

March 1, 2016

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 2016 Consulting Engineer's Report

Dear Mr. Paolicelli:

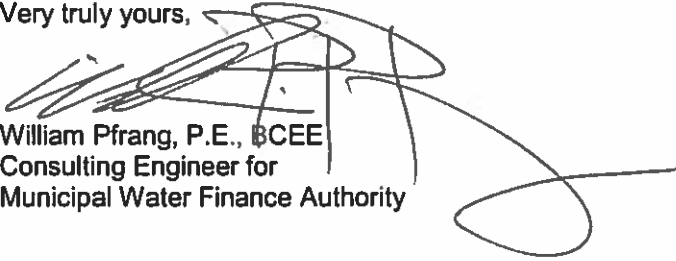
We herewith submit the Fiscal Year 2016 Consulting Engineer's Report on the operation of the Water and Sewer System of the City of New York. This Report addresses the condition and operation of the System as it presently stands, as well as the adequacy of capital and operating programs for Fiscal Years 2016 and 2017.

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 2016 and Fiscal Year 2017 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



**THE NEW YORK CITY MUNICIPAL WATER
FINANCE AUTHORITY**

**FISCAL YEAR 2016 CONSULTING ENGINEER'S
REPORT**

PREPARED BY

AECOM

March 1, 2016

TABLE OF CONTENTS

<u>TITLE</u>	<u>PAGE</u>
1.0 PURPOSE AND SCOPE OF THE REPORT	1
2.0 METHODOLOGY FOR ANALYSIS	1
3.0 THE CONSULTING ENGINEER.....	2
4.0 THE CONSULTING ENGINEER'S CONCLUSIONS.....	2
5.0 OVERVIEW OF THE SYSTEM.....	2
5.1 Water Supply System.....	2
5.2 Wastewater System	4
6.0 MANAGEMENT OF THE SYSTEM	7
7.0 CAPITAL IMPROVEMENT PROGRAM (CIP)	9
7.1 Overview	9
7.2 System-wide Programs	12
7.3 Capital Program Accomplishments.....	15
7.4 Capital Improvement Program Highlights for the Water System (Supply, Treatment, and Conveyance Programs)	15
7.5 Capital Improvement Program Highlights for the Wastewater and Stormwater System	19
7.6 Superfund Designations.....	22
7.7 Potential Water and Wastewater Projects Beyond Current Capital Plan.....	22
8.0 PERFORMANCE OVERVIEW.....	24
9.0 OTHER NOTEWORTHY ISSUES AND COMMENTS.....	31
10.0 SUMMARY AND CONCLUSIONS.....	32

LIST OF FIGURES

Figure 1: New York City Water Supply System	3
Figure 2: New York City Water Conveyance Infrastructure	5
Figure 3: New York City Wastewater Treatment Plants	6
Figure 4: NYCDEP Historical and Projected Budgets	11
Figure 5: New York City Average Daily Water Demand in Million Gallons per Day (MGD)	24
Figure 6: NYCDEP – Staffing and Vacancy Levels FY 1997-2016	25
Figure 7: Total NYCDEP Water Main Breaks per Fiscal Year.....	26
Figure 8: Sewer Backup (SBU) Complaints.....	27
Figure 9: Dissolved Oxygen for Harbor Survey Key Stations (1968-2015)	29
Figure 10: Fecal Coliform Counts and Enterococci for Harbor Survey Key Stations (1974-2015).....	29

THE NEW YORK CITY MUNICIPAL WATER FINANCE AUTHORITY
Fiscal Year 2016 Consulting Engineer's Report

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) 2016 capital budget and Fiscal Year 2017 projected capital budget for the System,
- Fiscal Year 2016 expense budget and FY 2017 projected expense budget relative to operation and maintenance of the System,
- overview of the Preliminary Four Year Current Capital Plan for Fiscal Years 2016 to 2019, 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 NYCDEP and discussions with representatives of the Authority,
- 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. AECOM currently has nearly 85,000 employees worldwide and serves clients in more than 150 countries. In 2015, Engineering News Record (ENR) magazine ranked AECOM #1 in the top 500 overall design firm category for the sixth 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) 2016 satisfy the current needs for the System including all legally mandated projects, which comprise approximately 30% of the capital budget for FY 2016.
- NYCDEP capital and expense budget projections for FY 2017 satisfy the current needs for the System including all legally mandated projects, which comprise approximately 18% of the capital budget for FY 2017.
- The physical condition of the System receives an adequate rating, our highest rating.
- Staffing levels are approximately 91% of current allocations. NYCDEP is working diligently on recruitment practices, succession planning and training in order to strengthen and incentivize NYCDEP staff. The ongoing reorganization will align core skill sets and overall strengthen the NYCDEP organization. The reorganization is not anticipated to result in a reduction of staff, but rather reallocation of staff and perhaps new staff.

5.0 OVERVIEW OF THE SYSTEM

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

5.1 Water Supply System

The NYC water is supplied from 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 Catskill and Delaware systems currently provide the majority of the NYC daily water supply. The Croton system is available to supplement the Catskill and Delaware systems. 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 2015 was 1.01 billion gallons per day (BGD) which has not changed significantly since 2010. Upstate water consumption for FY 2015 was 114 million gallons per day (MGD).



Figure 1: New York City Water Supply System

The New York City water supply is conveyed by gravity from the upstate reservoirs through an extensive system of gravity tunnels and aqueducts. The Catskill Aqueduct conveys water from the Ashokan Reservoir to the Kensico Reservoir and the Delaware Aqueduct conveys water from the Rondout Reservoir to the Kensico Reservoir. Because of the high quality water supplies upstate, the Delaware and Catskill watersheds are unfiltered and operate under a federally-mandated Filtration Avoidance Determination (FAD) which specifies disinfection by chlorine and ultraviolet (UV) treatment. The Catskill/Delaware UV Disinfection Facility, treating water from Kensico Reservoir, commenced operations in the fall of 2012, feeding water to the city through the Hillview Reservoir. The UV Facility, located at a 153 acre facility between Kensico and Hillview reservoirs, has a design capacity of 2.4 BGD.

Croton system water is delivered from the New Croton Reservoir by the New Croton Aqueduct to the Jerome Park Reservoir in the Bronx. From there the water is sent to the Croton Water Filtration Plant (WFP), which came online and started to send water into the NYC distribution system in May 2015. After treatment, the water is conveyed through finished water tunnels to the distribution service areas. The Croton WFP has a capacity of 290 MGD. Use of the Croton WFP will vary based upon NYCDEP's operational needs.

Both Kensico Reservoir and Hillview Reservoir serve as balancing reservoirs for the water system, handling the daily and hourly fluctuations of water demand, respectively. Figure 2 shows the NYCDEP conveyance capabilities downstream of these reservoirs. 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.

5.2 Wastewater System

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 3 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) which are necessary 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 3, eight of the WWTPs are required to provide Biological Nitrogen Removal (BNR). Four of the Upper East River WWTPs and two of the Jamaica Bay WWTPs have been upgraded and are currently operating in BNR mode. Two of the Jamaica Bay WWTPs are currently in the design 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). During dry weather, the combined sewers carry municipal wastewater to the WWTPs. During a wet weather event wastewater, rainwater and surface water runoff is also collected in 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



