

Fiscal Year 2023 CO-CONSULTING ENGINEERING REPORT

March 2023



Front Cover:
Coney Island Creek, Lower New York Bay and the Verrazzano Bridge
<http://www.nyc.gov/dep>

March 1, 2023

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 2023 Co-Consulting Engineering Report

Dear Ms. Chernat:

AECOM USA, Inc. (AECOM) and Macan Deve Engineers, DPC. (MDE) herewith submit the Fiscal Year (FY) 2023 Co-Consulting Engineering 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 2023 and 2024.

It is the joint opinion of AECOM and MDE that The System condition is adequate, the highest rating, 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 2023 and FY 2024 are adequate for the immediate needs of The System. As discussed, the NYCDEP is facing continued challenges. The opinions provided herein reflect the joint opinion of AECOM and MDE.

The information presented herein is based on the Preliminary Budget released on January 12, 2023. 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,


Eileen Profit, P.E.
NY Metro Water, AECOM
Co-Consulting Engineer for
Municipal Water Finance Authority



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


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

**FISCAL YEAR 2023 CO-CONSULTING
ENGINEERING REPORT**

PREPARED BY:

AECOM and MDE

March 1, 2023

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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 2023 and 2024 as presented in the New York City Department of Environmental Protection (NYCDEP) Preliminary Budget released on January 12, 2023.

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"*¹. The critical mission of NYCDEP is to enrich the environment and protect public health for all New Yorkers by providing high quality drinking water, collecting, treating, and discharging wastewater and stormwater, and reducing air, noise and hazardous materials pollution in NYC¹. The scope of this report focuses on the water, wastewater, and stormwater systems infrastructure, and programs. NYCDEP remains vigilant in providing operation and maintenance of water and wastewater infrastructure comprising significant capital assets and providing long-term planning for future needs. NYCDEP has implemented new programs and built additional infrastructure to meet more stringent regulatory requirements (Biological Nitrogen Removal (BNR) for wastewater resource recovery facilities (WRRFs), 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, wastewater and stormwater system. NYCDEP must manage risks and prioritize competing needs of The System to achieve its objectives. In addition to these competing needs, NYCDEP continues to face many challenges due to high staffing vacancies and must manage risk associated with delivery of a large capital program, and operating and managing a large and complex system. Considering the magnitude of the overall infrastructure, the operational service required, and the ongoing challenges due to staffing shortages, 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 will require future capital investments for the continuous replacement and/or repair of aging infrastructure in a systematic and cost-effective manner.
- NYCDEP capital and expense budget projections for Fiscal Year (FY) 2023 satisfy the immediate needs for The System. This includes legally mandated² projects, which comprise approximately 41.8% of the capital budget for FY 2023.
- NYCDEP capital budget projections for FY 2024 satisfy the immediate needs for the System including legally mandated projects, which comprise approximately 41.2% of the capital budget for

¹ NYCDEP 2018 Strategic Plan, *Enriching Our Legacy*.

² Mandates and mandated projects throughout this report refer to projects required due to negotiated Consent Orders or agreements or other regulatory requirements between NYCDEP and regulatory agencies.

FY 2024. Expense budget projections for FY 2024 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 System.
- Over the last year, the total approved staffing positions have decreased by 124 due to the Mayoral Vacancy Reduction Line Initiative. Overall, there are 1,007 vacancies, and NYCDEP is at approximately 84% of approved allocations. Although the City-wide hiring restrictions³ have been lifted, NYCDEP continues to face significant staffing challenges due to high rates of attrition and slow hiring when the restrictions were in effect. Since the City's restrictions were lifted, NYCDEP has been actively recruiting and expediting hiring. NYCDEP is prioritizing staffing issues to fill vacancies and retain staff to support capital program delivery, and to sustain adequate operations and maintenance in the long-term.

³ The City-wide hiring freeze was put in place March 2020 and then transitioned to a partial hiring freeze, known as two for one hiring restrictions. The two for one hiring restrictions were lifted in November 2022.

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. In 1984, the NYC Municipal Water Finance Authority (The Authority) was formed following studies and analyses 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 (formerly Metcalf & Eddy) provided engineering services related to the NYC Water and Wastewater Operations Evaluation Study (Study) in 1983, and has continued to provide services to The Authority since its origin in 1984. Since July 2021, Macan Deve Engineers, DPC (MDE) has been working with AECOM as Co-Consulting Engineers to The Authority. MDE is an established small Women Business Enterprise (WBE) engineering and architectural firm. AECOM and MDE have jointly 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.

This report addresses the issues listed below:

- present physical condition of The System,
- FY 2023⁴ capital budget and FY 2024 projected capital budget for The System,
- FY 2023 expense budget and FY 2024 projected expense budget related to operation and maintenance of The System,
- overview of the Preliminary Ten-Year Capital Strategy for FYs 2023 to 2033⁵ and,
- management of The System.

⁴ The NYCDEP Fiscal Year begins on July 1 and ends on June 30. FY 2023 began on July 1, 2022 and ends on June 30, 2023.

⁵ The Ten-Year Capital Strategy includes the current year, FY 2023 and the ten-year projection for FY 2024 to FY 2033.

3.0 METHODOLOGY FOR ANALYSIS

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

- Due Diligence interviews with representatives of the NYCDEP and discussions with representatives of The Authority,
- Review of documents related to the ongoing budgetary process,
- Review of the status of ongoing major programs and review of select reports and presentations provided by NYCDEP,
- Information gathered from visiting operating facilities and major ongoing construction projects,
- 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).

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 2023. 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 MANAGEMENT AND OPERATION OF THE NYCDEP SYSTEM

NYCDEP Strategic Plan

NYCDEP has embarked on a new Strategic Planning effort in calendar year (CY) 2023 that will evaluate operational performance and address future capital planning within NYCDEP in light of significant challenges due to climate change and the associated economic impacts to The System.

Organization Structure

Rohit Aggarwala is New York City's Chief Climate Officer and NYCDEP Commissioner, with overall responsibility for NYCDEP. The NYCDEP is currently organized into the following Offices and Bureaus as shown in **(Figure 4-1)**:

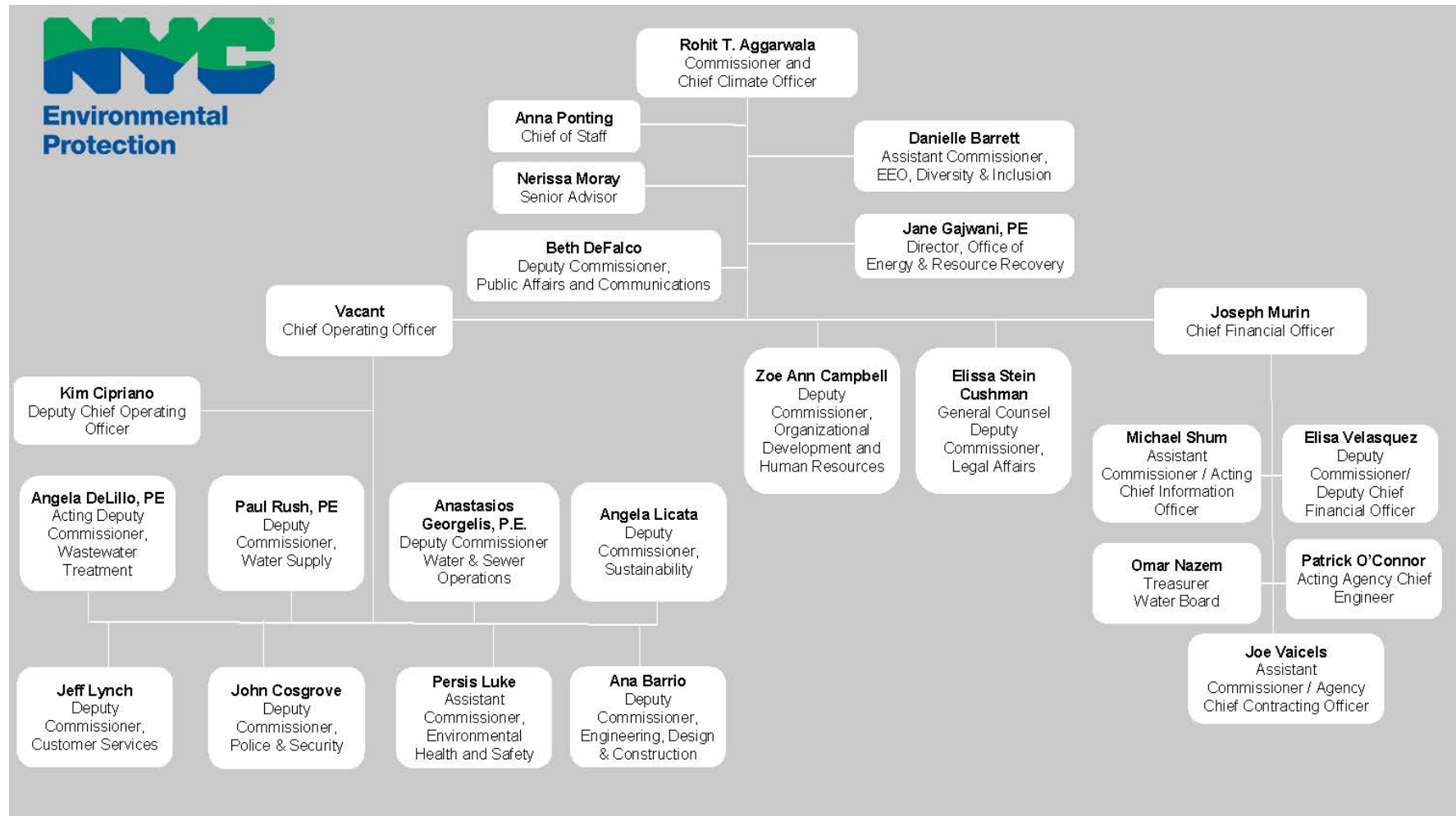


Figure 4-1: NYCDEP Executive Level Organizational Chart

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The following offices and bureaus report directly to the Commissioner:

- the Chief Operating Officer (COO), which under the agency acts as an oversight office, responsible for administering and coordinating the activities of NYCDEP's engineering and operational bureaus. The following offices and bureaus report directly to the COO: Bureau of Wastewater Treatment (BWT); Bureau of Water Supply (BWS); Bureau of Water and Sewer Operations (BWSO); Sustainability; Bureau of Engineering, Design, and Construction (BEDC); Environmental Health & Safety (EH&S); Bureau of Customer Services (BCS); and Police and Security (BPS).
- the Chief Financial Officer (CFO) is responsible for the budget and finance functions. Additional functions include contracts and procurement, information technology, development of rate setting recommendations, and treasury functions. The CFO oversees the Budget Office; the Office of the Agency Chief Engineer (OACE); the Office of Agency Chief Contracting Officer (ACCO); Information Technology (BIT), as well as the water and sewer charges collections and treasury functions encompassed by the Water Board.
- the Office of Energy and Resource Recovery (OERR); the Chief of Staff; Senior Advisor; Public Affairs and Communications; EEO, Diversity and Inclusion; General Counsel/Legal Affairs; and Organizational Development and Human Resources.

The Bureaus and Offices that pertain to The System operations and capital planning/implementation are described in more detail below:

- The three Operating Bureaus consist of the BWS, the BWSO, and the BWT. The Deputy Commissioner of each Operating Bureau reports to the COO. The key responsibilities of each operating bureau are described as follows:
 - BWS is responsible for the delivery of high-quality drinking water to New York City. It is organized into the seven directorates that report to the Deputy Commissioner of BWS (Water Quality and Innovation; Planning; Watershed Protection Programs; Source Water Operations; Water Treatment Operations; Water Management Services/Budget; and Environmental Health/Safety). The Research Application section, within Water Quality and Innovation, 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. BWS' responsibilities include the management, operation and maintenance of the Croton Water Filtration Plant (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 NYC's Filtration Avoidance Determination (FAD) program. Once the water leaves the Hillview Reservoir and Croton WFP, it enters the distribution system that is operated and maintained by BWSO.
 - BWSO is responsible for the operation and maintenance of the portions of the City's drinking water distribution system that are within City lines, the wastewater collection system, and Bluebelts. BWSO field operations are responsible for the following: (1) that residences and businesses have an adequate supply of potable water (joint responsibility along with BWS), (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 ongoing program to alleviate chronic flooding in Southeast Queens. BWSO has initiated implementing online permitting for water, sewer and stormwater connections. The online permitting is known as the Permitting and Review Information System (PARIS).

- 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. Capital Planning/Delivery and Wastewater/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 OERR. 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 WRRFs. 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.
- BEDC is responsible for the delivery of the Capital Improvement Program. BEDC is organized into the following directorates: Water System Capital Program, Wastewater Capital Program, In-House Design (IHD), and a newly formed Design Build/In-City Water Supply group. Within IHD, there are two groups - the Design Service Division and the Engineering Services Division. BEDC has a Sustainability Group that incorporates sustainability into BEDC projects by integrating Climate Resiliency Design Guidelines into Standard Operating Procedures. BEDC is responsible for project delivery consisting of the design and construction of capital improvement projects, including major water transmission facilities, water treatment facilities, WRRFs, wastewater pumping stations, and stormwater/CSO facilities. BEDC implements many of these projects with contract services for planning, design, construction and construction management, 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.
- 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. The Green Jobs/Green Infrastructure Maintenance are part of 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 coordinates with the Mayor's Office of Climate and Environmental Justice (MOCEJ) on 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.

- OERR is responsible for the coordination of energy management for all operating bureaus and overall NYCDEP energy initiatives. OERR 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, 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 NYCDEP appointed the Director of OERR as the Agency Chief Decarbonization Officer.
- OACE is responsible for 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; and 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 set priorities across all NYCDEP.

