

**Fiscal Year 2021**

# **CONSULTING ENGINEER'S REPORT**

March 2021





March 1, 2021

Ms. Olga Chernat  
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 2021 Consulting Engineer's Report**

Dear Ms. Chernat:


We herewith submit the Fiscal Year (FY) 2021 Consulting Engineer's Report on the operation of the Water and Sewer System of the City of New York (hereinafter referred to as "The System"). 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 FYs 2021 and 2022.

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 capital budget allocations for FY 2021 and FY 2022 are adequate for the immediate needs of The System.

The information presented in this report is based on the Preliminary Budget released on January 14, 2021. It is important to note that budgetary planning will continue past the date of this report and revisions may be made. It is our opinion, however, that meaningful observations and conclusions can be drawn at this time, although the final budget allocations may change during the budget finalization process.

We are not required 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 2021 CONSULTING ENGINEER'S  
REPORT**

**PREPARED BY**

**AECOM**

**March 1, 2021**



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## **1.0 EXECUTIVE SUMMARY**

This Report addresses the condition of The System and the adequacy of the capital program and operating budgets for Fiscal Years 2021 and 2022 as presented in the New York City Department of Environmental Protection (NYCDEP) Preliminary Budget released on January 14, 2021.

The NYCDEP is charged with the responsibility of the overall operation and maintenance of the vast water and wastewater infrastructure serving New York City (NYC). NYCDEP's vision is *"to be a world class water and wastewater utility, while building a sustainable future for all New Yorkers"*. The critical mission of NYCDEP is to enrich the environment and protect public health for all New Yorkers by providing high quality drinking water, managing wastewater and stormwater, and reducing air, noise and hazardous materials pollution in NYC<sup>1</sup>. The scope of this report will focus on the water and wastewater systems. NYCDEP remains vigilant in providing operation and maintenance of water and wastewater infrastructure comprising significant capital assets and providing long-term planning of future needs. NYCDEP has implemented new programs and infrastructure to meet more stringent regulatory requirements (Biological Nitrogen Removal (BNR) for wastewater resource recovery facilities, Combined Sewer Overflow (CSO) treatment facilities, and water treatment facilities). While providing these infrastructure improvements, NYCDEP is also tasked to maintain its water and wastewater infrastructure to comply with strict regulations and avoid critical failure of processes and assets. Considering climate change, it is essential for NYCDEP to continue its efforts to maintain a resilient and sustainable water and wastewater system. NYCDEP must constantly manage risks and prioritize competing needs of The System to achieve its objectives. In addition to these competing needs, NYCDEP faced many challenges this past year due to the ongoing global pandemic. Considering the magnitude of the overall infrastructure, the operational service required, and the ongoing challenges created by the global pandemic, it is our opinion that:

- 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.
- The physical condition of The System receives an "adequate rating", our highest rating. Due to the size and complexity of The System, NYCDEP continuously requires future capital investments for the replacement and/or repair of aging infrastructure in a systematic and cost-effective manner.
- NYCDEP capital and expense budget projections for FY 2021 satisfy the immediate needs for The System including legally mandated projects, which comprise approximately 28% of the capital budget for FY 2021.
- NYCDEP capital budget projections for FY 2022 satisfy the immediate needs for the System including legally mandated projects, which comprise approximately 28% of the capital budget for FY 2022. Expense budget projections for FY 2022 are currently being evaluated based upon the projected new needs of The System and may require adjustment when the evaluation is complete.
- NYCDEP capital planning is an ongoing iterative process addressing priorities and needs of The System. The NYCDEP is responsive to the long-term requirements of the service area.

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<sup>1</sup> NYCDEP 2018 Strategic Plan, *Enriching Our Legacy*.

- Staffing levels have dropped from 96% to approximately 92% of approved allocations, which reflects an increase in vacancies. The hiring freeze policy that was implemented across NYC in March 2020 through June 2020, and the partial hiring freeze that is currently in effect have created a challenge for NYCDEP. NYCDEP has implemented a mitigation program based on increasing overtime and reallocation of resources to critical operating vacancies. However, these are short-term measures, and not sustainable over the long-term. Additional staffing to fill critical vacancies will be required when the hiring freeze is lifted.

## **2.0 PURPOSE AND SCOPE OF THE REPORT**

The purpose of this report is to provide engineering information pertinent to the condition of The System serving NYC and the adequacy 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 its origin in 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 — Preliminary 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, which has included independently reviewing the capital and operating programs pertaining to water and wastewater, reviewing select pertinent studies associated with the long-term development of The System, and conducting Due Diligence interviews with key individuals responsible for managing the activities of the NYCDEP.

The report addresses the issues listed below:

- present physical condition of The System,
- Fiscal Year (FY) 2021<sup>2</sup> capital budget and FY 2022 projected capital budget for The System,
- FY 2021 expense budget and FY 2022 projected expense budget relative to operation and maintenance of The System,
- overview of the Preliminary Ten-Year Capital Strategy for FYs 2022 to 2031 and,
- management of The System.

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<sup>2</sup> The NYCDEP Fiscal Year begins on July 1 and ends on June 30. FY 2021 began on July 1, 2020 and ends on June 30, 2021.

### 3.0 METHODOLOGY FOR ANALYSIS

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

- Due Diligence interviews with representatives of the NYCDEP and discussions with representatives of the Authority,
- Review of documentation relative to the ongoing budgetary process,
- Review of the status of ongoing major programs and review of select reports/ presentations provided by NYCDEP,
- Consideration of national and local trends in the water and wastewater industry (federal, state and local regulations, resource recovery, aging infrastructure, resiliency, climate change impacts, energy programs, and
- Consideration of COVID-19 related impacts to water/ wastewater operations and the capital program.

The budgetary process for the current capital and expense budgets was not concluded by the time of this report's publication. It is anticipated that the Executive Plan will be released in April 2021. Observations and conclusions presented herein are therefore based on budget data as it stood at the date of this report. 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 final outcome of the budgetary process.

## **4.0 COVID-19 GLOBAL PANDEMIC**

The World Health Organization (WHO) declared the outbreak of the 2019-Novel Coronavirus disease (COVID-19) a global pandemic. New York State (NYS) Governor Andrew Cuomo declared a state of emergency in NYS on March 7, 2020 and Mayor Bill DeBlasio declared a state of emergency in New York City (NYC) on March 12, 2020. These state of emergency orders are still in effect.

Operation of NYCDEP water and wastewater treatment facilities have continued throughout the global pandemic. NYCDEP operations are deemed an essential service and NYCDEP continued to fulfill its mission of providing operation of services 24 hours per day/ 7 days per week. Drinking water quality, water distribution, water supply, wastewater collection and wastewater treatment capacities have not been impacted significantly. Currently, there is no evidence that coronavirus survives the disinfection process for drinking water and wastewater<sup>3</sup>. In April 2020, the Water Environment Federation (WEF) convened a Blue-Ribbon panel of experts that concluded the occupational risk of infection to wastewater workers from the SARS-CoV-2 virus is low, and not greater than those from other pathogens in the wastewater<sup>4</sup>.

In March 2020, NYCDEP quickly focused on COVID-19 containment measures and followed all appropriate guidance, safety measures, and protocols. These measures include wearing personal protective equipment (PPE), disinfecting work areas, use of hand sanitizers and hand washing, staggering work schedules to allow for social distancing, contact tracing for positive cases, and continued communication. The essential workers continue to report to field sites for the operation and maintenance of facilities. The majority of the NYCDEP office staff are working from home (WFH) to adhere to social distancing and other COVID-19 safety guidelines.

The pandemic has impacted other aspects of NYCDEP operations, such as water consumption rates. NYCDEP has experienced an increase in residential water consumption but a decrease in commercial consumption. The change in water use patterns is attributed to the stay at home orders, limited operation of a significant number of business and office buildings, and prolonged closures of businesses throughout NYC. NYCDEP continues to monitor the water consumption trends. The economic uncertainty caused by COVID-19 and the impact on NYCDEP capital planning and delivery and staffing hiring freeze will be discussed later in the report, in Sections 7.1 and 9.0, respectively.

Both academia and utilities have determined that the presence of SARs-COVID can be found in wastewater and can be used as a leading indicator for the presence of the disease within sewersheds, prior to communities and individuals getting tested or becoming symptomatic of the virus. NYCDEP began testing for the presence of the COVID-19 RNA in the NYC wastewater, at the 14 WRRFs starting in August 2020 and testing is still ongoing. NYCDEP provides this data to the New York City Department of Health and Mental Hygiene (NYCDOHMH). The RNA signal detected in the wastewater

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<sup>3</sup> <https://www.cdc.gov/coronavirus/2019-ncov/faq.html#Food-and-Water>  
<https://www.wef.org/news-hub/current-priorities/coronavirus/>

<sup>4</sup> <https://www.accesswater.org/publications/-10027929/protecting-wastewater-professionals-from-covid-19-and-other-biological-hazards>



correlates well with the presence of COVID-19 clinical cases in the communities within the NYCDEP sewersheds. The success of the NYCDEP wastewater surveillance program is in part due to the collaboration of academic partners, water utilities, and research foundations.

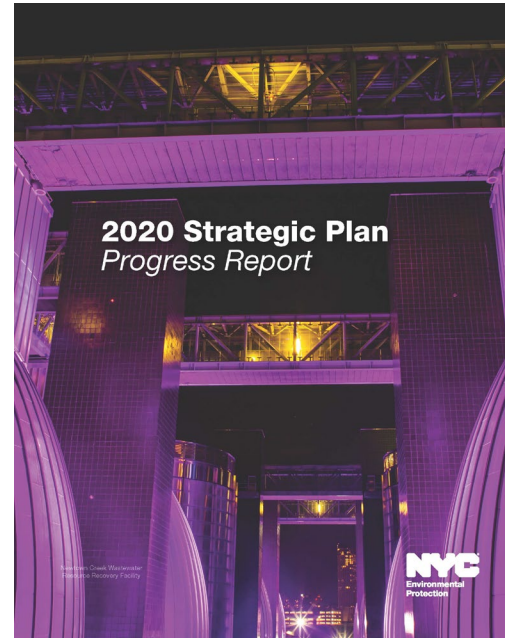
## 5.0 MANAGEMENT AND OPERATION OF THE NYCDEP SYSTEM

### NYCDEP Strategic Plan

NYCDEP released its Strategic Plan in June 2018, titled the *2018 Strategic Plan Enriching Our Legacy*. NYCDEP updated the mission and vision of the organization to reflect the shifting priorities and to meet new objectives. The Plan identifies eight core values that pertain to how NYCDEP conducts business; these core values are safety, integrity, service, diversity, support, transparency, sustainability, and innovation. NYCDEP published *2020 Strategic Plan Progress Report*, the annual update of the Strategic Plan in October 2020, which monitors their performance and provides accountability of their progress in implementing the Strategic Plan goals. The 2020 Progress Report provides an update on the following seven goals and forty-three specific initiatives that will guide NYCDEP to focus on their priorities:

- Provide world-class and sustainable water and wastewater services now and for future generations (includes thirteen specific initiatives)
- Control local sources of pollution to improve quality of life (includes six specific initiatives)
- Reduce our carbon impact and mitigate the effects of climate change (includes four specific initiatives)
- Increase public awareness of our operations and improve service to our customers and the business community (includes six specific initiatives)
- Cultivate a diverse and highly qualified workforce to meet future challenges (includes four specific initiatives)
- Maximize operational efficiencies across the agency (includes five specific initiatives)
- Leverage innovative approaches to improve performance (includes five specific initiatives)

NYCDEP is on schedule for about 88% of the strategic initiatives within the second year of the Plan, including two initiatives that are completed. The remaining initiatives are either delayed or not started yet. NYCDEP considered a wide range of factors in the development and implementation of the Plan, including current and anticipated mandates, institutional knowledge of The System, financial planning, technology and industry trends, workforce demographics, customer service, and the economic impact of water rates to customers. The Strategic Plan will evolve over the years to reflect emerging and changing trends in the industry while adhering to the NYCDEP visionary goals.



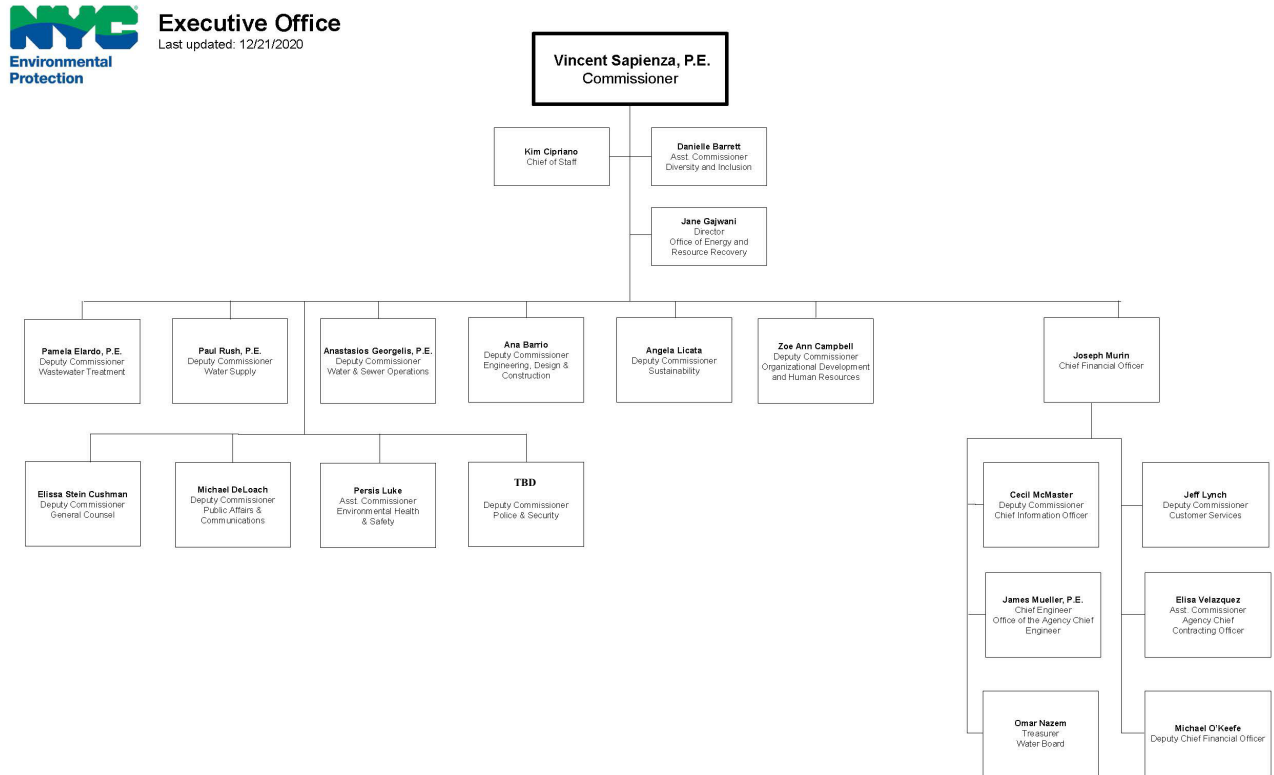
**Figure 5-1: NYCDEP Strategic Plan 2020 Update**

# THE NEW YORK CITY MUNICIPAL WATER FINANCE AUTHORITY

## *Fiscal Year 2021 Consulting Engineer's Report*

### Organizational Structure

NYCDEP maintains an ongoing close collaboration among all bureaus since many complex programs impact multiple disciplines and operating bureaus. The NYCDEP is currently organized into the following Bureaus:



**Figure 5-2: NYCDEP Executive Level Organizational Chart**

- The following offices and bureaus report directly to the Commissioner: Chief of Staff, Bureau of Public Affairs and Communications, Assistant Commissioner of Diversity and Inclusion, General Counsel, Environmental Health & Safety (EH&S), the Chief Financial Officer, Police and Security, Organizational Development and Human Resources, Bureau of Wastewater Treatment (BWT), Bureau of Water Supply (BWS), Bureau of Water and Sewer Operations (BWSO), Office of Energy and Resource Recovery Programs (OERR), Sustainability, and Bureau of Engineering, Design, and Construction (BEDC).
- The Chief Financial Officer oversees the Budget Office, Bureau of Customer Service, the Office of the Agency Chief Engineer (OACE), the Office of Agency Chief Contracting Officer (ACCO), and Information Technology.
  - The main function of the OACE is planning, capital funding and program prioritization and optimization within NYCDEP. The OACE is organized within the following directorates: Capital Budget; Wastewater Integrated Planning; Water Supply and Distribution Integrated Planning; Asset Management and Data Analytics; Business Analysis and Optimization; Engineering Guidelines and Standards. The OACE coordinates with the Capital Planning section of the Operating Bureaus (BWS, BWT and BWSO). The OACE also collaborates

with BEDC, BWS, BWT, BWSO, Sustainability, and OERR to integrate projects and setting priorities across all NYCDEP.

- The three Operations Bureaus consist of the BWS, the BWSO, and the BWT. The Deputy Commissioner of each operating Bureau reports directly to the Commissioner. The key responsibilities of each operating bureau are:
  - The mission of BWS is to reliably deliver a sufficient quantity of high-quality drinking water to protect public health and enhance the quality of life of New York City. It is organized into eight directorates (Water Innovation and Research, Planning, Watershed Protection Programs, Source Water Operations, Water Treatment Operations, Water Quality, Management Services/Budget and Environmental Health/Safety) that report directly to the Deputy Commissioner. The Research Application section focuses on applying national and international research developments to best practices and to help prepare for future challenges. The Water Treatment Operations Directorate focuses on the treatment of water leaving the reservoirs before it moves toward the distribution system. Once the water leaves the Hillview Reservoir and Croton Water Filtration Plant (WFP), it enters the distribution system that is operated and maintained by BWSO. BWS' responsibilities include the management, operation and maintenance of the Croton WFP, Catskill/Delaware Ultraviolet (Cat/Del UV) Disinfection Facility, Hillview Reservoir, Jerome Park Reservoir, and Chlorination and Fluoridation at Kensico Reservoir Shaft 18, Pleasantville Alum Plant and all associated dams, aqueducts, shafts, waterworks and support systems. The Source Water Operations Directorate is 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 City's Watershed Protection Program and for complying with the NYC's Filtration Avoidance Determination (FAD) program. In April 2020, BWS released a Strategic Plan for water supply planning and operation for 2020 through 2024, which aligns with the Agency Strategic Plan discussed in the previous section.
  - BWSO is responsible for the operation and maintenance of the city's drinking water distribution system, wastewater collection system, Bluebelts and Green Infrastructure. BWSO field operations are responsible for the following: (1) that residences and businesses have an adequate supply of potable water, (2) that there is sufficient water for fire protection, and (3) that the wastewater collection system is properly functioning. BWSO coordinates closely with the New York City Department of Design and Construction (NYCDDC), since NYCDDC has the responsibility for the construction of the water mains and sewers that BWSO operates and maintains. BWSO is heavily focused on stormwater management issues and has an intensive program to alleviate chronic flooding in Southeast Queens. The Green Jobs/ Green Infrastructure Maintenance are part of BWSO. BWSO has initiated implementing online permitting for water, sewer and stormwater connections. The online permitting is known as Permitting and Review Information System (PARIS).
  - The BWT Mission statement is "We safely convey and treat wastewater, manage stormwater, and recover valuable resources to protect public health and enhance the environment to sustain the economy and quality of life for all who live, work and play in NYC". The BWT Vision statement is "Advance a state of good repair through engaged employees and responsible asset management and become a leader in wastewater resource recovery." BWT is responsible for the operation and maintenance of the 14 in-city Wastewater Resource Recovery Facilities (WRRF), the City's 96 wastewater pump stations, interceptors, CSO regulators, biosolids dewatering facilities, fleet of marine

vessels, laboratories, and the control of discharges from combined sewer overflows. Two Assistant Commissioners (Capital Planning/Delivery and Wastewater Treatment/Resource Recovery Operations) report directly to the Deputy Commissioner. BWT plans to further drive decision-making through data driven analytics. Because of the energy-intensive nature of its facilities, BWT coordinates closely with the OERR Programs. BWT's Research and Development Plan focuses on innovation, one of NYCDEP's core values. BWT continues to focus on organizational development planning to identify and evaluate the current and future staffing and skill set needs of BWT operations. Seven Area Facility Managers (two WRRFs per Facility Manager) provide senior leadership in the operation of the 14 wastewater resource recovery facilities. The Area Facility Managers report to the Director of Plant Operations. Working with the Chief Operators of the individual plants, the Area Facility Managers provide overall operational consistency. Each Area Facility Manager has an assigned Reliability Centered Maintenance Engineer (RCME) who coordinates maintenance operations.