Figure 2: New York City Water Conveyance Infrastructure

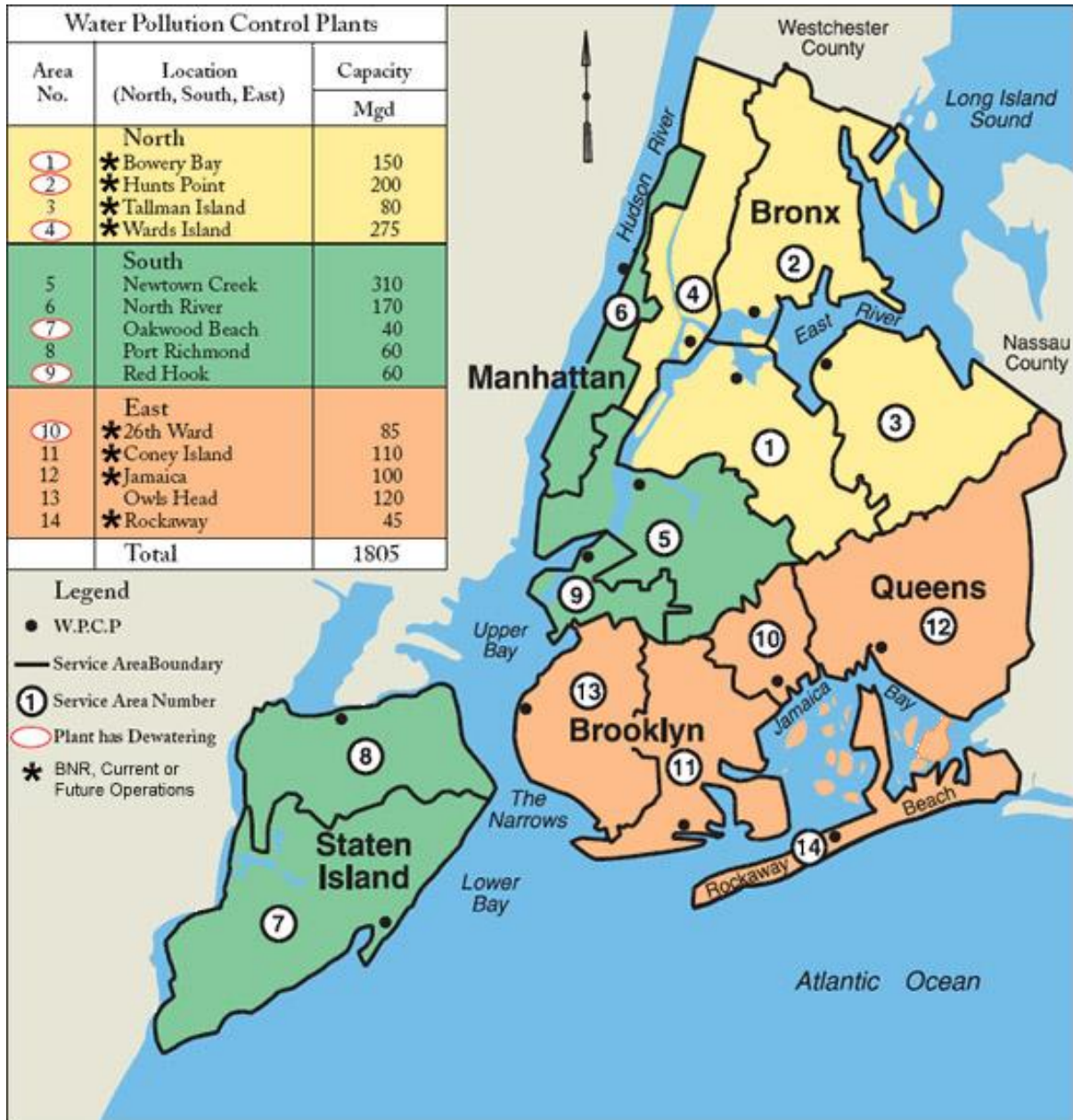


Figure 3: New York City Wastewater Treatment Plants

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.

6.0 MANAGEMENT OF THE SYSTEM

Organizational Structure

In February 2014, Mayor deBlasio announced that Emily Lloyd would be returning as the Commissioner of the NYCDEP. Commissioner Lloyd returned to NYCDEP 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.

NYCDEP has very recently undergone reorganizational changes within the operating bureaus to better align skill sets for drinking water supplies and stormwater management. Due to the consolidation of drinking water treatment operations under the Bureau of Water Supply (BWS), the management, operation and maintenance of the Croton WFP, Hillview Reservoir and Jerome Park Reservoir has been transferred from Bureau of Water and Sewer Operations (BWSO) to BWS. BWSO will expand its focus on stormwater management and build-out stormwater infrastructure. BEDC is currently in the process of developing a Stormwater Engineering Group to address long-term planning around stormwater management.

- The Utility Operations consist of the three operating Bureaus: Bureau of Wastewater Treatment (BWT), Bureau of Water Supply (BWS) and (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. 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 water supply system to deliver a sufficient quantity of high quality drinking water. Due to the consolidation of the drinking water treatment operations under BWS, organizational changes within BWS have recently been made. Two new directorates have been formed within BWS – Water Treatment Operations Directorate and Source Water Operations Directorate. The Water Treatment Operations Directorate will focus on the treatment of water once it leaves the reservoirs and moves toward the distribution system. Their responsibilities include the management, operation and maintenance of Kensico Reservoir and its facilities, CAT/DEL UV Disinfection Facility, Hillview Reservoir, and the Croton Water Filtration Plant. The Source Water Operations Directorate will be responsible for the storage and transmission of drinking water, maintenance of reservoirs, dams and other infrastructure, downstream releases and treatment at upstate wastewater treatment plants. BWS conducts extensive monitoring of water quality, both within the City's distribution system and throughout the upstate watersheds. BWS is also 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 system, wastewater collection system, Bluebelts and more recently Green Infrastructure (Green Jobs). BWSO field operations are responsible for the following: (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 coordinates closely with the NYC Department of Design and Construction (DDC), since DDC does the design of the water mains and sewers that BWSO is responsible for once in use. BWSO is focused on stormwater management issues. BWSO is working diligently analyzing the problems and determining solutions to alleviate the Southeast Queens flooding issues.
- 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, and stormwater/CSO facilities. A newly created group within BEDC, known as the Stormwater Engineering Group will collaborate with Sustainability, BWSO and BWT to address current and future long-term planning for stormwater infrastructure. The Project Management Information Systems (PMIS) continues to make project management more efficient by tracking cost and project schedule performance. BEDC is now using e-Builder, a robust comprehensive electronic program management tool to track projects. e-Builder will provide transparency and improved project management for BEDC projects. BEDC in-house design and construction management groups continue to improve project delivery for various NYCDEP projects. The BEDC Sustainability Group uses Envision™, a sustainability certification rating system, to perform triple bottom line evaluations on BEDC 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), Hazardous Materials and Superfund Planning & Analysis, and the Bureau of Environmental Compliance (BEC). The 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 Sustainability Group is also responsible for implementing OneNYC initiatives throughout the agency, and will also develop long-term strategies to meet the NYCDEP's water quality goals. 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 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 regulatory requirements/legal mandates, mayoral initiatives such as OneNYC, 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 and determines the most important funding requirements across all NYCDEP programs.

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 next Ten Year Capital Program will be released January 2017. The Preliminary Four Year Current Capital Plan for FY 2016 through FY 2019 was published on January 21, 2016 and is the document considered herein. This review includes the budget for FY 2016, which ends on June 30, 2016, and the budget for FY 2017, which begins on July 1, 2016. AECOM has reviewed the Preliminary Four Year Current Capital Plan and met with key individuals responsible for budgetary planning to provide an assessment of its adequacy. It is anticipated that the Mayor will issue the Executive Budget in April 2016. Our findings are summarized in the following paragraphs.

Regarding FY 2016

The Preliminary Plan FY 2016 budget is set at \$2.327 billion. Approximately 30% of FY 2016 funding supports mandated projects, consisting primarily of CSO (green and grey infrastructure) projects and the 26th Ward WWTP wet weather stabilization upgrades. Additional mandated projects in FY 2016 include filtration avoidance determination (FAD) requirements, Croton WFP including park projects, the total residual chlorine (TRC) program, some BNR upgrades and citywide repairs of intercepting sewers and CSO reduction sewer system improvements. NYCDEP has indicated that all legally

mandated projects are fully funded in FY 2016. Significant funding is also included in FY 2016 for the accelerated water main replacement work, storm sewer buildout for Southeast Queens, water distribution system and wastewater collection sewer work, wastewater treatment plant SOGR projects, water supply infrastructure SOGR projects, emergency contracts for water and sewer work, and water main work associated for City Tunnel #3, and water supply infrastructure SOGR projects.