5.0 OVERVIEW OF THE SYSTEM

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

5.1 Water Supply System

NYC water is supplied from three upstate watersheds (Delaware, Catskill and Croton), which extend 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 Park Reservoirs) as shown in **Figure 5-1**. 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 owns wells in Queens; however, this groundwater supply system has not been providing water to the NYC distribution network since 2007 and the upstate surface water supply is the primary source water for NYC. NYCDEP has submitted groundwater renewal permits so that the groundwater will be available as a back-up water supply, if necessary.

Croton System

The Croton water supply system, NYC's oldest water supply, was put into service in 1842 with the construction of the Old Croton Aqueduct delivering water to the City. It has continued to expand and 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 million gallons per day (MGD) and is divided into Plant A and Plant B (each plant has 145 MGD capacity). The water treatment processes consist of chemical addition, dissolved air flotation (DAF), and filtration followed by ultraviolet (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 capacity of the Catskill Aqueduct is approximately 600 MGD. 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 operation in 1917. City Tunnel No. 1

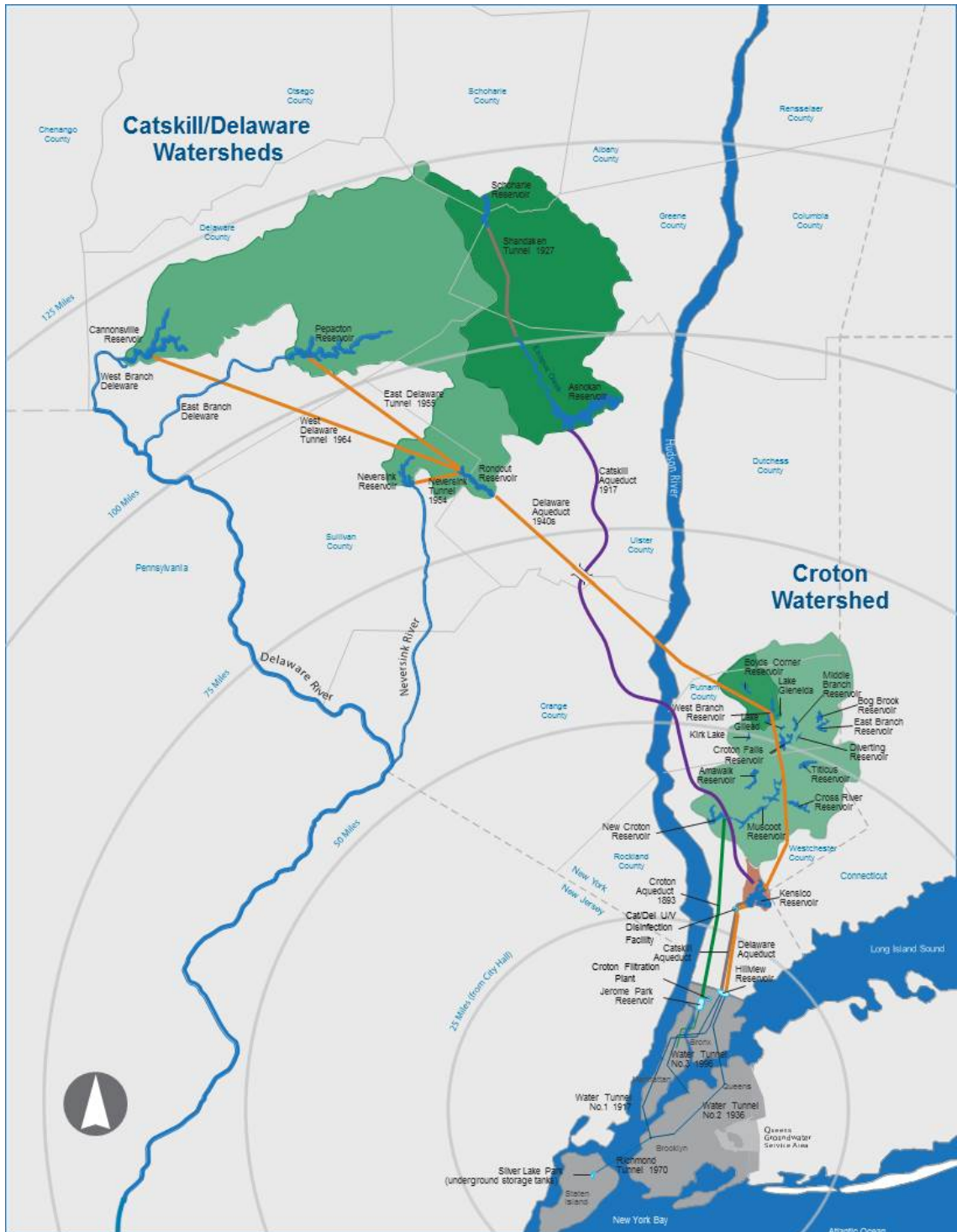


Figure 5-1: New York City Water Supply System

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 have recently been 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 Rondout Reservoir completed in 1950. The Rondout 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. Construction of a bypass tunnel at the Hudson River has been completed which will allow the leaking portion of the aqueduct to be taken out-of-service once the connections to the Delaware Aqueduct is completed. This major capital construction repair project will be discussed later in the report, in Section 7.5.

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. The USEPA then transferred authority of the Filtration Avoidance Determination (FAD) to New York State Department of Health (NYSDOH) in 2008. As a result of the waiver, the Delaware and Catskill watersheds do not require filtration and the watersheds are protected by a 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, 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 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 Billion Gallons per Day (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, and is further discussed later in the report.

Connection to the Distribution System

Both the Kensico Reservoir and the Hillview Reservoir serve as balancing reservoirs for the water system, handling the daily and hourly fluctuations of water demand. Located downstream of the UV facility at Eastview, the Hillview reservoir is an uncovered reservoir and does not comply with Federal Regulations that require finished water reservoirs to be covered. Under a 2019 Consent Decree, NYCDEP is undertaking planning studies to evaluate alternative ways of achieving compliance. The Hillview Reservoir will be further discussed later in the report.

Water from the Hillview Reservoir is conveyed by gravity to the city through three tunnels as indicated on **Figure 5-2**. 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 2022 was 985 MGD⁶, which provides for approximately 8.5 million residents of NYC, and transients consisting primarily of tourists and daily commuters. It should be noted that the current average daily water delivery in NYC is about 36% less than the average delivery levels experienced in the 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 100 MGD) to upstate consumers in parts of Westchester, Putnam, Ulster, and Orange Counties (population approximately one million people).

⁶ Water delivery data provided by NYCDEP BWS



Figure 5-2: New York City Water Conveyance Infrastructure

5.2 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 5-3**, and operated by 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 BGD and are currently treating approximately 1.23 BGD of wastewater consisting of municipal sewage and some stormwater from combined sewers.



Figure 5-3: New York City Wastewater Resource Recovery Facilities and Drainage Areas

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,

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) that provide screening, settling and storage of the CSO before discharging. The combined sewage 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. Eight of the WRRFs are also 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 four of the Jamaica Bay WRRFs are currently operating in Step Feed Biological Nitrogen Removal (BNR) mode. Step Feed BNR is a biological nutrient removal process designed to eliminate excessive nitrogen in the effluent discharge. The primary effluent is introduced at multiple points along the aeration tanks to optimize the biological removal process. The liquid biosolids produced during wastewater treatment processing are transported by five DEP-owned, inner-harbor sludge vessels to centralized biosolids dewatering facilities. Dewatering facilities are currently located at six WRRFs, however BWT is planning to consolidate dewatering operations for some facilities. 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.

The wastewater treatment facilities are referred to as WRRFs, highlighting a focus on the opportunities to recover valuable resources from 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 WRRFs are being systematically upgraded to meet the requirements of a combination of mayoral directives and executive orders, Climate Mobilization Act of 2019 directives, and NYCDEP Strategic Plan goals to minimize NYC's reliance on fossil fuels and to minimize GHG emissions. It is expected that upgrading of the WRRFs will play an important part in NYCDEP's ability to meet scheduled goals, and studies are being carried out to identify the future capital investment necessary.

6.0 IMPACTS OF CLIMATE CHANGE

6.1 NYCDEP Sustainability Initiatives

NYCDEP continues to further implement sustainability in planning, design, and construction of new facilities and in everyday operations of current facilities. Many sustainability-focused local laws have been passed in NYC over the past several years that impact all aspects of NYCDEP operations. 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. PlaNYC, the NYC sustainability plan, is scheduled to be released in April 2023, and NYCDEP will be a major contributor to the plan. It is anticipated that PlaNYC will address sustainability, resilience, the circular economy, energy and climate change impacts in NYC.

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.

6.2 Greenhouse Gas Reduction and Energy Efficiency Planning

In 2019, the New York City Council passed eight sustainability-focused local laws entitled the "Climate Mobilization Act". Local Law 97 requires a 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 reduction goals are interim measures that must be achieved in advance of the long-term energy and carbon neutrality target outlined in OneNYC2050, 80% citywide reduction in greenhouse gas emissions from FY 2006 baseline by 2050 (also known as "80 by 50"). Although the GHG and energy reduction targets are citywide, NYCDEP has a significant role since NYCDEP's 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 local law requirements. In response to climate change, the NYCDEP Strategic Plan and recent NYC local laws, NYCDEP continues to develop an ECN Plan.

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. Significant collaboration and coordination across all NYCDEP Bureaus, along with other City agencies and external stakeholders, is essential for a successful ECN Plan. Energy bureau liaisons within each Bureau coordinate with OERR.

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.

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, and (3) continuing to find beneficial reuse for NYCDEP biosolids to avoid landfills emissions. Biosolids Master Planning is underway to evaluate strategies beyond 2030, and to develop a roadmap for biosolids planning for 2050. The ECN Plan continues to evaluate carbon management and net energy neutrality of the NYCDEP operations. In order for the NYCDEP to become net energy neutral, an analysis is required to evaluate energy efficiencies, energy generation and renewable energy initiatives. The results will form NYCDEP's strategic plan to achieve energy neutral operations. Preliminary findings indicate that ECN will require significant investment and will be operationally challenging.

With new systems and facilities coming online, OERR 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 State-of-Good-Repair (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 the Newtown Creek WRRF will be replaced with gravity belt thickeners and will be funded by DCAS.

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 anaerobic digester gas (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 pipeline 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 2023. Another public private partnership ongoing at the Newtown Creek WRRF is with Waste Management (WM), Inc. The Newtown Creek WRRF is accepting food waste from NYC public schools, NYC residents, the green markets, and commercial establishments. NYC is currently developing a Citywide Organic Plan, which will determine quantity of available food waste for NYCDEP to use in WRRF co-digestion. The pre-processed food waste delivered by WM is added to the digesters to increase the production of ADG. Pre-COVID-19, NYCDEP had been co-digesting up to 200 tons per day (tpd) of food waste at Newtown Creek. There was a significant reduction of food waste availability when schools were shut down and the NYC Sanitation Department stopped curbside food waste collection during COVID-19 pandemic. However, the food waste collection has resumed, and NYCDEP is currently co-digesting approximately 150 tpd of NYC food waste with biosolids generated from WRRF operations. The estimated capacity for co-digestion of food waste at Newtown Creek is approximately 500 tpd. 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 has also been evaluated for the new digesters at the Hunts Point WRRF.

OERR will continue to coordinate with the 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 cogeneration facility is currently under construction at the 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 at the Wards Island WRRF, Spring Creek CSO Facility, the Cat/Del UV Facility, Kingston office, and two upstate WRRFs (Pine Hill and Margaretville). These installations will contribute 12.3 MW to the NYC goal of 100 MW of solar power installed 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, design has been initiated on a 6-MW hydroelectric facility. 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. The NYCDEP CIP includes \$9 million in funding to support the installation of the Cannonsville Hydroelectric Facility, with additional funding provided by DCAS. 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 Lake Gatehouse. The NYCDEP Ten-Year Capital Plan includes \$20.8 million in funding for Shaft 4 valve replacement, and DCAS is providing additional funding this project.

NYCDEP OERR collaborates with 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.

6.3 Climate Change Adaptation

Introduction

NYCDEP has been actively focused on the effects of climate change on 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, the NPCC 2015 report titled *Building the Knowledge Base for Climate Resiliency* was released, which 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.

The NPCC published an updated report in March 2019. In September 2020, the Mayor's Office of Climate Resiliency (MOCR) released *Climate Resiliency Design Guidelines* version 4.0. The Guidelines were developed based on the NPCC's regional climate projections that inform New York City resiliency policy.

NYCDEP has been planning and evaluating climate change adaptation requirements for over a decade, 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.

Wastewater

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.

Watershed

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 (OST) models, the watershed protection program, and improving flexibility in operations with increased water supply interconnections. The OST is a computerized decision-making support system that BWS uses for water supply operations and planning. BWS is also conducting extensive research on the impact that climate change will have on the current and future water supply system. The Delaware River Basin Commission (DRBC) is conducting a study on the impacts of salinity, sea level rise, and the migration

of the saltwater front in the Lower Delaware River. The United States Army Corps of Engineers (USACE), in partnership with the NYCDEP and the DRBC is performing a feasibility re-evaluation study to evaluate of the Francis E. Walter Dam and Reservoir in White Haven, PA to help the Delaware River deal with future droughts, sea level rise, and saltwater intrusion because of climate change. Among other issues being evaluated, this study will examine reservoir management options that could release additional water under drought conditions to help repel salinity downstream. NYCDEP continues to stay engaged in the saltwater intrusion issue in the Delaware watershed and its impact on water storage needs.

Coastal Resiliency

The NYCDEP Resiliency Program continues to implement resiliency projects across 14 WRRFs and 96 pump stations. NYCDEP is obtaining funding and financing through the New York State Department of Environmental Conservation (NYSDEC) Storm Mitigation Loan Program and through the Federal Emergency Management Agency (FEMA) for these resiliency upgrades. 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 future storms.

