

March 1, 2012

Mr. Thomas Paolicelli
Executive Director
New York City Municipal Water Finance Authority
75 Park Place
New York, NY 10007

Re: New York City Municipal Water
Finance Authority
Fiscal Year 2012 Consulting Engineer's Report

Dear Mr. Paolicelli:

We herewith submit the Fiscal Year 2012 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 2012 and 2013.

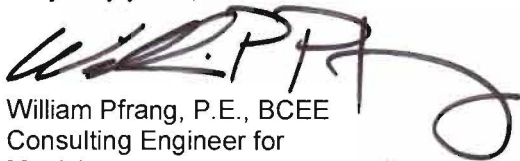
It is our opinion that the System condition is adequate and that it continues to be managed by the New York City Department of Environmental Protection (NYCDEP) in a professional and prudent manner. The current budget allocations for Fiscal Year 2012 and Fiscal Year 2013 are adequate for the immediate 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.

We look forward to continuing to support the New York City Municipal Water Finance Authority as Consulting Engineer.

Very truly yours,



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

cc: Marjorie E. Henning, Secretary



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

**FISCAL YEAR 2012 CONSULTING ENGINEER'S
REPORT**

PREPARED BY

AECOM

March 1, 2012

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1.0 PURPOSE AND SCOPE OF THE REPORT

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

The report addresses the issues listed below:

- present physical condition of the System
- Fiscal Year 2012 capital budget and Fiscal Year 2013 projected capital budget for the System
- Fiscal Year 2012 expense budget and Fiscal Year 2013 projected expense budget relative to operation and maintenance of the System
- overview of the Preliminary Current Capital Plan for Fiscal Years 2013 to 2016
- management of the System

2.0 METHODOLOGY FOR ANALYSIS

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

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

The budgetary process is ongoing and has not been concluded by the date of this report's publication. Observations and conclusions presented herein are therefore based on budget data as it presently stands. It is the opinion of AECOM 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. We understand that no significant changes are expected in the Current Capital Plan with the release of the Executive Budget.

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 water/wastewater, facilities, environment, energy, government, and transportation. AECOM has over 45,000 employees worldwide and serves clients in approximately 130 countries. In 2011, Engineering News Record (ENR) magazine ranked AECOM #1 in the top 500 overall design firm category.

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) 2012 satisfy the immediate needs for the System including all legally mandated projects, which comprise approximately 18% of the capital budget for FY 2012.
- NYCDEP capital and expense budget projections for FY 2013 satisfy the immediate needs for the System including all legally mandated projects, which comprise approximately 13% of the capital budget for FY 2013.
- The physical condition of the System receives an adequate rating, which is the highest of the three ratings that have been established for this analysis.
- Staffing levels are at approximately 94% of current allocations. NYCDEP continues to maximize the efficient use of its staff through re-allocation of current positions and new hires. The key staffing goals are to provide adequate staffing for the future operation of the CAT/DEL Ultraviolet (UV) Disinfection Facility by the Bureau of Water Supply (BWS), to provide adequate staffing for the future operation of the Croton Water Filtration Plant (WFP) by the Bureau of Water and Sewer Operations (BWSO), and to continue succession planning for key operational staff at the wastewater treatment facilities by the Bureau of Wastewater Treatment (BWT). Strong recruitment practices are in place to continue to strengthen NYCDEP staff.

5.0 OVERVIEW OF THE SYSTEM

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

The NYC water supply system consists of three upstate watersheds, Delaware, Catskill and Croton that extend as far as 125 miles north of NYC, consisting of 19 storage reservoirs and three controlled lakes. The Delaware, Catskill and Croton watersheds have the ability to supply approximately 50%, 40% and 10% of the NYC's daily water supply, respectively. NYCDEP also maintains wells in Queens which can provide up to 1% of the NYC's daily water supply. However the groundwater system has not been in operation since 2007. For calendar year 2011, the total water delivered to NYC and the upstate customers was approximately 420.6 billion gallons. The water supply is conveyed by gravity from the upstate reservoirs through an extensive system of tunnels and aqueducts. Water supplies from the upstate watersheds are presently unfiltered. In 2013 the Croton

WFP, which is presently under construction, will come on line. A UV facility to treat water from the Delaware and Catskill watersheds will commence operations in 2012, feeding Hillview Reservoir, a balancing reservoir. 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 over 6,700 miles of pipe, as well as valves, fire hydrants, distribution facilities, gatehouses, pump stations, and maintenance and repair yards.

The NYCDEP wastewater system is comprised of fourteen in-city Wastewater Treatment Plants (WWTPs) that discharge into receiving bodies surrounding NYC and seven upstate WWTPs that protect the watersheds. The NYC WWTPs treat approximately 1,315 million gallons per day (mgd) of wastewater. 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. Some of the WWTPs are also performing Biological Nitrogen Removal (BNR). The sewer system is comprised of approximately 7,400 miles of sewer pipes of varying size and material, which are classified as sanitary, storm or combined sewers. Much like many other older cities, NYC is made up of approximately 70% combined sewer, which means during a wet weather event wastewater, rainwater and surface water runoff is collected into the sewer system with a portion being sent to the WWTPs. There are approximately 423 combined sewage overflow (CSO) regulators and outfalls and four combined sewer overflow retention facilities that store the flow until the WWTP has the capacity to treat additional combined flow. Additional NYCDEP infrastructure that supports the wastewater system include 95 wastewater pump stations, laboratories, eight sludge dewatering facilities and inner-harbor vessels which transport sludge between facilities.

6.0 MANAGEMENT OF THE SYSTEM

Organizational Structure

Commissioner Carter Strickland, Jr. was appointed Commissioner of the NYCDEP in August 2011 to replace Commissioner Cas Holloway who accepted an appointment as the Deputy Mayor of Operations. Commissioner Strickland was most recently the former NYCDEP Deputy Commissioner of Sustainability. He continues to manage the agency based upon the four core functions of NYCDEP, as set out in the Strategic Plan: (1) Utility Service (water and wastewater operations), (2) Capital Program Delivery, (3) Regulatory Compliance (Air, Water, and Environment), and (4) Financial Management:

- The Utility Group consists of the three operating Bureaus: Bureau of Wastewater Treatment (BWT), Bureau of Water Supply (BWS) and Bureau of Water and Sewer Operations (BWSO), and the Office of Strategic Planning (OSP). All operating bureaus coordinate activities through the Chief Operating Officer (COO). The key responsibilities of each operating bureaus in the Utility Group are:
- BWT is responsible for the operation and maintenance of the fourteen in-city WWTPs, the City's wastewater pump stations, interceptor regulators, sludge dewatering facilities, fleet of marine vessels, laboratories, and the control of discharges from combined sewer overflows.
- BWS is responsible for managing, operating, maintaining and protecting the City's upstate water supply system to deliver a sufficient quantity of high quality drinking water. BWS will also be responsible for the management, operation and maintenance of the CAT/DEL UV Disinfection Facility when the new facilities are commissioned.

- BWSO is responsible for the operation and maintenance of the City's drinking water distribution and wastewater collection systems. BWSO will also be responsible for the management, operation and maintenance of the Croton WFP when the new facilities are commissioned. A new unit was recently formalized within BWSO to address Capacity, Management, Operations, and Maintenance (CMOM) program related issues with specific Standard Operating Procedures (SOPs) in place. This group will focus on target areas that have reoccurring problems to reduce such problems in the collections system.
- OSP is responsible for development and update of the Strategic Plan, the implementation of transparent performance metrics for each of NYCDEP's four core functions, the development and implementation of an asset management system to guide capital investment prioritization, the development of energy initiatives to reduce NYCDEP operating costs, and more recently the coordination of the Operation Efficiencies, OpX program.
- BEDC is the bureau responsible for managing the design and construction of major capital projects, including major water transmission facilities, water treatment facilities, wastewater treatment and disposal facilities, wastewater pumping stations stormwater/CSO facilities. BEDC continues to implement improvements to overall business practices, increase efficiencies and implement standardization across BEDC in cost estimating, project scheduling, project delivery, contract structure and change order procedures. Phase I of the Project Management Information Systems (PMIS) has been rolled out this past year which will continue to make project management functions more efficient by tracking cost and project schedule performance. BEDC in-house design department also continues to strengthen. BEDC recently reorganized to create a new group for the project delivery of the Water for Future program. The Water for Future program organization is designed to promote inter-bureau coordination due to the magnitude and complexity of the program.
- The Sustainability Group is responsible for the development and implementation of environmental policy and strategy, including water and air quality, the noise code, and other quality of life issues. The Group includes the Office of Green Infrastructure (OGI), Bureau of Environmental Planning and Analysis (BEPA) and Bureau of Environmental Compliance (BEC). An Office of Green Infrastructure has been established to support and implement the Green Infrastructure Plan. This group will continue 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. BEC is responsible for responding to air and noise code complaints, maintaining the database of facilities containing hazardous and toxic material, overseeing remediation of hazardous waste municipal landfills, managing investigation of contaminated sites and responding to hazardous material emergency incidents. The Sustainability Group is also responsible for implementing PlaNYC initiatives throughout the agency, and will also develop long-term strategies to meet the NYCDEP's water quality goals.
- The Chief Financial Officer (CFO) is responsible for financial management of NYCDEP. In this capacity, the CFO oversees the Budget Office and the Bureau of Customer Service. The CFO is also responsible for overseeing the administrative functions consisting of procurement, information technology, engineering audit, and human resources.