Regarding FY 2017

The Preliminary Plan FY 2017 budget is set at \$3.219 billion. Approximately 18% of FY 2017 funding supports legally mandated projects, such as CSO projects (grey and green infrastructure), storm sewer build-out and FAD requirements. NYCDEP believes that all legally mandated projects will be fully funded in FY 2017. The budget allocation for FY 2017 is relatively high because of significant funding increases for storm sewer buildout for Southeast Queens, accelerated water main replacement work, wastewater treatment and conveyance SOGR projects, specific sewer and water main work, Bluebelt land acquisition and construction, and water supply infrastructure SOGR projects.

Regarding the Current Four Year Plan for FY 2016 to FY 2019

The Preliminary Four Year Current Capital Plan for FY 2016-2019 consists of \$9.983 billion in funding, approximately \$1.7 billion greater than the previous quarterly update to the Four Year Current Plan. Approximately 22% of the total funding for FY 2016-2019 is dedicated to mandated projects, which is consistent with the recent trend of decreasing NYCDEP mandated projects, as shown in Figure 4. 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 2016 consist of green and grey infrastructure and FAD requirements. 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 State of Good Repair needs of the system and significant more BWSO water main replacement and sewer work. However, as discussed later in this report, the mandated CSO Program and the MS4 program may require additional funding beyond the ten year planning horizon. Although, it is not anticipated that there will be as many large mandated projects occurring simultaneously as there was in FY 2008-FY2010, there is likelihood for additional funding for mandated projects in the next Ten Year Capital Plan. In addition there is likelihood for increased needs for SOGR in the next Ten Year Capital Plan based upon the ability to more readily identify needs using the Asset Management tools currently in place.

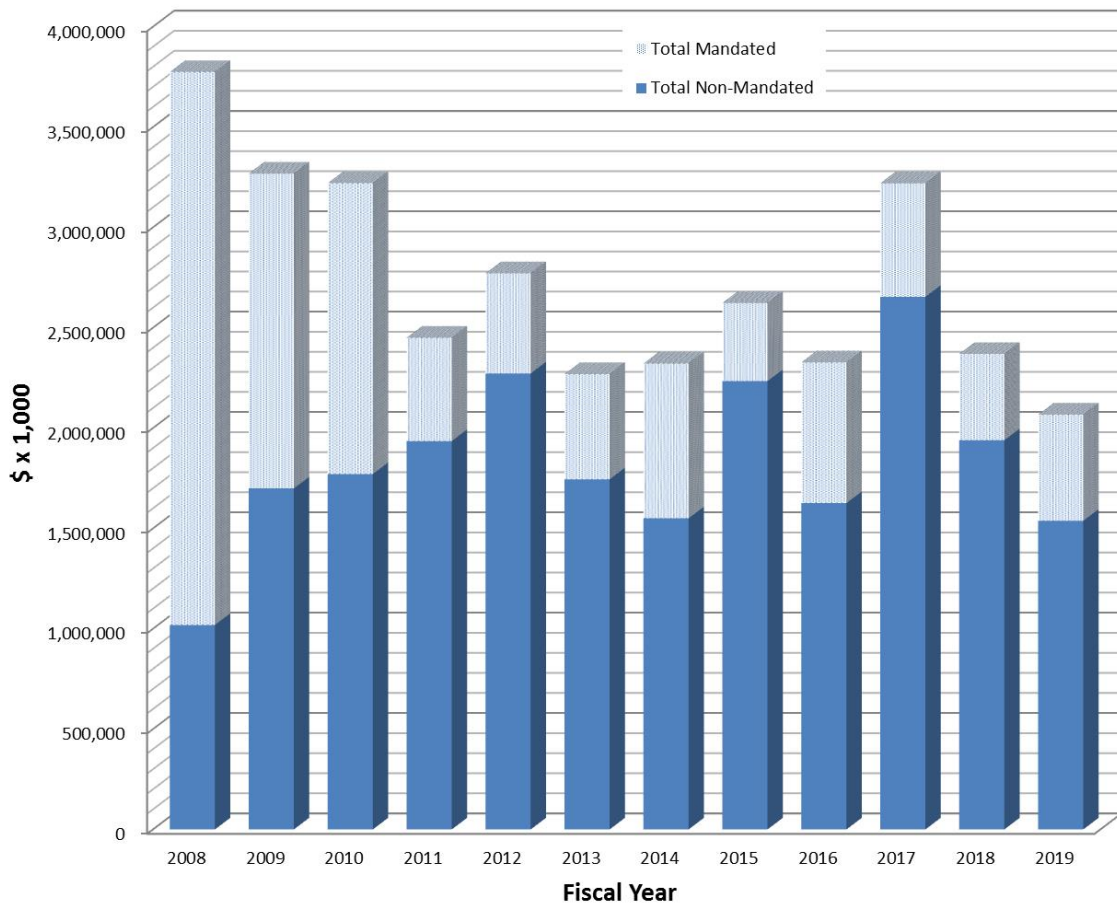


Figure 4: NYCDEP Historical and Projected Budgets

As in most US cities, the NYCDEP water and wastewater 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 its 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 SOGR projects and water distribution system and sewer projects. Approximately 38% of the total funding for FY 2016-2019 is dedicated to various programs addressing in-city water, sewer work, including the accelerated water main program, the Southeast Queens storm sewer build-out, emergency contracts for water and sewer street work, programmatic replacement and repairs. Approximately 32% of the total funding for FY 2016-2019 is dedicated to the SOGR projects. For example there is significant SOGR work funded for wastewater treatment pump stations (PSS), tank work at the WWTPs, and solids handling facilities at the WWTPs. NYCDEP is making significant strides in dedicating funds to the SOGR projects across all bureaus and continued increased funding for water and sewer work across the city. Other priority projects that NYCDEP is funding provide redundancy for the water supply system, such as the water for the Future program and the Kensico-Eastview Connection Tunnel.

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 its 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 provided 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 adaptation analysis. The possible adaptation strategies ranged in varying degrees of resiliency, effectiveness and cost.

NYCDEP BEDC has awarded a Resiliency Program Management contract and has established contracting mechanisms to implement resiliency projects across 14 WWTPS and 96 pump stations. 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 the October 2013 study will be reassessed with detailed site analyses during the design. NYCDEP has adopted new design standards to account for the critical flood elevation with Flood Emergency Management Agency (FEMA) maps. NYCDEP has developed *Resiliency Design Guidelines*. As part of the October 2013 study, Storm Surge Guidance was also developed for all 14 NYCDEP WWTPs to assist NYCDEP staff in preparations in advance of another potential 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 through 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 adaptive 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 (grey infrastructure) stormwater collection system. NYCDEP continues to focus on climate change as it evaluates its stormwater management needs.

NYCDEP maintains strong involvement with the climate change science community on the City, State, national and international level. NYCDEP initiated a three-year working partnership with Copenhagen, Denmark. The knowledge sharing between the NYCDEP and Copenhagen will involve best practices in response to intense rain events and stormwater management. NYCDEP was represented at the United Nations Educational, Scientific and Cultural Organization's International Conference on Water, Megacities, and Global Change in Paris, France in December 2015. On the national level, NYCDEP maintains utility membership and actively engaged with the Water Utility Climate Alliance (WUCA) and the National Association of Clean Water Agencies (NACWA).

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 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* have provided a framework to prioritize and package projects that are ready to be implemented with outside sources of funding.

OneNYC: NYCDEP Sustainability Initiatives

On April 22, 2015, Mayor deBlasio released *One New York, The Plan for a Strong and Just City Report* (OneNYC). This comprehensive plan focuses on four principles - growth, sustainability, resiliency and equity. OneNYC is an expansion of the previous sustainability plan, PlaNYC. 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. Mayor deBlasio 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 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 NYCDEP 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 is looking at energy control measures at each of the WWTPs. One case study has been completed by NYSERDA, and NYCDEP has received funding to evaluate energy control

measures on a case by case basis for the remaining 13 WWTPs. NYCDEP is evaluating the incorporation of energy efficiency with SOGR projects.