Resiliency improvements are ongoing to protect facilities from 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.

NYC is coordinating with many coastal resiliency projects, 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. OACE, BEDC, and BWSO are coordinating NYCDEP's efforts. The CIP includes \$299 million for NYCDEP's funding of a portion of the ESCR and USACE coastal resiliency projects in NYC. Additional funding will be required as these coastal resiliency programs progress and for additional resiliency projects throughout the city. Additional resiliency projects are planned in the Financial District and Jamaica Bay/Rockaway Beach. These large coastal resiliency projects are a collaborative effort among many city agencies and USACE. NYC agencies are in discussions about the future operations of these projects. Additional staff will be required for the future operations of these large citywide resiliency projects.

Storm Resiliency

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.

Climate change is causing more intense storms, more storm variability, and more intense precipitation events. Hurricane Ida reached NYC in the evening of September 1, 2021 and caused devastating flooding within the city and surrounding areas. The National Weather Service (NWS) declared a flash flood emergency in New York City, for the first time in history. The total rainfall for the day was 7.13 inches. The maximum intensity was measured as 3.15 inches in one hour far exceeding the previous record.

The NYC sewer system could not handle the significantly greater storm intensity of Ida, as the NYC system is designed for 1.5-2 inches per hour rainfall intensity. The intense storm flooded streets, subways, and homes, and tragically caused loss of life.

An Extreme Weather Task Force was assembled immediately after the storm comprised of leaders from several city agencies, including NYCDEP. NYC issued a report on September 27, 2021, entitled *The New Normal Report – Combating Storm-Related Extreme Weather in NYC*, based upon the recommendations put forth by the Task Force. Several recommendations were identified for many city agencies. NYCDEP's role on the Task Force was to address short-term infrastructure, long-term infrastructure, and subway flooding jointly with other agencies. The short-term infrastructure for which NYCDEP has responsibility includes accelerating high-level storm sewer upgrades; adding 50 acres of porous pavement in the East Bronx; increasing catch basin inspection frequency in commercial areas; accelerating GI projects citywide; and finding drainage solutions for community driveways. The long-term infrastructure for which NYCDEP has responsibility includes improving the legacy sewer system for the future by the following: incorporating projected future rainfall into drainage planning; supplementing the existing sewer system; accelerating the sewer replacement cycle; and upgrading storm sewer outfalls. NYCDEP is working closely and cooperatively with the Metropolitan Transportation Authority (MTA) and New York City Department of Transportation (NYCDOT) in weekly Task Force meetings to address flooding in the subways in priority locations. Monthly updates of *The New Normal Report – Combating Storm-Related Extreme Weather* have been released to track progress.



**Figure 6-1: Post Hurricane Ida
New Normal Report**



Figure 6-2: Stormwater Resilience: Long Term Vision Report

In July 2022, NYC released *Rainfall Ready NYC* Action Plan to address short-term measures to prepare the city for more extreme rainfall in the future. In September 2022, NYCDEP, along with other city agencies released a report entitled *Increasing Stormwater Resilience in the Face of Climate Change: Our Long Term Vision*, which focuses on two strategies to address stormwater resilience in light of more intense storms caused by climate change: (1) implementing programs to expand sewer capacity and improve the performance sewers, and (2) advancing the installation of a citywide network of blue and green infrastructure to catch stormwater before it reaches the sewer system.

FloodNet is a collaboration with communities, researchers, and NYC government agencies working to better understand the frequency, severity, and impacts of flooding in New York City. MOCEJ, coordinating with NYCDEP, launched FloodNet, a new network of flood sensors that will provide real-time information about where streets are flooded. Currently 37 sensors have been deployed throughout NYC, with the goal of building out the network to a total of 500 sensors around the City by 2027.

Additional projects will be discussed further in this report in Section 7.6 Capital Improvement Program, including the expansion of the Cloudburst Initiative, expansion of the Bluebelt Program, and the Tibbetts Brook daylighting project. A comprehensive stormwater resiliency plan will be released as part of the PlaNYC Report planned for April 2023.

Ongoing Efforts

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 (WUCA) and the National Association of Clean Water Agencies. NYCDEP was one of the founding members of WUCA and today there are 12 water utility members across the US that share the mission of sharing knowledge and advancing resilient water practices. WUCA released a report entitled *Leading Practices in Climate Adaptation* that focuses on five leading practices - engage, understand, plan, implement, and sustain. Several NYCDEP projects are highlighted in this report as examples of successful climate change adaptation implementation measures.

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. NYCDEP anticipates that additional resiliency projects will be identified, and additional funding will be required.

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; increased storm intensity; and additional 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 2024 through FY 2033 and the Current Capital Plan for FY 2023 through FY 2027. The Preliminary Ten-Year Capital Strategy was published on January 12, 2023, 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 2023, which ends on June 30, 2023, and the preliminary capital budget for FY 2024, which ends on June 30, 2024. AECOM and MDE have 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 late April 2023. Our findings are summarized in the following paragraphs.

FY 2023 Capital Budget

The FY 2023 capital budget is set at \$2.27 billion. Approximately 41.8% of the funding supports regulatory mandated projects, consisting primarily of the Gowanus Canal Superfund CSO tank, green and grey infrastructure (both CSO and MS4 projects), the FAD program, and the rehabilitation/repair of intercepting sewers. Significant funding is also included 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, and WRRF SOGR projects.

FY 2024 Preliminary Capital Budget

The FY 2024 preliminary capital budget is set at \$3.31 billion. Approximately 41.2% of the funding supports regulatory mandated projects, such as the Hillview Reservoir modifications and chemical facilities, the Kensico Eastview connection tunnel work, green and grey infrastructure, and the FAD program. Significant funding is also included in FY 2024 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 2023 to FY 2033

Figure 7-1 shows the funding allocated per fiscal year in the CIP for FY 2023 through FY 2033. The CIP for FY 2023 through FY 2033 consists of \$31.3 billion in funding. Mandated and other NYCDEP priority project funding is shown per fiscal year. Approximately 20.8% of the total funding for FY 2023 through FY 2033 is dedicated to regulatory mandated projects. As shown in **Figure 7-1**, the funding for mandated projects varies from year to year, pending Consent Decree milestones and requirements. Most of the mandated projects in FY 2023 through FY 2033 consist of the green and grey CSO-related infrastructure, Gowanus Superfund CSO tanks, 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 2023 through FY 2033 must be planned and budgeted based solely on its importance to the overall System and NYCDEP prioritization as determined by NYCDEP. These projects include extensive 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.

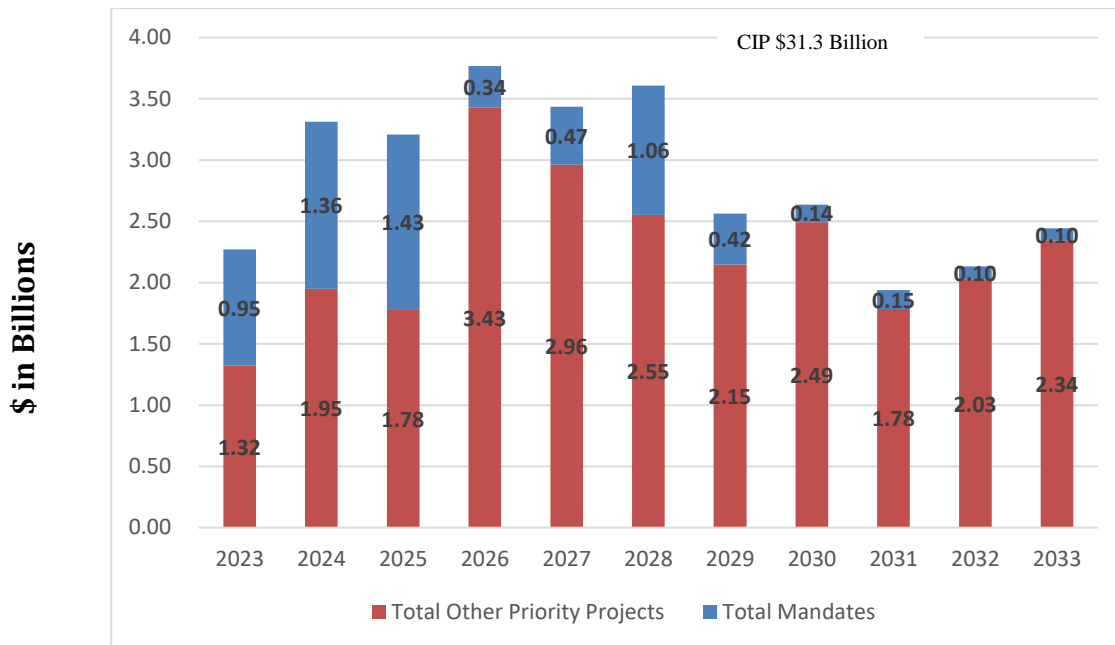


Figure 7-1: CIP (\$ in billions) for FY 2023 – FY 2033

Figure 7-2 shows how the funding is allocated by each operating bureau for the CIP, FY 2023 – FY 2033. BWSO's funding is the largest part of the total CIP and covers water and sewer main replacement throughout the city, the Southeast Queens Stormwater Program, City Tunnel #3 completion, Bluebelts, emergency water and sewer contracts, and other BWSO SOGR projects. BWT's funding is the second

largest bureau budget, and addresses SOGR needs for wastewater infrastructure (extensive work throughout the WRRFs and pump stations), the CSO Program, the Gowanus Superfund program, the TRC Program, and other BWT SOGR projects. BWS's funding addresses the KEC tunnel, Hillview Reservoir upgrades and modifications, SOGR needs for water supply infrastructure, FAD requirements, 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.

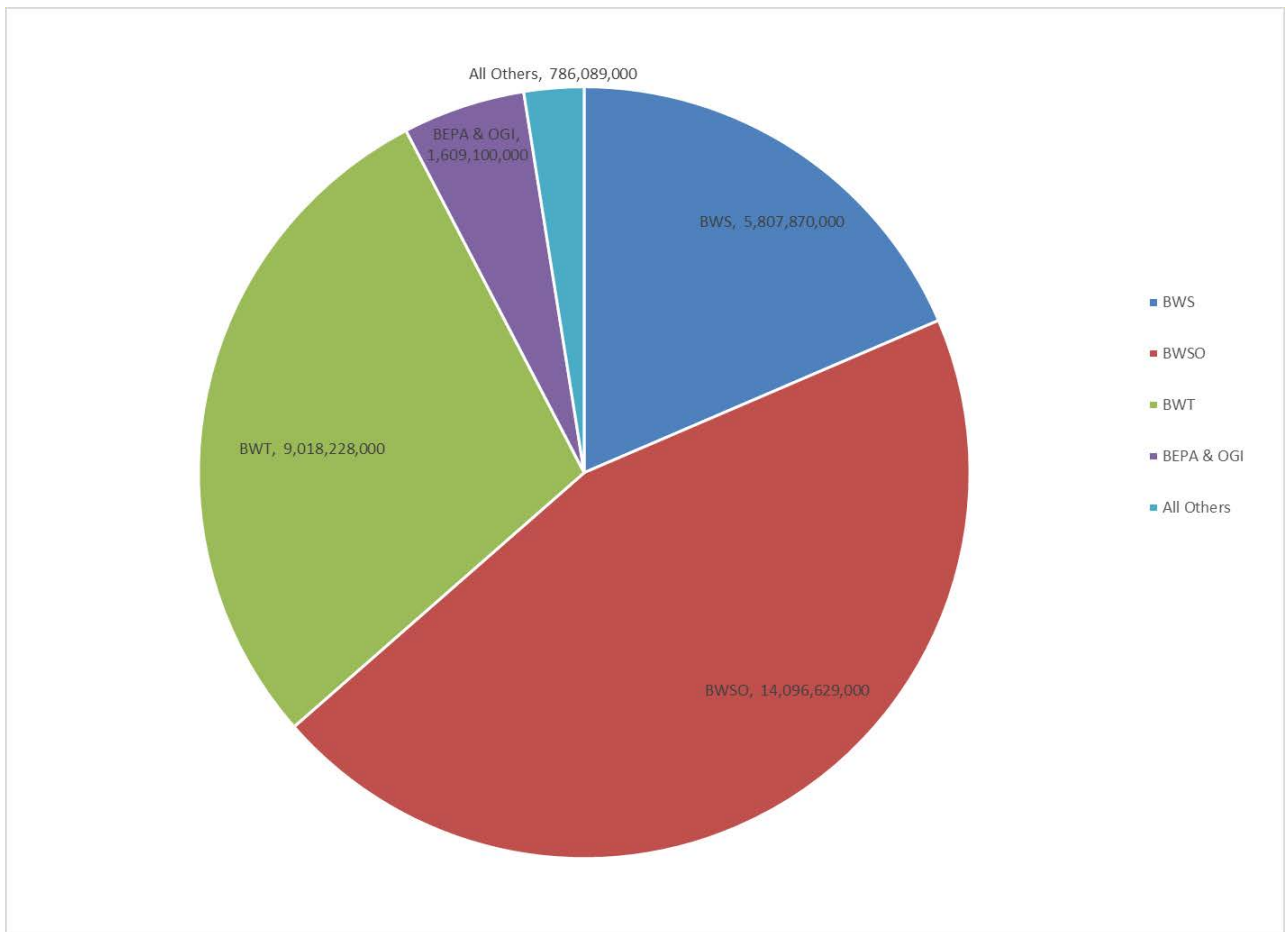


Figure 7-2: Preliminary Ten Year Capital Strategy by NYCDEP Operating Bureaus

NYCDEP is continuously finding a balance between funding mandates and funding SOGR needs. When mandated projects are accelerated, this typically causes SOGR projects to be deferred. As discussed later in this report, the mandated CSO Program and green infrastructure program, the Superfund Program, the Hillview Reservoir Cover, and the FAD 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 extensive SOGR funding due to the age of the NYCDEP infrastructure and the enhanced ability to 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. In addition, there will be a need for additional funding for resiliency projects to address climate change and increased storms.

