements of the permit within three years.

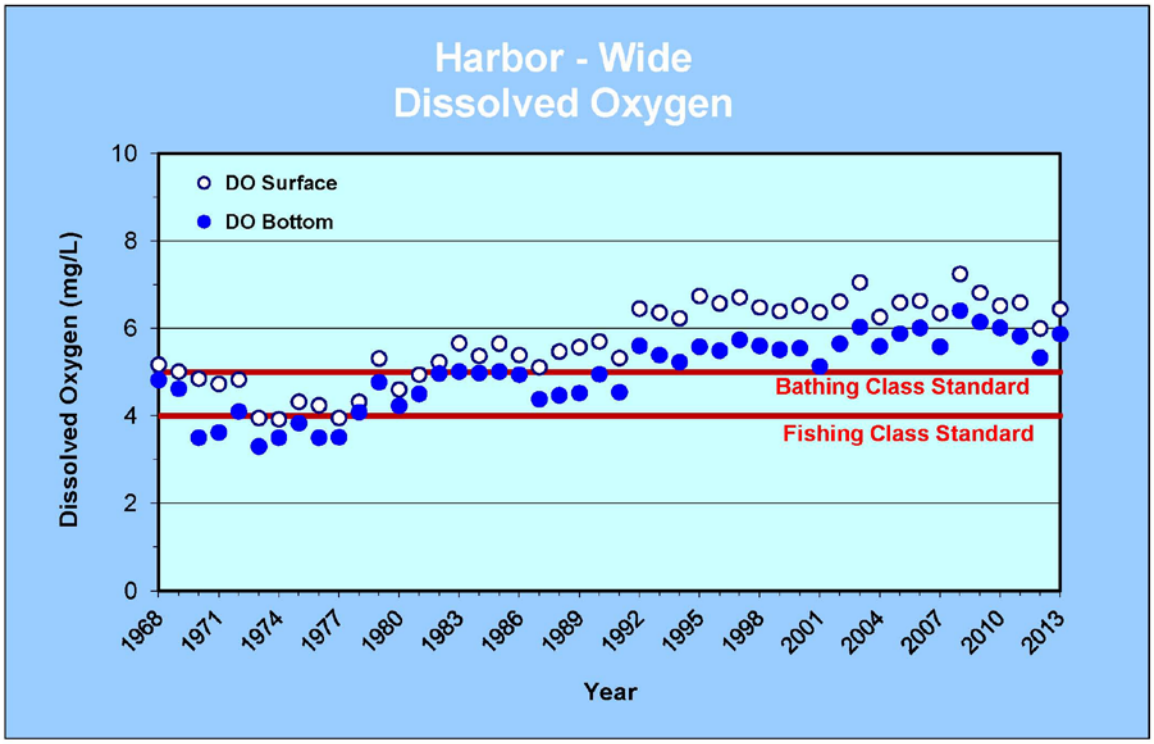


Figure 8: Dissolved Oxygen for Harbor Survey Key Stations (1968-2013)