As NYCDEP's largest WWTP, Newtown Creek produces 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 under design. This project will improve local air quality, reduce citywide greenhouse gas emissions, utilize a renewable energy resource, and supplement citywide natural gas supply with high quality ADG. 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 has 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 has implemented 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. If the demonstration project is successful, the goal would be to send 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 and solar panels at NYCDEP facilities. Cogeneration at North River WWTP is proceeding. Cogeneration at other WWTPs is being evaluated. Solar panels have been installed at the Port Richmond WWTP in Staten Island.

In 2014, NYCDEP received a Federal Energy Regulatory Commissioner (FERC) license for the installation of a 14 megawatt hydroelectric facility consisting of four hydro-electric turbines at Cannonsville Reservoir and Dam in the NYC upstate watershed. In the summer of 2015, while the contractor was on site drilling borings in preparation of the hydroelectric facility design and construction phases, turbid flow was found below the dam. It is thought that the drilling connected into artesian conditions which were known to exist in areas of the dam foundation. The Cannonsville Dam remains well monitored and is deemed safe, however, all drilling for the hydropower facility was halted. NYCDEP's main concerns are dam safety, maintaining operational control over the dams and the ability to meet flow management agreements. NYCDEP is planning to conduct a Feasibility Study to determine the viability of a hydroelectric facility at Cannonsville Dam in the future. NYCDEP has requested an extension of the construction milestones that are required under the FERC license.

Asset Management

NYCDEP recently initiated a new 5-year Asset Management contract, to provide a third party independent review of all assets. NYCDEP asset management program includes the majority of the water and wastewater infrastructure. The results of the asset management program will be used in the development of the funding needs for the state of good repair for the next 10-Year Capital Plan. This 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.

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 Croton WFP became operational in May 2015, prior to the Consent Order milestone, providing water to the NYC water distribution network. In November 2015, Croton WFP demonstrated operation at full capacity, 290 MGD.
- The Water for the Future by-pass tunnel construction contract (BT#2) valued at \$706 million was registered in June 2015. Notice to Proceed (NTP) was given in July 2015.
- Testing has begun for the newly constructed Catskill/Delaware connection at Shaft 4, which will provide operational flexibility for water conveyance. The Shaft 4 connection will allow the transfer of water from the Delaware Aqueduct to the Catskill Aqueduct, when necessary.

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. Contract BT#2, the by-pass tunnel construction was awarded in 2015. There is approximately \$250.5 million in funding in the Preliminary Four Year Current Capital Plan for the Water for the Future program, which consists of \$10.9 million for the by-pass tunnel and repairs and \$239.6 million in water supply augmentation projects (when the Delaware Aqueduct is not in service for by-pass connection). 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.

Since the early 1990s, NYCDEP has closely monitored the Rondout-West Branch (RWB) Tunnel portion of the Delaware Aqueduct that has shown evidence of water leakage through cracking of the aqueduct concrete 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, remote operated vehicle (ROV) investigations and a series of dives and investigations at Shaft #6. After evaluating several repair alternatives, NYCDEP decided on a comprehensive plan to build a two and a half mile bypass tunnel around the leaking 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 tunnel construction contract (BT#2) was initiated 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 shut down 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 demand management measures and optimization of the Upper Catskill Aqueduct to increase its capacity as water supply augmentation projects that will be in place before the tunnel is taken out-of-service. Reactivation of the Queens groundwater system is no longer required as part of the water supply augmentation plan; however, NYCDEP plans to renew the groundwater permits in 2017 for added protection against drought or other emergency.

NYCDEP is implementing 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 \$84 million in the Four Year Current Plan.

A project to repair and rehabilitate the Upper Catskill Aqueduct (from Ashokan Reservoir to Kensico Reservoir) is funded at \$130.8 million in the Four Year Current 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.

Additional water transmission projects are underway to increase the reliability and flexibility of water supply operations. The interconnection of the Delaware Aqueduct with the Catskill Aqueduct at Shaft #4, which allows water from the Delaware Aqueduct to be diverted to the Catskill Aqueduct came into operation in 2015. This interconnection gives operational flexibility and an additional tool in dealing with turbidity incidents following high rainfall in the Catskill watershed. 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 Storm Irene and Tropical Storm 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 Four Year Current Plan at a level of approximately \$140 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. Additional capital funding may be required to support the next FAD program beyond the current 2017 FAD. NYCDEP plans to submit the required five-year assessment of water quality and program status to NYSDEC in May 2016. NYCDEP and NYSDOH will continue discussions for the next FAD. In December 2016, NYCDEP will submit a Long-Term Watershed Protection Plan.

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. This is an important high priority project for NYCDEP, therefore they have decided to move forward with design of a new tunnel, Kensico Eastview Connection (KEC2) Tunnel. Funding of \$132 million is included in the Four Year Current Plan, which includes \$35 million for design and \$97 million for construction management. The current construction estimate is \$1.2 billion, therefore significant additional funding is required for construction in the next Ten Year Plan in order to move ahead with this priority. NYCDEP continues to evaluate project schedule as the sequencing of KEC2 may impact other water system projects.

Dam Safety

Upstate reservoir dams are critical infrastructure for NYCDEP operations and the safety of the surrounding communities. NYCDEP has committed to go beyond the level of protection currently required by New York State, which requires existing dams to be capable of safely passing half of the probable maximum flood (PMF). When capital improvements are made at a dam, NYCDEP commits to providing that the dams safely pass the full PMF.

Due to SOGR needs to provide continued dam safety, there is \$129.3 million in funding for the Olive Bridge Dam at the Ashokan Reservoir. Additional funding will be required in the next Ten Year Plan for additional construction at Ashokan Reservoir/ Olive Bridge Dam. The full long-term rehabilitation upgrades for the Gilboa Dam that brought the dam into compliance with the NYSDEC dam safety guidelines have been completed. A contract for \$143 million for the new low level outlet was awarded in FY15. The remaining upgrades at Gilboa Dam are funded at approximately \$39.8 million in the Four Year Current Capital Plan.

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. NYCDEP is planning to let a new contract for In-City Dam Inspections.

Croton Water Filtration Plant

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. The Croton WFP is located underground, beneath Van Cortlandt Park in the Bronx. It is the largest underground water filtration plant in the United States. It is also the largest stacked DAF filter plant in the United States.

NYCDEP met Croton milestone of sending potable water into the NYC distribution network on May 7, 2015 before the Croton Consent Order date of May 17, 2015. In November 2015 the Croton WFP operated at full capacity and delivered 290 MGD to high level and low level service areas. The Croton WFP will continue operating under the Croton Consent Order for a 12-month compliance period. NYCDEP anticipates submitting the requirements for the Final Completed Works Approval to NYSDOH in 2016.

Approximately \$102.9 million is included in the CIP for 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 \$42.9 million is included in the CIP for payments to the Parks Department in connection with the Croton WFP. NYCDEP is reviewing the energy demand for standby power for the Croton WFP to increase dependability in case of a major power outage. The additional facilities for standby power are currently not funded in the Croton budget.

Accelerated Water Main Replacement

Significant additional funding has been allocated in the Four Year Current Capital Plan for the acceleration of water main replacement. NYCDEP anticipates working with DDC to address areas with recurring problems and replacement of the oldest cast iron assets, when possible. Funding of approximately \$337.8 million has been allocated over the Four Year Current Capital Plan, \$100 million per year for the next three years, for accelerated water main replacement.

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 gas utilities (Con Edison and National Grid) to coordinate underground construction projects, accelerate the pace of replacement of old infrastructure and make improvements to emergency response.

City Tunnel No. 3, Stage 2

City Tunnel No. 3 Brooklyn/Queens activation has been deferred. There is funding of \$52 million for design and site acquisition of Shaft 17B and 18B required for activation of City Tunnel No. 3. 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. NYCDEP anticipates including significant additional funding for City Tunnel No. 3 Brooklyn/Queens activation in the next Ten Year Capital budget. Funding of \$63.8 million is included in the Four Year Current Plan for DDC trunk water main projects for City Tunnel No. 3.