7.2 Capital Process Reform Task Force

A Citywide Capital Reform Task Force was convened in April 2022, with the task of performing a review of the city's capital process from project initiation to closeout and providing recommended reforms. The Task Force was managed by the Mayor's Office of Policy and Planning and supported by many city agencies that initiate and manage capital projects, including the NYCDEP. The final report, released in January 2023, includes a total of 39 recommendations, made up of nine state legislative recommendations and 30 internal reforms. Several recommendations are intended to improve NYCDEP capital project delivery processes with the goal of reducing time and cost for capital delivery. NYCDEP is currently implementing some of these process improvements, with the focus on reducing procurement time and addressing contract change management.

7.3 Recent Program 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 approved mid-FAD review was released that covers the second 5 years of the 2017 10-year FAD.
- The construction contract was awarded for the first of two Gowanus Canal Superfund CSO Tanks, known as the Red Hook tank.
- The expansion of the Cloudburst Program was initiated to include four additional neighborhoods in NYC.

7.4 Asset Management/ SOGR

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 plans to continue 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 conduct a more detailed appraisal of its asset management program. The pilot program will help BWT identify needs by assessing life cycle costs of equipment and will provide a bottom-up approach to identify needs for equipment repair/replacement. BWT plans to expand the Asset Management tools to all 14 WRRFs. The new SPDES permits require an Asset Management Program. NYCDEP plans to submit an Asset Management Program Update Workplan to NYSDEC by July 2023. The new SPDES permits require an

Asset Management Program (AMP) for vertical assets (including WRRFs, pump stations, and CSO control facilities). The goal of the AMP is to extend asset life and assist with the rehabilitation, repairs and replacement decisions of capital assets. NYCDEP plans to submit an Asset Management Program Update Workplan to NYSDEC by July 2023. NYCDEP is also required to submit an AMP Annual Report to NYSDEC by September 30 each year.

The NYCDEP Asset Management 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 Asset Management Plan should continue. The continued integration of the Asset Management program with the CIP is evolving and it is anticipated that NYCDEP will improve their ability to prioritize and integrate SOGR projects into the CIP planning process.

Due to the age of the infrastructure, there are significant SOGR needs throughout the water and wastewater system. In particular, significant BWT SOGR funding needs exist for the wastewater system across various pump stations and WRRFs, including sludge handling and dewatering, settling tanks (primary secondary and final), collection systems (pumping stations and regulators), power distribution (generators/engines), and main sewage pump systems.

7.5 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). The most significant of these programs are described below.

Catskill/Delaware Water Supply System Filtration Avoidance

On December 28, 2017, the NYSDOH issued another 10-year FAD, known as the 2017 FAD, to the NYCDEP for the Catskill and Delaware watersheds (**Figure 7-3**). NYCDEP received its first FAD in 1993 by the USEPA. Jurisdiction of the FAD was turned over to NYSDOH in 2007/2008. The current 2017 FAD consists of a watershed protection program for 2017-2027, and required a mid-point five-year review. NYCDEP submitted the 2021 Long-Term Watershed Protection Plan to NYSDOH in December 2021. The mid-term FAD update was recently finalized and released by NYSDOH in December 2022 (**Figure 7-4**).

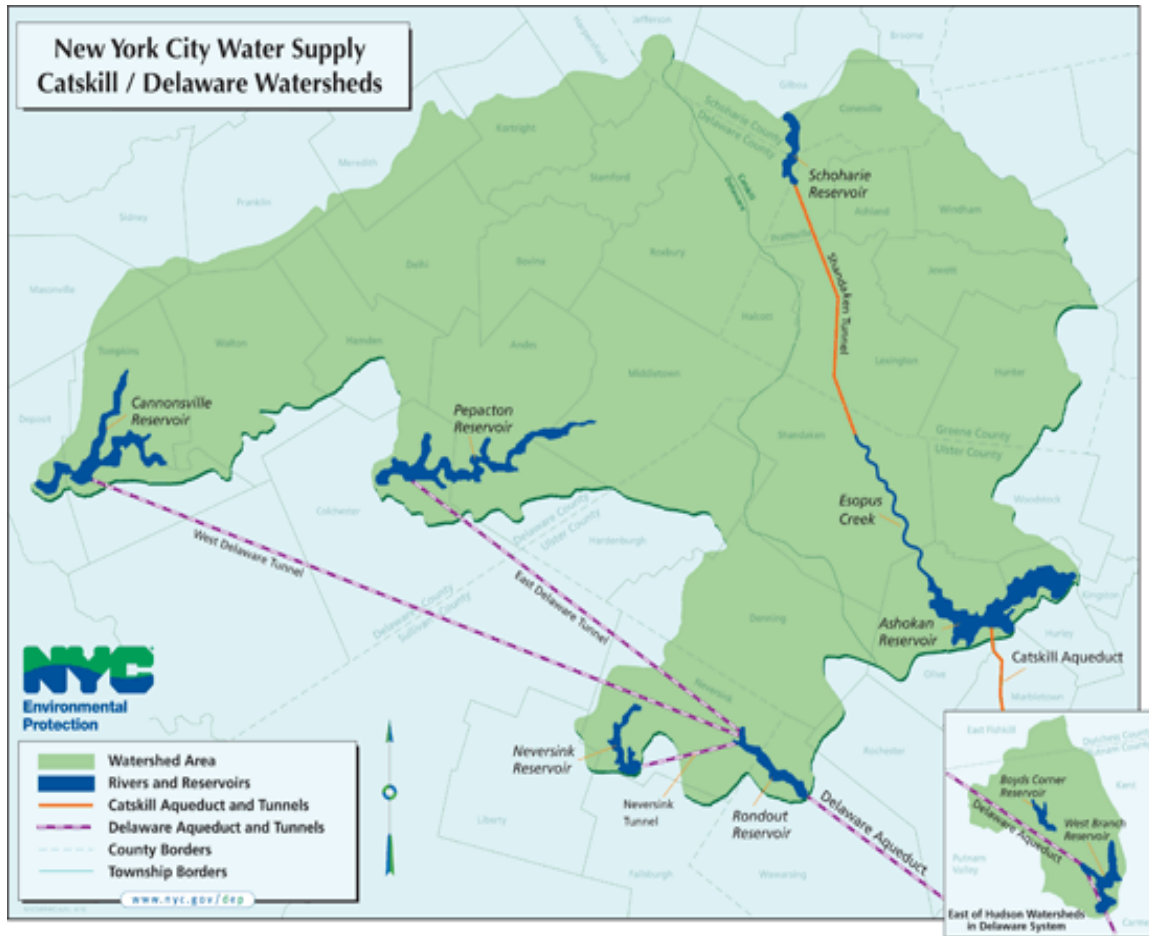


Figure 7-3: Filtration Avoidance Determination (FAD) for the Delaware and Catskill Watersheds

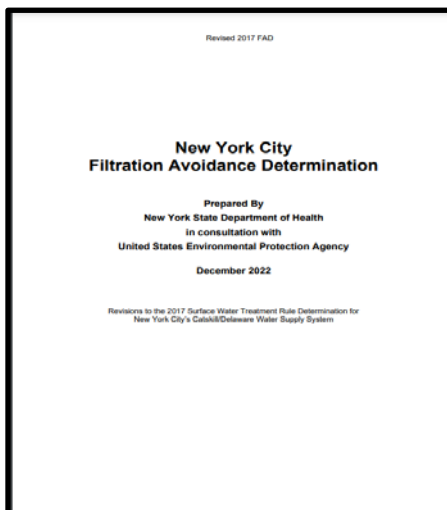


Figure 7-4: 2022 Mid-Point FAD Revision of 2017 FAD

The 2022 five-year mid-term review of the 2017-2027 FAD was based in part upon the results of an expert panel review of the program. 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*. 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 provided 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, and public health programs, along with monitoring,

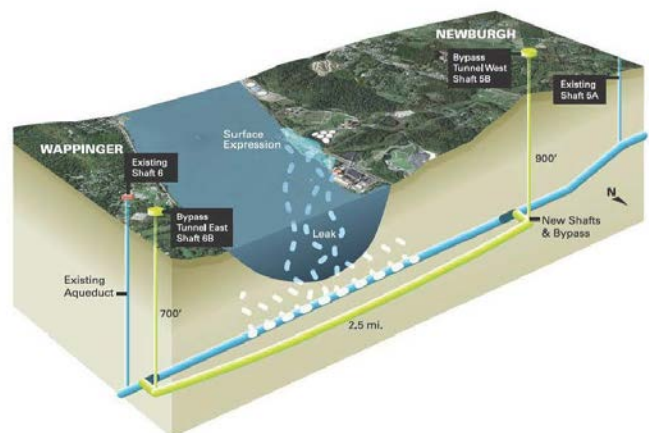
assessment and modeling. NYCDEP has thoroughly reviewed and addressed the expert panel review recommendations, including revising the land acquisition program and continuing to focus on climate change impacts to the water supply. Based upon the expert panel review, a significant revision to the revised FAD is the 43% reduction in the seven year goal for solicitation for the watershed land acquisition program. Other revisions to the FAD include a new economic vitality study of the watershed communities, an evaluation of areas in the Kensico Reservoir basin for potential future sewer connection, an expansion of the Stream Management Program in the Ashokan Reservoir basin, and an expansion of a collaboration between the Conservation Reserve Enhancement Program and the Catskill Streams Buffer Initiative.

Funding for FAD programs comes from both the NYCDEP capital budget and the annual expense budgets. The continuation of the existing FAD program for the next 5 years is currently funded in the CIP at a level of \$250.8 million. Additional capital funding will be required in the later years of the 10 Year Capital Planning Strategy beyond 2027, once the next FAD is negotiated. FAD funding currently on the expense budget is \$65 million for FY 2023 and \$64 million for FY 2024. It is anticipated that funding for the FAD will continue to 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 to identify the capital investment and operating cost impact if it becomes necessary to build a water treatment plant for the Delaware and Catskill water supply. The Cat/Del UV Facility currently provides disinfection of the drinking water derived from the Catskill and Delaware watersheds, however if the FAD is no longer in place, additional treatment facilities would be required. 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 investments in FAD programs are a more cost-effective means to protect the Catskill/Delaware water supply than building a filtration plant with high up-front capital constructions costs, as well as recurring operation and maintenance costs.

Delaware Aqueduct Rondout-West Branch Tunnel (RWBT)

After extensive thorough evaluations and study of several repair alternatives, NYCDEP developed a long-term comprehensive plan to address the leaks in the Delaware Aqueduct RWBT. The plan consists of building a two-and-a-half-mile bypass tunnel under the Hudson River between the Town of Newburgh in Orange County (west connection site) to the Town of Wappinger, in Dutchess County (east connection site), to address the leaking section of the Delaware Aqueduct in the area of Roseto, NY, and to perform repairs of the concrete liner in upstream areas near Wawarsing, in Ulster County, NY (**Figure 7-5**). 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 began tunnel construction in January 2018, and the tunneling was completed in August 2019. The by-



Figure 7-6: Delaware Aqueduct By-pass Tunnel Triple Pass Design

pass tunnel steel-liner installation was completed in May 2020. A second layer of concrete lining has been added inside the steel liner. The concrete was placed inside the tunnel at a pace of about 80 linear feet per day. The final concrete liner was completed in February 2021. A total of 29,600 cubic yards of concrete was used for the finished lining. The concrete was formed by a system of rolling formwork that was moved through the tunnel by a specially designed trolley and rail system. This triple pass design (concrete, steel, concrete) of the bypass tunnel is intended to provide structural stability and prevent future leaks (**Figure 7-6**). The Delaware

Aqueduct RWB bypass tunnel is the largest repair project in the history of the NYC's water supply system.

A strong organizational structure has been in place within BEDC and across all operating bureaus and executive management, to diligently continue with the construction, implementation and risk management of this program due to its magnitude and complexity. The majority of the funding for this bypass tunnel was committed in previous years. Approximately \$16 million is committed in FY 2023 for the continued construction of the bypass tunnel connection and repairs.

The new bypass tunnel has been completed and will be connected to the Delaware Aqueduct by short drill and blast tunnels. This will require the Delaware Aqueduct to be taken out-of-service and dewatered. Shutdown was originally scheduled for October 2022 but was delayed a year to provide additional time for NYCDEP to perform further testing of parts of the system that will be operational during the shutdown. The shutdown is currently planned for October 2023, and the overall work is scheduled to take 5 to 8 months during the low water demand season (fall and winter) to minimize the possibility of water shortages to the city. During the shutdown, work will proceed with a 24 hours per day, 7 days per week schedule. During the Delaware shutdown, water will be supplied and delivered to the City by the Catskill Aqueduct and the Croton WFP operating at near to full capacity. NYCDEP and its contractors are currently completing necessary pre-cursor testing and planning operations during the shutdown.

Hillview Reservoir

The Long Term 2 Enhanced Surface Water Treatment Rule (LT2), a federal regulation administered by USEPA, requires the Hillview Reservoir (**Figure 7-7**) to be covered. However, a series of compliance agreements with several commitments to cover the Hillview Reservoir between NYCDEP and the regulators dating back to 1996 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 commencing operation with the West Basin covered 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 provides 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 a \$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 into a wide range of options for the development of covered storage. NYCDEP plans to evaluate the most cost-effective solution before committing capital investment funding. The Facility Plan report must be submitted to the regulators in 2024 in accordance with the Hillview Consent Decree. Pending the results of the LT2 compliance feasibility planning study, significant additional funds will most likely be necessary beyond the 10-year budget planning period. Currently, \$50 million is included in the CIP for Hillview Reservoir to address the requirement to achieve LT2 compliance.