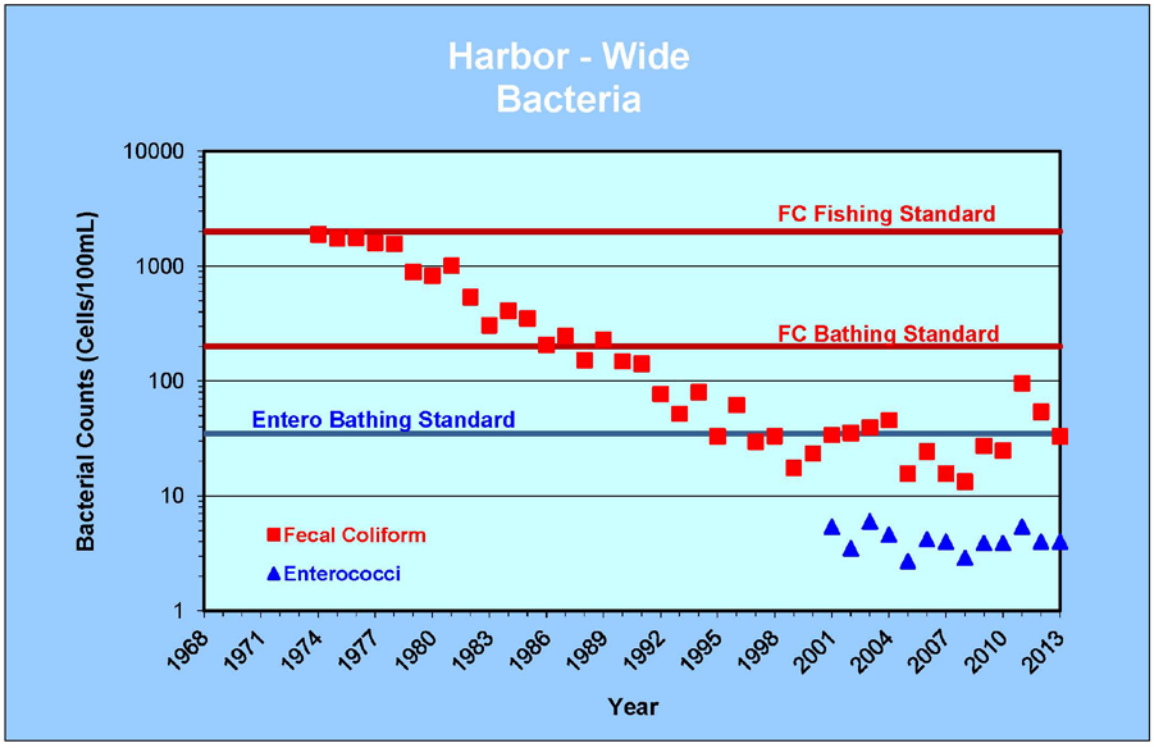


Figure 9: Fecal Coliform Counts for Harbor Survey Key Stations (1974-2013)

Collection Systems Supervisory Control and Data Acquisition (SCADA). NYCDEP recently completed and implemented the Citywide Collection Facilities SCADA System (CCFISS) which is the consolidation of the extensive wastewater collections SCADA system. This system provides monitoring and reporting for the vast collection system for NYCDEP operations.

Sludge Vessels. In 2014, NYCDEP commissioned three new sludge vessels, the Motor Vessel (M/V) Hunt's Point, the M/V Port Richmond and the M/V Rockaway. The three new ships join the M/V North River and the M/V Red Hook sludge vessels. The sludge vessels transport liquid sludge from the six wastewater treatment plants not served by onsite dewatering facilities to those wastewater treatment plants with dewatering facilities.

Environmental Health & Safety (EH&S). NYCDEP maintains a robust and comprehensive EH&S program across all bureaus throughout the NYCDEP. NYCDEP provide consistent EH&S training so that staff can carry out their work responsibilities safely and in compliance with the many local, state and federal regulations. The EH&S Group is responsible for a comprehensive EH&S compliance program, all EH&S training, audits, EH&S employee surveys and the NYCDEP internal compliance office.

Operations and Maintenance Program Summary

Staffing levels for the System, when combined with capital and operating programs are sufficient to provide for adequate operation of the current System. NYCDEP has continued to evaluate increased staffing efficiencies and consolidation of groups within operations. BWSO will manage/operate the Croton treatment facility when it comes on-line and when commissioning is complete in May 2015. Succession planning and recruitment will continue to be a key priority for NYCDEP management.

The operating bureaus continue to evaluate and find effective means to operate more efficiently without impacting the overall operation and maintenance (O&M) of the System. NYCDEP has implemented alternative chemical procurement opportunities and reduction of nonessential expense items without impacting the system-wide water supply, water distribution and wastewater treatment processes. NYCDEP and the OpX contract will continue to evaluate reductions in the O&M expense budget without impacting the integrity of their operations.

9.0 OTHER NOTEWORTHY ISSUES AND COMMENTS

NOVs

As a result of the fire in the engine room at the North River WWTP in July 2011, NYSDEC issued a Notice of Violation (NOV) to the NYCDEP due to the bypass during the plant shutdown. NYCDEP requested a withdrawal of the NOV and NYSDEC denied the withdrawal. On July 15, 2013, a brief power failure at North River WWTP caused a discharge of untreated wastewater to the Hudson River. NYCDEP and NYSDEC continue discussing these North River WWTP events and the NOV.

NYSDEC issued NOVs to four WWTPs and the Spring Creek CSO Facility in 2014. NYCDEP responded to NYSDEC regarding the NOVs in a letter sent in August 2014. Further discussions between NYCDEP and NYSDEC are anticipated to address these NOVs.

Natural Gas Exploration

On December 17, 2014, Governor Cuomo announced a ban on high volume hydrofracking (HVHF) in New York State, including the Catskill/Delaware watersheds. No permits have been issued in the NYC watershed. NYSDEC is expected to finalize its EIS evaluating HVHF. Once that occurs NYS is expected to pass legislation to ban HVHF on New York State.

Gowanus Creek and Newtown Creek Superfund Designations

In March 2010, the Gowanus Canal was declared a Superfund site and in September 2010, Newtown Creek was declared a Superfund site. USEPA has notified NYC that they are considered a potential responsible party (PRP) for hazardous waste under Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) for both Superfund sites.