7.5 Capital Improvement Program Highlights for the Wastewater and Stormwater System

Combined Sewer Overflow (CSO) Program

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).

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.

At this time, NYCDEP has also submitted the Westchester Creek LTCP in June 2014, the Hutchinson River LTCP in September 2014, the Flushing Creek LTCP in December 2014, the Bronx River LTCP in June 2015, and the Gowanus Canal LTCP in June 2015. NYCDEP is proceeding with the remaining 4 LTCPs, as they have staggered submittal dates, through June 2017. The due date for two LTCPs, for Harlem River and Citywide is still pending. The LTCP Citywide annual public meeting was held on January 12, 2016. The NYSDEC and NYCDEP are in negotiations regarding the approval status of submitted LTCPs and future obligations and commitments of the NYC CSO Program.

In November 2015, NYS adopted a rule 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 recently adopted rule could have financial impacts for compliance with the new water quality standards.

The Four Year Current Capital Plan includes approximately \$775 million in funding for grey infrastructure capital projects for implementation of the CSO Program, which includes \$560 million for the retention tank at the Gowanus Superfund site. Funding for disinfection facilities at Alley Creek, Hutchinson River and Flushing Creek are included in the Four Year Current Plan. Additional funding will be required in the Ten Year Plan and beyond that budget planning period. NYCDEP has completed a financial affordability assessment for the CSO Long-Term Control Plan.

Green Infrastructure

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 an adaptive approach to incorporating green infrastructure into NYCDEP's overall CSO program. DEP's adaptive management strategy includes regular monitoring of green infrastructure performance, continuous evaluation of lessons

learned in the field, furthering the understanding of green infrastructure co-benefits, and development of additional cost-effective tools to implement. NYCDEP has initiated a Research and Development contract to assist them in this effort.

The NYCDEP was unable to meet the first milestone on December 31, 2015 of capturing the equivalent of stormwater generated by one-inch of precipitation on 1.5% of impervious areas in NYC. NYCDEP is developing a Contingency Plan in cooperation with NYSDEC. NYCDEP will consider issues such as implementation challenges, field conditions, timelines, monitoring results, and costs as part of a contingency plan under the Consent Order. As the Order allows DEP to employ adaptive management principles for green infrastructure, the Contingency Plan should revise the green infrastructure implementation goals in more realistic terms by building on actual NYCDEP's experience of the past few years. A CSO Performance Metric report should be submitted to NYSDEC later in 2016. The Green Infrastructure Grant Program will continue for the private sector in 2016 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.

The Four Year Current Capital Plan includes approximately \$569.6 million in funding for green infrastructure projects.

Southeast Queens Stormwater Infrastructure

NYCDEP is performing a comprehensive program to improve drainage to address flooding issues in Southeast Queens. In the 2015 Executive Plan, \$1.5 billion was allocated over 10 years for the Southeast Queens storm sewer build-out program. This is part of a long-term plan to spend \$6 billion over 45 years in Southeast Queens. The Four Year Current Capital Plan includes \$658.2 million of the \$1.5 billion, which is allocated for FY 2016 - FY 2019. NYCDEP is aggressively working on this storm sewer build-out program in southeast Queens. It involves public outreach and close coordination with other city agencies.

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 GHG emission reductions 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 Four Year Current Capital Plan at a level of \$209.7 million. This project is in 90% design and is currently under legal review. 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. 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 (UER) WWTPs (Hunts Point, Bowery Bay, Tallman Island, and Wards Island WWTPs) and two of the Jamaica Bay WWTPs (26th Ward and Jamaica WWTPs) have been operating in Step Feed BNR mode as required by the Nitrogen Consent Judgment for the Phase I Facility Plan and a Stipulation and Order Modifying the Nitrogen Consent Judgment.

NYCDEP, NYSDEC and Natural Resources Defense Council (NRDC) entered into a Jamaica Bay Agreement which includes 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 Four Year Current Capital Plan for the nitrogen

removal upgrades at Coney Island and Rockaway at a combined level of \$28.5 million. The Coney Island BNR design recently underwent a VE review. 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 removal. 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 WWTP that require carbon addition for Phase II BNR is ongoing. Construction completion for these carbon facilities at the UER WWTPS is required by mid-2016. Supplemental carbon addition at 26th Ward WWTP has been completed.

Total Residual Chlorine (TRC)

Prior to discharge to a receiving body, wastewater effluent is disinfected with chlorine at the WWTPs. Excessive residual chlorine can be toxic to aquatic life in the receiving water body. A TRC Consent Order between NYSDEC and the NYCDEP became effective October 2015, which includes interim TRC limits, proposed final TRC limits and compliance schedule for the TRC upgrade projects required at each of the WWTPs. It has already been determined that six WWTPs are unable to achieve the proposed final TRC limits through system optimization. These six plants are North River (NR), Coney Island (CI), Newtown Creek (NC), Owls Head (OH), 26th Ward (26th W) and Oakwood Beach (OB). NYCDEP is proceeding with the design and construction of dechlorination facilities at five of these WWTPs (North River, Coney Island, Newtown Creek, Owls Head and Oakwood Beach). NYCDEP will submit a TRC Facility Plan for 26th Ward WWTP.

For the remaining eight WWTPS, NYCDEP will undergo a performance demonstration period with system optimization, consistent with USEPA and NYSDEC guidance. Upon completion of the performance testing period, NYCDEP will either demonstrate compliance with the proposed TRC final effluents or submit a TRC Facility Plan to determine other required upgrades. The Consent Order also requires an ambient water quality monitoring program.

NYCDEP is currently in compliance with the TRC Consent Order. There is \$43.9 million in the Four Year Current Capital Plan for the TRC program for dechlorination facilities at the required WWTPs and continued water quality monitoring program at the other WWTPs. Additional funding may be required in the next Ten Year Plan for continued implementation of 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 operations at the existing Rockaway WWTP or sending wastewater to 26th Ward WWTP for treatment. 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. After a decision has been determined for future operations, 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 awarded a contract in 2015 to build additional Bluebelts in the Mid-Island region of Staten Island, which was jointly funded by NYCDEP and the United States Department of Agriculture (USDA). Approximately \$302.8 million is included in the Four Year Current Capital Plan for land acquisition and construction to expand the Bluebelts for stormwater management.

7.6 Superfund Designations

In March 2010, the Gowanus Canal was declared a Superfund site and 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 the 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 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 its concerns with the unilateral Administrative Order, costs, alternative tank design, tank siting and the project schedule. Funding of \$560 million is included in the Four Year Current Capital Plan for the design, potential site acquisition and construction management of the Gowanus Canal CSO retention tanks. Additional funding may be required in later years for construction.

In September 2010, Newtown Creek was declared a Superfund site. 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 required 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 on-site and also 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.

7.7 Potential Water and Wastewater Projects Beyond Current Capital Plan

Hillview Reservoir Cover

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 allows 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 December 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 has collected water quality data and provided 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 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.

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 original proposed KCT tunnel would extend from the Kensico Reservoir to the interconnecting valve chamber of City Tunnel No. 3, Stage I, south of Hillview Reservoir. It is anticipated that NYCDEP will evaluate the needs of KCT in relation to the current Kensico Eastview Connection tunnel project. Cost estimates will depend 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 current budget 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 5 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 continued conservation measures, water usage metering, economic downturn and weather patterns.