- Capital Improvement Program Delivery is executed by BEDC. BEDC is organized into the following directorates: Water System Capital Program, Wastewater Capital Program, and In-House Design (IHD). Within IHD, there are two groups - the Design Service Division and the newly formed Engineering Services Division. BEDC is responsible for project delivery consisting of the design and construction of capital improvement projects, including major water transmission facilities, water treatment facilities, wastewater resource recovery facilities, wastewater pumping stations, and stormwater/CSO facilities. BEDC implements many of these projects with contract services for planning, design, construction and construction management (CM), along with the IHD group. BEDC continues to find ways to improve business practices that will have a positive impact on project implementation, such as streamlining procurement processes for improved efficiency and the development of front-end business cases. These improvements will benefit overall project execution with better controls on project schedules and project costs/change orders. BEDC is in the final phase of a change order Standard Operating Procedure (SOP), with the goal of improving business practices by reducing the time to process change orders and improve the final project.
- The OERR Programs is responsible for the coordination of energy management for all operating bureaus and overall NYCDEP energy initiatives and works closely with NYC Department of Citywide Administrative Services (DCAS). OERR guides and oversees NYCDEP's energy, biosolids and residuals, organics/ food waste, resource recovery, and greenhouse gas (GHG) policy, planning, projects, budgeting, research and studies. OERR advises on energy and GHG related expense and capital funding, in addition to seeking outside funding sources for projects, such as those available through DCAS. OERR is also managing the development of the Energy and Carbon Neutrality (ECN) Plan.
- 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 Bureau of Environmental Planning and Analysis (BEPA), Hazardous Materials and Superfund Planning & Analysis, and the Bureau of Environmental Compliance (BEC). Implementing, coordinating and tracking the many elements of the Green Infrastructure Plan occurs within BEPA. BEPA is also 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 provide appropriate forecasting, trend analysis, regulatory review, scientific modeling, and research. BEPA continues the work of the climate change task force and helps NYCDEP plan for the new growth stimulated by rezoning throughout the city. The Sustainability Group is also responsible for implementing and tracking the One NYC sustainability initiatives for NYCDEP, and coordinates with the Mayor's Office of Resiliency (MOR) on resiliency initiatives. The Hazardous Materials and Superfund Planning & Analysis group coordinates Superfund Programs. 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.

## **6.0 OVERVIEW OF THE SYSTEM**

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

### **6.1 Water Supply System**

The NYC water is supplied from three upstate watersheds (Delaware, Catskill and Croton), which extend as far as 125 miles north of NYC, consisting of 18 collecting reservoirs (in the Delaware, Catskill, and Croton Systems), three controlled lakes (in the Croton System), and three additional balancing and distribution reservoirs (Kensico, Hillview and Jerome Reservoirs) as shown in Figure 6-1. The NYC water supply system has a total available storage capacity of 570 billion gallons. NYCDEP maintains operational flexibility to vary the water supply from all three water systems, as it deems necessary.

NYCDEP also maintains wells in Queens; however, the groundwater supply system has not been providing water to the NYC distribution network since 2007. NYCDEP submitted the groundwater permits renewal in December 2017 so that the groundwater will be available as a back-up water supply, if necessary. However, the upstate surface water supply is the primary source water for NYC.

#### **Croton System**

The Croton water supply system, the NYC's oldest water supply, was put into service in 1842 with the construction of the Old Croton Aqueduct delivering water to the City and it has continued to expand. It now includes several reservoirs (New Croton, Croton Falls Main, Cross River, West Branch, Titicus, Amawalk, East Branch, Muscoot, Bog Brook, Middle Branch, Boyds Corner, Croton Falls Diverting), all of which now feed into the New Croton Aqueduct.

The Croton System delivers water by gravity from the New Croton Reservoir through the New Croton Aqueduct to the Jerome Park Reservoir in the Bronx. The water is then sent to the Croton WFP, which came online in May 2015. The Croton WFP has a maximum capacity of 290 MGD and is divided into Plant A and Plant B. The water treatment processes consist of chemical addition, dissolved air flotation (DAF), and filtration followed by UV disinfection. The Croton WFP is located beneath Van Cortlandt Park in the Bronx. It is the largest underground water filtration plant in the United States. The Croton WFP is also the largest stacked DAF filter plant in the United States. After treatment, the water is conveyed through concrete lined pressure water tunnels to the distribution service areas. Use of the Croton WFP varies based upon NYCDEP's operational needs. The Croton WFP provides NYCDEP with a valuable and flexible resource.

#### **The Catskill System**

The Catskill system was put into service in 1915 and provided water to all five boroughs by 1917. The Catskill system is made up of the Schoharie Reservoir and the Ashokan Reservoir, which feed water to the City by gravity via the Catskill Aqueduct. The balancing reservoir at Kensico, and the distribution reservoir at Hillview were implemented as part of the Catskill system. The system also includes City Tunnel No.1 which conveys water from Hillview Reservoir by gravity to the City and which was put into

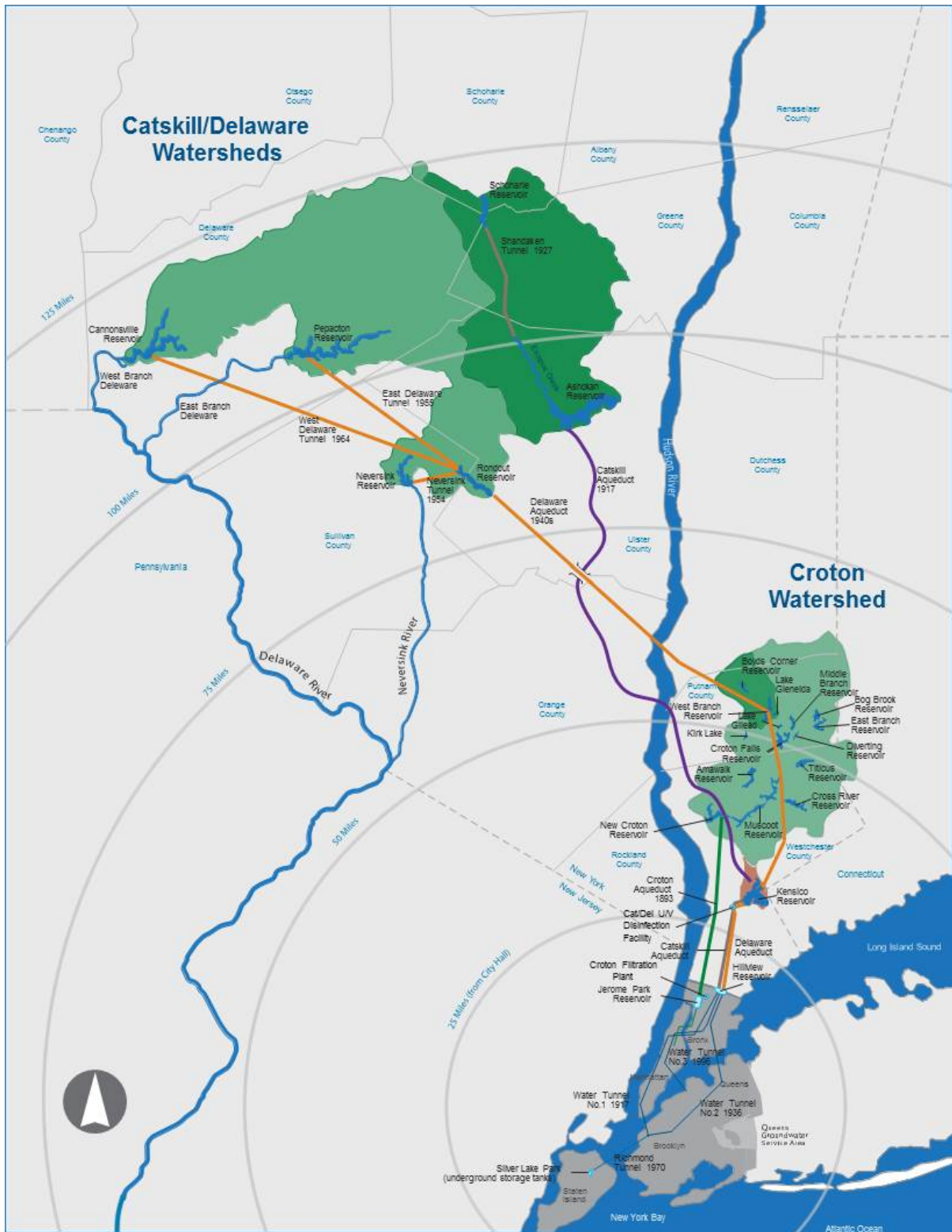


Figure 6-1: New York City Water Supply System

operation in 1917. City Tunnel No.1 is a deep rock tunnel which connects into the water supply distribution network via a series of riser shafts.

The Catskill Aqueduct is for most of its length a near surface aqueduct, with pressure tunnels only where the aqueduct alignment encounters low terrain, the most significant being the Hudson River valley. The near surface portions of the aqueduct are presently being cleaned to improve capacity, and plans are underway to investigate methods to reduce leakages in the pressure tunnel portions of the aqueduct.

### **The Delaware System**

Construction of the Delaware system began in 1937. The Delaware watershed was put into service in phases and is comprised of four reservoirs - Cannonsville Reservoir completed in 1964, Pepacton Reservoir completed in 1955, Neversink Reservoir completed in 1954 and Roundout Reservoir completed in 1950. The Roundout Reservoir receives water by gravity from the other reservoirs in the Delaware System. Delaware water is conveyed by gravity to Kensico Reservoir by the Delaware Aqueduct, via Shafts 17 and 18. The Delaware Aqueduct continues to Hillview Reservoir via the Eastview site and was connected into the balancing storage at Hillview by two new gate chambers with connecting conduits to the existing chambers at the reservoir. At that time City Tunnel No. 2 was constructed, which is a deep rock tunnel connected to the city distribution network by a series of riser shafts. The Delaware Aqueduct is a deep concrete lined pressure tunnel which passes about 600 feet below the Hudson River. Over the years, leakage has developed at some sections of the pressure tunnel, most notably at the Hudson River crossing. A bypass tunnel is presently under construction at the Hudson River which will allow the leaking portion of the aqueduct to be taken out of service.

### **Filtration Avoidance of Catskill and Delaware Water Supplies**

Water from the upstate reservoirs is conveyed by gravity through an extensive system of tunnels and aqueducts. The 92-mile Catskill Aqueduct conveys water from the Ashokan Reservoir to the Kensico Reservoir and the 85-mile Delaware Aqueduct conveys water from the Rondout Reservoir to the West Branch Reservoir and then to the Kensico Reservoir. Because of the high-quality water in the upstate reservoirs and well-protected water supply, the US Environmental Protection Agency (USEPA) granted NYC a waiver from the federal requirement to filter drinking water originating from surface water supplies. As a result, the Delaware and Catskill watersheds do not require filtration and the watersheds are protected by a mandated Filtration Avoidance Determination (FAD), which specifies disinfection requirements and identifies watershed source protection requirements to maintain its high level of water quality. Water entering the distribution system is treated with chlorine (disinfectant), fluoride (to prevent tooth decay), food-grade phosphoric acid (to create a protective film on pipes to reduce the release of metals such as lead from household plumbing) and sodium hydroxide (to raise the pH and reduce corrosivity). BWS disinfects Catskill and Delaware water systems at Kensico Reservoir Shaft 18 and additional chlorine disinfection occurs prior to entering the distribution system at Hillview Reservoir.

A condition of the FAD required NYCDEP to provide UV treatment to Catskill and Delaware water. Accordingly, a UV facility was completed in 2012 at the 153-acre Eastview site which is on the alignment

of both the Delaware Aqueduct and the Catskill Aqueduct. The Catskill/Delaware Ultraviolet Disinfection (Cat/Del UV) Facility, which treats water from the Kensico Reservoir, feeds water to NYC through the Hillview Reservoir. The Cat/Del UV Facility has a capacity of 2.4 BGD and is the largest UV facility in the United States. At present the UV facility at Eastview can only be supplied via the Delaware Aqueduct from Shaft 18 on the Kensico Reservoir. Hydraulic limitations prevent the use of the Catskill Aqueduct for this purpose. In order to provide system redundancy, NYCDEP is in the process of designing an additional tunnel from the Kensico Reservoir to the UV facility at Eastview. This is referred to as the Kensico Eastview Connection (KEC) Tunnel.

### **Connection to the Distribution System**

Both the Kensico Reservoir (30.6 billion gallons storage capacity) and the Hillview Reservoir (900 million gallons storage capacity) serve as balancing reservoirs for the water system, handling the daily and hourly fluctuations of water demand, respectively. Located downstream of the UV facility at Eastview, the Hillview reservoir is an uncovered reservoir and as such is not in compliance with Federal Regulations that require finished water reservoirs to be covered. Under a 2019 Consent Decree, DEP is presently undertaking planning studies to evaluate alternative ways of achieving compliance.

Water from the Hillview Reservoir is conveyed by gravity to the city through three tunnels as indicated on Figure 6-2. City Tunnel No. 1 was constructed as part of the Catskill system, and City Tunnel No. 2 as part of the Delaware system. City Tunnel No. 3, which is partially in operation and partially under construction, first came into operation in 1996. All three tunnels are deep concrete lined tunnels which connect into the surface distribution network by a series of riser shafts.

Most of the water from the Croton WFP is pumped into the city tunnels, with some water conveyed by gravity to the lower supply areas. The water distribution system from the three city tunnels consists of a network of approximately 7,000 miles of water mains, as well as valves, fire hydrants, distribution facilities, gatehouses, pump stations, water quality monitoring stations, laboratories and maintenance and repair yards.

The average daily NYC water delivered for FY 2020 was 978 million gallons per day (MGD)<sup>5</sup>, which provides for more than 8.6 million residents of NYC, and transients consisting primarily of tourists and daily commuters. It should be noted that there was a significant reduction of business operations, commuters and tourists in NYC beginning in March 2020 due to stay-at-home orders and restrictions due to the COVID-19 global pandemic, and at this time these impacts to water use should be considered short-term trends. It should also be noted that the current average daily water delivery in NYC is about 35% less than the delivery levels experienced in the early 1990s, due to long-term conservation trends. If the conservation measures currently in place remain effective there will be no immediate need for NYC to develop additional long-term water sources to meet normal demand. The Water System also provides potable water (approximately 103 MGD) to upstate consumers in parts of Westchester, Putnam, Ulster, and Orange Counties (population approximately one million people).

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<sup>5</sup> Water delivery data provided by NYCDEP BWS

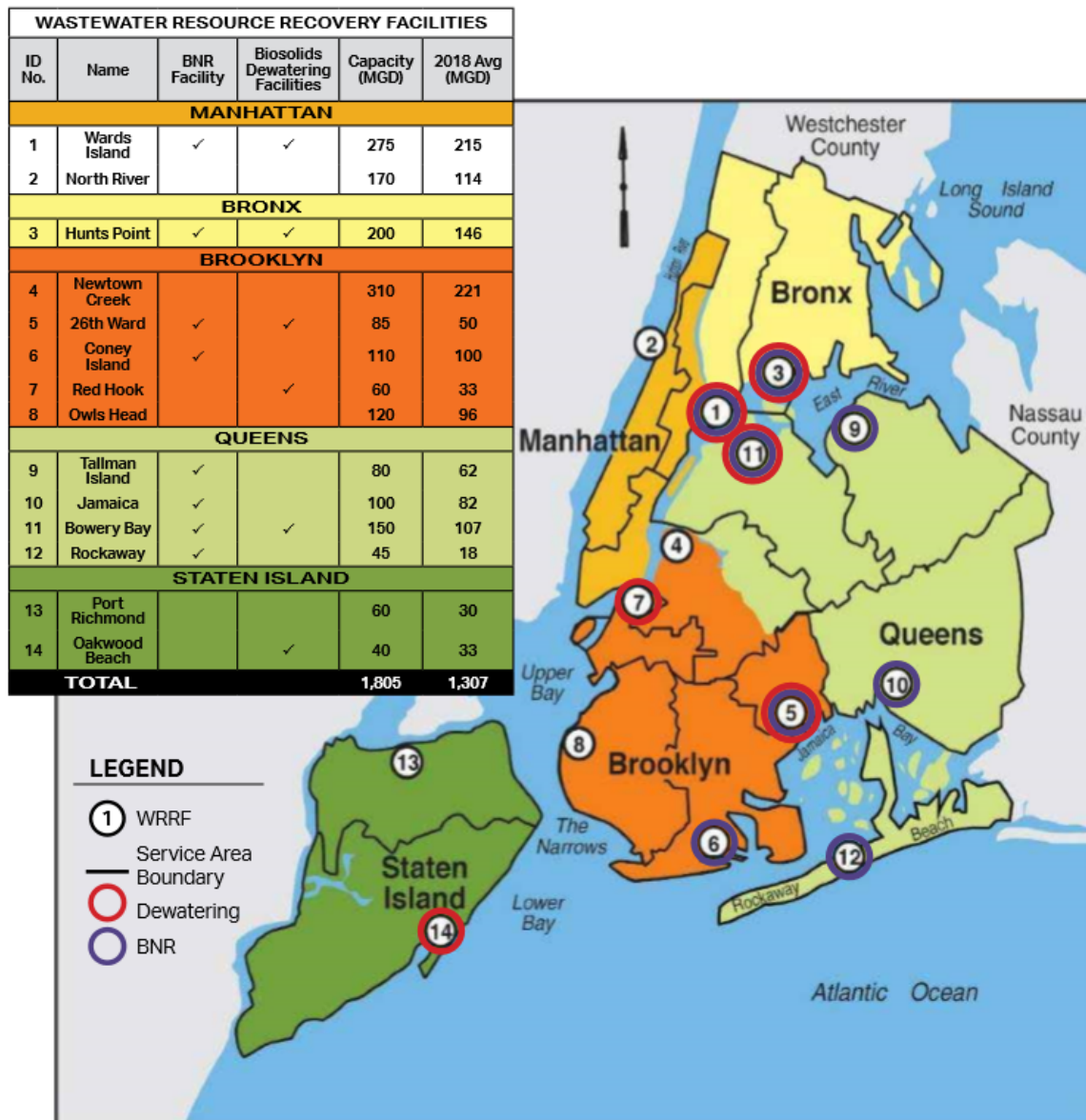




Figure 6-2: New York City Water Conveyance Infrastructure

## 6.2 Wastewater System

The NYCDEP wastewater treatment system is comprised of 14 in-city WRRFs that discharge into receiving bodies surrounding NYC, as indicated in Figure 6-3, and is operated by the BWT. In addition, seven upstate WRRFs and one community septic system which are necessary to protect the NYC upstate watersheds are also operated by BWS. The in-city WRRFs have an average design capacity of 1.8 Billion Gallons per Day (BGD) and are currently treating approximately 1.31 BGD of wastewater consisting of municipal sewage and some stormwater from combined sewers.