Funding for the precursor 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, which includes 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 \$751 million for this work at Hillview.

Kensico Eastview Connection (KEC) Tunnel Project

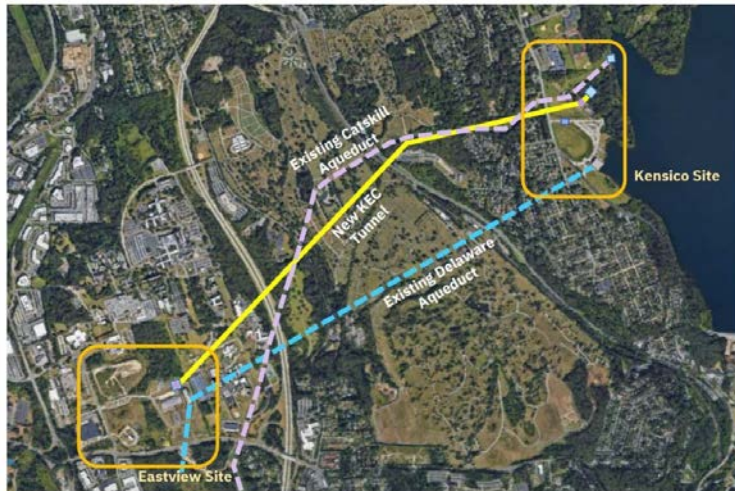


Figure 7-8: Kensico Eastview Connection

NYCDEP has determined that the KEC tunnel is essential to improve redundancy and increase operational flexibility by having a second 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, making a significant improvement to system reliability and operational flexibility. This is an important high priority project for NYCDEP. Funding of \$1.83 billion is included in the CIP for this tunnel project, which is currently in the design phase. The KEC tunnel project has been determined to be a precursor project which is part of the Hillview Cover Consent Order, and the KEC tunnel is considered to be a mandated project.

The KEC tunnel project will consist of many components, the chief being the tunnel itself, but also including upgrading of the existing Catskill Intake Chamber on Kensico Reservoir, construction of a new Screen Chamber at Kensico and a new Connection Chamber at the Eastview site. The tunnel will be excavated by TBM and will be about 2 miles in length extending from a new downtake shaft at Kensico to a new uptake shaft at the Eastview site adjacent to 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 about 2,600 MGD.

The existing intake chamber on Kensico Reservoir will be upgraded and its capacity increased from 800 MGD to 2,600 MGD. The upgraded intake chamber will connect into a new Screen Chamber at Kensico via an existing tunnel, enlarged to handle the increased flow and provided with a short tunnel to connect into the downtake shaft of the KEC tunnel. The new Connection Chamber at Eastview will be constructed directly above the new uptake shaft and will connect into the existing UV facility via a system of 12-foot diameter steel pipes.

The KEC project will be broken down into several construction contracts, the first of which should be registered in FY 2024. In the CIP, about \$20 million is provided in FY 2023 and about \$244 million in FY 2024.

Catskill Aqueduct

NYCDEP has completed the work on clearing and repairing the at-grade sections of the Catskill Aqueduct between Ashokan and Kensico Reservoir and has achieved some capacity improvement. NYCDEP is now focusing on repairs to the pressure tunnel portions of the aqueduct. Inspection of the Rondout pressure tunnel using a remote operated vehicle (ROV) was completed in January 2023. Funding of \$93.7 million is included in the CIP for the design and repairs of the tunnel leaks identified in the Rondout Creek pressure tunnel. NYCDEP is now undertaking monitoring of the Wallkill pressure tunnel to determine the condition of that section of the aqueduct.

Dam Safety

Upstate reservoir dams are critical infrastructure for NYCDEP operations and the safety of the surrounding communities. New York State requires existing high hazard dams to be capable of safely passing half of the probable maximum flood (PMF). The PMF is the flood that can be expected from the most severe combination of critical meteorological and hydrologic conditions that are reasonably possible in a particular area. When capital improvements are made at dams, NYCDEP evaluates the ability of the dams to safely pass half of the PMF and the full PMF, and DEC Dam Safety is briefed on these analyses.

Due to significant SOGR needs to provide continued dam safety, dam upgrades are in various stages of design and construction throughout The System. Funding is provided for the Olive Bridge Dam, part of the Ashokan Century Program, as described below. An agreement was reached with NYSDEC for Olive Bridge Dam to be designed to meet 75% PMF. 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 \$24 million in the CIP. The New Croton Dam requires reconstruction and is funded in the CIP with \$174 million. New funding of \$50 million was added to the CIP for Class C high hazard dams.

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 programs, 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. The CIP includes \$1.184 billion in funding for the Olive Bridge Dam and the Ashokan Reservoir upgrades.



Figure 7-9: Ashokan Reservoir

City Tunnel No. 3, Stage 2

The CIP includes funding of \$421.3 million for the completion, activation and shaft work (Shafts 17B and 18B) for City Tunnel No. 3, Stage 2 Brooklyn/Queens leg. The Notice to Proceed (NTP) for the first contract was issued in January 2021, and work is proceeding. 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 construction contracts are completed, which is currently expected in 2032. NYCDEP plans to conduct inspections of CT#1 and then CT#2 once CT#3 is fully in service.

Water Main and Sewer Replacement

The CIP includes \$8.1 billion for water main and sewer work (new and replacement) throughout the City. Approximately \$5.5 billion is allocated to sewer work and \$2.6 billion is allocated to water mains in the CIP. BWSO coordinates closely with NYCDDC and other city agencies for water and sewer projects. The NYCDDC is responsible for the construction and reconstruction of water and sewer mains in the City. 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.

7.6 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 7-10** 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).

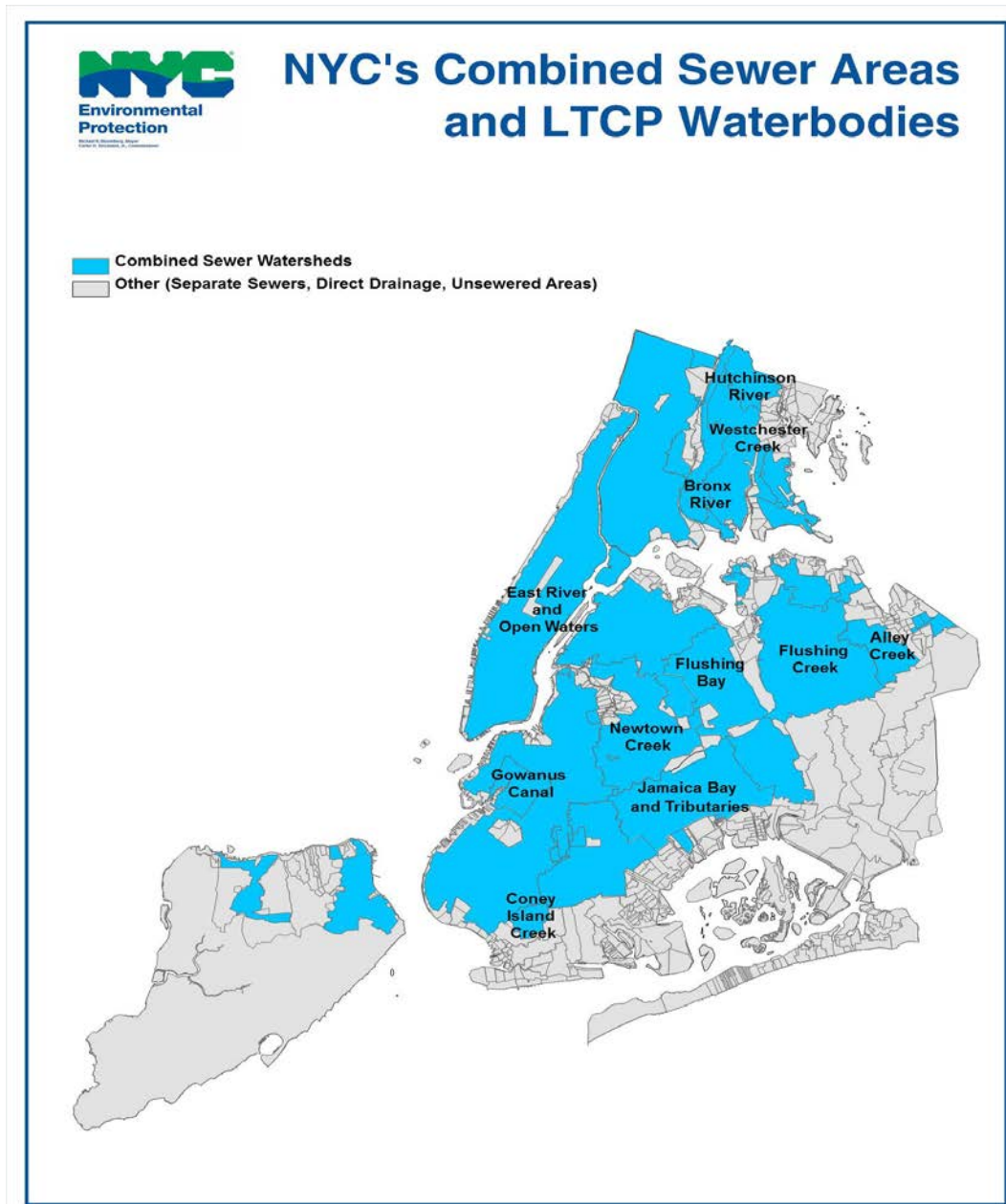


Figure 7-10: Combined Sewer Areas and CSO LTCP Waterbodies

NYCDEP has submitted eleven LTCPs to NYSDEC, ten of which have been approved. The Jamaica Bay and Tributaries CSO LTCP was recently approved in 2023. Each approved LTCP identifies plans at each CSO LTCP waterbody. **Figure 7-11** along with **Table 7-1** present the status of the LTCPs.

THE NEW YORK CITY MUNICIPAL WATER FINANCE AUTHORITY
Fiscal Year 2023 Co-Consulting Engineering Report

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	Approved January 2023
Citywide/Open Waters	Submitted September 2020, Pending approval



Figure 7-11: Status of CSO LTCPs

NYCDEP and NYSDEC have negotiated revisions to parts of the CSO Consent Order, allowing the Flushing Creek CSO tunnel to be deferred until a decision has been made regarding the feasibility of the Rikers WRRF Consolidation Plan (see Section 7.8 for further description of the Rikers WRRF Consolidation Plan).

The CIP includes approximately \$2.21 billion in funding for grey infrastructure capital projects for implementation of the CSO Program, which includes \$1.17 billion for the CSO Gowanus Superfund Facility. The design for Newtown Creek CSO tunnel is funded in FY 2023. Additional funding will 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.

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 promulgated amendments to 6 NYCRR § 703.4, titled "*Water quality standards for coliforms, enterococci, and E. coli*", effective October 6, 2021. The amendments add site-specific criteria to select Class I and Class SD waterbodies. The new criteria use *Enterococcus* bacteria as a fecal indicator. USEPA has indicated that they are working on their own rulemaking with respect to these waters. On July 27, 2022, NYSDEC published an Advanced Notice of Proposed Rulemaking which solicits input for the potential (1) reclassification of the "best use" of saline waters and (2) related amendments to certain "water quality criteria." Reclassification of water bodies around NYC could also require new water quality standards for *Enterococcus*. NYCDEP may be required to revise the LTCPs based upon *Enterococcus* bacteria rather than the fecal coliform standard. 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 continuously planning and constructing green infrastructure. The GI 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 advanced, the goal has evolved to a metric of a 1.67 billion gallon reduction in average annual CSO volume 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.



Infiltration Basin with Grass Top



Infiltration Basin with Concrete Top

Figure 7-12: Green Infrastructure Infiltration Basin

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 rain gardens (standard and Type D inlets), infiltration basins, and permeable pavements. Infiltration basins have 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 (**Figure 7-12**). The GI assets are designed to manage up to 2,500 gallons each during a storm event. Updated ROW Green Infrastructure Design Standards for new and revised ROW GI have been published. More than 11,000

GI assets have either been constructed or are currently in construction throughout NYC, with 1,500 total equivalent green acres. A “greened acre” represents a volume of runoff 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 revisions to the GI Program. NYCDEP submitted the 2021 Contingency Plan in June 2022.

The proposed Unified Stormwater Rule amendments were publicly reviewed and then published as final Rule on February 15, 2022. This Rule includes amendments to Chapter 31 and Chapter 19.1 of Rules of the City of New York, changing requirements for how stormwater is managed on all new and redevelopment sites that discharge to City sewers. This new rule updates and aligns stormwater regulations for both separate and combined sewage drainage areas across the City. The Unified Stormwater Rule provides a consistent stormwater policy and requires 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 7-13: 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, and other city agencies. NYCDEP has introduced 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 2021 Annual Report was submitted April 30, 2022 (**Figure 7-13**). It provides a comprehensive summary of the green infrastructure program in NYC. The next update, the Annual Report for 2022, is expected to be released on April 30, 2023. 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 \$1.18 billion 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 is continuously looking for ways to optimize and advance the GI Program. The Tibbetts Brook Daylighting Project will reduce combined sewer overflow discharges to the Harlem River by diverting the brook away from the combined sewer system and into its own conduit. The Tibbetts Brook Daylighting project is advancing since an agreement has been reached with railroad freight company CSX Transportation for NYC to purchase a property critical to this project. Tibbetts Brook daylighting is included as part of the Baseline Conditions for the NYCDEP Citywide Open Waters Combined Sewer Overflow LTCP. The project is now in the final stages of the design process and construction is expected in 2025. The CIP includes \$97 million for this daylighting project, and additional funding will be provided from Department of Parks due to the cost-sharing agreement in place.