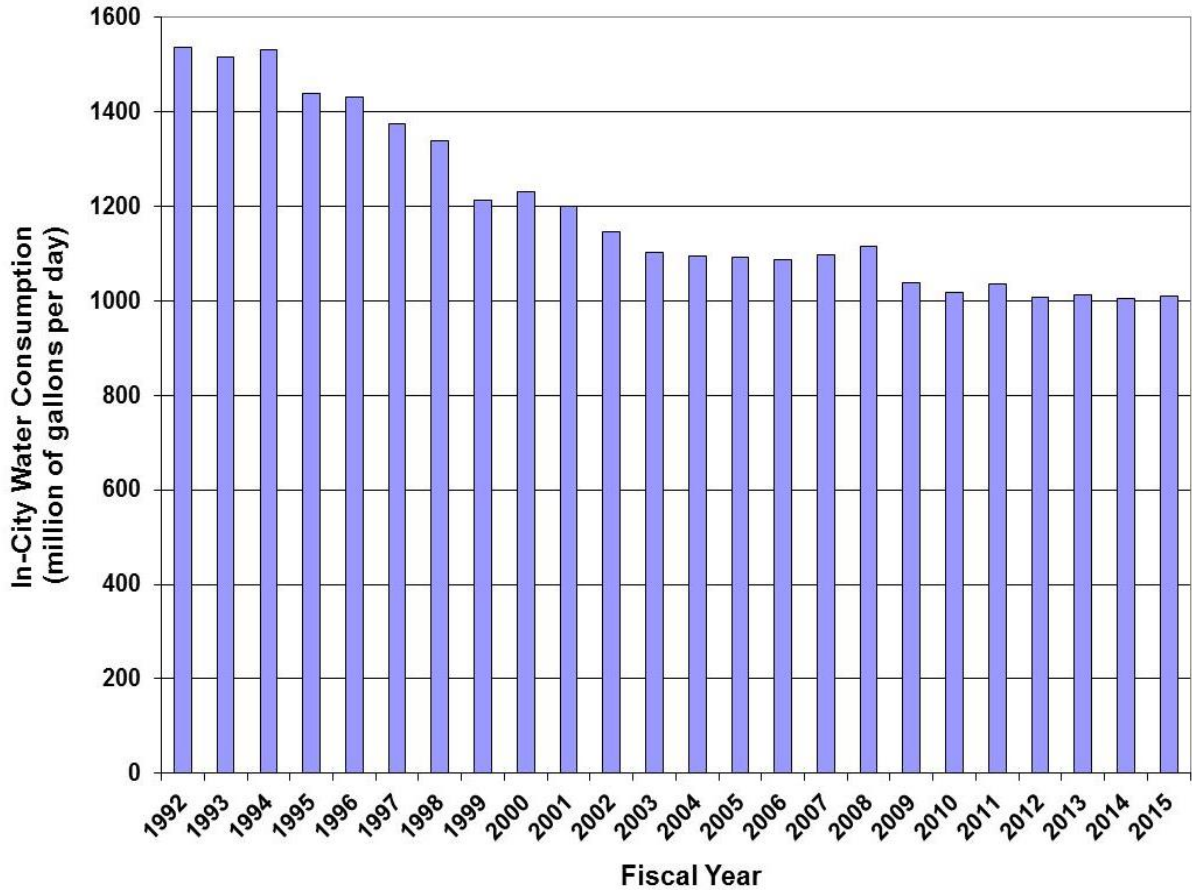


Figure 5: New York City Average Daily Water Demand in Million Gallons per Day (MGD)

System Staffing Levels

Approved positions for the System presently stand at 6,201 for FY 2016 and vacancies currently stand at 578. This reflects an increase in budgeted headcount and an increase in vacancies compared to FY 2015, as shown in Figure 6. 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 and staff retention programs. Recruitment, training and succession planning are essential to maintain a skilled DEP workforce. NYCDEP maintains a strong diverse workforce.

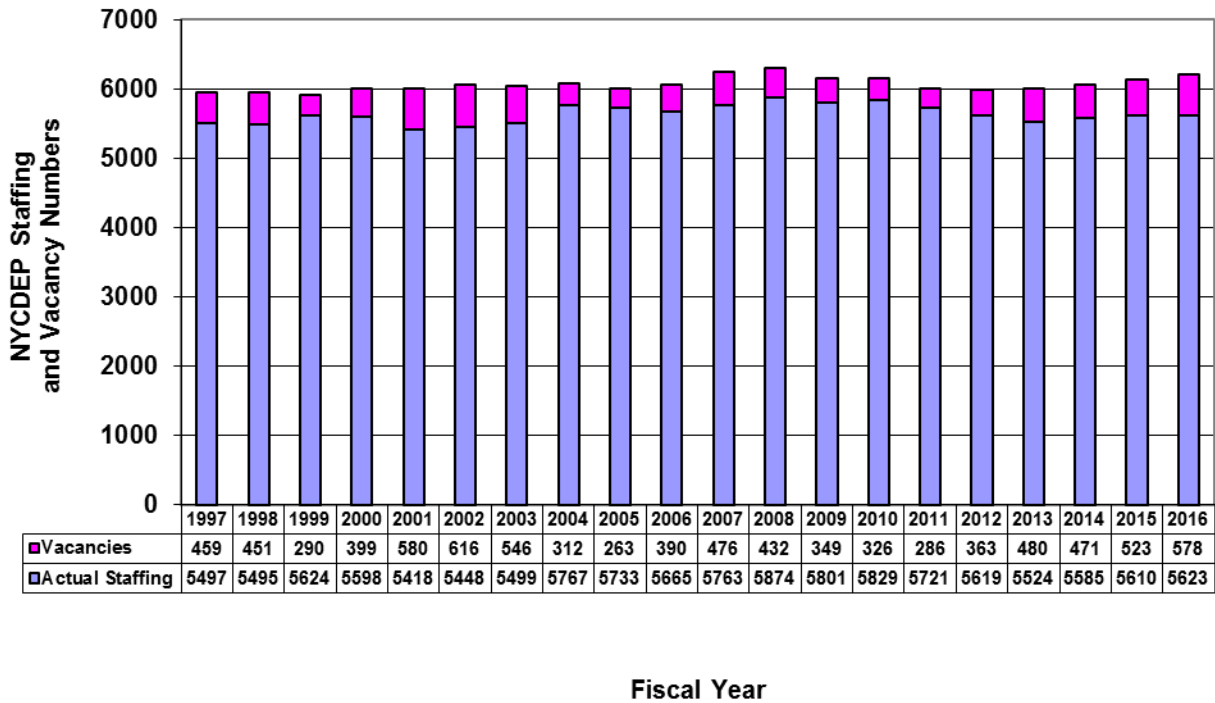


Figure 6: NYCDEP – Staffing and Vacancy Levels FY 1997-2016

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 562 water main breaks reported in FY 2015, which translates to 8 breaks per 100 miles of main. The number of water mains breaks in FY 2015 has increased compared with the last few years, most likely attributed to colder temperatures experienced in the winter months (see Figure 7). 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 breaks, costly repairs, leaks and disruption of service. NYCDEP continued to restore water to residents within an average of 5.1 hours after confirming the water main break. The range of water main breaks that NYC has recently experienced remains below that of other municipalities in the United States.