**Figure 6-3: New York City Wastewater Resource Recovery Facilities**

The NYC sewage collection system is divided into 14 sewersheds, which correspond to each of the 14 WRRFs. The sewage collection system comprises approximately 152 miles of intercepting sewers and 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 WRRFs. During a wet weather event, in addition to municipal wastewater, rainwater from surface water runoff is also collected in the combined sewers. Most of the flow is sent to the WRRFs while combined sewer flow discharges to the receiving water as combined sewer overflow (CSO) during major wet weather events. Approximately 426 permitted CSO outfalls are located along the shoreline of NYC, along with four CSO retention facilities (Paerdegat, Alley Creek, Spring Creek, Flushing Bay) provide screening, settling and storage of the CSO before discharging. The stormwater remaining in the CSO facilities after the wet weather event is then directed to the WRRFs for treatment.

The in-city WRRFs provide secondary treatment in accordance with their State Pollutant Discharge Elimination System (SPDES) permits. Additionally, eight of the WRRFs are required to provide nitrogen removal to meet Total Maximum Daily Load (TMDL) regulatory requirements that have been set to protect the Upper East River and Jamaica Bay receiving waters. Four of the Upper East River WRRFs and three of the Jamaica Bay WRRFs are currently operating in biological nitrogen removal (BNR) mode. The Coney Island WRRF is currently being upgraded to BNR. The liquid biosolids produced during wastewater treatment processing is transported by five DEP-owned, inner-harbor sludge vessels to centralized biosolids dewatering facilities located at six WRRFs. Dried biosolids and other treatment by-products are collected by third-party contractors who take responsibility for final disposal.

Additional NYCDEP infrastructure that supports the wastewater system includes 96 wastewater pump stations, two in-stream aeration facilities, 497 flow regulators, 148,000 stormwater catch basins, and six testing laboratories.

Until recently, the WRRFs were referred to as Wastewater Treatments Plants (WWTPs). This nomenclature described the primary function of the facilities, which was to treat municipal wastewater so that the treated effluent could be discharged to the receiving waters surrounding NYC without negatively impacting water quality in accordance with the regulatory requirements set by the New York State Department of Environmental Conservation (NYSDEC). The facilities are now being referred to as Wastewater Resource Recovery Facilities (WRRFs), highlighting a new focus on the opportunities to recover valuable resources from the municipal wastewater. Recovered resources include reclaimed water which can be used to meet non-potable water demand, wastewater biosolids suitable for agricultural reuse, and methane gas which can be used as a green energy source. The wastewater industry has adopted this change from wastewater treatment to resource recovery, focusing on the products and benefits that can be extracted from the wastewater beyond simply removing pollutants from the effluent flow.

The transition from WTP to WRRF is further necessitated by the Mayoral initiative to minimize NYC's reliance on fossil fuels and intent to minimize GHG emissions. This will require DEP in general and BWT specifically to upgrade facilities to meet scheduled goals. Studies are currently underway to identify the future capital investment necessary to meet these goals.

## **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 the NYCDEP. NYCDEP budgeting is an ongoing, iterative process that considers significant and substantial needs including regulatory requirements, legal mandates, mayoral initiatives, state-of-good-repair (SOGR), energy projects, capacity enhancements, dependability, environmental, health, and safety (EH&S) compliance requirements, localized community drivers, security measures, and climate change adaptation/resiliency improvements. These many needs must be met within the funding limitations. NYCDEP seeks opportunities for synergies with project implementation such as addressing SOGR needs along with energy and resource recovery and flood resiliency requirements. Project schedules, cost estimate updates, technical issues, regulatory updates, emergency events, recurring events and legal issues may impact project prioritization and the overall budgeting process. NYCDEP is continuously evaluating projects to prioritize NYCDEP's most critical needs first. This challenging budget exercise requires NYCDEP to evaluate project elements and scheduling to efficiently address the most immediate needs. As the projects are fully developed, scheduling modifications are necessary within the 10-Year Capital Strategy. As such, the 10-Year Capital Strategy is constantly being adjusted and published every two years.

The NYCDEP CIP consists of the Preliminary Ten-Year Capital Strategy for FY 2022 through FY 2031 and the Current Capital Plan for FY 2021 through FY 2025. The Preliminary Ten-Year Capital Strategy was published on January 14, 2021, and it is updated every two years. The Current Capital Plan is updated quarterly and supersedes the Ten-Year Capital Strategy in the overlapping fiscal years. This report reviews the CIP, including the capital budget for FY 2021, which ends on June 30, 2021, and the preliminary capital budget for FY 2022, which ends on June 30, 2022. AECOM has reviewed the Preliminary Ten-Year Capital Strategy and met with key individuals responsible for budgetary planning to provide an assessment of its adequacy. It is anticipated that the Mayor will issue the Executive Budget in April 2021. Our findings are summarized in the following paragraphs.

### **FY 2021 Capital Budget**

The FY 2021 budget is set at \$2.69 billion. Approximately 28% of the funding supports regulatory mandated projects, consisting primarily of CSO (green and grey infrastructure) projects, the FAD program, Coney Island WRRF main sewage pumps (MSPs) motors and controls, Hannah Street Pump Station reconstruction, the Kensico Eastview Connection (KEC) tunnel, and total residual chlorine (TRC) reduction program. Significant funding is also included for NYCDEP priority projects such as City Tunnel #3 (completion, activation, and shaft work), emergency contracts for water and sewer work, the Southeast Queens storm sewer buildout program, water distribution system and wastewater collection sewer work, WRRF SOGR projects, water supply infrastructure SOGR projects, and Bluebelt land acquisition and construction.

### **FY 2022 Preliminary Capital Budget**

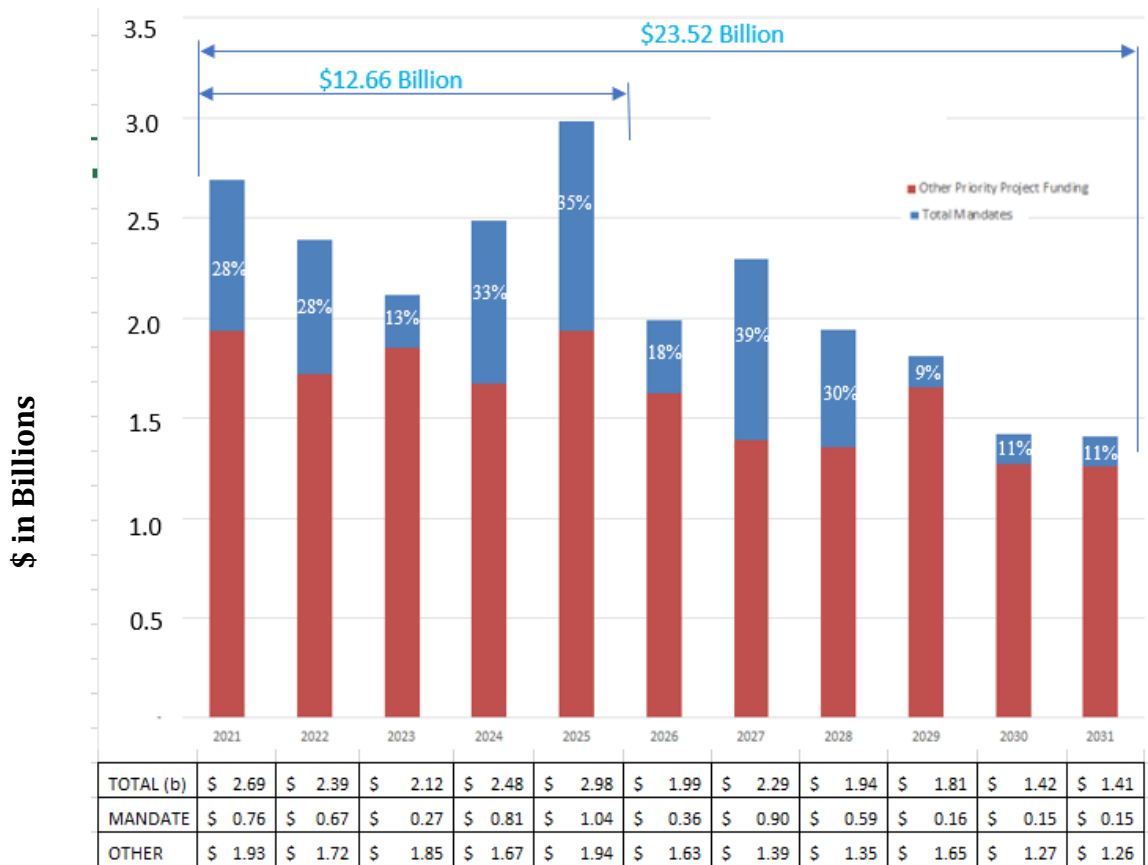
The FY 2022 preliminary capital budget is set at \$2.39 billion. Approximately 28% of the funding supports regulatory mandated projects, such as construction of the Gowanus Superfund CSO Red Hook tank, CSO projects (grey and green infrastructure), and the FAD program. Significant funding is also included in FY 2022 for NYCDEP priority projects such as emergency contracts for water and sewer work, the Southeast Queens storm sewer buildout program, water distribution system and wastewater collection sewer work, WRRF SOGR projects, and water supply infrastructure SOGR projects.

### **Capital Improvement Plan for FY 2021 to FY 2031**

The CIP for FY 2021 through FY 2031 consists of \$23.52 billion in funding. Figure 7-1 shows the funding allocated per fiscal year in the CIP for FY 2021 through FY 2031. Mandated and other NYCDEP priority project funding is shown per fiscal year. Approximately 25% of the total funding for FY 2021 through FY 2031 is dedicated to regulatory mandated projects. As shown in Figure 7-1, the funding for mandated projects vary from year to year, pending Consent Decree milestones and requirements. Most of the mandated projects in FY 2021 through FY 2031 consist of the green and grey CSO-related infrastructure, Gowanus Superfund CSO tank, the KEC tunnel, the Hillview Reservoir upgrades and chamber modifications, the FAD program, and the TRC program. The majority of the remaining capital improvement program for FY 2021 through FY 2031 must be planned and budgeted based solely on its importance to the overall System and NYCDEP prioritization as determined by NYCDEP. These projects include the SOGR needs of the older assets in The System, City Tunnel #3 completion and activation, the Southeast Queens storm sewer buildout program, and significantly more BWSO water main replacement/installation and sewer work, and emergency contracts for emergency water and sewer work.

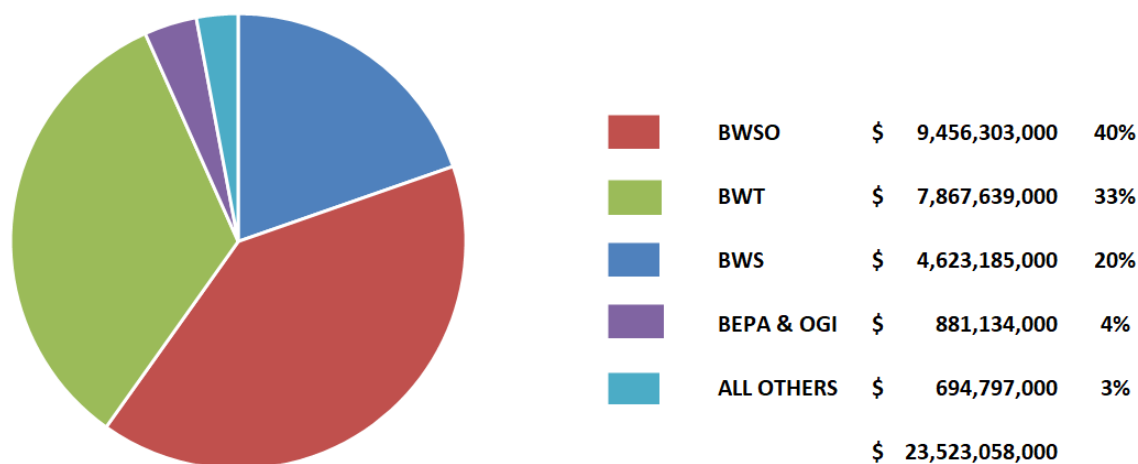


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**Figure 7-1: CIP (\$ in billions) for FY 2021 – FY 2031**

Figure 7-2 shows how the funding is allocated by each operating bureau over the next 11 years. BWSO's funding is the largest part of the total CIP and covers water and sewer main replacement, the Southeast Queens Stormwater Program, City Tunnel #3 completion, Bluebelts, emergency water and sewer contracts, and other BWSO SOGR projects. BWT's funding is next and covers SOGR needs for wastewater infrastructure, the CSO Program, the Gowanus Superfund program, resiliency projects, the TRC Program, and other BWT projects. BWS's funding covers SOGR needs for water supply infrastructure, FAD requirements, the KEC tunnel, Hillview Reservoir upgrades and modifications and other BWS projects. The OGI and BEPA's funding covers the green infrastructure program and BEPA projects. The remaining funding includes projects within BEDC, BCS, Police and Security, Facilities Management, Fleet, Office of Information Technology, Department of Parks and Recreation and other bureaus.



**Figure 7-2: CIP FY 2021 through FY 2031 by NYCDEP Operating Bureaus**

NYCDEP is continuously finding a balance between funding mandates and funding SOGR needs. When mandated projects are accelerated, this typically causes SOGR needs to be deferred. As discussed later in this report, the mandated CSO Program, the Superfund Program and the Hillview Reservoir Cover will require additional funding in the future and will extend beyond the next 10-year planning horizon. It is anticipated that there will be a continuous need to fund regulatory mandated projects. There will also be an increased and continuous need for SOGR funding due to the age of the NYCDEP infrastructure and the ability to more readily identify needs using Asset Management tools. Based upon the age of the infrastructure, there will be a need to replace wastewater and water system assets in accordance with a proactive, systematic, data-driven plan that minimizes reactive replacements brought about by asset failures.

As described in the beginning of the report, there have been many impacts to NYCDEP due to COVID-19. The ability to get capital projects out for bid, awarded and initiated was significantly impacted by the global pandemic. Procurement was delayed in the Spring of 2020, and many projects that were planned to be committed in FY 2020 were delayed. Many NYCDEP priority projects have been reallocated for subsequent years, in FY 2021, FY 2022 and FY 2023. NYCDEP prioritized projects critical to its core mission to provide clean drinking water and to collect and treat wastewater in accordance with the regulatory requirements of the Safe Drinking Water and Clean Water Acts and to protect water quality. NYCDEP has issued Force Majeure notifications on all current Consent Decrees due to the schedule impacts brought on by COVID-19. In addition to COVID-19 schedule impacts, NYCDEP is in ongoing negotiations with the regulators for potential revisions for implementation of mandated projects and evaluating the integration of multiple programs. The ongoing negotiations will be addressed later in Section 7 under specific programs. Pending the results of the ongoing negotiations, some adjustments to the Capital Program may be required for funding in specific FYs to reflect the potential program revisions. Although NYCDEP's top priority is to provide funding for critical infrastructure necessary for operation and maintenance of the water and wastewater system, the funding allocation timing may be dependent upon regulatory relief from NYSDEC and USEPA.

mandated projects. Although there are some economic uncertainties caused by COVID-19, NYCDEP remains committed to be compliance-focused, addressing short-term needs while continuing long-term planning.

## **7.2 System-wide Programs**

### **Asset Management**

As is the case in most US cities and municipalities, 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 continues to refine and implement its Asset Management program to better 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 schedule preventive maintenance and upgrade physical assets so that capital improvements can progress in an orderly manner. To further improve upon this effort, a pilot program at the Port Richmond WRRF is underway to take a more detailed appraisal of its asset management program. The pilot program will help BWT further identify needs by assessing life cycle costs of equipment and will provide a bottom up approach to identify needs for equipment repair/replacement. Pending the outcome of the pilot program, BWT will expand the Asset Management tools to all 14 WRRFs. NYCDEP has formed an Asset Management Working Group to coordinate and strengthen all asset management activities. BWT has initiated a Strategic Asset Management Plan to drive BWT toward the new Asset Management system, with the goal of striving toward industry standard best practices in Asset Management.

NYCDEP is evaluating several other studies/assessment tools that will support the long-term requirements of the NYCDEP assets. NYCDEP will be performing Integrated Master Planning for all 14 drainage areas. The integrated planning approach takes into account many factors including aging infrastructure, regulatory mandates, growth and equity, capacity of the system, and resiliency/ climate change. In addition, energy feasibility studies are being performed to identify opportunities to reduce energy consumption and costs. Resiliency improvements are ongoing to protect facilities from projected sea level rise and increasing storm intensities due to changing weather patterns. Other large inter-agency and multi-faceted coastal resiliency projects are underway throughout NYC that will require continued NYCDEP coordination. These efforts will identify needed improvements that will then have to be coordinated, organized and prioritized. With the completion of these studies/assessments, additional facility plans will continue to be prepared to effectively group and prioritize the needed upgrades for each facility as part of a data driven systematic approach to guide capital investment planning.

The NYCDEP Asset Management program includes the majority of the water and wastewater infrastructure. The program will be used in the development of the funding needs for the SOGR for future capital budgets. Utilizing the asset management tools, the operating bureaus submit business cases to OACE for review and prioritization. This effort is based upon a collaborative approach between the operating bureaus and OACE 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, hazard, community, public image and financial. 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. The continued integration of the NYCDEP Asset Management program with the Capital Improvement Program for the prioritization of the replacement and rehabilitation of NYCDEP assets is anticipated, as it will better assist NYCDEP in determining prioritization of projects and best use of funding for SOGR projects.

### **NYCDEP Sustainability Initiatives**

NYCDEP continues to further implement sustainability in planning, design, construction of new facilities and everyday operations of current facilities. Sustainability is a core value identified in the *2018 Strategic Plan*, which supports the NYCDEP vision to “*be a world-class water and wastewater utility, while building a sustainable future for all New Yorkers*”. One of the seven goals of the *2018 Strategic Plan* is to reduce GHG emissions and mitigate the effects of climate change. NYCDEP has identified four strategic initiatives (SI) to achieve this sustainability goal:

- Reduce greenhouse gas emissions and expand renewable energy sources (SI#20).
- Restore natural habitats throughout New York Harbor (SI#21).
- Expand the green infrastructure program (SI#22).
- Expand integrated water management through water conservation, water reuse, and resource recovery (SI#23).

There have been many sustainability local laws passed in NYC over the past several years that impact water supply and wastewater resource recovery facility operations. Recently, more aggressive goals have been set for energy and carbon neutrality that impact many city agencies. Therefore, NYCDEP continues to evaluate current and future facility operations and long-term planning.

The NYCDEP Panel for Sustainable Infrastructure (PSI) is made up of representatives from BWT, BWSO, BEDC, BEPA, OACE, and the Commissioner's Office. The PSI looks at sustainable planning, design, construction and operations for water and wastewater infrastructure projects by evaluating environmental, social, and economic standards throughout the project life cycle and into operations. Some of the ways the PSI strives to incorporate sustainability across NYCDEP-initiatives is through inter-bureau networking, sustainability local law compliance and tracking, generation of best practices, and site visits to assess evolving technologies.

### **Greenhouse Gas Reduction and Energy Planning**

Mayor deBlasio released *One City: Built to Last* in September 2014 with further aggressive goals for reductions of GHG emissions and carbon management. New York City Office of Sustainability

committed to an 80% citywide reduction in green-house gas emissions from FY 2006 base year levels by 2050 (also known as 80 by 50).