7.0 STRATEGIC PLAN

NYCDEP released its Strategic Plan (2011 – 2014) in February 2011 which established a plan to achieve the agency's core objectives over the long-term in a safe, cost-effective, efficient and transparent way. The Strategic Plan established 29 goals for NYCDEP's core functions and launched 100 initiatives to explain how each of these goals will be implemented within the next four years and beyond. The following areas are addressed in the Strategic Plan: strategic planning and performance; customer service; worker safety, public health and environmental protection; operations and capital; and sustainability. This plan presents significant programs that are already underway (such as Croton, UV, City Tunnel #3, WWTP upgrades) and other programs that are in the planning or early implementation phase (such as the Water for the Future program and the Green Infrastructure Plan). The Strategic Plan discusses implementation of several cost-effective strategies into their overall plan such as: green infrastructure implementation to improve water quality and provide other sustainability benefits; energy goals of reduced electrical demand and investment in cost effective clean energy projects; and improvements in the implementation of the CIP with an improved asset management tool, better business practices and further project controls. This Strategic Plan incorporated the significant progress that has been made for the water and wastewater system along with the plans for the future of the agency to continue in a forward-thinking positive direction, into a comprehensive plan. Updates of the Strategic Plan will be issued annually. Several projects discussed in the strategic plan are also addressed later in this report.

8.0 CAPITAL PROGRAM OVERVIEW

Capital Improvement Program (CIP)

Budgeting is a lengthy and comprehensive process, especially for a municipality operating such a large and complex system as is the responsibility of the NYCDEP. NYCDEP budgeting is an ongoing iterative process that takes into account legal mandates, mayoral initiatives such as PlaNYC, state of good repair (SOGR) projects to maintain permit compliance, capacity issues, dependability, environmental, health, and safety (EH&S) compliance requirements, community drivers, and other facility improvements. Project schedules, cost estimate updates, technical issues, regulatory updates and legal issues may impact project prioritization and the overall budgeting exercise.

The NYCDEP CIP consists of the Ten-Year Capital Strategy, along with the Four Year Current Capital Plan, which is updated quarterly. The Ten Year Strategy is updated every two years. The Preliminary Current Capital Plan for FY 2012 through FY 2016 was released on February 2, 2012. This review includes the budget for FY 2012, which ends on June 30, 2012, and the budget for FY 2013, which begins on July 1, 2012. The next Preliminary Ten Year Capital Strategy update will be released in the January/February 2013 timeframe. AECOM has reviewed the Preliminary Four Year Current Capital Plan and met with key individuals responsible for budgetary planning to provide an independent assessment of its adequacy. It is anticipated that the Mayor will issue the Executive Budget in April 2012. Our findings are summarized in the following paragraphs.

Regarding FY 2012

The Preliminary Plan FY 2012 budget is set at approximately \$2.77 billion. Approximately 18% of FY 2012 funding supports mandated projects, such as the combined sewer overflow (CSO) work and filtration avoidance determination (FAD) requirements. Change orders are funded in FY 2012 for the following mandated projects: Croton WFP, Cat Del UV Facility and Newtown Creek WWTP. NYCDEP has indicated that all legally mandated projects are fully funded in FY 2012. Significant funding is also included in FY 2012 for City Tunnel #3 connections, wastewater treatment plant SOGR projects, water supply infrastructure SOGR projects, water distribution system and wastewater collection sewer work.

Regarding FY 2013

The Preliminary Plan FY 2013 budget is set at approximately \$2.03 billion. Approximately 13% of FY 2013 funding supports legally mandated projects, such as CSO projects (grey and green infrastructure), FAD requirements, total residual chlorine (TRC) program and the nitrogen program. NYCDEP believes that all legally mandated projects will be fully funded in FY 2013. Additional funding may be required for the mandated TRC program pending the outcome of negotiations with regulators. Significant funding is also included in FY 2013 for Water for the Future projects (Rondout-West Branch tunnel by-pass, repairs and water supply augmentation), City Tunnel #3 connections, Gilboa Dam reconstruction, wastewater treatment plant SOGR projects, water supply infrastructure SOGR projects, water distribution system and wastewater collection sewer work.

Regarding the Current Capital Plan for FY 2012 to FY 2016

The Preliminary Four Year Current Capital Plan for FY 2012-2016 consists of about \$8.91 billion in funding. Approximately 18.9% of the total funding for FY 2012-2016 is dedicated to mandated projects. This is significantly less than previous years. As a consequence, the majority of the capital improvement program must be planned and budgeted based solely on its importance to the overall System and NYCDEP prioritization.

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

Currently, the non-mandated improvements include a significant amount of funding for the Water for the Future program, SOGR projects, and water distribution system and sewerage projects. Approximately 26.5% of the total funding for FY 2012-2016 is dedicated to the SOGR projects which is a significant increase compared to previous years. NYCDEP is making significant strides in dedicating funds to the SOGR projects across all bureaus.

EPA has recently proposed an integrated planning framework that NYCDEP has been very closely involved with since both NYCDEP capital programs and overall operations are strongly shaped by federal regulations. The recent flexibility EPA has shown with respect to CSOs, green infrastructure, and the LT2 rule is a good indicator of what is needed to address the concerns of federal enforcement, limited funding, and local goals, and to prioritizing NYCDEP investments in SOGR investment and other needed infrastructure. NYCDEP will continue to be a strong advocate for prioritizing water quality projects and the affordability issue, as a member of the National Association of Clean Water Agencies (NACWA) Money Matters Task Force and continued aggressive discussions with regulators.

System-wide Programs

Asset Management

Building on past experience, NYCDEP has made further efforts to refine their asset management program and expanded it to include the majority of the water and wastewater infrastructure. All pump stations have undergone asset management evaluations and business cases have been formed. Another phase (for vertical/linear assets) is planned for completion later this year. This ongoing effort is based upon a collaborative approach between the operating bureaus (BWT, BWS, and BWSO) and BEDC 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, growth/public/community, public image and financial. The results will continue to be used in the development of the funding needs for the state of good repair for the next Ten-Year Capital Strategy in January 2013. 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 principles of asset management have been effectively applied to many water and wastewater utilities worldwide and the NYCDEP's progress in asset management is a positive development. It is anticipated that NYCDEP will continue to build their asset management program to include operations and maintenance data to achieve a full comprehensive formalized Asset Management program for all assets. The following rating system was used to rank all assets.

5 – Very Poor: Effective life exceeded and/or excessive maintenance cost incurred. There is a high risk of breakdown or imminent failure with serious impact on performance. No additional life expectancy is possible and immediate replacement needed.

4 – Poor: Functions but requires a high level of maintenance to remain operational. Shows abnormal wear and is likely to cause significant performance deterioration in the near term. Replacement or major rehabilitation needed in the near term.

3 – Moderate: Functionally sound and acceptable and showing normal signs of wear. May have minor failures or diminished efficiency with some performance deterioration or increase in maintenance cost. Moderate renewal or rehabilitation needed in near term.

2 – Good: Sound and well maintained but may be showing slight signs of early wear. The asset delivers full efficiency with little or no performance deterioration. Only minor renewal or rehabilitation may be needed in the near term.

1 – Excellent Condition: Fully operable, well maintained, and consistent with current standards. Little wear shown and no further action required.

Sustainability, Climate Change and Greenhouse Gas Emissions

In April 2011, Mayor Bloomberg released an updated PlaNYC Progress Report: A Greener, Greater New York, an update on the comprehensive sustainability plan for New York City's future. This plan focuses on five key target areas of the City's environment – air, land, water, energy and transportation. From NYCDEP's perspective, three major initiatives have moved to the forefront and are currently being incorporated into NYCDEP's planning and design projects:

Climate Change Adaptation Requirements. Adaptation requirements are those actions that must be taken to allow NYCDEP facilities to meet their intended functions when considering increased sea levels and more intense storm events. Following release of the Climate Change Program Assessment and Action Plan in 2008, NYCDEP has implemented several of the next steps identified in the report, including 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 mitigate potential damage from larger, more frequent storm events and rising sea levels. NYCDEP's 2010 Green Infrastructure Plan outlined a comprehensive approach to stormwater management. The plan is based on implementing city-wide green infrastructure improvements to reduce the volume of stormwater that reaches the engineered stormwater collection system. According to the plan, the investment in green infrastructure will result in an overall savings of approximately \$2.4 billion in future capital investments to meet NYCDEP's future requirements. These initiatives have been negotiated with NYSDEC and green infrastructure has been incorporated in a modified CSO Consent Order. BEPA is underway with a two-year study that will develop an adaptation and optimization strategy to minimize global climate change risks. This project will result

in the development of a citywide risk based management strategy to address long term climate change. BWS is focused on climate change impacts on the water supply side though the use of models. 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 it includes climate trends and projections for NYC, which NYCDEP is using for analysis and planning. NYCDEP maintains strong involvement with the climate science community on the City, national and international level.