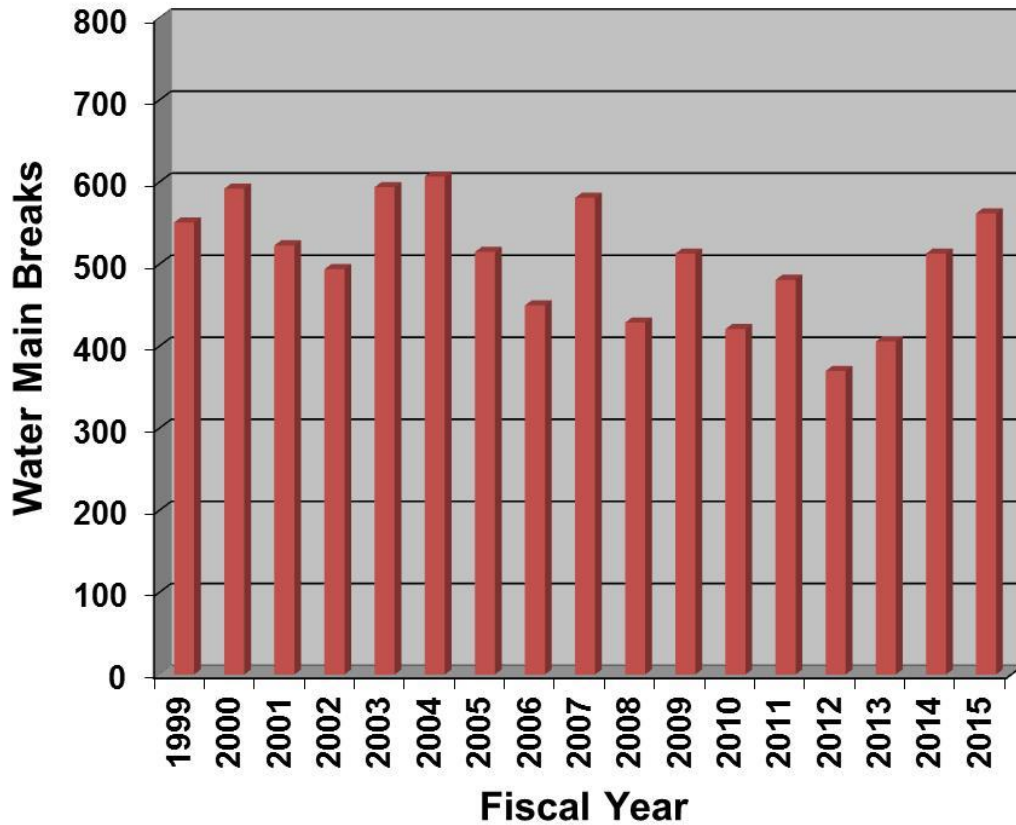


Figure 7: Total NYCDEP Water Main Breaks per Fiscal Year

Approximately 0.49% of total fire hydrants were broken and inoperative in FY 2015, slightly more than last year. The average time to repair or replace high priority broken or inoperative hydrants (as determined by the Fire Department) by NYCDEP was 2.5 days in FY 2015, which is less than the target time. Approximately 28% of catch basins were surveyed and inspected in FY 2015. The total number of catch basins that were cleaned by NYCDEP in FY 2015 is 30,112.

NYCDEP received 11,435 sewer backup (SBU) complaints in FY 2015. As shown in Figure 8, 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.

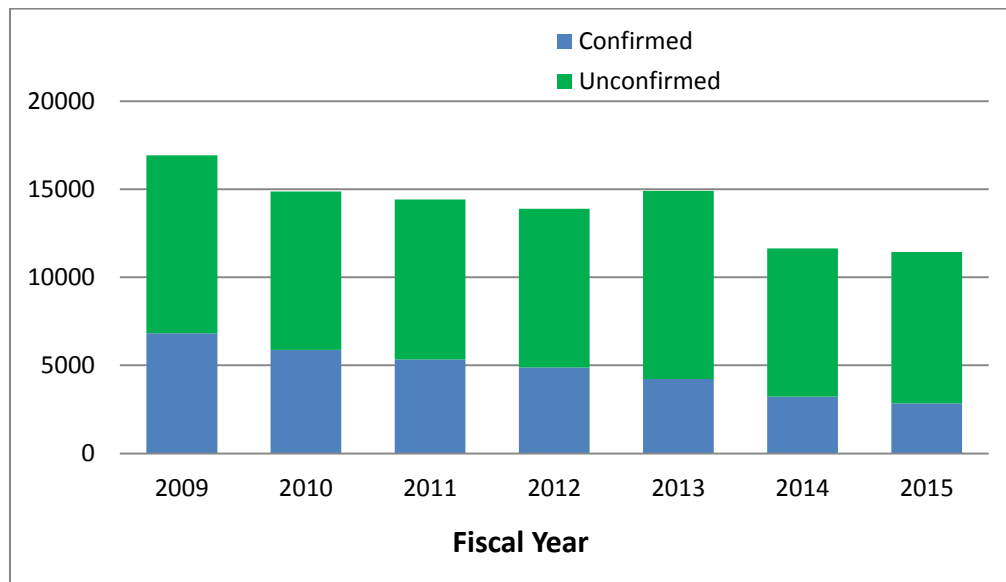


Figure 8: Sewer Backup (SBU) Complaints

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 its 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

Croton Operations. The Croton WFP began sending treated drinking water to the NYC distribution network in May 2015. In November 2015, Croton demonstrated operating at full capacity, 290 MGD. Operations of Croton WFP will vary depending upon the operational needs of the overall water supply and distribution system. Croton WFP operation and management was initially under BWSO; however, Croton WFP recently transferred to BWS, consolidating all water treatment under a single bureau.

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.

Drinking Water Quality. NYCDEP recently released the *New York City 2015 Drinking Water Supply and Quality Report*. NYCDEP conducts significant monitoring of the source water and in-city water quality. In calendar year 2015, NYCDEP collected 31,700 samples from the in-city distribution system and performed approximately 383,200 analyses, meeting all state and federal monitoring requirements. In addition, NYCDEP collected 15,500 samples and performed 193,500 analyses from the upstate watersheds to support FAD watershed protection programs. Microbiologists, chemists and other scientists with the BWS test water from key locations across the watershed and the City at NYCDEP laboratories. This past year, NYCDEP has upgraded and consolidated watershed laboratories into a new laboratory in Hawthorne. Other NYCDEP water quality laboratories are located in Kingston, Gramhamsville and Queens.

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. The OpX contract should be complete in June 2016. A total of \$95 million in reoccurring annualized savings have been implemented based upon the OpX program.

BNR Operations. NYCDEP has been operating in Step Feed BNR mode at several of the WWTPs, Hunts Point, Bowery Bay, Tallman Island, Wards Island WWTPs, 26th Ward and Jamaica WWTPs. Due to the long-term planning and significant capital projects that have been implemented, NYCDEP's operations have been achieving the interim total nitrogen (TN) removals established for the Upper East River and Jamaica Bay waterbodies.

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 9 and 10 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. The trend graphs for the 2015 Harbor Survey have been modified to reflect the extension of the bathing season by the NYC City Council. All trend graphs that are presented include data collected from the extended recreational bathing season, beginning of May to the end of October, rather than the beginning of June to the end of September, as previous graphs have shown. In FY 2015, 94% 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 2015 was 99.5%.

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.

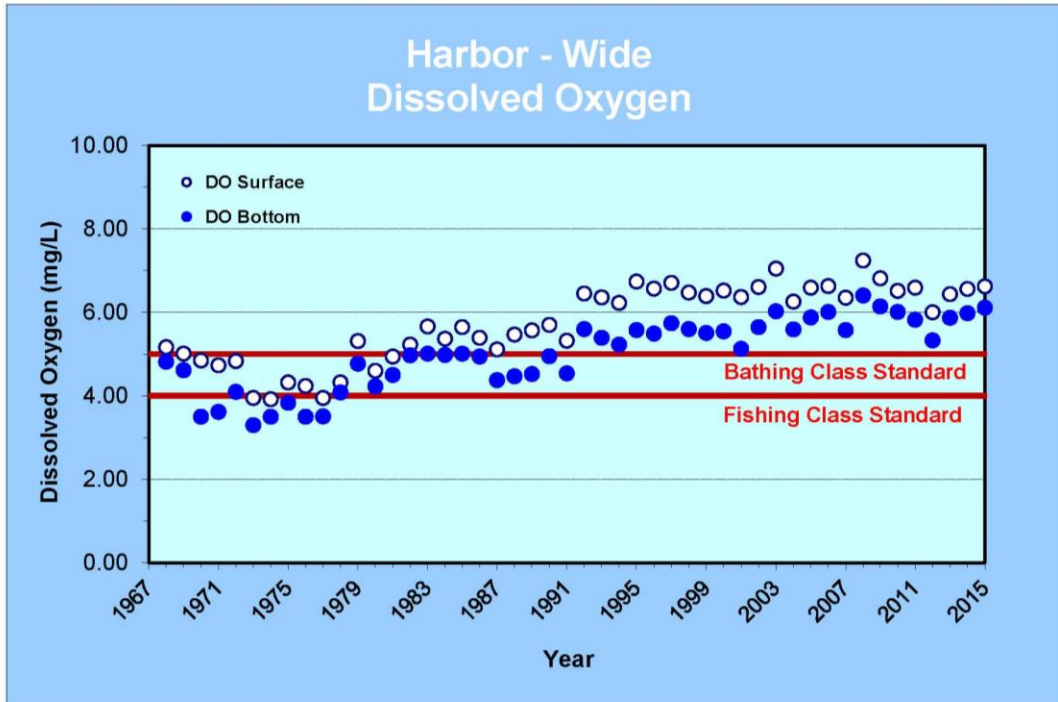


Figure 9: Dissolved Oxygen for Harbor Survey Key Stations (1968-2015)