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 citywide sustainability plan, PlaNYC. GHG reduction and energy planning are being incorporated into NYCDEP's planning and design projects. OneNYC2050, released in April 2019, lays out long-term goals for NYC, including a goal to achieve energy and carbon neutrality by 2050. Annual Progress Reports are issued providing progress on the OneNYC initiatives. The next update Progress Report is planned for April 2021.

In 2019, the New York City Council passed eight sustainability-focused local laws entitled the "Climate Mobilization Act". Local Law 97 mandates 40% reduction in City government GHG emissions by 2025 from the 2006 baseline, and a 50% reduction by 2030, which is a more aggressive target from what was originally planned. These aggressive reductions goals are interim measures that must be achieved in advance of the long-term energy and carbon neutrality outlined in OneNYC2050. Although the GHG and energy reduction targets are citywide, NYCDEP will have a significant role since NYCDEP energy-intensive operations makes them the second largest municipal emitter of GHG and the third largest municipal energy consumer. Local Law 94 requires installation of green roofs or solar photovoltaic electricity generating systems on certain buildings. NYCDEP projects are evaluating these recent local law requirements. In response to climate change, the NYCDEP Strategic Plan (Strategic Initiative #20) and recent NYC local laws, NYCDEP initiated an Energy and Carbon Neutrality (ECN) Plan about one year ago.

The ECN Plan is an aggressive multi-agency multi-phase plan to address short-term (40% GHG emissions by 2025), mid-term (50% GHG emissions by 2030), and long-term (80% GHG emissions by 2050) goals for significant GHG reductions and energy usage throughout all NYCDEP operations. The main focus areas of the ECN Plan include: NYCDEP-wide Energy and Carbon Neutrality; Energy Neutrality at the 14 in-city WRRFs; Biosolids/ Residuals Optimization; Energy, GHG and Biosolids Data Management; and Energy, GHG and Biosolids Demonstration Projects. It is anticipated that significant collaboration and coordination across all DEP Bureaus, along with other City agencies and external stakeholders will lead to the success of ECN Plan. Energy bureau liaisons within each Bureau coordinate with the Office of Energy and Resource Recovery. For NYCDEP to comply with the Climate Mobilization Act and to become carbon and energy neutral in the long-term, NYCDEP will need to make aggressive changes to all aspects of NYCDEP project implementation from prioritization, decision-making, planning, and design to construction, operation and maintenance.

In light of recent changes to the current Ten-Year Capital Strategy, OERR and the ECN Plan are currently re-evaluating the GHG projections and the ability of NYCDEP to meet the interim and long-term GHG reduction goals. NYCDEP intends to continue to pursue achieving the reduction goals with the following three strategies: (1) eliminating fugitive digester gas emissions and maximizing production and beneficial reuse of digester gas (2) expanding renewable energy options (3) continuing to find beneficial reuse for NYCDEP biosolids to avoid landfills. The ECN Plan 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 Plan will form NYCDEP's strategic plan to achieve energy neutral operations.

With new systems and facilities coming on-line, NYCDEP OERR Programs will assist in the planning of reliable sources of power, both from conventional and renewable sources. NYCDEP is evaluating the incorporation of energy efficiency with SOGR projects and energy conservation measures (ECMs). NYCDEP continues to look for synergies to coordinate SOGR upgrades with GHG reduction opportunities. For example, the energy intensive centrifuges at Newtown Creek WRRF will be replaced with gravity belt thickeners and will be funded by DCAS.

Due to COVID-19 and stay at home orders, there has been a significant reduction in municipal wastewater flow, sludge production and anaerobic digester gas (ADG) production which has impacted some of NYCDEP's energy programs. NYCDEP is participating in an innovative resource recovery program at the Newtown Creek WRRF. As part of the Newtown Creek/National Grid public/private partnership, NYCDEP will send ADG to a digester gas conditioning system to be owned and operated by National Grid. The product gas, referred to as renewable natural gas, will be pipe-line quality gas and will be added to National Grid's natural gas distribution network. This project will improve local air quality, reduce citywide greenhouse gas emissions, reduce fossil fuel consumption, and supplement the citywide natural gas supply. This project is anticipated to be operational in late Spring 2021. Another public private partnership ongoing at Newtown Creek WRRF is with Waste Management (WM), Inc. Newtown Creek WRRF is accepting food wastes from NYC public schools, NYC residents, the green markets, and commercial establishments. The pre-processed food waste, delivered by WM, Inc. is added to the digesters to increase the production of ADG. Last year (pre-COVID-19), NYCDEP had been co-digesting up to 200 tons per day (tpd) of food waste at Newtown Creek. Last year, however, there was a drastic reduction of food waste availability when schools were shut down and the NYC Sanitation Department stopped curbside food waste collection, due to COVID-19 restrictions and stay at home orders. Currently, NYCDEP is co-digesting approximately 60 tpd of food waste, which has greatly impacted its ability to produce ADG. NYCDEP anticipates returning to the pre-COVID level of 200 tpd when feasible. Approximately 500 tpd of food waste is the estimated capacity for co-digestion of food waste at Newtown Creek. The food waste co-digestion and the ADG sent to National Grid projects at Newtown Creek serve as a model for integrating renewable energy in a dense urban environment. Food waste co-digestion will be evaluated at other NYCDEP WRRFs, where viable.

NYCDEP has secured about \$174 million in funding through the Department of Citywide Administrative Services (DCAS) programs to date. OERR will continue to coordinate with DCAS for additional sources of funding or co-funding with NYCDEP for energy projects. Other energy projects that NYCDEP is implementing are cogeneration facilities and solar panels at NYCDEP facilities. A combined heat and power facility is currently under construction at North River WRRF. Solar panels (1.2-megawatt [MW] system) were installed at the Port Richmond WRRF in Staten Island in 2015. NYCDEP is currently working with NYPA and DCAS for solar installations planned at the Wards Island WRRF, the Cat/Del UV Facility and two upstate WRRFs. At the Wards Island WRRF, a combination of ground mounted,



carport, rooftop, and elevated canopy solar photovoltaic systems will be installed. These installations will assist NYC to reach its goal of installing 100 MW of solar power on public buildings by 2025.

NYCDEP completed a Feasibility Study to determine the viability of a hydroelectric facility at Cannonsville Dam. Based upon the study, a 6-MW hydroelectric facility is initiating design. This smaller revised plan qualifies for a license exemption from the Federal Energy Regulatory Commission. The facility will be licensed by NYC. The hydroelectric facility will use water that is continuously released downstream of the Cannonsville Reservoir. The proposed hydroelectric plant consists of two 3-MW generators inside a 4,400 square-foot powerhouse, adjacent to the West Delaware Release Chamber. There is \$8 million in funding for a hydroelectric facility at the Cannonsville Reservoir in the NYCDEP CIP, and DCAS is providing additional funding for the Cannonsville Hydroelectric Facility. NYCDEP's main priorities continue to be dam safety, maintaining operational control over the dams and the ability to meet flow management agreements. A Feasibility Study has also been completed for hydroelectric potential at Shaft 4, (the Catskill Aqueduct and Delaware Aqueduct Interconnection) and the Croton Gatehouse.

NYCDEP OERR have joined the New York State Climate Leadership and Community Protection Act Waste Advisory Panel, which allows NYCDEP to provide knowledge sharing and advocacy work on the state level. In the coming year, NYCDEP is planning to implement an online energy portal to share information about the energy projects and greenhouse gas emissions with the public.

### **Climate Change Adaptation and Resiliency**

NYCDEP has been actively focused on the effects of climate change to both the water supply and wastewater system, in particular the impact of rising sea levels and changes to the intensity and frequency of precipitation events throughout the upstate watershed and in-city.

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 titled *Building the Knowledge Base for Climate Resiliency*. This report provides climate projections for temperature, precipitation and sea level rise through year 2100. The NPCC recommends setting up a climate change monitoring system, so that resiliency measures can be adapted as changes continue to evolve. The NPCC has identified that the City has been experiencing climate change impacts and expects those impacts to become more acute in the future. Some climate change impacts include extreme weather, coastal flooding and droughts that could impact the operation of the water and wastewater system.

In April 2018, the Mayor's Office of Resiliency (MOR) released *Climate Resiliency Design Guidelines* version 2.0. The Guidelines were developed based on the NPCC's regional climate projections that inform New York City resiliency policy. The NPCC published an updated report in March 2019.

NYCDEP has been planning and evaluating climate change adaptation requirements for the past several years, well before Superstorm Sandy impacted the NYC area. Adaptation refers to those actions that must be taken to allow NYCDEP facilities to meet their intended functions when considering

projected sea level rise 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 more intense, more frequent storm events and projected rising sea levels. In May 2010, the NYC Panel on Climate Change released a report titled *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.

After Superstorm Sandy significantly impacted the New York City area in October 2012, NYCDEP strengthened 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 infrastructure at risk from future storms with proposed measures to protect equipment to reduce the risk of damage and loss of service. The study evaluated infrastructure at the NYCDEP WRRFs 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.

The NYCDEP Resiliency Program has begun to implement resiliency projects across 14 WRRFs and 96 pump stations. NYCDEP is obtaining funding and financing through the NYSDEC Storm Mitigation Loan Program and through the Federal Emergency Management Agency (FEMA) for these resiliency upgrades. There is approximately \$287 million in the CIP for resiliency projects at the WRRFs and pump stations. Prioritizing the resiliency capital projects is an important step in the planning process. The criteria being used for prioritization of projects and needs include operational, environmental, social and financial metrics. NYCDEP has adopted new design standards to account for the critical flood elevation with 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 WRRFs to assist NYCDEP staff in preparing for another storm.

Climate change adaptation evaluations are also taking place for other parts of The System. BWS is focused on climate change impacts on the water supply side using its Operation Support Tool models, the watershed protection program and improving flexibility in operations with increased water supply interconnections. BWS is also conducting extensive research on the impact that climate change will have on the current and future water supply system. NYCDEP is co-sponsoring a study (along with the Delaware River Basin Commission) of the F.E. Walter Reservoir in White Haven, PA, in order to plan for climate change, sea level rise and the future management of water resources in the Delaware River Basin. The United States Army Corps of Engineers (USACE) study will evaluate if the F.E. Walter Reservoir can help the Delaware River deal with future droughts, sea level rise, and saltwater intrusion because of climate change.

NYCDEP's Green Infrastructure Program provides a comprehensive adaptive approach to stormwater management. The plan is based on implementing citywide 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. On the national level, NYCDEP maintains utility membership and actively engages with the Water Utility Climate Alliance and the National Association of Clean Water Agencies.

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 overall System. However, despite the uncertainty of climate change prediction, rational capital investments must be considered to protect NYCDEP facilities. NYCDEP is evaluating climate change impacts for all new project elements and implementing climate resiliency measures. Some resiliency measures are stand-alone projects, and some are built into existing projects. DEP expects that additional resiliency projects will be identified, and additional funding will be required.

The MOR is coordinating many coastal resiliency projects in NYC, including the Lower Manhattan Coastal Resiliency and Eastside Coastal Resiliency (ESCR) projects. The USACE is working on the Staten Island seawall project. Along with many other NYC agencies, NYCDEP will play a role in these coastal resiliency projects. The CIP includes approximately \$282 million for NYCDEP's funding of a portion of the ESCR and USACE coastal resiliency projects in NYC. Additional funding may be required as these coastal resiliency programs progress.

### **7.3 Program Main Accomplishments**

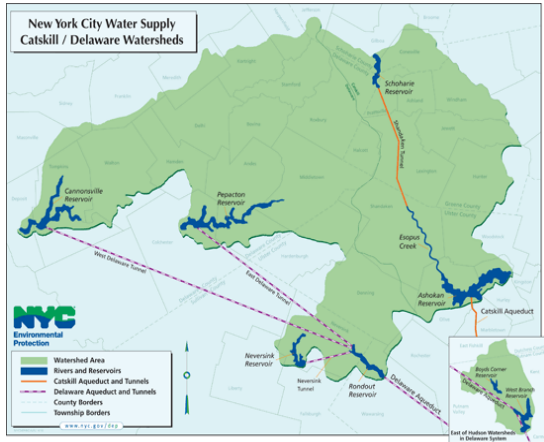
There are a number of program accomplishments during the past year that are noteworthy. These items play an essential role in the development and advancement of the CIP and provide for prudent and professional management of the System.

- The construction contract for City Tunnel #3 Shafts #17B and #18B commenced; NTP occurred in January 2021.
- NYCDEP completed installation of the steel liners in the by-pass tunnel of the Delaware Aqueduct under the Hudson River, as part of the Water for the Future Program. Installation of the final concrete layer, part of the triple layer of the by-pass tunnel is currently underway.
- In preparation for the Delaware Aqueduct shutdown planned for October 2022, the third planned Catskill Aqueduct shutdowns began in December 2020 and the shutdown was completed in February 2021.
- The Rockaway WRRF BNR upgrade was completed in accordance with the Nitrogen Order and certified with NYSDEC.

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

A number of NYCDEP projects and programs for the water system are in various stages of implementation (planning, design, and construction). Some of these significant programs are described below.

##### Catskill/Delaware Water Supply System Filtration Avoidance

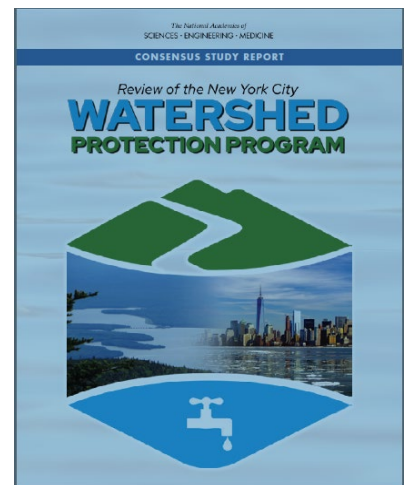


**Figure 7-3: Filtration Avoidance Determination (FAD) for the Delaware and Catskill Watersheds**

On December 28, 2017, the New York State Department of Health (NYSDOH) issued another 10-year Filtration Avoidance Determination (FAD), known as the 2017 FAD to the NYCDEP for the Catskill and Delaware watersheds (Figure 7-3). The 2017 FAD consists of a watershed protection program for 2017-2027. The new FAD requires NYCDEP to continue its core watershed protection programs that are already established and in place, such as land acquisition in the protected watershed, whole farm planning, stream management and various upgrades to wastewater infrastructure in the watersheds. In addition, the FAD contains new requirements, which includes expanding the small business septic program in the Catskills,

development of a community wastewater treatment facility for the hamlet of Shokan near Ashokan Reservoir and protecting additional streamside lands through the Conservation Reserve Enhancement Program and the Streamside Acquisition Program. The FAD has several milestones and implementation schedules for the required programs.

The National Academies of Sciences, Engineering, and Medicine expert panel completed a review of the current NYCDEP FAD programs and published a report titled *Review of the New York City Watershed Protection Program* (Figure 7-4). The panel performed a comprehensive review and evaluation of the NYCDEP's Watershed Protection Program to determine if the programs are adequate to comply with the Surface Water Treatment Rule now and into the future. The report was released August 10, 2020 and provides a number of conclusions and recommendations for specific programs of the FAD, including the land acquisition program, watershed agricultural program, stream management program, wastewater programs, ecosystem protection and management programs, public health programs, along with monitoring, assessment and modeling. Although the FAD spans ten years there is a review planned for the halfway point. The results of this expert panel review will form the basis of the five-year mid-term review of the FAD. NYCDEP is



**Figure 7-4: Report on the Watershed Protection Program Expert Panel Review**

reviewing and addressing the expert panel review recommendations. Discussions with NYCDEP, NYSDOH, and watershed partners will specifically focus on these recommendations. NYCDEP is developing the 2021 Long-Term Watershed Protection Plan and intends to submit to NYSDOH by December 2021. It is anticipated that the FAD midterm update will be completed by 2022.

Funding for FAD programs comes from both the NYCDEP capital budget and the annual expense budgets. The continuation of the existing FAD program is currently funded in the CIP at a level of approximately \$204 million. Additional capital funding will be required in the later years of the 10 Year CIP for the second half of the ten-year FAD to continue to support FAD programs. It is anticipated that funding for the FAD will also be included in the NYCDEP expense budget for the duration of the FAD.

As part of the continuous long-term planning efforts, NYCDEP will update its planning level studies, if it were ever to become necessary to build a filtration plant for the Delaware and Catskill water supply. NYCDEP is planning a comprehensive review of filtration methods and technologies, which will result in the development of a new conceptual design for a filtration facility, and updated cost estimates. The NYCDEP capital and expense financial investment in FAD programs are a far more cost-effective means to protect the Catskill/ Delaware water supply than building a filtration plan with high operation and maintenance costs.

#### **Water for the Future**

The Water for the Future program is a comprehensive program that requires continued coordination throughout the entire NYCDEP. It consists of two main components; (1) repairing the Delaware Aqueduct to eliminate significant leakage has been noted and (2) supplementing NYC water supply during the period when the Delaware Aqueduct is out-of-service.



**Figure 7-5: Delaware Aqueduct By-pass Tunnel Installation of Steel Liner**

After evaluating several repair alternatives, NYCDEP developed a comprehensive plan to build a two-and-a-half-mile bypass tunnel around the leaking section under the river 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). Construction of the two vertical shafts has been completed (contract BT#1). The tunnel construction contract (contract BT#2) was initiated in the summer of 2015. A tunnel boring machine (TBM) was utilized for the construction of the new tunnel between the two shafts. The TBM was assembled 845 feet below ground in Newburgh at the bottom of the shaft in a bell-out chamber. It is approximately 470 feet in length and weighs 2.7 million pounds. The TBM began tunnel construction in January 2018, and the tunneling was completed in August 2019. The by-pass tunnel steel-liner installation was completed in May 2020 (Figure 7-5). The (230) 16-foot diameter steel liners

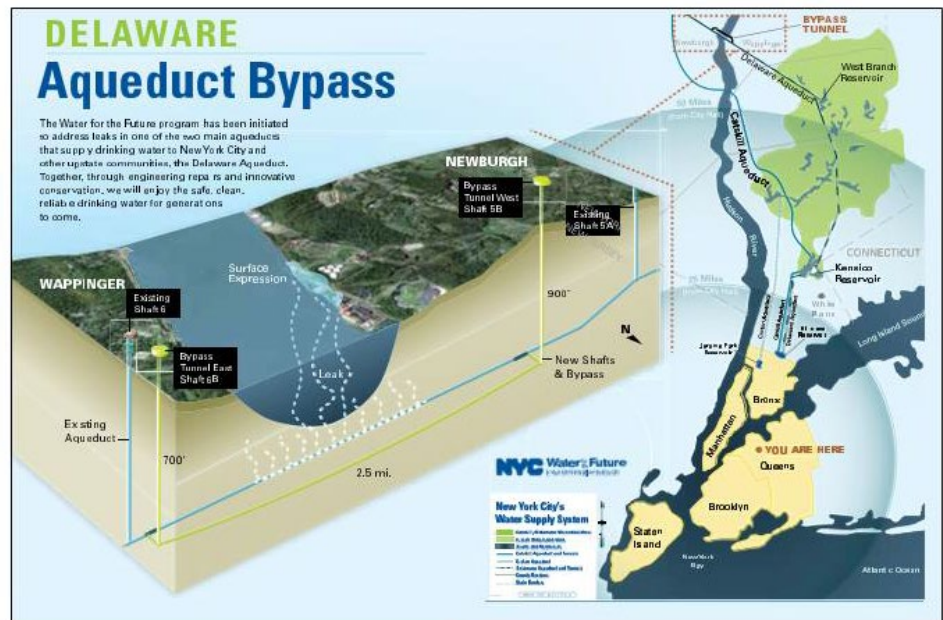


were installed inside the first layer of the concrete tunnel and welded together. A second layer of concrete lining is currently being added inside the steel liner. This triple pass design (concrete, steel, concrete) of the bypass tunnel is intended to provide structural stability and prevent future leaks.