Greenhouse Gas Reduction Requirements. As part of PlaNYC, the City has committed to reducing its municipal greenhouse gas emissions by 30% below FY 2006 levels by FY 2017. NYCDEP is continuing a project to develop a strategic plan to meet the 30% reduction. NYCDEP continues to fully inventory its annual greenhouse gas emissions, which identifies the largest emissions sources and greatest opportunities for reductions, and continued to quantify the impact of ongoing and planned projects on the inventory. Although substantial energy consumption increases are expected over the next several years system-wide, largely driven by mandated activities, NYCDEP is diligently pursuing projects that reduce greenhouse gas emissions and improve energy efficiency. Current planned and on-going energy and greenhouse gas-related projects bring NYCDEP within 80% of their overall reduction goals. In FY 2011, NYCDEP conducted detailed energy audits of five WWTP facilities to identify additional opportunities for energy reduction and develop the strategic plan to meet the PlaNYC goal. Building on that effort, NYCDEP has embarked on four additional WWTP energy audits in FY 2012. Results of these energy audits help NYCDEP fully understand how energy is being used at its facilities, identify low and no-cost operational modifications that will meaningfully reduce on-site energy consumption and GHG emissions, and identify capital projects with favorable payback periods to further reduce energy consumption and GHG emissions.

Energy Planning. NYCDEP is working closely with the Mayor's Office to plan sustainable energy management in the coming years. With new systems and facilities coming on-line, it is in the best interest of the Agency to assist in the planning of reliable sources of power, both from conventional and renewable sources. The Mayor's Office is diligently working to identify the needs of its various agencies, assessing the resources that each agency possesses, and actively looking for compatibilities and synergies. One particular project that appears to have promising dividends is the Newtown Creek/National Grid Partnership. As NYCDEP's largest WWTP, Newtown Creek produces an excess of anaerobic digester gas (ADG) that is typically flared in its flare towers. In this new 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. This project will improve local air quality, reduce City-wide greenhouse gas emissions, utilize a renewable energy resource, and increase City-wide natural gas supply.

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.

- NYCDEP completed construction to repair the Gilboa Dam spillway that was damaged during Hurricane Irene. The site preparation work that was destroyed due to Hurricane Irene has also been reinstated. This work will allow NYCDEP to continue with the full reconstruction of the dam.

- NYCDEP recently achieved a significant construction milestone at the Newtown Creek WWTP. Newtown Creek South Battery is now operational which will increase the plant's wet weather treatment capacity. NYCDEP also recently certified that the Newtown Creek WWTP meets the secondary standards effluent discharge requirements of the Clean Water Act.

- This past year NYCDEP completed upgrades to five Croton dams valued at \$96 million of work (Croton Falls, Croton Diverting, Sodom, and Bog Brook One and Bog Brook Two dams) to extend the useful life of each for 50 to 100 years and to bring them into compliance with updated state and federal dam safety guidelines and standards. The work to install additional control systems, as well as upgraded mechanical and electrical equipment, will allow the dams to safely release water in the unlikely event of an emergency and to maintain conservation releases.

In addition, NYCDEP made significant commitments for the continued development and implementation of major programs this past year. These decisions will provide major improvements in infrastructure and water quality and will take steps to move from planning into implementation phase.

- **Water for Future program.** In December 2011, NYCDEP released the draft Environmental Impact Statement (DEIS) for the plan to repair the Delaware Aqueduct by building a bypass tunnel around the major leakage area, and by grouting at other areas. Funding is included in the CIP, which supports the implementation schedule. Other recent accomplishments also include completion of 90% of the design for Shafts 5B in Newburgh and 6B in Wappinger and the completion of some deep and shallow soil and rock borings to determine subsurface conditions at sites between the two shafts.
- **CSO Modified Consent Order and the Green Infrastructure.** NYCDEP and NYSDEC negotiated a modified CSO Consent Order consisting of cost-effective grey infrastructure and green infrastructure to improve water quality. It is anticipated that the Modified Order will become effective in the near future once NYSDEC completes responding to all public comments.

Capital Improvement Program Highlights for Water Supply, Treatment, and Conveyance Programs

Water for the Future Program

The Water for Future program consists of two main components – fixing the Delaware Aqueduct leak (by-pass tunnel and repairs) and supplementing NYC water supply during construction of the repairs. The Water for the Future program is a comprehensive program that requires thorough coordination and communication 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 and implementation of the Water for Future program. NYCDEP released the draft environmental impact statement (DEIS) in December 2011 for the by-pass tunnel and repair component of the Water for the Future program. The Final EIS is expected to be released in March 2012. There is over \$1.2 billion in funding in the Preliminary Current Capital Plan for the Water for the Future program. Since the schedule continues past this Current Capital Plan, additional funding is required beyond this budget plan and will be addressed in the next Ten Year Capital Strategy.

Since the early 1990s, NYCDEP has closely monitored the Rondout-West Branch (RWB) Tunnel portion of the Delaware Aqueduct that has shown evidence of some water losses. NYCDEP has a series of tunnel leak investigations including geological investigations, tunnel flow monitoring, well monitoring, surface expression monitoring, automated underwater vehicle (AUV) investigations, and a series of dives and investigations at Shaft #6. After evaluating several repair alternatives, NYCDEP decided on a comprehensive plan to build a three-mile bypass tunnel around the leaking section in the area of Roseton, NY and to perform repairs of the concrete liner in other areas near Wawarsing, NY. NYCDEP's schedule for the repair consists of breaking ground in FY 2013 and construction completion in FY 2020. NYCDEP is also evaluating the effectiveness of lime addition to seal the

cracks from within the tunnel. The chemical addition project, which includes building a small-scale water system that replicates full-scale water supply conditions, will help the city better determine if full-scale application of lime will be successful. NYCDEP has been conducting 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 Current Capital Plan to provide operational flexibility for NYCDEP to provide safe, reliable additional water supply when the Delaware Aqueduct is shutdown for a period of six to fifteen months to connect the bypass tunnel to the existing tunnel and to make the other repairs. NYCDEP is currently planning to implement the following projects which would be in place by FY 2020: conservation measures, optimization of the Catskill Aqueduct to increase its capacity, reactivation of the Queens groundwater system and interconnections to New Jersey (NJ) and Nassau County, New York.

Increasing groundwater supply in Jamaica Bay has been identified as a project to supplement water supplies: Station 6, which is a 10 mgd centralized treatment facility for six supply wells from the former Jamaica Water Supply Company groundwater system in Queens, along with drilling further groundwater wells in Jamaica is funded at \$100 million. The interconnection of the Delaware Aqueduct with the Catskill Aqueduct at Shaft #4, is funded at a level of \$30 million in the Current Capital Plan in FY 2013. The implementation of conservation measures is also funded at \$60 million. A project to increase the capacity of the upper Catskill Aqueduct is funded at \$96 million. Funding for connections between NYC and Nassau County groundwater is in the Current Capital Plan at a level of \$20 million. Connections between NYC and NJ are funded at \$143 million. The Cross River Pump Station and the Croton Falls Pump Station are funded at \$61 million. These pumping stations provide conveyance flexibility to NYCDEP and would permit 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.

NYCDEP issued the 2011 Long-Term Watershed Protection Plan to the NYSDOH and the USEPA in December 2011 which provides a summary of accomplishments under the FAD and water quality results and it will form the basis for the continuation for the second five years of the current FAD. This report identifies the plan and schedule for the second five years of the FAD, 2012-2017. The report addresses several FAD programs (such as septic and sewer rehabilitation/replacement program, upstate wastewater treatment upgrade program, stormwater management program, waterfowl management program, land management, watershed agricultural program, and wetlands protection program) which were evaluated to determine the continuation of certain programs for the second five year period. Discussions are required between NYCDEP, USEPA and NYSDOH to establish milestones for the continuation of existing programs. It is anticipated that the continuation of the FAD for 2012-2017 will be issued in mid-2012 calendar year. The continuation of the FAD programs is funded in the Current Capital Plan through 2016 at a level of approximately \$334 million. Additional funding will also be required in FY 2017, outside this planning period for a new FAD.

The land acquisition program is currently funded through the end of the current FAD in 2017 with the initial 2007 funding allocation. Under the current FAD, NYCDEP is required to continue a land acquisition program (LAP) for the ten years covered by the FAD. NYCDEP received a new 15-year

New York State Department of Environmental Conservation (NYSDEC) land acquisition permit in December 2010, which will allow the City to continue to acquire environmentally sensitive land to protect the watershed, while making sure that the upstate community interests and economic development is protected. As of February 23, 2012, NYCDEP has either acquired or secured title or conservation easements to about 124,000 acres in the Catskill and Delaware watersheds at a cumulative value of approximately \$424 million since the inception of the LAP.

USEPA, NYSDEC and NYSDOH have endorsed the operational modifications that NYCDEP proposed for the Schoharie Reservoir and the Ashokan Reservoir with the implementation of an operational support tool (OST). NYCDEP's OST 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. OST is being rolled out in phases with full implementation planned in FY 2013.

CAT/DEL UV Disinfection Facility

The FAD also includes the construction of a UV disinfection facility to treat water from the Catskill and Delaware (CAT/DEL) watersheds. The facility is being constructed at the Eastview site. Operation must commence with completion of the first two quadrants by August 31, 2012, and full operation must commence October 29, 2012, in accordance with the UV Administrative Consent Order. UV Disinfection Facility construction is ahead of schedule, and is anticipated to be complete prior to the Consent Order deadlines. NYCDEP anticipates starting operation in June 2012, ahead of the Consent Order deadline. The change orders for this project are fully funded in the Current Capital Plan at a level of approximately \$14.4 million. NYCDEP will operate the UV Facility once it comes on-line. However, NYCDEP is in the process of possibly evaluating private contract operations for this facility in the future.