Cloudburst Initiative



Figure 7-14: A rendering of Cloudburst Infrastructure

Cloudburst projects use a combination of green and grey infrastructure strategies to slow, delay, and divert stormwater to minimize nuisance flooding and damage to property and infrastructure (**Figure 7-14**). These projects typically manage more stormwater than traditional green infrastructure. A “cloudburst” is a sudden, heavy downpour of rain in a short period of time. Cloudbursts can damage property and disrupt critical infrastructure. NYCDEP has expanded its Cloudburst program to four additional neighborhoods - Corona and Kissena Park in Queens, Parkchester in the Bronx, and East New York in Brooklyn. The selection process for the sites was based upon evaluations of historic and future stormwater flooding hotspots, existing city projects, environmental justice areas, and social factors that may increase vulnerability. Construction is expected to begin in 2025 for these new sites. The Cloudburst Program has already begun work in three neighborhoods: South Jamaica and St. Albans in Queens and East Harlem in Manhattan. These Cloudburst projects are part of the city’s continued resiliency efforts to better prepare for intense rainfall events.

Bluebelts

Bluebelts are innovative stormwater drainage systems made up of wetlands, creeks, streams and ponds, which are optimized to help control and filter stormwater from surrounding neighborhoods. NYCDEP has been successful in developing effective Bluebelt sites in the South Shore of Staten Island since the 1990s. Over the last 25 years, NYCDEP has built more than 70 Bluebelts across Staten Island, with additional sites currently in construction and design (**Figure 7-15**). NYCDEP is evaluating expansion of the program to



Figure 7-15: Bluebelt Program in Staten Island

sites on the North Shore of Staten Island, in Queens and in the Bronx, where they would also be effective. Approximately \$812.6 million is included in the CIP for land acquisition and construction to expand the Bluebelts for stormwater management.

Southeast Queens Stormwater Infrastructure

NYCDEP is continuing a comprehensive program to improve drainage to address flooding issues in Southeast Queens. The Southeast Queens Program (Community Districts 12 and 13) was initially announced in 2015 with \$1.5 billion in funding, and the program has increased to \$2.65 billion to build out the drainage program and reduce flooding in Southeast Queens. In the CIP, \$2.027 billion is funded for the Southeast Queens storm sewer program. The Southeast Queens Program consists of several projects which are in various stages of implementation (22 projects have been completed, 4 projects currently in active construction, 3 projects in procurement, 13 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 has also identified locations in Southeast Queens to implement cloudburst projects.

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 a collaboration between NYCDEP, NYCDDC and NYCDOT. NYCDEP continues to maintain close coordination with other city agencies.

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

A project for a Cogeneration Facility at the 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 nearing construction completion. 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 that use 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 will 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. Replacement and upgrade of the digesters at the Hunts Point WRRF commenced construction 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. 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. The sludge thickeners are an important step to produce a product that meets the criteria for Class “B” Biosolids, so that the full program goals are attained. Design funding for the sludge thickeners at Hunts Point is in the CIP at a level of \$26 million in FY 2023. Funding for construction is in FY 2027.

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 four of the Jamaica Bay WRRFs (26th Ward, Jamaica, Rockaway, and Coney Island 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 and the First Amended Nitrogen Consent Judgement (FANCJ) in 2011. The interim nitrogen load limits for the UER and 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 dissolved oxygen (DO) water quality in Jamaica Bay.

Glycerol has been used 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 26th Ward WRRFs) is operational.

The CIP includes funding of \$45.9 million for the nitrogen program, which includes the conversion of the Sharon nitrogen removal process demonstration facility at the Wards Island WRRF to the Anammox 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. NYSDEC and NYCDEP have negotiated modifications to the TRC Order, which became effective summer 2022. NYCDEP is required to meet the final water quality-based effluent limit for TRC that is identified in the current TRC Order. However, optimization of processes and revised schedules have been negotiated. The CIP currently includes \$71.5 million for the TRC program.

7.7 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. The term PRP still applies to NYC for the Gowanus Superfund site although financial responsibility has been identified, as described below.

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 the 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 outfall RH-034 (Red Hook tank) and 4 million gallons at outfall OH-007 (Owls Head 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. USEPA issued a Unilateral Order to the City in March 2021, requiring the City to design and construct both CSO tanks by March 2029, to complete design and construction of a new bulkhead, and to implement additional stormwater controls in the Gowanus Canal sewershed. Funding of approximately \$1.17 billion is included in the CIP for the Gowanus Canal CSO retention facility. Construction contracts for the Red Hook tank were awarded in January 2023. NYCDEP is continuing with design of the Owls Head tank. The design costs of the in-canal portion of the

remediation (dredging and capping of sediments) have 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 is expected to continue until 2027. The City's financial share has not yet been determined. The settlement does not cover any remediation that might eventually be required by USEPA to address the contamination identified as a result of the investigation and evaluation. In 2020, the USEPA issued the ROD to address the CSO discharges, which requires no further action beyond the projects identified in the NYSDEC approved Newtown Creek CSO LTCP. The September 2022 Administrative Settlement Agreement and Order on Consent between NYC and the USEPA requires monitoring of the four largest CSOs on Newtown Creek.

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 issued 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 finalizing a work plan for the pre-design investigation. NYCDEP is also coordinating with NYCDOT and NYCDDC on this Superfund site.

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 NYCDEP's former operation of the Mt. Kisco WWTP, NYCDEP 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.

7.8 Potential Future Long-Term Water and Wastewater Projects Beyond Current Budget Planning

Consolidation Plans for Jamaica Bay WRRFs

NYCDEP has evaluated alternatives for future operation of the Rockaway WRRF for several years. NYCDEP completed a Facility Plan for the Rockaway WRRF in 2014, which analyzed alternatives for future Rockaway WRRF operations. NYCDEP revisited this consolidation option and expanded the options to evaluate eight alternatives. As a result of the recent analysis, the recommended alternative is the consolidation of Rockaway and 26th Ward WRRFs, with a discharge to the Atlantic Ocean that would include the flow from the Jamaica WRRF. The consolidation of Rockaway and 26th Ward flows would be treated at an expanded 26th Ward WRRF, and the Rockaway WRRF would be taken out of operation. This plan would require a new effluent pump station at the 26th Ward WRRF to pump the consolidated 26th Ward and Jamaica WRRF effluent to the Atlantic Ocean for discharge. This recent Jamaica Bay WRRFs Consolidation Plan Update analysis has determined this option to be the most economical solution to address a series of water quality issues (limit of technology for nitrogen, ammonia toxicity in Hendrix Creek, etc.). NYCDEP will begin a Master Plan of this consolidation scheme in the near future.

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 the 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 (**Figure 7-16**). Rikers Island consists of 413 acres and is located in the East River between the Bronx and Queens (**Figure 7-17**).

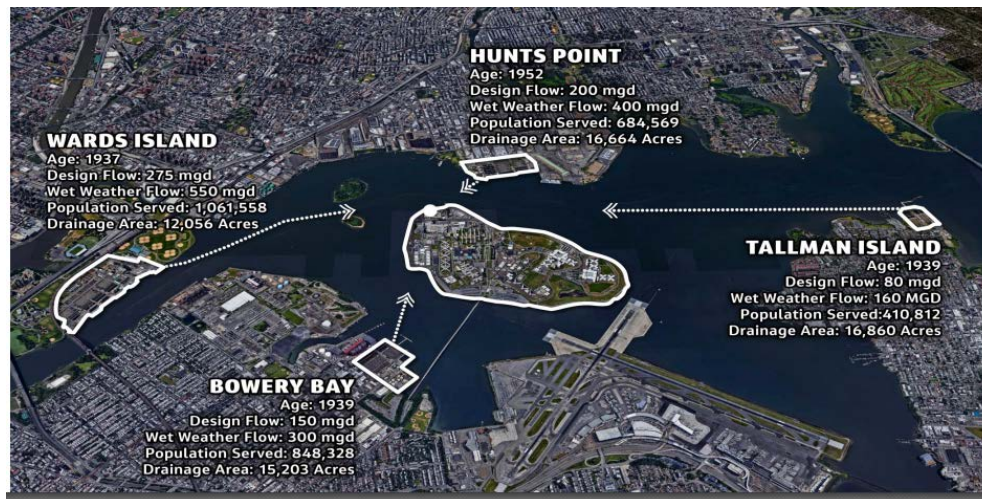


Figure 7-16: Rikers Island WRRF Consolidation Feasibility Study

The WRRF consolidation under consideration, the Reimagined Rikers Island WRRF, would potentially provide a step toward reaching city-wide goals for greenhouse gas reduction, carbon neutrality, and energy efficiency while meeting the challenges of increasing population and climate change. A formal public outreach process to obtain community input commenced in Spring 2022. The Rikers Island WRRF Consolidation Feasibility Study is ongoing and is anticipated to be completed in October 2023.

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.



Figure 7-17: Rikers Island

8.0 EXPENSE BUDGET

The FY 2023 expense budget released in the Preliminary Plan is \$1.67 billion. The proposed FY 2024 expense budget in the Preliminary Plan is \$1.54 billion. Expense budget projections for FY 2024 are currently being evaluated based upon the new needs of The System and will require adjustment when the evaluation is complete. The FY 2024 expense budget is expected to increase and be updated in the Executive Budget, to be released in late April 2023. The expense budget is made up of both Personal Services (PS) costs and Other than Personal Services (OTPS) costs. The PS budget is made up of staff salary, fringe benefits and pension costs. The OTPS costs make 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 OPERATIONAL PERFORMANCE OVERVIEW

One Water NYC – Water Conservation

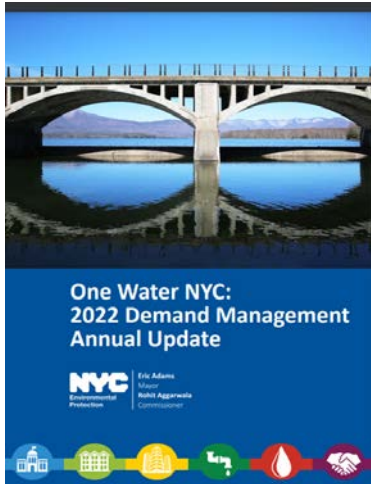


Figure 9-1: Water Demand Management 2022

NYCDEP released *One Water NYC: 2022 Demand Management Annual Update* in May 2022 (**Figure 9-1**). 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.

The average daily consumption for FY 2022 was 985 MGD. **Figure 9-2** presents the annual water consumption for the City for almost three decades. 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 116 gallons per day per person in 2021. This change reflects a 46% reduction in per capita water demand.⁷ It is anticipated that strategies identified in the NYCDEP Water Demand Management Plan will continue to reduce the water demand.

⁷ One Water NYC: 2022 Demand Management Annual Update, NYCDEP.

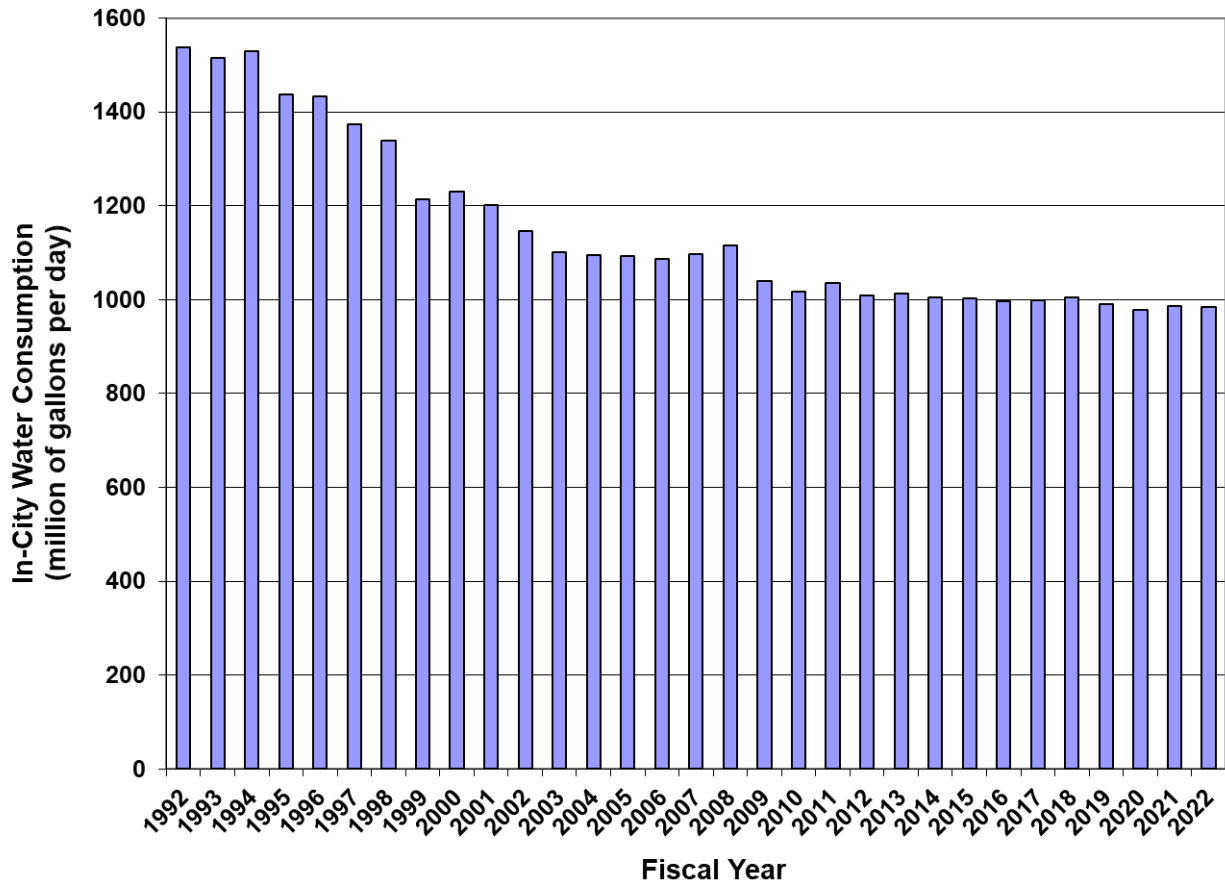
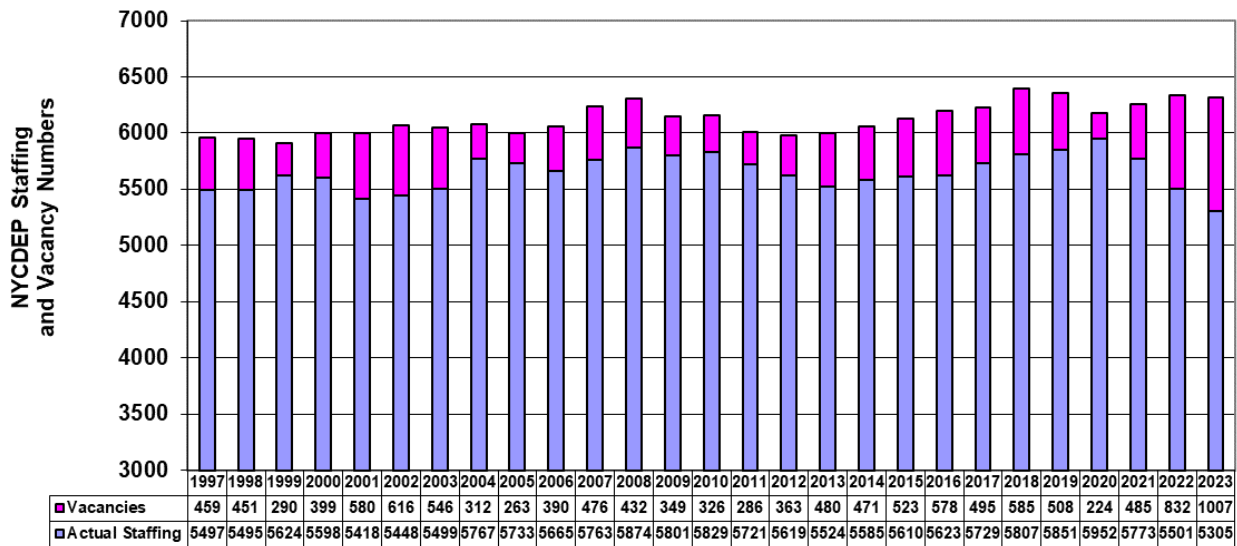