A strong organizational structure is in place within BEDC and across all operating bureaus (with designated liaisons) and executive management, to continue with the construction, implementation and risk management of the program due to its magnitude and complexity. A significant portion of the funding for this bypass tunnel has been committed in previous years. There is approximately \$134 million in the CIP for the Water for the Future program, which consists of \$28 million for the continued construction of bypass tunnel and repairs and \$106 million in water supply augmentation and conservation-related projects (when the Delaware Aqueduct is not in service for bypass connection). Engineering studies conducted during the project development have identified improvements that will result in shorter shutdown periods and less required water supply augmentation reducing the overall program cost, compared to the original program.

Construction to connect the bypass tunnel with the existing Delaware Aqueduct is planned for October 2022. These connections will require taking the Delaware Aqueduct out-of-service and dewatering the aqueduct. As the overall work will take several months, it will be scheduled during the low water demand season to minimize the possibility of water shortages.

The NYCDEP has been evaluating and planning strategies for water supply augmentation to meet the demands of The System when water supply system components are out-of-service, either planned (when the Delaware Aqueduct is shut down to connect the bypass tunnel to the existing tunnel and to make the other upstream repairs) or unplanned (Figure 7-6). NYCDEP is currently implementing demand management measures and improvements to the Upper Catskill Aqueduct to increase its capacity.



**Figure 7-6: Delaware Aqueduct Bypass Program**

NYCDEP released *One Water NYC: 2018 Water Demand Management Plan* in June 2018, and more recently the *Water Demand Management Plan June 2019 Annual Update* was released. NYCDEP's



current Water Demand Management Plan has achieved significant water savings. The plan focuses on the following key strategies for managing water demand: The Municipal Water Efficiency Program, the Residential Water Efficiency Program, the Non-Residential Water Efficiency Program, Water Distribution System Optimization, Water Supply Shortage Management, and Wholesale Customers Demand Management. NYCDEP created an interactive online map identifying the location of water conservation projects, the estimated demand savings, and the estimated energy and greenhouse gas reductions anticipated from each project.

NYCDEP completed the third shutdown of the Catskill Aqueduct to repair and rehabilitate the Upper Catskill Aqueduct (from Ashokan Reservoir to Kensico Reservoir). The recent Catskill Aqueduct shutdown started in December 2020 and was completed in February 6, 2021. This project includes inspection, implementation of mechanical and structural upgrades, and removal of the biofilm of the Catskill Aqueduct. During this shutdown biofilm was removed, cracks were grouted, repairs were made to the tunnel liner, debris and sediment were removed, and tunnel inspections were made. A shorter duration shutdown occurred in the Spring 2020 to make repairs. An additional fourth shutdown is being evaluated which may take place Fall/ Winter 2021/2022 to make more needed repairs. Catskill Aqueduct shutdowns require close coordination with the upstate users to maintain sufficient water quantity during the shutdown.

There is also funding in the CIP of \$125 million for reconstruction and repair of the lower Catskill Aqueduct (from Kensico Reservoir to Hillview). This work is anticipated to take place after the Delaware Aqueduct by-pass connection work.

#### **Catskill Aqueduct Roundout Pressure Tunnel**

NYCDEP began monitoring the Catskill Aqueduct pressure tunnel due to leaks beneath the Roundout Creek using a remote operated vehicle inserted into the operating aqueduct. United States Geological Survey is monitoring the area and performing an investigation study for the pressure tunnels along the Catskill Aqueduct. Funding of \$169.4 million is included in the CIP for repair of the tunnel leaks identified in the Roundout Creek area. Once the Delaware repairs are completed, it is anticipated that NYCDEP will further address these leaks in the Catskill Aqueduct tunnel sections. A long-term solution will need to be devised to address the other suspected leaks in the pressurized tunnel portion of the Catskill Aqueduct.

### Hillview Reservoir

Federal regulations administered by USEPA, Long Term 2 Enhanced Surface Water Treatment Rule (LT2) requires the Hillview Reservoir (Figure 7-7) to be covered. However, there have been a series of compliance agreements with several commitments to cover the Hillview Reservoir between NYCDEP and the regulators dating back to 1996 that predate the LT2 requirement.



**Figure 7-7: Hillview Reservoir Located in Yonkers**

In 2017, the USEPA declined to reconsider the requirement to cover finished water reservoirs such as Hillview. NYCDEP requested that NYSDOH and USEPA further extend the deadline to complete construction of the cover to enable NYCDEP to complete two higher priority water supply infrastructure capital improvements: construction of the Kensico Eastview Connection (KEC) tunnel and Hillview Reservoir Improvements. NYSDOH and USEPA agreed to extend the schedule for construction of the cover to 2049. A federal Consent Decree, known as the Hillview Consent Decree, was approved by the federal court in May 2019. The Hillview Consent Decree includes new deadlines for covering the reservoir, along with design and construction milestones for the KEC tunnel, the Hillview Reservoir Improvements, and stipulated penalties to enforce such milestones. The Consent Decree also includes \$1 million civil penalty payable to the United States and a \$250,000 penalty to the State (\$50,000 in cash and \$200,000 as an environmental benefit project).

NYCDEP is undertaking a facility planning study, which will allow NYCDEP to analyze alternative ways to achieve LT2 compliance. NYCDEP plans to evaluate cover alternatives to identify the most cost-effective solution before committing capital investment funding. The Facility Plan report is due to be completed in 2024. There is \$50 million included in the CIP for the cover, however significant additional funds will most likely be necessary beyond the 10-year budget planning period, pending the results of feasibility planning. Funding for the pre-cursor projects that are mandated in the Hillview Consent Decree is also included in the CIP.

The Hillview Reservoir Improvements include significant SOGR work for the ancillary facilities that include modification of chambers, chemical addition upgrades, flow control improvements, and other upgrades. The Hillview Modifications Basis of Design Report was submitted to the regulators in April 2020, as required by the Hillview Order. Funding is included in the CIP for \$487 million for this work at Hillview. Negotiations are ongoing between NYCDEP and the regulators regarding minor modifications to the schedule for the Hillview Modifications project. All other terms and milestones of the Hillview Consent Decree have not changed.

### **Kensico Eastview Connection (KEC) Tunnel**

NYCDEP has determined that the KEC tunnel is essential to improve redundancy and increase operational flexibility by having a secondary means to convey water from the Kensico Reservoir to the CAT/DEL UV Facility. The Catskill Aqueduct has not been able to convey water between Kensico and the UV Facility due to hydraulic limitations. As a result, the Delaware Aqueduct has been the only means to convey water from Kensico to the UV plant. The KEC tunnel project will add another connection between these two vital components of the water supply. This is an important high priority project for NYCDEP. Funding of \$1.57 billion is included in the CIP. The project is currently in the design phase. The KEC tunnel project has been determined to be a pre-cursor project which is part of the Hillview Cover Consent Order, and the tunnel is therefore considered to be a mandated project.

The KEC tunnel will be approximately two miles in length, starting at an intake chamber on the western side of the Kensico Reservoir to a connection point at the UV Facility. The finished tunnel will be approximately 27 feet in diameter and 400 to 500 feet below ground. The tunnel will be designed for a peak capacity of 2.6 billion gallons of water per day. Its design accounts for future growth in the City and Westchester County, the potential addition of treatment facilities, and the need to periodically take other aqueducts out-of-service for maintenance or inspection.

The project also includes new facilities and site work at Kensico Reservoir and the UV Facility. The intake chamber that draws water from Kensico will be upgraded and increased to connect to the new tunnel. Kensico Reservoir's shoreline around that intake will also be improved to prevent sediment from entering the tunnel. The chemical feed systems at Kensico Reservoir will be upgraded to meet the needs of the Delaware Aqueduct and the new tunnel.

### **Dam Safety**

Upstate reservoir dams are critical infrastructure for NYCDEP operations and the safety of the surrounding communities. New York State requires existing dams to be capable of safely passing half of the probable maximum flood (PMF). When capital improvements are made at dams, NYCDEP evaluates the ability of the dams to safely pass the half of the PMF and full PMF.

Due to significant SOGR needs to provide continued dam safety, there is funding for the Olive Bridge Dam, part of the Ashokan Century Program, as described below. 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. The remaining upgrades at Gilboa Dam and Schoharie Reservoir are funded at approximately \$23 million in the CIP. The New Croton Dam requires reconstruction and is funded in the budget with \$135.5 million. NYCDEP expects to add funding for Delaware system dam upgrades in future capital planning budgets.

NYCDEP has installed additional 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 for upstate and in-city dams, based upon capital upgrades, inspection and maintenance program, and emergency action plans.

### **Ashokan Century Program**

In 2017, as part of their commitment to SOGR upgrades in the watershed, NYCDEP announced the Ashokan Century Program. This program will upgrade all infrastructure associated with the Ashokan Reservoir in the Catskill watershed. In addition to the upgrade to the Olive Bridge Dam, this program will include upgrades to the Ashokan Reservoir spillway, dividing weir bridge, and the Ashokan Reservoir headworks. There is \$974 million in funding for the Olive Bridge Dam and the Ashokan Reservoir upgrades. This program was originally estimated at \$750 million, but estimates have increased as further evaluations have been undertaken.

### **City Tunnel No. 3, Stage 2**

Most of the tunneling work for City Tunnel No. 3, Stage 2 has been completed. There is funding of \$610 million in the CIP (\$430.5 million in FY 2021 and \$179.5 million in FY 2024) for the completion, activation and shaft work (Shafts 17B and 18B) for City Tunnel No. 3, Stage 2 Brooklyn/Queens leg. The NTP for the first contract was issued in January 2021. As of December 2017, City Tunnel No. 3 Brooklyn/Queens leg achieved activation-readiness, which means it is available in case of an emergency. NYCDEP maintains a Stakeholder Management Plan for continuous internal and external communications. Significant ongoing coordination is required with NYCDOT and other city agencies. Full operation of City Tunnel No. 3 Brooklyn/Queens leg is expected once the funded construction contracts are completed. Design is also underway for the connection of the Brooklyn/Queens leg of City Tunnel No. 3 to the Richmond Downtake Chamber, which will connect City Tunnel No. 3 to Staten Island. NYCDEP plans to conduct inspections of CT#1 and then eventually CT#2 once CT#3 is fully in service. Funding of \$28 million is included in the CIP for NYC DDC trunk water main connection projects for City Tunnel No. 3.

### **Water Main and Sewer Replacement**

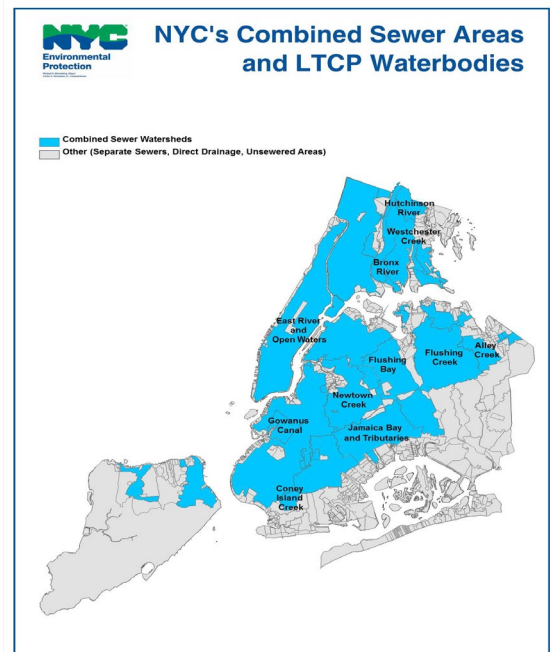
The CIP includes \$4.82 billion for water main and sewer work (new and replacement) throughout the City from FY 2021 through FY 2031. Over the planning period FY 2021 through FY 2031, approximately \$2.58 million is included for sewer work and \$2.24 million for water mains. There are variations in the spending per FY, however on average \$438 million per FY is anticipated for water and sewer work. BWSO coordinates closely with NYCDDC and other city agencies for water and sewer projects. NYCDEP utilizes several parameters for the selection of water main and sewer replacement, including the age, size, material, and historical performance of the current pipes. The construction of new water and sewer pipes is coordinated with other utility underground infrastructure construction projects. NYCDEP is working to develop a predictive model to forecast the likelihood of future water main breaks.

## **7.5 Capital Improvement Program Highlights for the Wastewater and Stormwater System**

Several NYCDEP projects and programs for the wastewater and stormwater system are in various stages of planning, design, and construction. Many of these significant programs are described below.

### 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) Planning. 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 has developed multiple waterbody-specific Long-Term Control Plans (LTCPs) to control CSOs and improve water quality in NYC's waterbodies and waterways. Figure 7-8 shows the locations of the combined sewer areas associated with each LTCP waterbody. 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 federal Clean Water Act (CWA).



**Figure 7-8: Combined Sewer Areas and CSO LTCP Waterbodies**

NYCDEP has submitted eleven LTCPs to NYSDEC, nine of which have been approved. Each approved LTCP identifies plans at each CSO LTCP waterbody. Figure 7-9 along with Table 7-1 present the status of the LTCPs.

**Table 7-1: Status of CSO Long Term Control Plans**

Waterbody/LTCP	Status of LTCP
Alley Creek	Approved March 2017
Westchester Creek	Approved August 2017
Hutchinson River	Approved March 2017
Flushing Creek	Approved March 2017
Bronx River	Approved March 2017
Gowanus Canal	Approved March 2017
Flushing Bay	Approved March 2017
Coney Island Creek	Approved April 2018
Newtown Creek	Approved June 2018
Jamaica Bay and Tributaries	Submitted June 2018, Pending approval
Citywide/Open Waters	Submitted September 2020, Pending approval



NYCDEP submitted a Force Majeure letter to NYSDEC identifying potential delays to the implementation to the CSO Program due to COVID-19 schedule impacts. NYSDEC agreed to extend the Citywide/ Open Water LTCP from March 2020 to September 2020. NYCDEP and NYSDEC are in the midst of ongoing negotiations for revising milestones for CSO projects and any other changes to the CSO projects.

The CIP includes approximately \$2.08 billion in funding for grey infrastructure capital projects for implementation of the CSO Program, which includes \$772 million for the CSO Gowanus Superfund facility, required due to the federal EPA Superfund Program. Additional funding may be required in the outer years of the CIP and beyond the current budget planning period to implement infrastructure required as part of the approved LTCPs.



**Figure 7-9 Status of CSO LTCPs**

NYCDEP has proposed an alternative integrated approach to manage bacterial loads into Alley Creek and Hutchinson River, rather than the traditional chlorination/ dechlorination facilities that were recommended in the LTCPs. In 2020, NYCDEP began piloting ceramic membrane technology at Alley Creek, as an alternative disinfection technology.

The LTCPs were based upon water quality criteria in effect at the time the individual LTCPs were developed. Those criteria have evolved over the course of the LTCP program, and the NYSDEC filed a Notice of Proposed Rule Making on January 5, 2021 to further amend 6 NYCRR § 703.4, titled "Water quality standards for coliforms, enterococci, and E. coli." The proposed rulemaking adds site-specific criteria to select Class I and Class SD waterbodies. The new criteria use *Enterococcus* bacteria as a fecal indicator, while the current fecal coliform criteria for those waterbodies would also remain in effect. NYCDEP may be required to revise the LTCPs based upon *Enterococcus* bacteria rather than the fecal coliform standard due to the proposed rulemaking. NYCDEP is evaluating the proposed changes to determine the impact on the approved LTCPs.



### Green Infrastructure (GI)

Green infrastructure is an approach to wet weather management that is sustainable and environmentally friendly. Many cities across the country have implemented green infrastructure as part of programs for wet weather management and water quality control. Since the release of NYC's Green Infrastructure Plan in 2010, NYCDEP has been planning and implementing green infrastructure. The Plan is an adaptive approach to incorporating green infrastructure into NYCDEP's overall CSO program. The initial goal was to capture the first inch of rainfall on 10% of the impervious areas in combined sewer watersheds through detention or infiltration over a 20-year period. As the GI Program has evolved and advanced, the goal has evolved to a metric of a 1.67 billion gallons per year reduction in CSO by 2030. NYCDEP'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 GI. NYCDEP's ongoing Research and Development Program assists in this effort.

The implementation of the GI Program in NYC focuses on three distinct locations: (1) public right of way (ROW) rain gardens, (2) GI on public property, and (3) GI on private properties. NYCDEP has implemented ROW GI assets in partnership with the NYCDOT. The ROW GI assets include the rain gardens (standard and Type D inlets), infiltration basins, and permeable pavements. Infiltration basins have recently been added to the ROW GI asset toolbox. They retain stormwater on site similar to a rain garden, however they do not include a tree. They are installed along street curbs and are designed to mimic existing conditions found throughout the City, with either a concrete or grass strip top. The GI assets are designed to manage up to 2,500 gallons each during a storm. Updated ROW Green Infrastructure Design Standards for new and revised ROW GI have been published. In 2020, NYCDEP completed construction of more than 3,000 GI assets. There are over 10,000 GI assets either constructed or currently in construction throughout NYC, and 1,230 total equivalent green acres. A "greened acre" represents a volume of runoff



**Infiltration Basin with Grass Top**



**Infiltration Basin with Concrete Top**

**Figure 7-10: Green Infrastructure Infiltration Basin**

managed by a green infrastructure project. It is the same as an “equivalent impervious acre”, which is the term referenced and used in the CSO Consent Order. The “greened acre” was derived from the Performance Metrics Report, since the “greened acre” represents the metrics and targets of green infrastructure projects in a volumetric unit. NYCDEP anticipates the GI Program to reduce approximately 500 million gallons of CSO volume per year in the near future. This is a significant step toward the Consent Order goal of 1.67 billion gallons per year of CSO reduction by 2030. NYCDEP is currently in negotiations with DEC regarding COVID-19 related schedule impacts. NYCDEP plans to submit a Contingency Plan in June 2021.

A draft Unified Stormwater Rule is expected in 2021. This new rule which will update and align stormwater regulations for both separate and combined sewage drainage areas across the City. This new Rule will provide a consistent stormwater policy and will require new construction to manage more stormwater onsite. It is intended to benefit both the CSO Program and the MS4 programs, as it unifies requirements for both sewage drainage areas. With the implementation of the new rule, greater CSO reductions are expected to further improve water quality and to achieve CSO Consent Order requirements of the 1.67 BGY of CSO reductions by 2030.



**Figure 7-11: Green Infrastructure Annual Report**

NYCDEP coordinates with many city agencies and partnering agencies to implement green infrastructure on public property, including parks, schools, and city housing facilities. NYCDEP engages with partnerships to implement the GI Program across the City, including Trust for Public Land, Department of Education, School Construction Authority, NYC Housing Authority, NYC Department of Parks and Recreation, NYCDDC, Economic Development Corporation, other city agencies. NYCDEP is introducing the Private Property Green Infrastructure Retrofit Incentive Program in order to aggressively expand green infrastructure retrofits on private property. The GI program will fund large cost-effective stormwater capture opportunities on private property.

The NYCDEP submits an annual report updating NYSDEC on the progress of the GI Plan. The 2019 Annual Report was submitted April 30, 2020 (Figure 7-11). It provides a comprehensive summary of the green infrastructure program

in NYC. The next update, the Annual Report for 2020 will be released on April 30, 2021. NYCDEP has implemented a database, known as NYC Green HUB for green infrastructure tracking (geographic location, cubic feet of stormwater managed, soil classification, permeability data, year constructed, and other data).