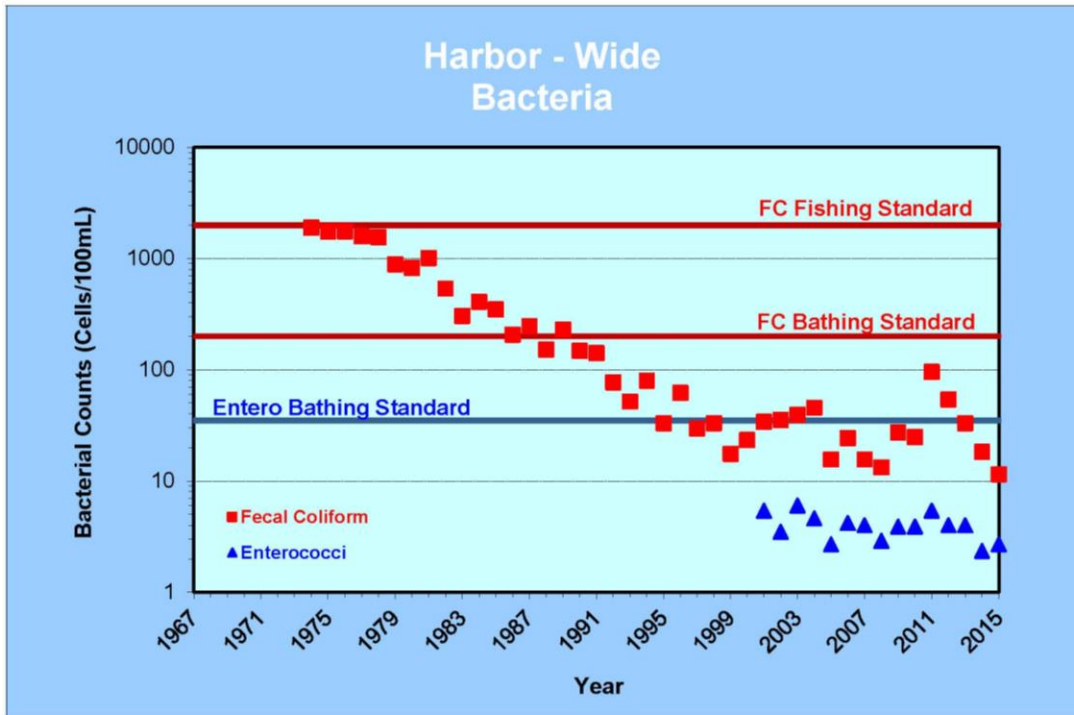


Figure 10: Fecal Coliform Counts and Enterococci for Harbor Survey Key Stations (1974-2015)

Environmental Health & Safety (EH&S). NYCDEP maintains a robust and comprehensive EH&S program across all bureaus throughout the NYCDEP. NYCDEP provides 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.

Permit Updates

NYSDEC issued final State Pollutant Discharge Elimination System (SPDES) permits for the 14 NYC WWTPs on October 15, 2015. NYCDEP is operating in accordance with the new SPDES permits.

NYSDEC issued a final municipal separate storm sewer system (MS4) permit for NYC on August 1, 2015. A portion of New York City has separate storm and sanitary sewer systems. The storm sewers are addressed under the MS4 permit and the separate sanitary sewers send flows to the WWTPs, which operate under the SPDES permits. NYC is the permit holder since the MS4 requirements covers 14 City chartered 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. Memorandums of Understanding (MOUs) have been developed between NYCDEP and the chartered city agencies that are impacted by the MS4 permit. This permit includes robust requirements, which significantly expand the City's obligations to reduce pollutants discharging to the storm sewers. The MS4 permit requires NYC to submit a Stormwater Management Program (SWMP) Plan within three years of the effective date of the permit. The SWMP is due August 1, 2018. Key components of the SWMP include public education and outreach, mapping, illicit discharge detection and elimination (IDDE), construction site stormwater runoff control, post-construction stormwater management, pollution prevention and good housekeeping for municipal operations, industrial stormwater sources, control of floatables and settleable debris, monitoring and assessment of controls, and impaired waters. The MS4 states annual reporting requirements. 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.

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. NYCDEP will continue to transition into the reorganization within drinking water supply and treatment operations. Succession planning, recruitment, and staff retention 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 will continue to evaluate ways to implement energy efficiency and energy management into operations.

9.0 OTHER NOTEWORTHY ISSUES AND COMMENTS

Lead and Copper Rule

NYCDEP has been in compliance with the current Lead and Copper Rule. NYCDEP has an active corrosion control program in place in order to reduce lead absorption from service lines and internal plumbing. NYCDEP treats the water with food grade phosphoric acid and sodium hydroxide. Sodium hydroxide is added to raise the pH and reduce corrosivity, which prevents the leaching of lead from pipes into the drinking water. Phosphoric acid is added to create a protective film on pipes that reduces the release of metals, such as lead, from household plumbing. Under the federal Lead and Copper Rule, mandated at-the-tap lead monitoring is conducted at select households throughout New York City. In 2015, based on the results of this monitoring, the 90th percentile did not exceed 15 µg/L, the established standard or Action Level for lead. The at-the-tap monitoring results are presented in the annual New York City Drinking Water Supply and Quality Report.

The USEPA is considering Long-Term Revisions to the Lead and Copper Rule to improve public health protection by making practical changes and to streamline the rule requirements. NYCDEP has been engaged with the National Drinking Water Advisory Council (NDWAC) Lead and Copper Rule Working Group.

Natural Gas Exploration

On June 29, 2015, NYSDEC released its Findings Statement (part of SEQRA process) banning High Volume Hydrofracking (HVHF) in New York State. Prior to that, Governor Cuomo placed a ban on HVHF in New York State, on December 17, 2014. No permits have been issued in the NYC watershed.

Awards

NYCDEP capital program and operations have been recognized throughout the industry by professional organizations. NYCDEP received an award in 2015 from the Association of State Dam Safety Officials (ASDSO) for the reconstruction of the Gilboa Dam. The full-scale reconstruction of Gilboa Dam was recognized as the National Dam Rehabilitation Project of the Year. The upgrade to the 26th Ward WWTP received the Envision sustainable infrastructure silver award from the Institute for Sustainable Infrastructure (ISI) in 2015. The National Association of Clean Water Agencies (NACWA) recognized two NYCDEP WWTPs (Bowery Bay and Red Hook WWTPs) for its performance throughout 2014.

American Council of Engineering Companies (ACEC) New York awarded two NYCDEP projects the Diamond Award in Engineering Excellence in the waste and stormwater category in 2015. The NYCDEP projects were the Whale Creek Sludge Dock and Transport Vessel, along with the NYCDEP program for Designing Supplemental Carbon Systems to Achieve High Level Nutrient Removal at Large Wastewater Treatment Plants.

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. The physical condition of the System receives an adequate rating, our highest rating.

Regarding the Capital Improvement Program (CIP)

Projects/Programs that are will require additional funding in the next Ten Year Capital Plan:

- As indicated throughout the report, the most specific notable projects that will require significant additional funding in the Ten Year Capital Plan will be SOGR projects, *KEC-2* tunnel construction, City Tunnel #3 activation, the Gowanus Superfund CSO retention tank construction.
- *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.
- *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 for a revised 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.
- *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 by August 2018.

Regarding the Physical Condition of the System

In our opinion, the NYCDEP facilities and infrastructure are in adequate condition. NYCDEP faces similar issues to many other large urban areas nationwide, such as aging infrastructure, strict regulatory requirements and ongoing climate change resiliency concerns. NYCDEP continues to successfully manage the overall operations of the NYC large water and wastewater system, and prioritize the most important projects and programs. 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 its 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 surrounding 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.