The Catskill Aqueduct pressurization project is funded at a level of \$35 million in the Current Capital Plan. However, additional funding is required beyond this budget planning period. This project will allow additional flows to be conveyed and treated at the CAT/DEL Facility.

Dam Safety

The full long-term rehabilitation upgrades for the Gilboa Dam are anticipated to bring the dam into a state of good repair and in compliance with the NYSDEC dam safety guidelines. The total rehabilitation is funded at approximately \$171.4 million in the Current Capital Plan, which includes a new low level outlet and rehabilitation of the Shandaken Tunnel intake chamber. The crest gates contract was completed in July 2011. The main dam full reconstruction contract was awarded last year. The site preparation contract was destroyed due to Hurricane Irene however this work has recently been redone.

After Hurricane Irene, NYCDEP assembled an Independent Technical Review Team to review the plans for the dam repairs prior to performing the work. Recently, NYCDEP conducted an After Action Review and received input from state and local officials on improving the Emergency Action Plan.

In addition to capital programs, BWS maintains an inspection and maintenance program to support dam safety. NYCDEP continues their dam inspection program using engineering contracts and in-house NYCDEP inspectors.

Croton Water Filtration Plant

NYCDEP and NYSDOH continue to negotiate revised milestones for the Croton WFP construction schedule due to delays in earlier Croton Filter Consent Decree milestones attributable to a delay in the notice-to-proceed (NTP) for the General (G), Heating, Ventilating and Air Conditioning (HVAC) and Electrical (E) construction contracts and slow progress by the E Contractor. BEDC is monitoring construction and is working diligently to maintain construction progress. NYCDEP's current estimate for the commencement of operations is summer 2013. Approximately \$244.7 million is included in the CIP for the remaining facilities associated with the Croton WFP, which includes the off-site facilities, the permanent Mosholu Golf Club House and construction change orders. Funding of approximately \$71.6 million is included in the CIP for mandated payments to the Parks Department in connection with the Croton WFP. NYCDEP evaluated alternatives to provide standby power for the Croton WFP to increase dependability if there was a major power outage. The additional work is currently not funded in the Croton budget. Standby power is not part of the critical path for completing construction and starting-up the Croton WFP.

The new electrical subcontractor has increased productivity, but the electrical work remains behind schedule. The General Contractor for the Croton Water Filtration Plant is finishing installation of equipment, instrumentation and controls, and the other contract work is progressing to keep pace. Con Edison is expected to energize the new electrical feeders to the plant by the first half of 2012. The tunnel contract has been completed. Construction of the Offsite Facilities at Jerome Reservoir and Gate House 1 is proceeding. Work at Gate House 1 has been delayed while access to the structure has been coordinated with the New Croton Aqueduct (NCA) Rehabilitation Contractor. The force main contract is being terminated and the WFP residuals will be discharged to the sewer in Jerome Avenue.

Rehabilitation of the NCA is nearing completion. Because of the shutdown of the Delaware Aqueduct for shaft dives and inspections, access to the NCA was limited. The NCA Contractor expects to complete the below grade rehabilitation work by September 2012, so that the NCA is operational in time for the start-up of the Croton Water Filtration Plant. The above grade work and other change order work will be completed by late 2012.

City Tunnel No. 3, Stage 2

NYCDEP has accelerated funding for the activation of City Tunnel No. 3, Stage 2, Manhattan leg to support an aggressive schedule for activation by the end of 2013. It is currently funded at \$930.9 million in the Current Capital Plan for connections and activation of the Manhattan segment. Significant coordination among NYCDEP, Department of Design and Construction (DDC) and Department of Transportation (DOT) is ongoing regarding the challenging issues associated with the connection of shafts and the distribution mains. State legislation which allows joint utility bidding will be used for City Tunnel #3 contracts to improve coordination of the contracts and the utilities.

Funding of \$5 million is included in the Current Capital Plan for the activation of City Tunnel No. 3, Stage 2 Brooklyn-Queens section. Construction completion for the Brooklyn-Queens section is anticipated in 2018. Additional funding will be required in the next budget planning period. On completion of City Tunnel No. 3, NYCDEP will have significantly increased conveyance capacity downstream of Hillview Reservoir which will enable NYCDEP to take City Tunnel No.1 out-of-service for inspection and repair for the first time since it was put into service in 1917.

Hillview Reservoir

The Hillview cover has been required due to federal regulations administered by USEPA and an Administrative Consent Order with NYSDOH, which includes a schedule for installation. NYCDEP and USEPA executed a revised Administrative Order in May 2010, which provided an extension of

time for construction of the Hillview cover. According to the current order, the site preparation construction contract is required to start by January 31, 2017, construction start for the East Basin cover is required by December 31, 2018, and construction completion of the cover by May 31, 2028. This revised Order also allowed NYCDEP to submit an additional time deferral request. In October 2010, NYCDEP requested an additional six years, due to planned water system projects that would not permit Hillview cover construction simultaneously. Last year 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 is currently in compliance with the Administrative Order.

There is currently no funding in the Current Capital Plan for construction of the Hillview cover. Funding of \$3.7 million for design modifications to the Hillview cover is included in FY 2012. Depending upon the outcome of the USEPA review and the discussions regarding the additional time extension, funding may be required in a future budget planning period.

Funding is included in the Four Year Current Capital Plan for state of good repair upgrades planned at Hillview Reservoir. Approximately \$6 million is included in FY 2016 for the modification of chambers at Hillview. Approximately \$67,000 is included in the budget for the Hillview Chlorination Building to improve chemical deliveries and security of the building.

Capital Improvement Program Highlights for Wastewater Treatment

Combined Sewer Overflow (CSO) Program/Green Infrastructure Plan

NYCDEP released its Green Infrastructure Plan in September 2010, which outlines a comprehensive long-term hybrid approach of grey and green infrastructure implementation to address water quality issues and other public sustainable benefits. Green infrastructure is an approach to wet weather management that is cost-effective, sustainable and environmentally friendly. The overall goal of NYC's Green Infrastructure Plan over the next 20 years is to capture the first inch of rainfall on 10% of the impervious areas in combined sewer watersheds through detention or infiltration. The Green Infrastructure Plan presents a savings of approximately \$2.4 billion over twenty years with implementation of green infrastructure compared to the all-grey infrastructure strategy (tanks, tunnels and WWTP expansions).

Implementation of this plan requires significant coordination among several city agencies and this effort is ongoing with the Green Infrastructure Task Force. In collaboration with other city agencies NYCDEP has built several demonstration projects for a variety of land uses, such as blue roofs/green roofs, porous pavement, tree pits, street side swales, green streets, constructed wetlands, and rain barrels. Several cities across the country have implemented green infrastructure for wet weather management and water quality control issues. Approximately \$4 million in grants will be available through the 2012 Green Infrastructure Grant Program 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 sewer areas.

NYCDEP and NYSDEC has held a series of successful negotiations with regard to modifying the 2005 CSO Order to eliminate/change some grey infrastructure requirements to more cost-effective grey alternatives, to modify the Long-Term Control Plan (LTCP) submittal dates and to incorporate green infrastructure into the CSO Order. The proposed CSO Consent Order Modification was negotiated and signed by NYCDEP in October 2011. The public comment period for the Modified Order ended November 2011, and NYSDEC received many comments on the document. NYSDEC is currently responding to the public comments on the Modified Order. NYCDEP anticipates the 2011

CSO Modified Order to become effective in the near future. NYCDEP and NYSDEC have negotiated 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. The modified Order calls for \$187 million in green infrastructure in the next four years to meet the first milestone in 2015. NYCDEP recently initiated a CSO monitoring pilot program, with the installation of remote sensors that monitor combined sewer overflows in real time at five CSO outfall locations. The pilot objectives are to better understand the effects of combined sewer overflows and improve the public notification system for CSOs.

Approximately \$189.2 million is funded in the Four Year Current Capital Plan for green infrastructure and approximately \$546 million is included for grey infrastructure for a combined funding of \$734.9 million in capital projects for implementation of the CSO Program.

Paerdegat Facility, Alley Creek Facility, Spring Creek Facility and Flushing Bay Facility are all operational CSO retention facilities. NYCDEP has recently implemented two inflatable dams within existing large sewers to assist in providing storage in the sewer system during rain events. These dams will be controlled remotely at the Newtown Creek and Red Hook WWTPs.

Citywide Nitrogen Removal Program

Regarding the Upper East River and 26th Ward WWTPs

The Upper East River WWTPs (Hunts Point, Bowery Bay, Tallman Island, and Wards Island WWTPs) and the 26th Ward WWTP have been undergoing BNR upgrades as required by the Nitrogen Consent Judgment for the Phase I Facility Plan. Hunts Point WWTP completed construction for the Phase I nitrogen removal upgrades and started operation of biological nitrogen removal in the Summer of 2010. The full-scale 25-mgd BNR demonstration project at Wards Island WWTP came on-line in December 2008; this demonstration project will serve as a testing facility for various operational control and optimization strategies that the City can implement at its other BNR installations. The SHARON® (Single reactor system for high activity Ammonium Removal Over Nitrite) demonstration facility came on-line in November 2009.