The CIP includes approximately \$770.5 million in funding for green infrastructure projects. Components of the GI program are also funded through the expense budget, including maintenance of the GI assets,

research and development and partner agency support. NYCDEP continuously looking for ways to optimize the GI Program.

#### **Southeast Queens Stormwater Infrastructure**

NYCDEP is continuing a comprehensive program to improve drainage to address flooding issues in Southeast Queens. NYC has made a commitment of \$1.9 billion to construct infrastructure projects in Southeast Queens (Community Districts 12 and 13) to build out the drainage program and reduce flooding. In the CIP, \$1.79 billion is funded for the Southeast Queens storm sewer program. The Southeast Queens Program consists of 46 projects which are in various stages of implementation (15 projects have been completed, 8 projects currently in active construction, 3 projects in procurement, 16 projects in design, and 4 projects in pre-design). NYCDEP has also developed an interactive online map that shows the completed and ongoing projects in Southeast Queens. NYCDEP has developed an approach to continue to address the flooding issues in the area, which consists of quick fixes in areas with the most severe flooding, construction of neighborhood sewers, construction of larger trunk sewers, and the evaluation of opportunities to reduce groundwater flooding. NYCDEP plans to initiate a demonstration project to further evaluate groundwater flooding in the area. NYCDEP is aggressively working on this storm sewer build-out program in Southeast Queens. NYCDEP plans to implement projects in a phased approach on a priority basis. Green infrastructure and Bluebelts are also being constructed in Southeast Queens to help manage stormwater.

NYCDEP provides annual updates that show progress of the implementation of the Southeast Queens Plan to the Mayor and City Council. NYCDEP also provides continuous public outreach and program updates to the Southeast Queens community. The buildout of the drainage system in Southeast Queens is collaboration between NYCDEP, NYCDDC and NYCDOT. NYCDEP maintains close coordination with other city agencies.

#### **Combined Heat and Power (CHP) Facility at North River WRRF**

A project for a Cogeneration Facility at North River WRRF was developed as a sustainability project to provide significant GHG emission reductions and replace the engine-driven main sewage pumps and engine blowers that are near the end of their useful life. The North River WRRF Cogeneration Facility is currently under construction. Additional funding of approximately \$39.7 million is included in the CIP in FY 2021. The project consists of replacing the engines driving the main sewage pumps with electric motors, and the existing engine-driven aeration blowers with new aeration blowers with electric motors. The new cogeneration facilities will provide new gas driven engines and generators which will provide electricity to drive the main sewage pumps and the nine high speed turbo aeration blowers, and heat for digester and building heating. The new engines would operate on both digester gas and natural gas. Fuel oil will no longer be required at the WRRF.

#### **Hunts Point WRRF Digesters and Sludge Thickening**

NYCDEP is planning a major sludge processing upgrade at the Hunts Point WRRF that will improve digestion performance, enhance biosolids quality to enable more beneficial reuse, and increase biogas production. Design has been completed on the new digesters. Replacement and upgrade of the

digesters at Hunts Point WRRF is funded in the CIP at a level of \$393 million in FY 2022. The upgrade to the sludge thickening equipment is an integral part of the overall sludge processing facilities and improved thickening will make the digesters operate more efficiently. Funding for the sludge thickeners at Hunts Point is in the CIP at a level of \$276 million. Design for the Hunts Point Solids Handling is expected to begin in FY 2022.

The sludge thickeners reduce the volume of water that passes through the digesters, which reduces the energy required for heating and increases solids retention time sufficiently to produce a product that meets the criteria for Class "B" Biosolids so that the full program goals are attained. It is important that the schedules of these two projects (digesters and sludge thickening) are coordinated so that both process upgrades will be operational at the same time to fully meet the project goals.

As discussed earlier in the report, NYCDEP is evaluating potential energy projects in collaboration with SOGR needs. It is anticipated that digesters and sludge thickening at other WRRFs will be evaluated.

### **Citywide Nitrogen Removal Program**

The Upper East River (UER) WRRFs (Hunts Point, Bowery Bay, Tallman Island, and Wards Island WRRFs) and two of the Jamaica Bay WRRFs (26<sup>th</sup> Ward and Jamaica WRRFs) 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 and NYSDEC entered into the First Amended Nitrogen Consent Judgement (FANCJ) in 2011 which requires, among other things, nitrogen removal upgrades at the Jamaica Bay WRRFs, construction milestones for the Jamaica Bay WRRFs, and interim nitrogen effluent discharge limits for Jamaica Bay. Coney Island WRRF is the only remaining Jamaica Bay WRRF that is currently under construction for BNR upgrades, and construction completion is expected in 2022. Construction was completed at Rockaway WRRF for BNR upgrades in 2020, and the completion was accepted by NYSDEC. NYCDEP is evaluating alternatives for future use and operations at the Rockaway WRRF facility. The interim nitrogen load limits for the Jamaica Bay WRRFs are currently being met. The final performance-based nitrogen limit for Jamaica Bay will go into effect 19 months after the last construction completion of nitrogen control upgrades at the Coney Island WRRF. NYCDEP submitted a Jamaica Bay Feasibility Study in January 2020 to evaluate the available nitrogen removal technologies and optimization techniques for existing infrastructure, to identify potential measures to reduce nitrogen discharges from the Jamaica Bay WRRFs and to improve DO water quality in Jamaica Bay.

Glycerol has been implemented as the supplemental carbon source for additional nitrogen removal. The supplemental carbon addition for Phase II BNR at the UER WRRFs (Hunts Point, Bowery Bay, Tallman Island and Wards Island WRRFs) and the Jamaica Bay WRRFs (Jamaica and 26<sup>th</sup> Ward WRRFs) is operational. NYCDEP and NYSDEC are in ongoing negotiations for a new Nitrogen Consent Order which is anticipated to address optimizing nitrogen removals at the WRRFs and continuation of a nitrogen research and development programs. There is funding of \$23.1 million in the budget for nitrogen program, which includes the conversion of the Sharon® demonstration facility



at Wards Island to another nitrogen removal process, as part of the BWT's ongoing Research and Innovation Program.

### **Total Residual Chlorine (TRC)**

Prior to discharge to a receiving body, wastewater effluent is disinfected with chlorine at the WRRFs. Excessive residual chlorine can be toxic to aquatic life in the receiving water body. A TRC modified Consent Order between NYSDEC and NYCDEP became effective March 2018, which includes interim TRC limits, proposed final TRC limits and a compliance schedule for the TRC upgrade projects required at the WRRFs. NYCDEP submitted a Force Majeure letter to NYSDEC regarding the COVID-19 pandemic, potential schedule impacts and economic uncertainties. NYCDEP requested a 12-month pause on open TRC Order milestones for Owls Head, Oakwood Beach, 26<sup>th</sup> Ward, Hunts Point, Tallman Island, and Port Richmond WRRFs. NYCDEP also performed a Technical Review of the TRC Program which includes a more holistic approach to the TRC projects in the Order. NYCDEP is evaluating options to achieve TRC compliance with plant optimization. NYSDEC has agreed to a 12-month pause of the TRC program, which will allow time for modifications of the Order. NYCDEP is still required to meet the final water quality-based effluent limit for TRC that is required in the current TRC Order, however alternative solutions and revised schedules will be negotiated. There is currently \$199.3 million in the CIP for the TRC program.

### **Rockaway WRRF**

Due to several factors including low wastewater flows, NYCDEP has been evaluating alternatives for future operation of the Rockaway WRRF. NYCDEP completed a Facility Plan for the Rockaway WRRF in 2014, which analyzed alternatives for future Rockaway WRRF operations. The evaluation considers maintaining wastewater treatment operations at the Rockaway WRRF or diverting wastewater to 26<sup>th</sup> Ward WRRF for treatment. Significant upgrades for SOGR and flood resiliency are required at Rockaway WRRF to maintain continuous operation. Two consolidation plans were evaluated to transfer the wastewater flows to 26<sup>th</sup> Ward WRRF across the Jamaica Bay: horizontal directional drilling (HDD) with open cut conveyance and tunneling under 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 is currently updating the alternative analysis to determine the best solution for future Rockaway wastewater flow. Additional studies are underway that may impact this decision, such as the Rockaway infiltration/inflow (I/I) studies. There is currently approximately \$213.8 million in SOGR funding for Rockaway WRRF in the CIP. However, after a decision has been determined for future operations, additional funding may be required for upgrades to serve the Rockaway drainage basin.

## Bluebelts

NYCDEP has been successful in developing effective Bluebelt sites in the South Shore of Staten Island since the 1990s. More than 70 bluebelts have been constructed across Staten Island (Figure 7-12). Bluebelts are an innovative stormwater drainage system made up of wetlands, streams and ponds. This past year construction began on an expansion of the award-winning Bluebelt program in the Mid-Island section of Staten Island, consisting of 2 projects. NYCDEP is evaluating expansion of the program to sites on the North Shore of Staten Island, Queens and the Bronx, where they would be effective. Approximately \$299.8 million is included in the CIP for land acquisition and construction to expand the Bluebelts for stormwater management.



**Figure 7-12: Bluebelt Program in Staten Island**

## 7.6 Superfund Designations

NYC has been identified as a potential responsible party (PRP) for the following three Superfund sites: Gowanus Canal, Newtown Creek, and Wolff-Alport Chemical Company. This may have future potential financial impacts to NYC; however, the extent to which NYC will be responsible has not yet been fully determined for the Newtown Creek and the Wolff-Alport Chemical Company sites.

In March 2010, the Gowanus Canal was declared a Superfund site and USEPA notified NYC that they are considered a PRP for hazardous waste under Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). 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 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. In June 2016, USEPA issued a memorandum stating that the size of the two CSO storage tanks should be 8-million gallons at RH-034 outfall (RH tank) and 4-million gallons at OH-007 outfall (OH tank). In March 2020, NYCDEP submitted a Force Majeure letter to the USEPA identifying potential delays to the implementation to the Superfund Gowanus tanks due to COVID-19 schedule impacts. NYCDEP and USEPA are currently in discussions to resolve the scheduling issues. Funding of approximately \$772 million is included in the CIP for the Gowanus Canal CSO retention facility. Construction contracts for the RH tank is expected to start in FY 2022. NYCDEP is continuing with design of the OH tank. It is anticipated that additional funding will be required for construction of the OH tank. The design costs of the in-canal portion of the remediation (dredging and capping of sediments) has been allocated between NYC and twenty other parties. In January 2020, the USEPA issued a Unilateral Order to the six largest PRPs to implement the in-canal remediation in the upper reach of the Canal, the first of three portions where this work will occur.



In September 2010, Newtown Creek was declared a Superfund site. In July 2011, NYCDEP entered into an Administrative Settlement Agreement and Order on Consent with EPA, along with five other PRPs that own or operate facilities adjacent to Newtown Creek in the investigation of conditions in Newtown Creek and the evaluation of feasible remedies. The investigation and feasibility study are currently ongoing and is expected to continue until 2023. 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. NYCDEP is coordinating with the NYSDEC and the USEPA regarding the recommended plans for the Newtown Creek CSO LTCP along with the Newtown Creek Superfund program.

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. In September 2017, USEPA issues its ROD requiring jet washing and replacement of sewers and excavation of contaminated portions of the right-of-way. In December 2017, USEPA notified NYC of its status as a PRP for the work on City property pertaining to this Superfund site. In September 2019, the USEPA issued a Unilateral Administrative Order requiring the City to perform additional investigatory work and develop a remedial design in accordance with the ROD. NYCDEP is preparing a work plan for the pre-design investigation.

NYC operated a wastewater treatment plant in the Town of Mt. Kisco which was decommissioned in the 1960s. Elevated radiation levels have been detected throughout the site. These levels are most likely due to the operations of Canadian Radium & Uranium Corporation (CRUC) which processed radioactive materials in Mt. Kisco and most likely sent wastewater to the Mt. Kisco WWTP. Based upon DEP's former operation of the Mt. Kisco WWTP, DEP signed an Order of Consent with NYSDEC which committed NYCDEP to fund an environmental study of the site. NYCDEP completed the preliminary environmental study and submitted to NYSDEC. A new or amended Order is anticipated between NYCDEP and NYSDEC that may require further investigations and actions. NYCDEP may be required to fund remedial design and remedial action at the site, along with waste disposal, which could amount to significant costs.

## **7.7 Potential Future Long-Term Water and Wastewater Projects Beyond Current Budget Planning**

### **Renewable Rikers**

In 2019, City Council passed legislation for the closing of the Rikers Island Detention Facility by 2026. Subsequently, City Council introduced legislation that requires studies to be completed to determine future use of Rikers Island, known as Renewable Rikers. NYCDEP will conduct a feasibility study to evaluate the relocation and consolidation of the four Upper East River (Bowery Bay, Tallman Island, Hunts Point, Wards Island) WRRFs to Rikers Island. NYC Mayor's Office of Sustainability will conduct a feasibility study to evaluate different types of renewable energy sources combined with battery

storage to be located on Rikers Island. Rikers Island consists of 413 acres and is located in the East River between the Bronx and Queens (Figure 7-13).



**Figure 7-13: Location of Rikers Island and Four NYCDEP WRRFs**

#### Potential Further Nitrogen Removal in NYC WRRFs

The USEPA Long Island Sound Study is evaluating further nitrogen reductions for the Long Island Sound. The results of this analysis have the potential to impact NYCDEP UER WRRFs by requiring further nitrogen removals. NYCDEP continues to remain involved and will provide meaningful input throughout this Nitrogen Reduction Strategy.

#### City Tunnel No. 3, Stage 3 and Stage 4

The long-term planning for the next phase of City Tunnel No. 3 is the Stage 3 (known as Kensico City Tunnel) and the Stage 4 extension. The Stage 3, Kensico City Tunnel would extend from Kensico Reservoir to Tunnel 3, south of Hillview Reservoir. Stage 4 would deliver additional water to the eastern parts of the Bronx and Queens. It would extend southeast from the northern end of Stage I in the Bronx to Queens and then southwest to interconnect with the Queens portion of Stage 2. City Tunnel No. 3 Stage 4 will enable The System to maintain full service even if Tunnel 1 or 2 were shut down. NYCDEP must decide on its next long-term priorities and needs, and therefore a schedule or budget for this anticipated next phase will have to be developed. These stages would incur beyond the current CIP planning period.

## **8.0 EXPENSE BUDGET**

The FY 2021 expense budget released in the Preliminary Plan is \$1.499 billion. The proposed FY 2022 expense budget in the Preliminary Plan is \$1.385 billion. Expense budget projections for FY 2022 are currently being evaluated based upon the new needs of The System and will require adjustment when the evaluation is complete. The FY 2022 expense budget is expected to increase and be updated in the Executive Budget, to be released in April 2021. NYCDEP anticipates receiving FEMA or CARES Act reimbursement for COVID-19 related expenses, which is approximately \$3 million in FY 2021. The expense budget is made up of both Personal Services (PS) costs and Other than Personal Services (OTPS) costs. The personnel services budget is made up of staff salary, fringe benefits and pension costs. The OTPS makes up the remaining expense budget, including taxes, chemicals, supplies, fuel oil, gasoline, biosolids, equipment, contract services, leases, FAD, training, and other requirements/needs. There are many competing needs within the Expense budget each year; therefore, NYCDEP must continue to evaluate all requirements of the water and wastewater system when completing the expense budget. In accordance with applicable regulations and directives, NYC decides the projects (or elements of a project) that are eligible for capital funding. The remaining needs are covered in the expense budget. In addition to the day-to-day requirements to operate and maintain the NYCDEP system, the expense budget must also cover planning studies that are necessary to prioritize capital investments but the studies, themselves, are not capital eligible. Planning studies/Facility Plans are important aspects of long-term management of The System and should be carried out before any significant capital funds are committed to a specific project or facility.

## 9.0 PERFORMANCE OVERVIEW

### Water Conservation

The average daily consumption for FY 2020 was 978 MGD. Figure 9-1 presents the annual water consumption for the City over the last 28 years. Water conservation measures taken by NYCDEP in the 1990s have resulted in a steady reduction in the overall water demand. Water demand has decreased by approximately 36% since the 1990s. More recent declines in water consumption have been noted most likely attributed to continued conservation measures, water usage metering, availability of easily accessible data for tracking, and weather patterns. New York's per capita water demand has declined from its peak of 213 gallons a day per person in 1979 to 118 gallons per day per person in 2019. This change reflects a 45% reduction in per capita water demand.<sup>6</sup> It is anticipated that strategies identified in the NYCDEP Water Demand Management Plan will continue to reduce the water demand.

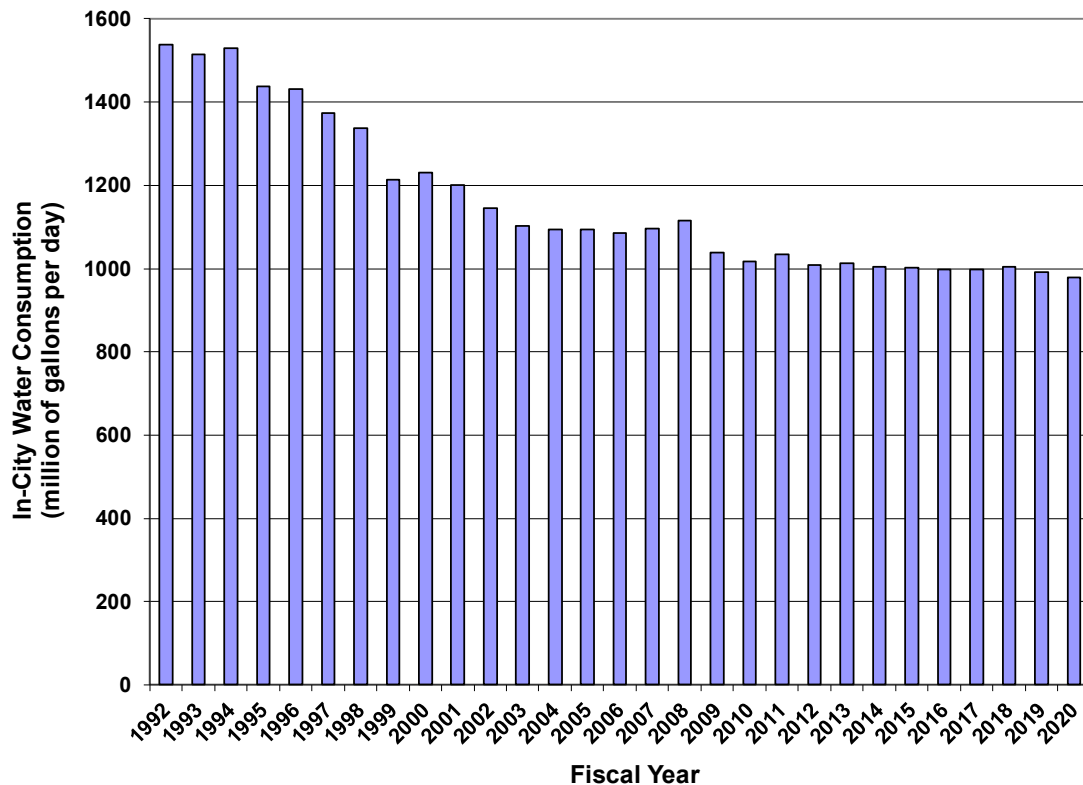


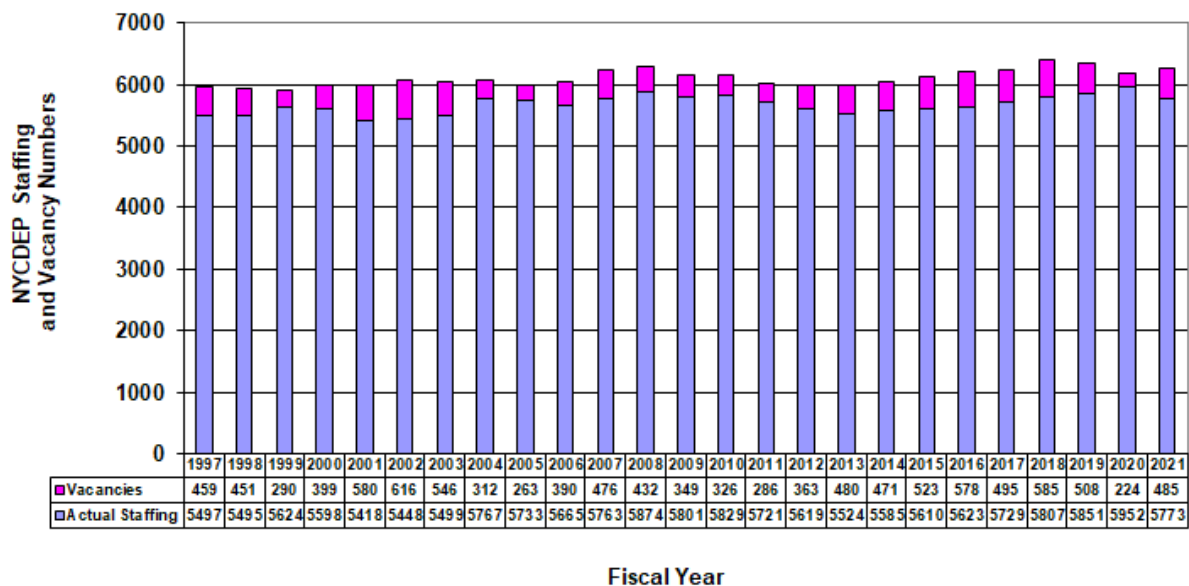
Figure 9-1: New York City Average Daily Water Demand in Million Gallons per Day (MGD)

### System Staffing Levels

Figure 9-2 shows the NYCDEP approved staffing positions and vacancies from 1997 to the present. Over the last year, the approved staffing positions have increased by 82 reflecting the increase in critical

<sup>6</sup> Water Demand Management Plan June 2020 Annual Update, NYCDEP.

assets that must be operated and maintained. For that same period, the number of vacancies has more than doubled from 224 in FY 2020 to 485 in FY 2021. Of the 485 vacancies within NYCDEP, over 50% of the staff vacancies are from the Operating Bureaus - BWT, BWS and BWSO.