On September 30, 2013, USEPA issued its Record of Decision (ROD) for the Gowanus Canal, establishing the dredging, capping and source control requirements. The ROD requires NYC to build two costly CSO retention tanks as part of the source control component due to the CSO contribution at Gowanus Canal. In December 2013, NYCDEP completed and reactivated the Gowanus Canal Flushing Tunnel to directly improve water quality and circulation within the canal. In May 2014, USEPA issued a unilateral Administrative Order requiring the City to design major components of the remedy for the Gowanus Canal, including the CSO retention tanks. NYCDEP is proceeding with the siting and design for the proposed tanks, in accordance with the Order. NYCDEP has communicated with USEPA regarding their concerns with the unilateral Administrative Order, costs, alternative tank design and the project schedule. Funding of $300 million is included in the Ten Year Capital Plan for the construction of the Gowanus Canal CSO retention tank.

NYCDEP has entered into an Administrative Settlement Agreement and Order on Consent with EPA, along with five other potential responsible parties that own or operate facilities adjacent to Newtown Creek in the investigation of conditions in Newtown Creek and the evaluation of feasible remedies. The Remedial Investigation/Feasibility Study (RI/FS) is ongoing. The RI/FS is expected to take several years. The City is responsible for a portion of the cost of the study; however the settlement does not cover any remediation that might eventually be chosen by USEPA to address the contamination identified as a result of the investigation and evaluation.

In May 2014, the USEPA listed Wolff-Alport Chemical Company in Queens as a Superfund site, based upon radioactive contamination at the site. USEPA has indicated that the Superfund process would include an investigation of impacts to the NYCDEP sewer system from operations at the chemical company site. Radioactive material was disposed of on-site and into the sewer system.

There are future potential financial impacts to NYC for the Superfund sites; however, the extent to which NYC will be responsible has not yet been fully determined.

Awards

American Council of Engineering Companies (ACEC) awarded the Newtown Creek NC-41 Central Residuals Building the Engineering Excellence Diamond Award in 2014. The NYCDEP Advanced Wastewater Treatment Project also received an ACEC Diamond Award in 2014.

10.0 SUMMARY AND CONCLUSIONS

Regarding System Management

In our opinion, the System continues to be managed in a professional and prudent manner with an appropriate regard for the level of service afforded to the users.

Regarding the Capital Improvement Program (CIP)

Projects that are not fully funded in the Ten Year Capital Plan:

- *Climate Change Resiliency, Energy Efficiency, Sustainability Projects*: NYCDEP is evaluating other funding mechanisms for climate change resiliency and energy efficiency

projects. There will be a need in the future for additional NYCDEP funding to pursue these projects. This might result in an incremental cost added to some state of good repair projects or entirely new projects. Additional funding may be identified in the next budgeting cycle.

Additional increases in funding may be necessary in the next budget cycle, depending upon the outcome of negotiations with regulators and/or ongoing evaluations. The most notable projects are:

- *Combined Sewer Overflow (CSO) Program*: NYCDEP will submit several Long Term Control Plans (LTCPs) in the next few years. NYCDEP and NYSDEC are currently negotiating modifications to the CSO Program. Depending upon the outcome of the studies and the ongoing discussions, additional funding may be required for the CSO Program beyond this budget cycle.

- *Hillview Reservoir Cover*: The NYCDEP and the federal EPA have been considering the installation of a fixed concrete cover over the Hillview Balancing Reservoir. The cost of this cover is estimated at approximately $1.6 billion and is not included in this Ten Year Capital Plan. The outcome of the federal review of Long Term 2 Enhanced Surface Water Treatment Rule (LT2) which will be completed in 2016 will impact the decision to cover the reservoir. If it is found necessary, additional funding will be required.

- *Total Residual Chlorine (TRC):* Pending the outcome of the negotiations with the regulators additional funding may be required for additional facilities at the WWTPs for the TRC Program.

- *Municipal Separate Storm Sewer System (MS4):* Capital costs have not yet been identified. NYC is required to submit a fiscal analysis of the capital, operating and maintenance costs necessary to meet the requirements of the permit within three years of the permit date.

Regarding the Physical Condition of the System

In our opinion, the NYCDEP facilities and infrastructure are in adequate condition and are similar to water and wastewater assets in other urban areas nationwide. As indicated, an Asset Management program is being utilized by NYCDEP that better identifies the needs and costs for infrastructure upgrades. These needs will have to continue to be addressed and implemented as they are identified. NYCDEP is taking a proactive approach prioritizing their needs and spending money (capital investment and operating expenses) where it will have the greatest impact to the water and wastewater system operations, reliability and redundancy, and to the water quality in the upstate watershed and the surrounds NYC waterways. NYCDEP has started to move from the planning stage to implementation phase of climate change adaptation based upon sound cost-effective analysis and this process will need to continue. Prioritization of greatest need is a significant factor in moving forward with implementation of climate change resiliency. Because of the extensive nature of the NYCDEP facilities, continued diligence and future capital improvements will be necessary.