In accordance with the Nitrogen Consent Judgment, NYCDEP submitted a Basis of Design Report (BODR) for the Phase II BNR upgrades to NYSDEC in June 2011. NYSDEC issued comments to the report and upon addressing the comments, NYCDEP submitted the final BODR to NYSDEC in December 2011. Glycerol has been selected as the supplemental carbon source for additional nitrogen removals. The carbon addition for Hunts Point WWTP is required by August 2014 and funding of approximately \$7.9 million for construction is included in FY 2012. Additional funding of \$51.3 million is included in the Current Capital Plan for construction of supplemental carbon facilities for the remaining UER WWTPs (Bowery Bay, Tallman Island and Wards Island WWTPs) for Phase II BNR. Construction completion for these carbon facilities is required by July 2016.

Regarding Jamaica Bay

26th Ward WWTP completed construction for the Phase I nitrogen removal upgrades and started operation of biological nitrogen removal in December 2010. NYCDEP and NYSDEC entered into an agreement to upgrade the Jamaica WWTP to reduce nitrogen discharges. A Stipulation and Order Modifying the Nitrogen Consent Judgment became effective October 2009, which added nitrogen removal upgrades at the Jamaica WWTP. NYCDEP, NYSDEC and Natural Resources Defense Council (NRDC) have entered into a Jamaica Bay Agreement which addresses nitrogen removal upgrades at Rockaway WWTP and Coney Island WWTP, construction milestones for the Jamaica Bay WWTPs interim nitrogen effluent limits for Jamaica Bay and the funding of an environmental benefits project for the saltwater marsh restoration in Jamaica Bay. Funding is included in the CIP for

the nitrogen removal upgrades at Coney Island at a level of \$2.25 million and Rockaway WWTP at a level of \$4.5 million for each plant in the Current Capital Plan.

As of January 1, 2012, NYCDEP is in compliance with the step down combined nitrogen limit for the Jamaica Bay WWTPs of 36,500 pounds/day of total nitrogen, as required under the Consent Judgment. This is a direct result of the capital upgrades and the operation of the Jamaica Bay WWTPs.

NYCDEP recently completed an interim carbon addition facility at the 26th Ward WWTP to further remove nitrogen from the wastewater. NYSDEC approved the final design of the permanent separate sidestream centrate at 26th Ward, known as Ammonia Removal Process (ARP®) System that will treat the nitrogen-rich side-stream centrate at the 26th Ward WWTP. This physical-chemical process is considered advantageous because it is not sensitive to fluctuations in flow or temperature, has lower capital costs than conventional advanced biological treatment technologies, has low residual waste, and ammonium sulfate, the process by-product is a marketable fertilizer commodity. The ARP system is funded at a level of \$28.8 million in FY 2013.

Newtown Creek WWTP Upgrade Program

All Newtown Creek Consent Order milestones are in compliance. In May 2011, NYCDEP certified that the Newtown Creek WWTP meets the effluent discharge requirements of the Clean Water Act, well in advance of the Consent Judgment milestone of May 2013. The Newtown Creek WWTP mandated upgrade projects that are part of the Consent Judgment are funded in FY 2012 at a level of approximately \$77.7 million for construction change orders.

NYCDEP and NYSDEC entered into a Newtown Creek Third Modified Consent Judgment effective August 2009, which addresses a revised construction schedule for the attainment of secondary treatment and completion of all construction at Newtown Creek WWTP, and resolution of penalties for missed milestones. The key elements of the resolution are: (1) Placement of \$29 million in escrow, which can be recovered if NYCDEP meets certain future milestone dates; (2) Establishment of a \$10 million fund for environmental benefits projects (EBP); (3) Performing environmental audits of NYCDEP's in-City wastewater treatment plants and four combined sewer overflow (CSO) facilities, under an agreement that requires NYCDEP to remedy any legal deficiencies uncovered during the audits but protects NYCDEP from penalties for any such deficiencies; (4) The continued implementation of improvements to NYCDEP's business practices related to certain elements of its capital construction program. NYCDEP is required to complete construction of all Newtown Creek mandated work by July 4, 2014. This past year NYSDEC released \$7.3 million of the \$29 million placed in escrow because NYCDEP met certain milestones.

Total Residual Chlorine (TRC)

The State Permit Discharge Elimination System (SPDES) permits for each of the fourteen WWTPs calls for an interim effluent limit for total residual chlorine in the effluent of 2.0 mg/l. This interim limit will stay in effect until construction completion of facilities required to achieve compliance with the final water quality based effluent limits. The SPDES permits also include a schedule of compliance for each plant to make improvements to further reduce residual chlorine. The final effluent limit has not yet been determined by NYSDEC. Due to a number of issues, NYCDEP submitted a proposal for permit modification to the TRC compliance schedule requesting additional time to complete these projects. NYCDEP received a NOV from NYSDEC in January 2012 due to missed dates of compliance with TRC requirements in the SPDES.

There is \$64.5 million in the Current Capital Plan for the TRC program. Additional funding will be required for TRC upgrades at the BNR plants. NYCDEP will determine how much funding and when it will be required pending the outcome of discussions with the regulators regarding the compliance

schedule and pilot results for UV disinfection process and the chlorination/dechlorination for the BNR WWTPs.

Potential Water and Wastewater Projects Beyond Current Capital Plan

Kensico-City Tunnel (KCT)

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

Nitrogen Removal in the Harbor Estuary

The New York/New Jersey Harbor Estuary Program (HEP) is a National Estuary Program that has been sanctioned by the USEPA to restore the waters of the Lower Harbor Estuary and the tidally influenced portions of all rivers and streams that empty into the Estuary. The HEP was convened as a partnership of federal, state, and local governments; scientists; civic and environmental advocates; the fishing community; business and labor leaders; and educators (called the Management Conference). NYCDEP submitted a report to USEPA last year 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 currently not in the Capital Plan for HEP-related upgrades. Upon completion of the HEP studies and based upon negotiations with USEPA, funding may be required in a later planning period.

9.0 PERFORMANCE OVERVIEW

Water Conservation

Figure 1 presents the annual water demand for the last 20 years. Water conservation measures taken by NYCDEP in the 1990s have resulted in a steady reduction in the overall water demand. More recent declines in water consumption have been noted most likely due to conservation measures, economic downturn and weather patterns.

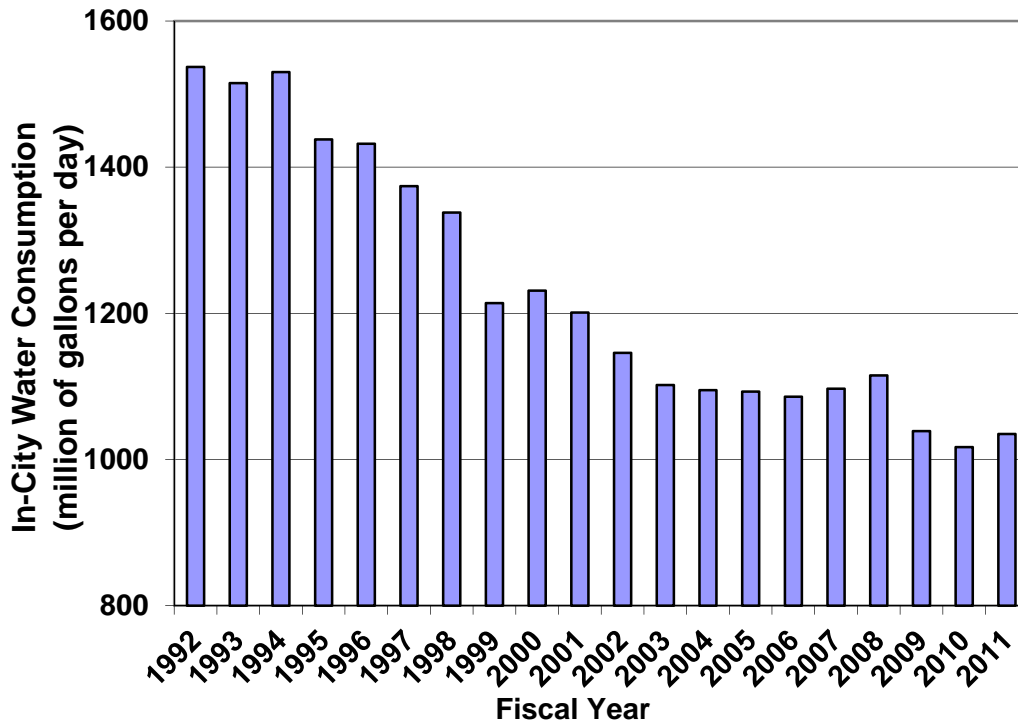


Figure 1: New York City Average Daily Water Demand in Million Gallons per Day (mgd)

System Staffing Levels

Approved positions for the System presently stand at 5,982 for FY 2012 and vacancies currently stand at 363, which reflect a slight decrease in headcount and a slight increase in vacancies compared to FY 2011. Further improvements are underway for the recruitment and personnel procurement process. Figure 2 shows a slight decrease in the NYCEP staffing numbers due to the transfer of the Environmental Control Board from NYCDEP that occurred in FY 2009, which accounted for 142 budgeted headcount. Increased staffing levels, and in combination with reassigning existing staff are required to operate new facilities that will be on-line in the near future. In April 2010, NYC and unions representing NYCDEP employees came to an agreement and settled long standing contract disputes (through 2008/2009) for the Stationary Engineers and Senior Stationary Engineers (Electric); and Sewage Treatment Workers and Senior Sewage Treatment Workers. NYCDEP has seen improvements in attracting highly skilled and qualified staff.