**Figure 9-2: NYCDEP – Staffing and Vacancy Levels FY 1997-2021**

The increase in vacancies is attributed to the hiring freeze that has been placed on NYCDEP in March 2020 when the global pandemic began, and continued through June 2020. In June 2020 a "2 for 1" partial hiring freeze was put in place on NYCDEP (along with other NYC agencies) allowing agencies to hire one position for every two attritions. A new hiring policy of "3 for 1" was announced in January 2021, which will allow one hire for every three attritions, on a monthly basis. This new policy has not yet been implemented and when implemented will not address the growing number of vacancies. Further, it will not allow the transfer of knowledge from the departure of highly experienced staff to new hires. It is important to note that many experienced, critical employees are eligible for retirement in the near future and more than half the current work force is eligible to retire in the next ten years. The challenges associated with the hiring freeze are compounded by the ongoing and anticipated retirements. Recruitment, training, transfer of knowledge, and succession planning are essential to maintain a skilled DEP workforce. The following provides a brief overview of the situation faced by each operating bureau.

#### Bureau of Wastewater Treatment

BWT must have the ability to successfully fill Sewage Treatment Worker (STW) positions. The overlap between new hires and retiring employees is essential for knowledge transfer, and mentoring programs that encourage the interaction between experienced staff and new hires is extremely important. In addition, BWT has identified new operation and maintenance staffing needs as new facilities come on-line. BWT has also identified additional staff needs to provide

timely preventive maintenance for critical equipment and avoid more costly corrective maintenance when critical equipment fails.

#### Bureau of Water Supply

Retention of skilled staff and succession planning is challenging particularly for licensed operators for the new water treatment facilities and particularly the Croton WFP. Currently, the Croton WFP is operating at less than full capacity. In preparation for the Delaware Aqueduct shut down, this facility will have to ramp up to full capacity in October 2022. When the Delaware Aqueduct is taken out-of-service, the Croton WFP will have to operate at full capacity for several months in order to meet water supply demands.

#### Bureau of Water and Sewer Operations

New staffing needs have been identified in order to expand their pro-active inspection of water mains. BWSO plans to add three additional crews to improve valve inspection and exercising so that they can meet their stated goal, which is consistent with industry standards. By increasing the valve inspection, crews will be more able to promptly shut off water when there is a water main break. BWSO will also need to increase seasonal Green Jobs that perform maintenance of green infrastructure assets throughout the City. Over the next few years, Green Infrastructure assets are expected to increase in NYC, however, there has been an increase in Green Infrastructure staffing vacancies.

The hiring freeze has put a strain on NYCDEP's resources and continues to challenge operations, planning and engineering. NYCDEP continues to operate water and wastewater facilities 24 hours per day, 7 days a week with essential workers/operators. DEP's Mitigation Plan calls for increased overtime and re-allocation of staff to critical positions. However, the mitigation measures taken are short term solutions that are not sustainable over the long term. The current staffing level is not sustainable for future safe operation and management of the System.

The current partial hiring freeze is not sustainable and can become more problematic the longer that it continues. There is an increased risk for long-term impacts and compliance (permit and Consent Order). The hiring freeze has required NYCDEP to operate inefficiently, requiring significant overtime. NYCDEP will need to resume hiring additional staff to offset the reduction in staff due to attrition.

One goal of the 2018 Strategic Plan is to maximize operational efficiencies across the agency. This goal will be implemented with various strategic initiatives, which includes in-sourcing (expanding in-house capabilities, where appropriate) to improve capital program delivery and maintenance and operations, streamline procurement practices, and use predictive analytics to drive operational efficiencies. NYCDEP continues to evaluate the cost-effectiveness of in-sourcing some tasks/needs, where feasible, that are currently provided by contract services. If NYCDEP determines that insourcing is a viable means of achieving the same result, it is anticipated that additional staff will be identified and needed. NYCDEP will look to provide a balance of in-sourcing and contract service where appropriate. Due to the partial hiring freeze currently in place, most of the in-sourcing program has been on hold.

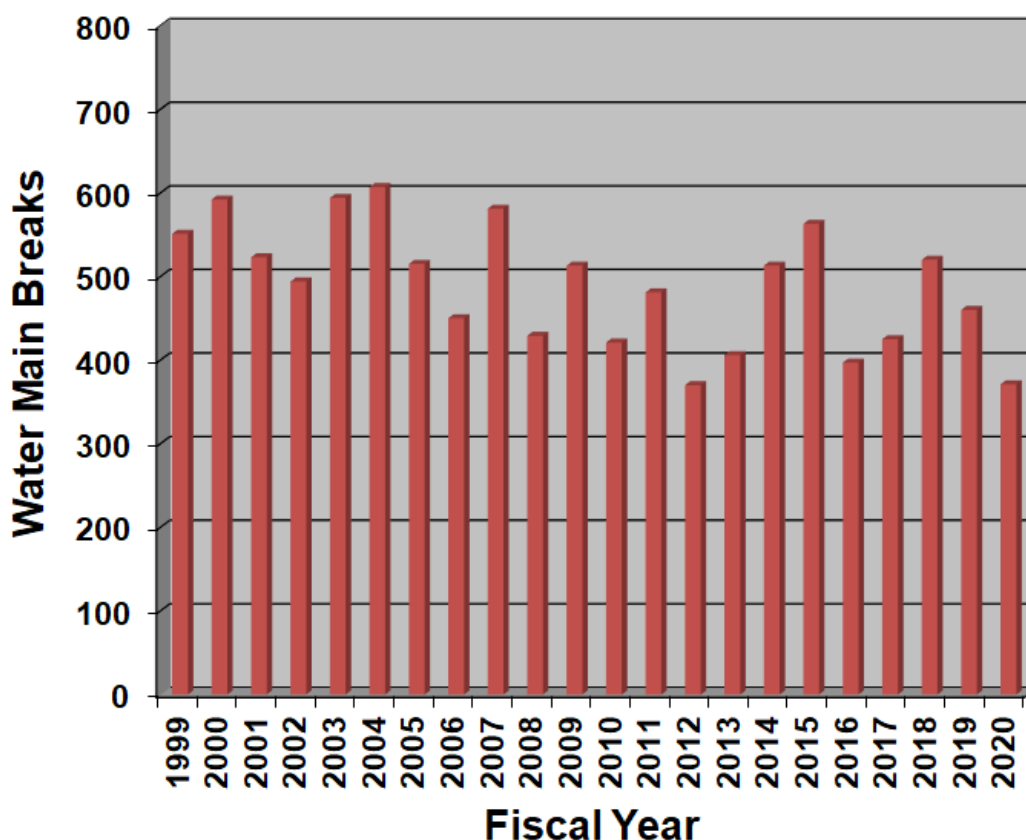


### **Operational Performance Indicators**

There are many operational parameters that can be reviewed to assess the effectiveness of operating programs. Several performance indicators for water and sewer operations are summarized below. However, there are other parameters that impact these indicators, such as localized weather patterns.

There were 371 water main breaks reported in FY 2020, which translates to 5.3 breaks per 100 miles of main over a 12-month period. The FY 2020 water mains breaks reflects a 19% reduction in water main breaks compared to FY 2019 breaks (see Figure 9-3). The range of water main breaks that NYC has recently experienced remains much lower than the average water main breaks experienced by other municipalities in the United States (various studies show overall average annual break rates for all pipe materials average 25 breaks per mile, 21-25 breaks per mile, 14 breaks/100 miles depending upon the study and utilities surveyed). NYCDEP BWSO operations continue a preventive maintenance program to target pressure reducing valves by exercising valves, inspecting regulators and utilizing predictive modeling to help prevent the occurrence of water main breaks, costly repairs, leaks and disruption of service. In addition, BWSO prioritizes replacement of water mains based upon those with the greatest risk of breakage. The majority of water main breaks occur in the winter since the water mains are impacted by the freeze/thaw cycles in the colder temperatures. NYCDEP continued to restore water to residents within an average of 4.9 hours after confirming the water main break. NYCDEP plans to enhance inter-agency coordination; NYCDEP and NYC Emergency Management plans to meet with several agencies, including FDNY, NYCDOT, Con Edison, National Grid, Metropolitan Transit Authority to review communication and coordination protocols to expedite water shut-off and service return during emergency events.

NYCDEP achieved approximately 54.8 miles of new water main replacement or reconstruction this past year. NYCDEP's goal is to target a 1% or 100-year annual water main replacement cycle (approximately 65 miles/year), which is more than the national average. Utilities have a 125-year water main replacement rate as a national average, which is an average of 0.8% of installed pipe replacement each year. The average age of the water mains throughout NYC is 63 years. NYCDEP completed construction or reconstruction of 28.3 miles of sewer lines this past year.



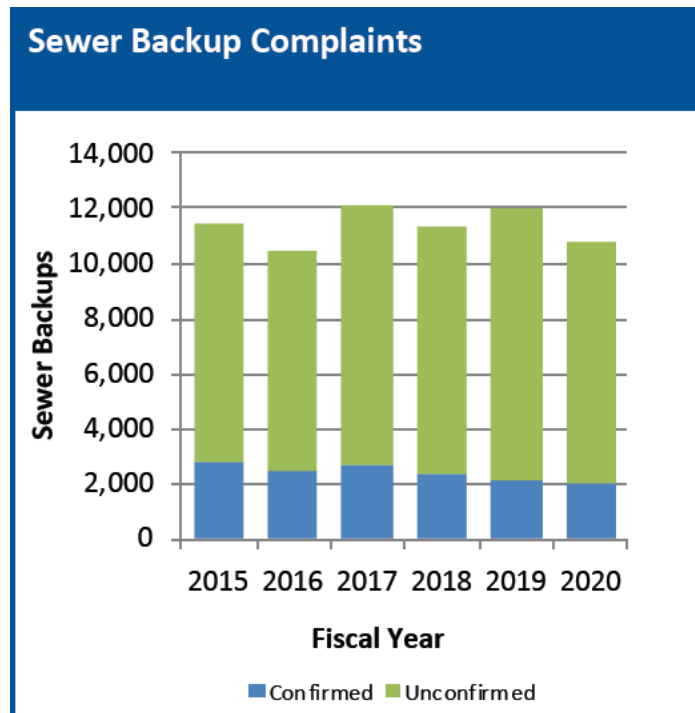
**Figure 9-3: Total NYCDEP Water Main Breaks per Fiscal Year**

There are 109,586 fire hydrants in NYC, of which BWSO is responsible for the repair and maintenance. Approximately 0.38% of total fire hydrants were broken and inoperative in FY 2020. The average time to repair or replace high priority broken or inoperative hydrants (as determined by the Fire Department) by NYCDEP was 2.3 days in FY 2020, which is less than the target time for repair or replacement of five days. In June 2020, the NYC Office of the Comptroller released a management audit of NYCDEP's fire hydrant inspections and repairs. The audit found that NYCDEP adequately handled its fire hydrant inspection and repairs responsibilities in FY 2019. The audit made 14 recommendations to NYCDEP; NYCDEP provided detailed responses to each of the recommendations, and the responses are included in the addendum to the report.

The number of catch basins that were surveyed and inspected in FY 2020 was 53.1% of the total (148,000 catch basins), which is a reduction from FY 2019 due to the sunset of Local Law 48 of 2015. This law mandated the annual inspections of all catch basins for FY 2017, FY 2018 and FY 2019. It is anticipated that BWSO will return to inspection of catch basins once every three years. The total number of catch basins that were cleaned by NYCDEP in FY 2020 is 40,631. BWSO field crews are using tablets in the field to track catch basin cleaning data.

As shown in Figure 9-4, NYCDEP received 10,768 sewer backup (SBU) complaints in FY 2020, which is made up of confirmed SBUs (on NYCDEP infrastructure) and unconfirmed SBUs (not on NYCDEP

infrastructure or not found). Response time for SBUs was 3.1 hours on average, which is less than the past several years and well below the target of seven 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 the FOG problem in the sewers. NYCDEP continues to use a public outreach campaign to educate the public what should not be flushed down the toilet (wipes, cooking oil, and many other personal hygiene products) as they impact the operation of sewers and treatment plants. This campaign is known as **Trash It. Don't Flush It. FatbergFree.nyc**.



**Figure 9-4: Sewer Backup (SBU) Complaints**

NYCDEP uses a data-driven risk management approach to operate and maintain the sewer system, targeting specific locations with recurring problems. A group within BWSO known as Collection Systems Investigations (CSI), is a specialized unit that targets in-house engineering and contract resources to address sewer system performance issues. The Sewer Operations and Analysis Program (SOAP) at NYCDEP allows for a more proactive rather than reactive approach. This group analyzes areas with recurring problems to determine the cause of the problem and then determines a remediation plan (degreasing, cleaning, repair, replacement) in specific areas. BWSO's top priority remains its core work, which consists of sewer television inspections, sewer cleaning, catch basin reconstruction and cleaning, hydrant repair, installation of new water mains.



**Figure 9-5 State of the Sewers 2020**

NYCDEP submitted a Sewer Backup Prevention and Response Plan to the NYSDEC in May 2017. In July 2017, NYCDEP commenced a three-year pilot program (July 2017 – June 2020), known as a Targeted Sewer Inspection Pilot (TSIP). The goal of the pilot is to further reduce the frequency of confirmed SBUs throughout NYC. During the pilot NYCDEP performed two cycles of visual inspections of the sanitary sewers over the 3-year period across specific geographic areas in Brooklyn and Queens that historically have had the highest number of SBUs. The increased inspections for these targeted areas reflect a proactive position rather than reactive for NYCDEP operations. BWSO issued a report to City Council in December 2019 entitled, A Plan to Prevent Confirmed Sewer Backups. BWSO also issued their annual report, State of the Sewers 2020 Report, which documents several metrics on sewer operations across the 5 boroughs (Figure 9-5).

### **Operational and Maintenance Program Summary and Updates**

**Water Supply and Treatment Operations.** NYCDEP strives to increase the reliability, flexibility and redundancy of overall 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, has been operational since 2015. This interconnection provides 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 provide the ability for Croton water to be supplied to the Delaware Aqueduct, if required in emergencies or when parts of the system are out of service for planned or unplanned maintenance, as needed. NYCDEP must receive NYSDOH approval prior to operating Croton Falls and Cross River Pump Stations. In addition, the connection between the Catskill Aqueduct and Croton allows blended water to be sent to the Croton WFP if necessary. NYCDEP strives to maintain/ increase operational flexibility in the operations of the vast network of upstate reservoirs and aqueducts in order to reliably deliver safe drinking water to NYC on a continuous basis.

**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 water production rate (290 MGD). The amount of water supplied by the Croton WFP is varied depending upon the overall water demand. Depending upon the water supply demands, NYCDEP will continue to vary water production at the Croton WFP. Croton WFP has been operational since the end of 2020 during the Catskill Aqueduct shutdown. NYCDEP scientists and engineers continue to evaluate seasonal variations in water quality from the Croton watershed. In 2020, BWS installed new filter media at Croton WFP, by removed the anthracite and replacing with granular activated carbon (GAC) to address the taste and odor issues.

*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 UV facility is the largest UV water disinfection facility in the world with a capacity to disinfect 2.4 billion gallons per day. It is currently receiving and providing UV disinfection to all Cat/Del waters. Currently, water is transferred from the Kensico Reservoir to the Cat/Del UV Facility via the Delaware Aqueduct. The Consent Order for the Cat/Del UV Facility was terminated July 2016.

*Drinking Water Quality and Quantity.* NYCDEP released the New York City 2019 Drinking Water Supply and Quality Report on February 24, 2020. It is anticipated that the 2020 Drinking Water Supply and Quality Report will be released in February or March 2021. NYCDEP conducts significant monitoring of the source water and in-city water quality. In FY 2020, NYCDEP collected 36,300 samples from the in-city distribution system and performed approximately 456,500 analyses, meeting all state and federal monitoring requirements. In addition, NYCDEP collected more than 15,000 samples and performed approximately 262,500 analyses from the upstate reservoirs and watersheds. Approximately 2 million robotic monitoring measurements were made to support FAD watershed protection programs and to optimize water quality. Microbiologists, chemists and other scientists with the BWS test water from key locations across the watershed and the City at NYCDEP laboratories. NYCDEP water quality laboratories are located in Hawthorne, Kingston, Grahamsville and Queens. As of February 19, 2021, the overall storage in NYC's water supply system stands at 86.9% of capacity, compared to the normal levels at this time of 91.2% of capacity.

NYCDEP BWS implemented an Emerging Contaminant Monitoring Project (ECMP) throughout the NYC watershed in 2019. Among over 140 emerging contaminants were tested, per- and polyfluoroalkyl substances (PFAS) were part of the analysis, including perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS). The results were posted quarterly on the NYCDEP website. These materials were often not detected, or they were detected at levels below New York State's standard of 10 parts per trillion (ppt) (PFOS, PFOA).

NYCDEP utilizes the Operation Support Tool (OST) for various decision making and operating modes. The 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.

*Wastewater Operations.* BWT utilizes predictive maintenance methods in order to better identify maintenance and replacement cycles and overall increase reliability of the WRRF's equipment. Examples of predictive maintenance include measuring mechanical wear on equipment parts and using thermographic cameras to examine electrical systems. This program is anticipated to save on capital replacement and energy costs.