Figure 9-2: New York City Average Daily Water Demand in Million Gallons per Day (MGD)

System Staffing Levels

Figure 9-3 shows the NYCDEP approved staffing positions and vacancies for the past 26 years. Over the last year, the total approved staffing positions have decreased by 124 due to the mayoral Vacancy Reduction Line Initiative. The total number of NYCDEP vacancies increased to 1,007 in FY 2023. NYCDEP has faced a significant number of retirements and departures, along with challenges in the hiring process during the hiring restrictions.

THE NEW YORK CITY MUNICIPAL WATER FINANCE AUTHORITY
Fiscal Year 2023 Co-Consulting Engineering Report



Fiscal Year
Figure 9-3: NYCDEP – Staffing and Vacancy Levels FY 1997-2023

The increase in vacancies is attributed to the past hiring freeze that had been placed on NYCDEP in March 2020 when the global pandemic began and continued through June 2020. In November 2022, the "2 for 1" partial hiring freeze was lifted for NYC agencies, including NYCDEP. It is important to note that many experienced, critical employees are eligible for retirement and NYCDEP continues to experience significant retirements. Recruitment, training, transfer of knowledge, and succession planning are essential to maintain a skilled NYCDEP workforce. Staffing vacancies remain in the engineering and technical staff. NYCDEP has been aggressively working on recruitment, hiring and retention strategies.

It is vital to the organization that these efforts continue so that operations and capital delivery are not impacted. BWT has hired sewage treatment workers (STWs) to increase and improve operations. However, significant vacancies still exist throughout BWT, including the BWR Asset Management group. BWT will require additional staff as new CSO facilities come online. BWS has begun converting watershed maintainers to water treatment operators to align with the job. BWS has initiated an Apprenticeship Program for water treatment operators with State University of New York (SUNY) Ulster County. Vacancies also exist throughout BWSO. Within Sustainability, the NYCDEP will need to increase seasonal Green Jobs that perform maintenance of green infrastructure assets throughout the City, as the number of green assets has increased. Over the next few years, GI assets are expected to increase in NYC, at the same time as GI staffing vacancies are also increasing. NYCDEP is posting jobs for seasonal GI employees to help care for its constructed green infrastructure assets and plans to hire soon. BEDC also has a significant number of vacancies in the engineering staff.

Although the hiring restrictions have been lifted, there continue to be significant vacancies which have put a strain on NYCDEP's resources and have created challenges for some maintenance, planning and engineering activities. NYCDEP continues to operate water and wastewater facilities 24 hours per day,

7 days a week with essential workers/operators. NYCDEP will also require additional staff to operate infrastructure associated with the citywide resiliency programs, once those large projects come on-line.

Operational Performance Indicators

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

A total of 459 water main breaks were reported in FY 2022, which translates to 6.6 breaks per 100 miles of main over a 12-month period (see **Figure 9-4**). The range of water main breaks that NYC has recently experienced remains much lower than the average frequency of 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 100 miles, 21-25 breaks per 100 miles, 14 breaks per 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 restores water to residents following a break within an average of 4.4 hours after confirming the water main break.

NYCDEP's goal is to target a 1% or 100-year annual water main replacement cycle (approximately 65 miles/year). 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. NYCDEP achieved approximately 22 miles of new water main replacement or reconstruction in 2022, which is lower than the average 46.4 miles of new water main replacement or reconstruction over the past 20 years. NYCDEP experienced a lag in water main replacements due to pandemic-related delays; however, BWSO plans to accelerate the water main replacement cycle.

For sewer replacement, NYCDEP's goal is to target a 0.75% or 133-year annual sewer replacement cycle (approximately 52.5 miles/year). NYCDEP completed construction or reconstruction of 13.3 miles of sewer lines in 2022, and an average of 24.8 miles of sewer line construction or reconstruction over the past 20 years. NYCDEP experienced a lag in sewer replacements due to pandemic-related delays; however, BWSO plans to accelerate the sewer replacement cycle.

The amount of water main replacement and sewer replacement varies from year to year based upon funding, procurement and other factors. The average sewer replacement per year is typically less than the water main replacement due to operating conditions and pipe materials.

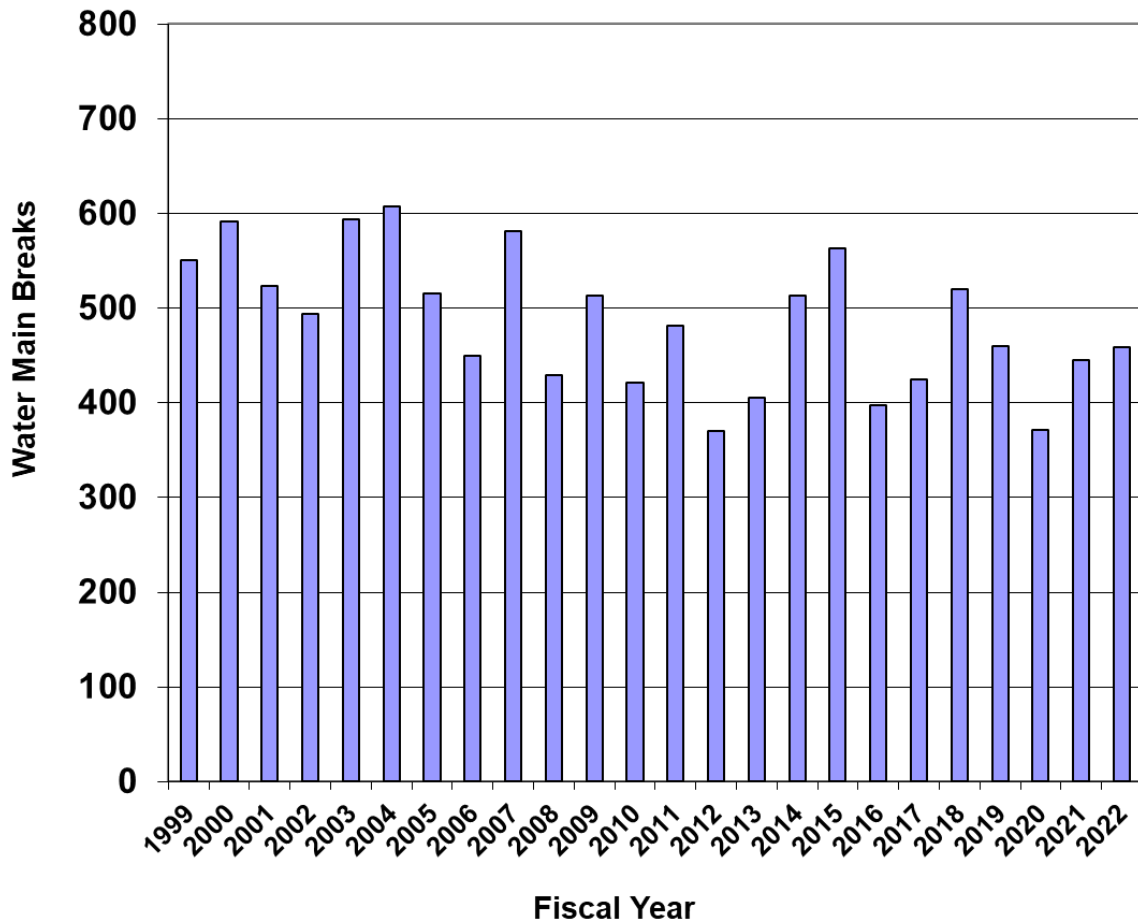


Figure 9-4: Total NYCDEP Water Main Breaks per Fiscal Year

There are 109,586 fire hydrants in NYC over which BWSO has responsibility for repair and maintenance. Approximately 0.26% of total fire hydrants were broken and inoperative in FY 2022, a reduction from 0.28% of total fire hydrants that were broken and inoperative in FY 2021. The average time to repair or replace high priority broken or inoperative hydrants (as determined by the Fire Department) by NYCDEP was 2.1 days in FY 2022, which is less than the target time for repair or replacement of five days.

A total of 29,503 catch basins were cleaned by NYCDEP in FY 2022. BWSO field crews are using tablets in the field to track catch basin cleaning data. The number of catch basins that were surveyed and inspected in FY 2022 was 31.5% of the total (148,000 catch basins), which is an increase from FY 2021 due to the sunset of Local Law 48 of 2015. LL 48 mandated the annual inspections of all catch basins for FY 2017, FY 2018 and FY 2019, after which the legislation sunset. BWSO had planned to return to the previous inspection frequency of once every three years; however, BWSO recently changed plans to increase catch basin frequency in specific areas and to clean when necessary.

NYCDEP received 16,521 sewer backup (SBU) complaints in FY 2022, which includes 3,773 confirmed SBUs (on NYCDEP infrastructure) and 12,749 unconfirmed SBUs (not on NYCDEP infrastructure or not found). Response time for SBUs was 15.5 hours on average. The number of SBUs and the response

time for resolution of the SBUs increased in FY 2022 compared to FY 2021, most likely due to the massive flooding caused by the intense storm Hurricane Ida in September 2021. NYCDEP has also found that the significant majority of the 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 about which objects 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 9-5: State of the Sewers 2022

BWSO issued the bureau's annual *State of the Sewers 2022 Report*, which documents several metrics on sewer operations across the five boroughs (Figure 9-5).

NYCDEP continues to use a data-driven proactive approach to operate and maintain the sewer system.

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 (such as during the upcoming Delaware Aqueduct Shutdown). 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 or 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 initially began sending treated drinking water to the NYC distribution network in May 2015. In November 2015, Croton demonstrated operations at its full water production rate (290 MGD). Depending upon the water supply demands, NYCDEP varies water production at the Croton WFP. During the upcoming Delaware shutdown, Croton WFP will be operating Plant A and Plant B for an extended period. 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 removing the old anthracite filters and replacing them with granular activated carbon (GAC) filters to address the taste and odor issues. Croton WFP has been operational since February 1, 2023 to test the GAC filters in cold temperature operating conditions and to demonstrate sending additional flow into distributions to prepare for the upcoming Delaware shutdown.

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 water from the Catskill and Delaware watersheds. Currently, water is transferred from the Kensico Reservoir to the Cat/Del UV Facility via the Delaware Aqueduct.

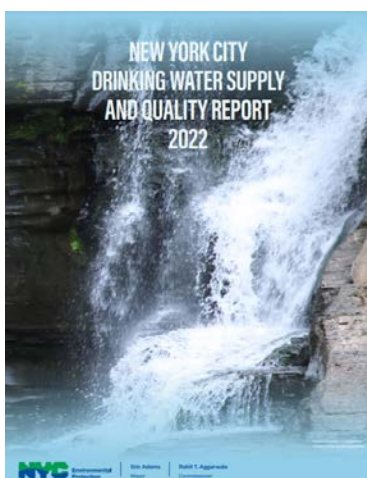


Figure 9-6: New York City Drinking Water Supply and Quality Report 2022

Drinking Water Quality and Quantity. NYCDEP released the *New York City Drinking Water Supply and Quality Report for 2022* on February 27, 2023 (**Figure 9-6**). NYCDEP conducts significant monitoring of the source water and in-city water quality. In FY 2022, NYCDEP collected 32,300 samples from the distribution system and performed approximately 376,700 analyses, meeting all state and federal monitoring requirements. In addition, NYCDEP collected more than 11,600 samples and performed approximately 200,600 analyses from the upstate reservoirs and watersheds. Approximately 2.7 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 28, 2023, the overall storage in NYC's water supply system stands at 92.6% of capacity, compared to the normal levels at this time of 90.6% of capacity.