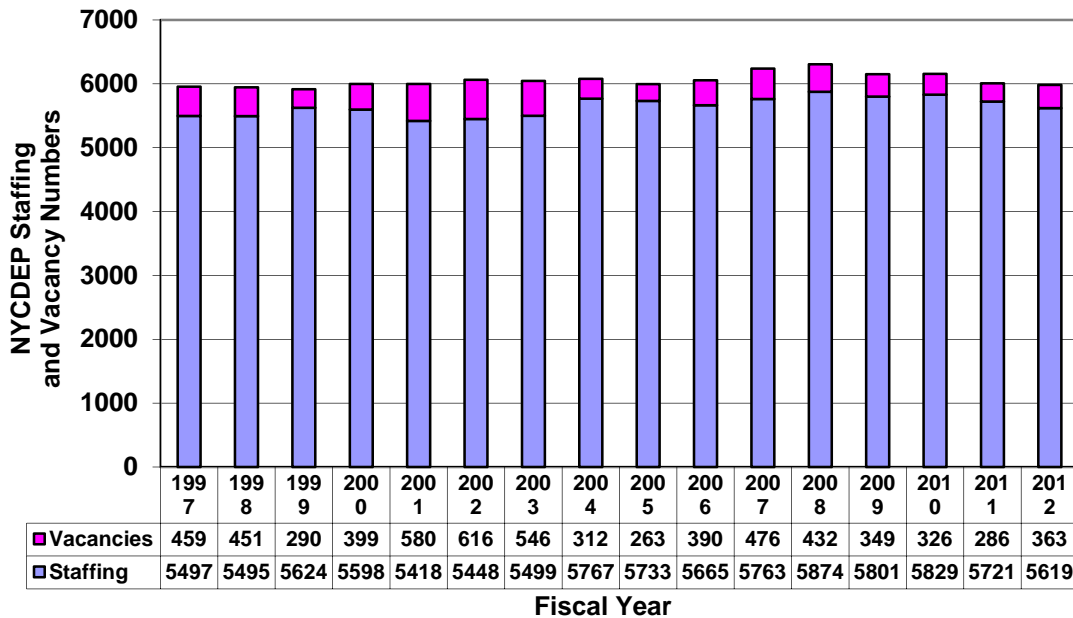


Figure 2: New York City DEP – Staffing and Vacancy Levels 1997-2012

Operational Performance Indicators

There are many operational parameters that can be reviewed to assess the effectiveness of operating programs. NYCDEP recently developed and implemented H₂OStat to improve operational efficiencies, drive performance management and increase accountability across the agency. In the first year of the H₂OStat program, NYCDEP has experienced good results with improved performance. Several performance indicators for water and sewer operations are summarized below.

The NYCDEP performed leak detection surveys on approximately 55% of the City's water mains in FY 2011. There were 481 water main breaks reported in FY 2011, which is typical of the water main breaks reported in the previous several years. On average, NYCDEP restored water to residents within 5.4 hours after identifying the location of the break, which is similar to last year but less than the previous two years. The range of water main breaks that NYC has experienced compares well with other municipalities in the United States. NYCDEP has expanded its preventative maintenance program to target pressure reducing valves by exercising valves and inspecting regulators to help prevent the occurrence of water main break, costly repairs, leaks and disruption of service.

Response time for leak repairs decreased to 14.1 days (See Figure 3). The average backlog of broken and inoperative fire hydrants was 600 hydrants (0.55%) in FY 2011. The average time to repair or replace high priority broken or inoperative hydrants (as determined by the Fire Department) by NYCDEP was 5.9 days in FY 2011, which is less than the previous few years. Sewer back-up (SBU) complaints received by NYCDEP dropped to 14,450 in FY 2011, which reflects a decrease in the last several years. Response time for SBUs was 5.5 hours on average, within the range of the past several years and below the target. Approximately 29% of catch basins were surveyed and inspected in FY 2011. The NYCDEP has an agreement with NYSDEC that each catch basin is inspected by the NYCDEP once every three years, therefore the total catch basins inspected in a given year fluctuates. BWSO's top priority remains their core work which consists of televising of sewers, sewer cleaning, catch basin reconstruction and cleaning, hydrant repair, etc.

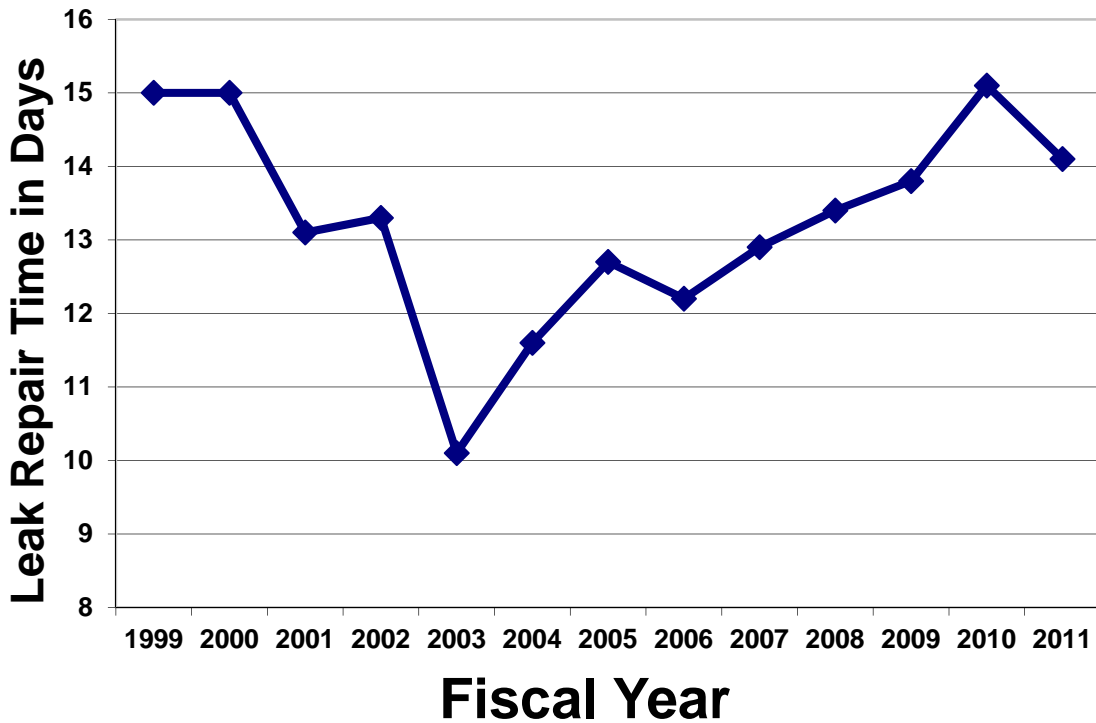


Figure 3: Water Main Leak Repair Time in Days

Operational and Maintenance Program Significant Accomplishments

Operational Excellence. Operational Excellence, also known as OpX is a new program that seeks to find efficiencies in overall NYCDEP operations and maintenance that provides recurring cost savings to the NYCDEP. This program will address all aspects of O&M, such as procurement, chemical usage, fleet management, energy usage and plant operations. It was initiated by NYCDEP in November 2011 and it will be implemented in two phases over the next four years. Phase I report will be submitted to NYCDEP in June 2012.

Drinking Water Quality. NYCDEP conducts significant monitoring of the source water and in-city water quality. In calendar year 2010, NYCDEP collected more than 33,000 samples from the city's distribution system and performed more than 375,800 analyses, meeting all state and federal sampling requirements.

Lead in Tap Water Testing Program. NYCDEP is required to perform annual tap water testing program for lead and copper to determine if they leached into the water from the pipes. In 2010, 10% of the 222 samples collected exceeded the State action level for lead, which is 15 parts per billion (ppb). The lead is not found in the NYC water supply; however, it leached into the water from lead pipes or copper plumbing, a common situation in older service lines. As required, NYCDEP has conducted a public information campaign known as *Run Your Tap*, to educate the public how to reduce the exposure to lead in drinking water. NYCDEP has also provided free lead test kits to homeowners. Due to the anomaly in the number of samples that exceeded the threshold, NYCDEP increased the frequency of monitoring for lead from once a year to twice a year. The results of the two rounds of samples have shown substantial decrease in the number of samplings that exceeded EPA standards. The first round of results, taken from January 1 through June 30, subsequent to the elevated findings in 2010 showed that less than 2% (2 samples) of 114 samples were elevated, also

below the 10% threshold. The most recent results, taken from July 1 through December 31, 2011, showed that 7.6% (18 samples) of 238 samples were elevated, which is below the 10% threshold. On account of the two testing rounds that showed lead levels have returned to normal, NYCDEP is no longer required to inform customers of potentially elevated levels of lead on water bills and they will resume to routine annual monitoring for lead.