*BNR Operations at the Wastewater Resource Recovery Facilities.* NYCDEP has been operating in Step Feed BNR mode at several of the NYCDEP WRRFs (Hunts Point, Bowery Bay, Tallman Island, Wards Island, 26<sup>th</sup> Ward, Rockaway, and Jamaica WRRFs). Due to the long-term planning and significant capital projects that have been implemented, NYCDEP operations has been achieving the final total nitrogen (TN) removals established for the Upper East River. Due to the required upgrades

at the plants, the UER WRRFs have seen a significant reduction in TN in the effluent. NYCDEP and NYSDEC are currently negotiating terms of a new nitrogen Consent Order. The final TN load for Jamaica Bay will be performance-based and will go into effect 19 months after construction completion of the BNR upgrades at the Coney Island WRRF.

*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 89 sampling stations harbor-wide, with 40 located in open waters and another 49 located in tributaries. NYCDEP has increased the number of monitoring sites throughout the harbor and at the mouth of key tributaries in order to evaluate the effectiveness of the NYCDEP stormwater management and CSO control projects. The number of water quality parameters measured has increased from five in 1909 to 27 water quality parameters at present.

*Sludge Vessels.* In FY 2014, NYCDEP commissioned three new sludge vessels, the Motor Vessel (M/V) Hunts 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 WRRFs not served by onsite dewatering facilities to those WRRFs with dewatering facilities.

*Biosolids.* NYCDEP typically produces 1,400 wet tons per day of biosolids from the wastewater treatment operations at the 14 WRRFs. NYCDEP is developing a Biosolids Strategic Plan to identify alternative end uses for NYCDEP biosolids. The majority of biosolids from NYCDEP WRRFs have been landfilled in recent years. However, BWT plans to increase the beneficial reuse of biosolids. In 2020, about 70% of biosolids were sent to landfill and about 30% of biosolids were sent to composting, mine reclamation, or use as a fertilizer. NYCDEP plans to continue increasing the amount of beneficial reuse contracts going forward. Beneficial reuse of biosolids supports the OneNYC Mayoral initiative of zero waste to landfills by 2030 due to the significant environmental and sustainability benefits it provides.

*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. EH&S is carried out by in-house NYCDEP management and staff as well as EH&S contracts. Safety is one of NYCDEP's core values as identified in the Strategic Plan. Over the past decade, NYCDEP has created a culture where safety comes first for every employee, contractor and the public.

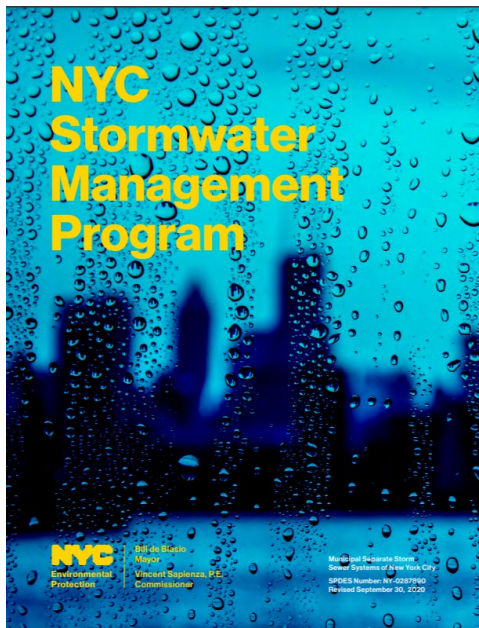
The National Safety Council (NSC) recognized NYCDEP EH&S programs by awarding the Significant Improvement Award, the Hazard Recognition Bronze, and the Perfect Record Award. NYCDEP also achieved semi-finalist status for the NSC Green Cross Advocate Award, Excellence Award, and Innovation Award. These awards recognize NYCDEP's progress to promote and sustain safety in the workplace.



Safety has remained a priority for NYCDEP during these ongoing challenging times during the global pandemic. NYCDEP continues to put safety as a top priority and is committed to creating the safest workplace for everyone involved in their work at NYCDEP.

### Permit Updates

**Wastewater Treatment.** In 2020, NYCDEP completed the comprehensive State Pollutant Discharge Elimination System (SPDES) Permit Renewal Applications for the 14 NYC WRRFs. NYCDEP is in discussions with NYSDEC for revised and renewed SPDES permits, which is anticipated to be complete in the coming months. The current SPDES permits for the 14 WRRFs expired in 2020, however NYCDEP received an Administrative extension as negotiations are ongoing for new SPDES permits. NYCDEP is operating in accordance with the current SPDES permits. Based upon diligent wastewater treatment plant operations, 99.9% of the NYCDEP wastewater treatment plant effluent met state pollutant discharge elimination standards in FY 2020. For the first four months of FY 2021, 99.8% of the NYCDEP wastewater plant effluent met state pollutant discharge elimination standards.



**Figure 9-6: SWMP Plan**

**Stormwater.** 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 WRRFs, 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. As required by the MS4 permit, NYC established

legal authority in 2017 with the passage of Local law 97. The city has established a Stormwater Controls Working Group

that includes representatives from each agency that meet quarterly to discuss stormwater program development tasks and permit-related information. The MS4 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 was submitted August 1, 2018 (Figure 9-6). 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 SWMP Plan was approved by NYSDEC in March 2019. The MS4 includes annual reporting requirements. The 2019 Annual Report covered the period August 1, 2019 to December 31, 2019. Among other requirements, NYC submitted a fiscal analysis of the capital, operating and maintenance costs necessary to meet the requirements of the permit August 1, 2018. The MS4 permit expired in 2020; NYCDEP and NYSDCE have negotiated a new draft MS4 permit. It is anticipated a new MS4 permit will be released in the coming months. As discussed previously in the report, the Unified Stormwater Rule is anticipated in 2021 which will benefit MS4 areas by requiring more on-site stormwater management.

As part of NYCDEP's public outreach and education, in June 2017 NYCDEP announced the launch of *Don't Trash Our Waters*, a public awareness campaign aimed at reducing litter and improving the health of New York City's waterbodies.

## **10.0 OTHER NOTEWORTHY ISSUES AND COMMENTS**

### **Lead**

The finalized rule of the Lead and Copper Rule Revisions (LCRR) was published in the Federal Register, however the new Administration put a 60-day hold on all new regulations so that they can be reviewed by the new Administration before becoming final. The LCRR will have a three-year compliance period. There are significant and complex changes to the LCRR that will have an impact on NYCDEP and will make compliance more stringent and challenging.

Although the lead action level remains at 15 ug/L, the LCRR establishes a new trigger level of 10 ug/L. Compliance and associated actions are based upon two different levels. Another significant change to the LCRR is that only homes with lead service lines (LSL) will count toward compliance, whereas homes with copper pipes and lead solder were included in the monitoring pool for the current Lead and Copper. The sampling methodology has changed also. The current rule requires collection of a first liter sample after 6-hour stagnation; however, the revised rule requires an additional fifth liter sample, which would represent water sitting in the lead service line. Additional requirements of the LCRR include annual updates of the LSL inventory, additional sampling in elementary schools and childcare facilities, and additional public education elements.

The drinking water supply is lead-free when it leaves the upstate reservoir system. The city-owned distribution system is also lead free. NYCDEP is currently in compliance with the 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. In certain cases, privately owned infrastructure contains lead such as the LSL that connect the homes to the city-owned water mains. Under the current federal Lead and Copper Rule, mandated at-the-tap lead monitoring is conducted at select households throughout New York City. The at-the-tap monitoring results are presented in the annual New York City Drinking Water Supply and Quality Report. NYC residents can request a free lead kit to test their water.

NYCDEP has been engaged with the National Drinking Water Advisory Council (NDWAC) Lead and Copper Rule Working Group, Water Research Foundation expert panel, and others. NYCDEP has taken a pro-active approach and has initiated studies to further optimize corrosion control, better understand lead exposure and help prepare for the LCRR. BWS is continuing a pilot program in City Island in the Bronx to further optimize corrosion control treatment by increasing the orthophosphate (PO<sub>4</sub>) dosage.

In January 2019, Mayor deBlasio released a plan called LeadFreeNYC, a comprehensive roadmap to eliminating lead exposure in NYC children, which includes many ways to eradicate lead exposure. A NYS Health Department grant of \$5.3 million has been given to NYC for NYCDEP to pilot a program to replace lead service lines for low-income single-family homeowners. As part of this LeadFreeNYC

program, NYCDEP has also posted a map of NYC with potential lead service lines on the LeadFreeNYC website.

### **Awards**

NYCDEP capital program, operations and customer service have been recognized throughout the industry by professional and trade organizations.

NYCDEP was awarded the 2020 Association of Metropolitan Water Agencies (AMWA) Sustainable Water Utility Management Award, which recognizes AMWA members that have made a commitment to sustainable management. Sustainability is a core value of NYCDEP's Strategic Plan and this award recognizes NYCDEP's continued commitment to environmental, social, and economic sustainability. AMWA is an organization of the largest publicly owned drinking water suppliers in the United States.

The Ben Nesin Building rehabilitation earned the Leadership in Energy and Environmental Design (LEED) Gold Award for incorporating sustainable design and construction into the building rehabilitation at Ashokan Reservoir, which was completed in 2019. LEED is an international certification system to recognize buildings that save energy and water, reduce greenhouse gas emissions, and use local or renewable materials in their construction.

In October 2020, the Public Design Commission of New York (PDC) honored NYCDEP with an award for excellence for the design rehabilitation of the Wards Island Primary Settling Tanks Pre-houses. This project is one of 11 New York City projects recognized by the PDC this year, chosen to demonstrate best practices in public design.

NYCDEP also received several safety related awards from NSC; these awards are described in the previous safety section.

### **Design Build**

NYS passed legislation that allows for projects to be delivered using design build construction contracts in NYC. NYCDEP is currently developing an implementation plan for a design build program. NYCDEP has decided to implement design build as pilot project initially, and the pilot project is currently being chosen. The information gathered for the pilot project will help NYCDEP determine if design build will be used for larger projects in the future.

### **Water Rate Study**

NYCDEP has initiated a Sustainable Rate Structure Analysis which will analyze water and wastewater rate structure options and customer assistance and credit programs. This study will be in development for the next few years.

### Long Island Water Supply Feasibility Study

NYSDOH is funding and conducting a feasibility study to evaluate the possibility of Long Island purchasing water from the NYC water supply. There are many issues that require evaluation including technical issues, operational issues, legal framework and governance.

## **11.0 SUMMARY AND CONCLUSIONS**

The past year has been an extremely challenging year due to the COVID-19 global pandemic, however NYCDEP continued to operate facilities to provide essential services of water and wastewater treatment and delivery. Considering the magnitude of the overall infrastructure and the level of operational service required, it is our opinion that:

- 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.
- The physical condition of The System receives an “adequate rating”, our highest rating. Due to the size and complexity of The System, NYCDEP continuously requires future capital investments for the replacement and/or repair of aging infrastructure in a systematic and cost-effective manner.
- NYCDEP capital and expense budget projections for FY 2021 satisfy the immediate needs for The System including legally mandated projects, which comprise approximately 28% of the capital budget for FY 2021.
- NYCDEP capital budget projections for FY 2022 satisfy the immediate needs for the System including legally mandated projects, which comprise approximately 28% of the capital budget for FY 2022. Expense budget projections for FY 2022 are currently being evaluated based upon the projected new needs of The System and may require adjustment when the evaluation is complete.
- NYCDEP capital planning is an ongoing iterative process addressing priorities and needs of The System. The NYCDEP is responsive to the long-term requirements of the service area.
- Staffing levels have dropped from 96% to approximately 92% of approved allocations, which reflects an increase in vacancies. The hiring freeze policy that was implemented across NYC in March 2020 through June 2020, and the partial hiring freeze that is currently in effect have created a challenge for NYCDEP. NYCDEP has implemented a mitigation program based on increasing overtime and reallocation of resources to critical operating vacancies. However, these are short-term measures, and not sustainable over the long-term. Additional staffing to fill critical vacancies will be required when the hiring freeze is lifted.

### **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. 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 and complex water and wastewater system, and prioritize the most important projects and programs. An Asset Management program is being used by NYCDEP that better identifies the needs and costs for infrastructure upgrades. Capital funding will need to be allocated to address the state of good repair of aging infrastructure in order to avoid critical failure of essential processes. These needs will have to continue to be addressed and implemented in a systematic way. 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. Projects that address climate change impacts and adaptation to the system are in various stages of implementation (feasibility planning, design and construction) based upon sound cost-effective analysis and this process will need to continue as additional resiliency projects are identified. Prioritization of greatest need is a significant factor in moving forward with implementation of climate change resiliency. NYCDEP must remain diligent to make sure operational needs continue to be met while capital programs are identified and implemented in a timely manner. Because of the vast and extensive nature of the NYCDEP facilities and its aging infrastructure, continued diligence and future capital improvements will continue to be required in the near term and long term.

#### **Regarding the Capital Improvement Program (CIP)**

Projects/Programs that will require additional funding in future budgets include:

- *SOG*R: As indicated throughout the report, significant additional funding in future budgets will be required for the continuation of SOGR projects due to the aging infrastructure throughout the wastewater and water system and to support critical infrastructure projects required for the safe and continuous operation of the water and wastewater system.
- *FAD*: Once the five-year mid-term review of the FAD is completed, it is anticipated that additional funding will be identified for continued implementation of the ten-year FAD.
- *Climate Change Resiliency, Energy Carbon Neutrality, and Sustainability Projects*: NYCDEP is seeking supplemental funding mechanisms for climate change resiliency and energy carbon neutrality projects. There may 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 needs will continue to be identified in the future budgeting cycle.
- *Combined Sewer Overflow (CSO) Program*: NYCDEP has submitted eleven Long Term Control Plans (LTCPs). Additional funding will continue to be required for implementation of the CSO projects that have been identified in the LTCPs in the future budget cycles beyond the ten-year horizon. Additional funding will also be required for the continuation of the Green Infrastructure Program.
- *Hillview Cover*: Based upon the schedule and the results of the feasibility planning study in the Hillview Consent Decree, significant funding will need to be added to future capital plans.
- *Superfund Sites*: Additional funding will be required for Gowanus Canal Superfund Facility for the OH tank. Once studies have been completed, additional funding will be required for other Superfund sites.

## **12.0 LIST OF ACRONYMS**

ACCO	Agency Chief Contracting Officer
ADG	Anaerobic Digester Gas
AMWA	Association of Metropolitan Water Agencies
AUV	automated underwater vehicle
BEC	Bureau of Environmental Compliance
BEDC	Bureau of Engineering, Design, and Construction
BEPA	Bureau of Environmental Planning and Analysis
BGD	Billion Gallons per Day
BGY	Billion Gallons per Year
BNR	Biological Nitrogen Removal
BWS	Bureau of Water Supply
BWSO	Bureau of Water and Sewer Operations
BWT	Bureau of Wastewater Treatment
CAG	Community Advisory Group
CARES	Coronavirus Aid, Relief, and Economic Security
Cat/Del	Catskill/Delaware
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CHP	Combined Heat and Power
CIP	Capital Improvement Program
CM	construction management
CMOM	Capacity, Management, Operations and Maintenance
COVID-19	2019-Novel Coronavirus
CRUC	Canadian Radium & Uranium Corporation
CSI	Collection Systems Investigations
CSO	Combined Sewer Overflow
CWA	Clean Water Act
CY	calendar year
DAF	Dissolved Air Flotation
DCAS	Department of Citywide Administrative Services
DOHMH	Department of Health and Mental Hygiene
DPR	Department of Parks and Recreation
ECM	Energy Conservation Measure
ECMP	Emerging Contaminant Monitoring Project
ECN	Energy Carbon Neutrality
EIS	Environmental Impact Statement
ESCR	Eastside Coastal Resiliency
ePMIS	Enterprise Project Management Information System
EH&S	Environmental Health & Safety
FAD	Filtration Avoidance Determination
FDNY	New York City Fire Department
FEIS	Final Environmental Impact Statement
FEMA	Flood Emergency Management Agency
FOG	fats, oils and grease

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FY	Fiscal Year (NYCDEP Fiscal Year begins on July 1 and ends on June 30)
GAC	granular activated carbon
GHG	greenhouse gas
GI	Green Infrastructure
HDD	Horizontal Directional Drilling
IHD	In-House Design
ISI	Institute for Sustainable Infrastructure
KEC	Kensico Eastview Connection Tunnel
KPI	Key Performance Indicator
LCR	Lead and Copper Rule
LCRR	Lead and Copper Rule Revisions
LEED	Leadership in Energy and Environmental Design
LIRR	Long Island Railroad
LL	Local Law
LSL	lead service line
LT2	Long Term 2 Enhanced Surface Water Treatment Rule
LTCPs	Long Term Control Plans
LTR	Long-Term Revisions
mg/L	milligrams per liter
MGD	Million Gallons per Day
MOR	Mayor's Office of Resiliency
MOU	Memorandums of Understanding
MS4	Municipal Separate Storm Sewer System
MSP	main sewage pump
MTA	Metropolitan Transit Authority
MTBM	micro-tunnel boring machine
MW	megawatt
M/V	Motor Vessel
NDWAC	National Drinking Water Advisory Council
NOV	Notice of Violation
NYC	New York City
NYCDDC	New York City Department of Design and Construction
NYCDEP	New York City Department of Environmental Protection
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NPCC	New York City Panel on Climate Change
NRDC	Natural Resources Defense Council
NSC	National Safety Council
NTP	Notice to Proceed
NYCDOT	New York City Department of Transportation
NYP&A	New York Power Authority
NYS	New York State
NYSDOH	New York State Department of Health
NYSERDA	New York State Energy Research and Development Authority

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OACE	Office of the Agency Chief Engineer
OERR	Office of Energy and Resource Recovery
OTPS	Other than Personal Services
PARIS	Permitting and Review Information System
PDC	Public Design Commission
PFOA	perfluorooctanic acid
PFOS	perfluorooctanesulfonic acid
PFAS	per- and polyfluoroalkyl substances
PM/CM	preventive maintenance/corrective maintenance
PMF	probable maximum flood
PO <sub>4</sub>	orthophosphate
PPE	personal protective equipment
Ppt	parts per trillion
PRP	Potential Responsible Party
PS	Personal Services
ROD	Record of Decision
ROV	remote operated vehicle
ROW	Right of Way
RWB	Rondout-West Branch
SBU	Sewer Backup
SCADA	Supervisory Control and Data Acquisition
SIRR	Special Initiative for Rebuilding and Resiliency
SOAP	Sewer Operations and Analysis Program
SOGR	State of Good Repair
SOPs	Standard Operating Procedures
SPDES	State Pollutant Discharge Elimination System
SMLP	Storm Mitigation Loan Program
SWMP	Stormwater Management Program
TBM	tunnel boring machine
TMDL	Total Maximum Daily Load
tpd	tons per day
TRC	Total Residual Chlorine
TSIP	Targeted Sewer Inspection Pilot
UER	Upper East River
µg/L	micrograms/L
ULURP	Uniform Land Use Review Procedure
USACE	United States Army Corp of Engineers
USDOJ	United States Department of Justice
USGS	United States Geological Survey
USEPA	United States Environmental Protection Agency
UV	Ultraviolet
WEF	Water Environment Federation
WHO	World Health Organization
WM	Waste Management

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WFF	Water for Future
WFH	work from home
WFP	Water Filtration Plant
WRRF	Wastewater Resource Recovery Facility
WWTP	Wastewater Treatment Plant
WRRF	Wastewater Resource Recovery Facility

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