Harbor Water Quality. NYC has been collecting and record keeping water quality data for over 100 years. The New York Harbor Water Quality Survey currently consists of 62 stations; 35 stations located throughout the open waters of the Harbor, and upwards of 27 stations located in smaller tributaries within the NYC. 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 Green Infrastructure Plan.

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 floatables program. Figures 4 and 5 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 current information indicates that the harbor waters have achieved the standard set for fishable and swimmable quality.

The percentage of wastewater treatment plant effluent that met federal standards in FY 2011 was 100 %.

Permits. NYSDEC issued final SPDES permits to the 14 WWTPs in October 2010, which expire in 2015. A portion of New York City has separate sanitary sewer systems. Until now the provisions for separate sanitary sewers were included in the SPDES permits however NYSDEC indicated its intention to issue a new citywide municipal separate storm sewer system (MS4) permit to NYC. Negotiations are ongoing to determine the additional requirements due to the proposed citywide MS4 permit and when the new permit will go into effect.

Biosolids. In December 2011, NYCDEP selected WeCare Organics for the beneficial reuse of biosolids. A \$56 million contract is anticipated to commence in the Spring of 2012. This contract will cost \$75/ton for the transporting, processing and marketing the biosolids, which is significantly less costly than the previous beneficial reuse contract. The remaining NYCDEP biosolids contracts will expire in 2012, 2013 and 2014.

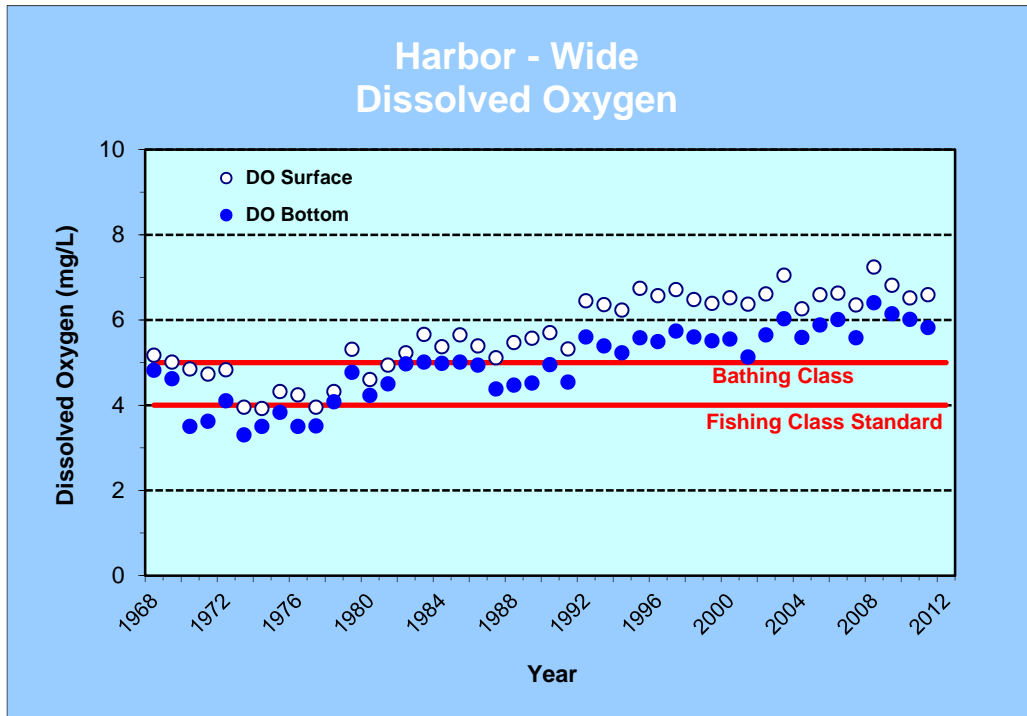


Figure 4: Dissolved Oxygen for Harbor Survey Key Stations (1968-2011)

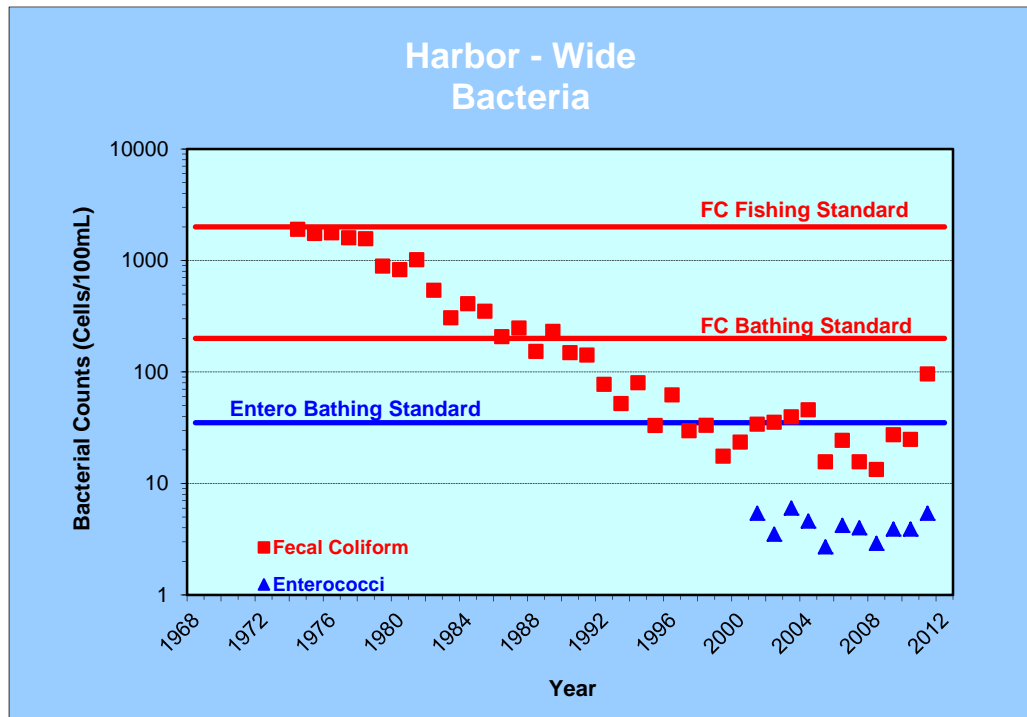


Figure 5: Fecal Coliform Counts for Harbor Survey Key Stations (1974-2011)

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 increase staff and/or redirect staff for the future operations for the Croton and CAT/DEL treatment facilities. BWS will manage/operate the Cat/Del UV facility and BWSO will manage/operate the Croton treatment facility. NYCDEP will be operating both of these facilities at start-up. However, NYCDEP is evaluating contract operations for future operations of the UV plant and possibly the Croton plant.

The operating bureaus continue to evaluate and find effective means to operate more efficiently with reduced expense budgets projections for FY 2012 without impacting the overall operation and maintenance (O&M) of the System. NYCDEP has implemented less costly biosolids management, alternative chemical procurement opportunities and reduction of nonessential expense items without impacting the system-wide water supply, water distribution and wastewater treatment processes. NYCDEP and the OpX contract will continue to evaluate reductions in the O&M expense budget for FY 2013 without impacting the integrity of their operations.

10.0 OTHER NOTEWORTHY ISSUES AND COMMENTS

Fire at the North River Wastewater Treatment Plant

On July 20, 2011, a fire began in the engine room for the main sewage pumps at the North River WWTP. It escalated to a four-alarm fire and plant operations were shut down. NYCDEP responded quickly and decisively to ensure the safety of NYCDEP personnel and other workers and to limit the untreated wastewater discharge to the Hudson River. NYCDEP provided thorough coordination efforts among City agencies, contractors, regulators and the public during the fire and aftermath. NYCDEP hired a third party consultant to investigate the cause of the fire. A Final Site Incident and Observation Report, North River WWTP Main Sewage Pump Station Risk Assessment was issued in October 2011. Two likely scenarios were identified as probable causes for the fire. According to the investigation, in both scenarios a most likely small initial fire spread when it compromised larger fuel pipes. It was concluded that neither of these scenarios was the result of improper operation or maintenance of equipment. New York City Fire Department (FDNY) made several recommendations to improve the facilities and to safeguard against similar events in the future. NYCDEP has implemented new procedures at all wastewater treatment plants such as performing quarterly drills, implementation of a lock box program, and review of Emergency Action Plans and evacuation procedures. NYCDEP has also implemented FDNY recommendations specific to North River and other engine WWTPs. NYCDEP maintained strong coordination with City agencies, state and federal regulators, Con Ed, stakeholders, NYC OEM during and after the fire and the subsequent investigation. Nobody was injured due to the fire.

Due to the plant shutdown, wastewater that was sent to North River bypassed the plant which caused untreated wastewater discharges to the Hudson River. North River treats on average 120 mgd of wastewater from northern Manhattan and the westside of Manhattan. In order to minimize untreated discharges, NYCDEP diverted some of the flow to Wards Island WWTP. The New York City Health Department issued beach pollution advisories for affected areas. NYCDEP made several public notifications during the discharge time period. NYCDEP continued to provide routine updates on the status of the plant's operations and public health impacts along with the Health Department. During and after the fire, NYCDEP and its contractors worked around the clock to stabilize the operations and put critical equipment back in working order. The plant resumed full primary treatment and chlorine disinfection on Saturday, July 23, and began reaching full secondary treatment standards starting on Monday, July 25.

Earthquake

An earthquake that occurred on August 23, 2011 in Virginia was felt in the NYC area and the upstate watershed. A smaller earthquake also occurred in upstate NY in the watershed on August 27, 2012. All critical infrastructure was inspected and it was determined there was no damage due to either of the earthquakes. NYCDEP followed the protocols in accordance with their Seismic Plan for inspection of dams and other critical infrastructure.

Hurricane Irene Impacts

Hurricane Irene moved through the NYC area and upstate watershed region on August 28 and 29, 2011. NYCDEP prepared in-city and upstate for the storm, however due to the nature of the storm intensity and routing, impacts in the upstate watershed were more severe than in the City. BWS took pro-active steps to prepare for the recent storms by increasing releases from the reservoirs. Record rainfall fell in some parts of the watershed causing widespread damage. Watershed impacts included loss of power at some facilities, large debris found in reservoirs, damage at two upstate wastewater treatment plants (Margaretville WWTP and Tannersville WWTP), and damage to roads and bridges. The Gilboa Dam site preparation work for the reconstruction project was destroyed and the dam spillway was damaged. NYCDEP performed emergency repair work throughout the watershed areas impacted by the storms. The Emergency Action Plan was triggered at Gilboa Dam due to the record inflows and the loss of remotely monitoring devices. However, the structure integrity of the dam was deemed safe after inspections, both in-house by NYCDEP and by outside dam experts.

Shortly after Hurricane Irene, parts of the watershed received heavy rain and flooding from Tropical Storm Lee. Although these two consecutive storms stressed the water supply system with flooding, infrastructure damage and some water quality issues, NYCDEP stayed in compliance at all times and managed the risks to the system due to the operational flexibility and strong decision making capabilities. NYCDEP is undergoing an after action analysis to determine what lessons learned can be applied in the event of future events.

Approximately \$41 million in funding of emergency repair contracts is included in FY 2012 and FY 2013. NYCDEP anticipates Federal Emergency Management Agency (FEMA) reimbursement for a majority of the emergency hurricane related required work.

In addition, NYCDEP has provided funding to upstate communities to assist in their recovery efforts. NYCDEP has also funded studies to improve flood studies and maps to minimize future flooding in the West of the Hudson (WOH) watershed.

Due to high turbidity levels in the Ashokan Reservoir caused by heavy rains late last year NYCDEP has been making water releases through the Ashokan Release Channel. NYCDEP has been operating under the NYSDEC Interim Protocol, issued in October 2011 for operation of the Ashokan Release Channel which will help reduce flooding and protect drinking water quality. In accordance with the protocol, NYCDEP achieved the 10% void space target in the Ashokan Reservoir as per the seasonal requirements to help mitigate future flooding events.

Natural Gas Exploration

In 2011, NYSDEC proposed a ban on high-volume hydrofracking (HVHF) within the watersheds of unfiltered water supplies in New York State, which includes the NYC Catskill/Delaware watershed and a 4,000 foot buffer around the watershed. NYSDEC issued a Revised Draft Supplemental Generic Environmental Impact Statement (RDSGEIS) on the Oil, Gas and Solution Mining Regulatory Program in September 2011. NYCDEP hired a geophysical expert consultant to study the impacts to microseismic events caused by natural gas drilling. NYCDEP issued significant comments to the RDSGEIS on January 11, 2012. The main concern pertains to risks and the potential consequences

of impacts from high volume hydrofracking near NYCDEP infrastructure that are located outside the watershed. The comments include a hybrid approach to infrastructure protection and are summarized as follows: (1) a seven-mile Infrastructure Exclusion Zone around the Delaware and Catskill Aqueducts, where no high volume hydrofracking would be permitted; (2) a two-mile Infrastructure Exclusion Zone around other tunnels overlying the Marcellus shale deposits (East Delaware Tunnel, West Delaware Tunnel, Neversink Tunnel); (3) an Infrastructure Enhanced Protection Zone between two and seven miles around the tunnels. In addition, NYCDEP requested that the Final Supplemental Generic Environmental Impact Statement (SGEIS) commit to further environmental review for low volume hydrofracking (LVHF). New York City will continue to monitor this issue very closely.

Hydro-Electric Power

NYCDEP holds a preliminary permit from the Federal Energy Regulatory Commissioner (FERC) to investigate the installation of hydro-electric turbines at NYCDEP upstate dams to harness hydro power. NYCDEP is currently evaluating the results of the studies in order to determine the feasibility of constructing these hydroelectric facilities at the dams on three Delaware reservoirs and one Catskill reservoir. NYCDEP's main concerns are dam safety, maintaining operational control over the dams and the ability to meet flow management agreements. The city intends to file its final license application in the spring of 2012. During the filings there will be an opportunity for public comment.

Emerging Contaminants

In August 2011, NYCDEP concluded a follow-up study that confirms no public health risks from the presence of pharmaceuticals and personal care products in New York City's source drinking waters. The follow-up study included data on chlorine-treated water in addition to source water, with samples taken from March to December of 2010. The results of the study are found in a report released in August 2011, entitled *Occurrence of Pharmaceutical and Personal Care Products (PPCPs) in Source Water of the New York City Water Supply*. The follow-up study consisted of the collection of quarterly water samples again from the Catskill, Delaware, and Croton untreated source waters. In addition, a new site was added to sample for PPCP occurrence in water that had been treated with chlorine for primary disinfection. The purpose of adding this site to the sampling program was to determine whether the presence of a strong oxidant such as chlorine degraded or changed the mixture of the minute amount of PPCPs present in samples from the Delaware Aqueduct.

Newtown Creek and Gowanus Creek Superfund Designations

In March 2010, the Gowanus Canal was declared a Superfund site and in September 2010, Newtown Creek was declared a Superfund site. USEPA has notified NYC that they are considered a potential responsible party (PRP) for hazardous waste under Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) for both Superfund sites. 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. This investigation is expected to take approximately six to seven years and cost approximately \$25 million. The City's share of the cost is one quarter of the total. The settlement does not cover any remedy that may ultimately be chosen by USEPA to address the contamination identified as a result of the investigation and evaluation.

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

In December 2011, USEPA released its draft feasibility study for the Gowanus Canal, evaluating various alternatives to address the contamination. NYCDEP is currently undertaking a \$160 million

capital project which will modernize a flushing tunnel to directly improve water quality and circulation within the canal. These projects should not be impacted by the listing of the Gowanus Canal as a federal Superfund site, based upon communication between NYCDEP and USEPA.

Awards

NYCDEP was recognized by the Clean Water America Alliance in 2011 and was one of five recipients of the U.S. Water Prize for watershed-based approaches toward water sustainability due to the implementation of the NYC Green Infrastructure Plan.

In addition NYCDEP received the Project of the Year award for the construction of the UV Disinfection facility, from the Professional Women in Construction (PWC).

NYCDEP was awarded the American Water Works Association's LaDue Safety award in the large U.S. water utility class for environmental, health and safety.

Engineering News Record (ENR) New York awarded the 2011 best civil/infrastructure project to the water tunnels and associated work for the Croton Water Treatment project.

American Council of Engineering Companies (ACEC) awarded the innovative SHARON® process at the Wards Island WWTP the Engineering Excellence Grand award in 2011.

NYCDEP was awarded its first Leadership in Energy and Environmental Design (LEED) Silver Certification by the United States Green Building Council (USGBKC) for the Construction Management Building at the Jamaica WWTP.

11.0 SUMMARY AND CONCLUSIONS

Regarding System Management

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

Regarding the Capital Improvement Program (CIP)

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

- **TRC Program:** It is anticipated that the NYCDEP and NYSDEC will negotiate revised dates for full implementation of the TRC program. UV disinfection may be required for the NYC BNR plants based upon the outcome of pilot studies. The funding for UV is not included in the Current Capital Plan; therefore additional funding will be required in the next Ten Year Strategy.
- **MS4:** NYSDEC has not indicated to NYCDEP what requirement will be necessary. Pending negotiations with the regulators additional funding may be required in the next Ten Year Strategy.
- **Climate Change Facility Impacts:** The climate change initiative will identify additional upgrading requirements for NYCDEP assets. Until the facility assessments have been made, the budgetary funding requirements cannot be ascertained. Additional funding may be required further outside this planning period.
- **Hillview Reservoir Cover:** The cost of completely covering the Hillview Reservoir using a fixed concrete cover is currently estimated at approximately \$1.6 billion; there is no funding for this currently in the Current Capital Plan. Pending the outcome of the federal review of LT2 which may take a few years and will impact the need to cover the Hillview Reservoir, additional funding may be required further outside this planning period.

Regarding the Physical Condition of the System

In our opinion, the NYCDEP facilities and infrastructure are in adequate condition and are similar to water and wastewater assets in other urban areas nationwide. As indicated, an Asset Management program is underway that better identifies the needs and costs for infrastructure upgrades. These needs will have to continue to be addressed and implemented as they are identified. NYCDEP is taking a proactive approach prioritizing their needs and spending money (capital and expense) where it will have the biggest impact to the water and wastewater system and water quality. Because of the extensive nature of the NYCDEP facilities, continued diligence and future capital improvements will be necessary to maintain an adequate rating.