PFAS. Per- and polyfluoroalkyl substances (PFAS) are a group of synthetic chemicals used in industrial applications and consumer products, such as stain resistance products, non-stick materials, waterproofing, and firefighting applications. PFAS compounds do not break down in the environment due to the high strength bonds between fluorine and carbon.

NYCDEP BWS implemented an Emerging Contaminant Monitoring Project (ECMP) throughout the NYC watershed in 2019. Over 140 emerging contaminants were tested, including PFAS compounds perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS). The results were posted quarterly on the NYCDEP website. In 2020, New York State established maximum contaminant levels (MCLs) for drinking water for two PFAS compounds, PFOS and PFOA with enforceable limits of 10 parts per trillion (ppt). The USEPA is expected to release MCLs for PFAS compounds in 2023. NYCDEP continues to monitor for PFAS compounds in the water supply, as reported in the *New York City Drinking Water Supply and Quality Report*.

Operation Support Tool. 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 includes National Weather Service forecasts.

Wastewater Operations. BWT utilizes predictive maintenance methods in order to better identify maintenance and replacement cycles and increase overall reliability of the WRRF 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 the UER WRRFs (Hunts Point, Bowery Bay, Tallman Island, Wards Island) and the Jamaica Bay WRRFs (26th Ward, Rockaway, Jamaica, Coney Island WRRFs). Due to the long-term planning and significant capital projects that have been implemented, NYCDEP operations have been achieving the final total nitrogen (TN) removals established for the UER. The UER and Jamaica Bay WRRFs have seen a significant reduction in TN in the effluent and have been in compliance with the TN limit since April 2019. The final TN load for Jamaica Bay will be performance-based and will go into effect after a specific performance period.

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 at the start of the New York Harbor Water Quality Survey Program to 27 water quality parameters at present. The 2019 – 2021 Harbor Water Quality Report was released September 2022 and is available online.

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. These three 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 beyond 2030. The majority of biosolids from NYCDEP WRRFs have been landfilled in recent years; however, NYCDEP has been transitioning to beneficial reuse. Currently, approximately 50% of the biosolids contracts send the NYCDEP biosolids to beneficial reuse. BWT plans to continue to increase the beneficial reuse of biosolids, with the goal of 100% beneficial reuse by 2030. Beneficial reuse of biosolids supports the 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.

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 has received revised and renewed SPDES permits, effective July 2022. The current SPDES permits for the 14 WRRFs expire in 2027. The new permits require additional sampling and monitoring for ammonia, free cyanide, and *Enterococcus*, with compliance limits. As previously discussed in the Asset Management section of the report, the new SPDES permits also require an AMP Update Workplan on July 1, 2023 and an AMP Annual Report due each year by September 30.

NYCDEP is operating in accordance with the revised SPDES permits. Based upon diligent wastewater treatment plant operations, 99.7% of the NYCDEP wastewater treatment plant effluent met state pollutant discharge elimination standards in FY 2022. For the first four months of FY 2023, measurement of effluent samples drawn from the plants indicated that 99.8% of the NYCDEP wastewater plant effluent met state pollutant discharge elimination standards.

Stormwater. NYSDEC issued a final municipal separate storm sewer system (MS4) permit for NYC on August 1, 2015. NYSDEC published a new draft Citywide MS4 permit on January 5, 2022 for public review and comment. The new MS4 final permit was issued in August 2022. 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 cover 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 original SWMP was submitted August 1, 2018. Key components of the SWMP include public education and outreach, mapping, illicit discharge detection and elimination (IDDE), construction site stormwater runoff control, post-construction stormwater management, pollution prevention and good housekeeping for municipal operations, industrial stormwater sources, control of floatables and settleable debris, monitoring and assessment of controls, and impaired waters. The SWMP Plan was approved by NYSDEC in March 2019. In the fall of 2021, the City updated of the SWMP to reflect the current status of program implementation and the City's compliance with the 2015 MS4 Permit. The updated SWMP was released in February 2022 (**Figure 9-7**). The MS4 Permit includes annual reporting requirements. NYCDEP plans to highlight major programmatic changes in the next MS4 Annual Report (for 2022), which is due September 30, 2023. As discussed previously in the report, the Unified Stormwater Rule will benefit MS4 areas by requiring more on-site stormwater management.

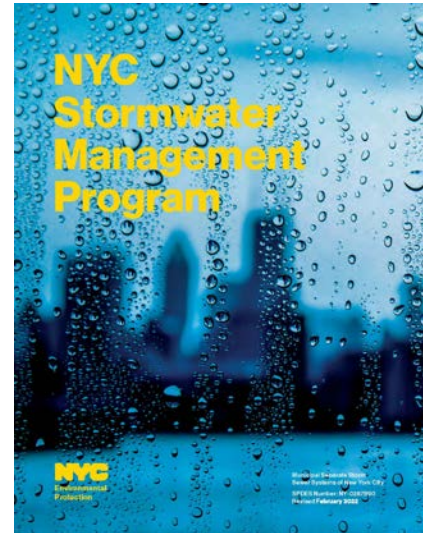


Figure 9-7: SWMP Plan

10.0 OTHER NOTEWORTHY ISSUES AND COMMENTS

Lead

The finalized rule of the Lead and Copper Rule Revisions (LCRR) became effective December 16, 2021. The LCRR includes a three-year period to achieve compliance; compliance must be achieved by October 16, 2024. On December 16, 2021, USEPA announced that they will be issuing Lead and Copper Rule Improvements, which will further revise the rule, before the 2024 compliance date. Some of the requirements NYCDEP has already been implementing and some will require new programs. There are significant and complex changes to the LCRR that will have an impact on NYCDEP and will make compliance more stringent and challenging.

Compliance and associated actions are based upon two different levels in the LCRR. Although the lead action level remains at 15 ug/L, the LCRR establishes a new trigger level of 10 ug/L. 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 Rule. The sampling methodology has also changed. 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 current Lead and Copper Rule. NYCDEP has an active corrosion control program in place in order to reduce lead absorption from service lines and internal plumbing. NYCDEP treats the water with food grade phosphoric acid and sodium hydroxide. Sodium hydroxide is added to raise the pH and reduce corrosivity, which prevents the leaching of lead from pipes into the drinking water. Phosphoric acid is added to create a protective film on pipes that reduces the release of metals, such as lead, from household plumbing. In certain cases, privately owned infrastructure contains lead such as the LSL that connects 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 proactive approach and has initiated studies to further optimize corrosion control, better understand lead exposure, and help prepare for the LCRR. BWS conducted a pilot program in City Island in the Bronx to further optimize corrosion control treatment by increasing the orthophosphate (PO₄) dosage.

In January 2019, a plan called LeadFreeNYC was released, which is a comprehensive roadmap to eliminating lead exposure in NYC children. NYSDOH provided a grant of \$5.3 million to NYC for a NYCDEP to pilot a program to replace lead service lines for low-income single-family homeowners. The

pilot replacement program replaced 600 LSLs and ended in October 2022. As part of this Leadfree NYC program, NYCDEP has also posted a map of NYC with potential lead service lines on the LeadFreeNYC website. NYCDEP has applied to NYS through the State Revolving Fund (SRF) for additional funding through Bipartisan Infrastructure Law (BIL) for LSL replacements in six targeted areas – five areas in the Bronx and one area in Queens. NYCDEP also plans to update the NYC lead service line inventory.

Awards

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

NYCDEP received awards for the recent new water connection to City Island in the Bronx. The project consisted of two 20-inch subaqueous water mains stretching 4,200 feet installed under Eastchester Bay. The project received a Diamond Award in the water resources category by the American Council of Engineering Companies New York's 2022 Engineering Excellence Awards. The project was also named 2021 Project of the Year in the \$25-100 million category by the Construction Management Association of America's NY/NJ Chapter for providing safe and reliable drinking water to 4,500 residents in City Island.

The WaterReuse Association presented NYCDEP with the *Transformational Innovation* award. The honor "recognizes technological advances, research breakthroughs, and innovative practices that advance the adoption, implementation, or public acceptance of recycled water." This award recognizes the innovative work undertaken by DEP's Water Reuse program, including the FDNY reuse facility, Brooklyn Botanic Garden, and upcoming projects at Central Park and the Domino Sugar Refinery redevelopment; development of the Water Conservation and Reuse grant program; advancing new water quality guidance specific to non-potable water reuse with the DOHMH, and adopting new rate discounts.

The West Pond Living Shoreline project in the Jamaica Bay Wildlife Refuge was honored by the American Society of Landscape Architects, New York, this past year.

Design Build

NYCDEP is pursuing design build as an alternate project delivery method to save time with project implementation and delivery. The NYS legislation that allows for projects to be delivered using design build construction contracts in NYC has been extended. NYCDEP has developed an implementation plan for a design build program, starting with a few design build pilot projects initially. The information gathered from the pilot projects will help NYCDEP determine if design build will be used for larger projects in the future.

Water Rate Study

The NYCDEP Sustainable Rate Structure Analysis (SRSA) is ongoing. The SRSA is analyzing water and wastewater rate structure options and customer assistance and credit programs.

Long Island Water Supply Interconnection Feasibility Study

NYSDOH, in collaboration with NYSDEC, completed the *New York City-Nassau County Water Supply Interconnection Feasibility Study* (Feasibility Study). The purpose of Feasibility Study was to evaluate the feasibility of connecting NYC public water supply to Nassau County. The report was released in August 2022. The Report evaluated a range of 20 – 180 MGD (known as the low and high bookends) for the interconnection between NYC water supply to Nassau County. This study shows that it is feasible for NYC water supply to serve some of Nassau County's water demands; however, there are several significant challenges that would need to be further evaluated.

Federal and State Funding

NYCDEP is planning to apply for federal funding from the Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA). NYCDEP is currently seeking consultant support to evaluate securing and administering Federal and state funding that are specifically made available for water and sewer utilities.

11.0 SUMMARY AND CONCLUSIONS

Although NYCDEP continues to face significant challenges due to staffing vacancies, NYCDEP continues 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 will require future capital investments for the continuous replacement and/or repair of aging infrastructure in a systematic and cost-effective manner.
- NYCDEP capital and expense budget projections for FY 2023 satisfy the immediate needs for The System. This includes legally mandated projects, which comprise approximately 41.8% of the capital budget for FY 2023.
- NYCDEP capital budget projections for FY 2024 satisfy the immediate needs for the System including legally mandated projects, which comprise approximately 41.2% of the capital budget for FY 2024. Expense budget projections for FY 2024 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 System.
- Over the last year, the total approved staffing positions have decreased by 124 due to the mayoral Vacancy Reduction Line Initiative. Currently, there are 1,007 vacancies throughout NYCDEP, which is approximately 84% of approved allocations. Although the City-wide hiring restrictions have been lifted, NYCDEP continues to face significant staffing challenges due to high rates of attrition and slow hiring during the hiring restrictions. Since the City’s restrictions were lifted, NYCDEP has been actively recruiting and expediting hiring. NYCDEP is prioritizing staffing issues to fill vacancies and retain staff to support capital program delivery, and to sustain adequate operations and maintenance in the long-term.

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 NYC’s large and complex water and wastewater system, and prioritizes the most important projects and programs. Capital funding will need to be allocated to address the state of good repair of aging infrastructure in order to avoid emergency repairs and 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 on 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 to The System and adaptation needs 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:

- *SOGR*: 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 systems. This is required in the near and long term.
- *FAD*: It is anticipated that additional funding will be identified for continued implementation of the FAD in 2027 for possibly another ten-year FAD.
- *Climate Change Adaptation, 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 SOGR projects or entirely new projects. Additional funding needs will continue to be identified in future budgeting cycles.
- *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. Also, additional funding will be required for the continuation of the Green Infrastructure Program.
- *Hillview Cover*: Based upon the schedule and the results of the ongoing feasibility planning study required as part of the Hillview Consent Decree, significant funding may need to be added to future capital plans.

12.0 LIST OF ACRONYMS

ACCO	Agency Chief Contracting Officer
ADG	Anaerobic Digester Gas
AMP	Asset Management Program
AMWA	Association of Metropolitan Water Agencies
ASCE	American Society of Civil Engineers
AUV	automated underwater vehicle
AWWA	American Water Works Association
BCS	Bureau of Customer Services
BEC	Bureau of Environmental Compliance
BEDC	Bureau of Engineering, Design, and Construction
BEPA	Bureau of Environmental Planning and Analysis
BIL	Bipartisan Infrastructure Law
BGD	billion gallons per day
BGY	billion gallons per year
BNR	Biological Nitrogen Removal
BPS	Bureau of Police and Security
BWS	Bureau of Water Supply
BWSO	Bureau of Water and Sewer Operations
BWT	Bureau of Wastewater Treatment
CAG	Community Advisory Group
Cat/Del UV	Catskill/Delaware Ultraviolet
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFO	Chief Financial Officer
CHP	Combined Heat and Power
CIP	Capital Improvement Program
CMOM	Capacity, Management, Operations and Maintenance
COO	Chief Operating Officer
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
DRBC	Delaware River Basin Commission
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

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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
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
IIJA	Infrastructure Investment and Jobs Act
IRA	Inflation Reduction Act
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
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
MDE	Macan Deve Engineers, DPC
mg/L	milligrams per liter
MGD	Million Gallons per Day
MOCEJ	Mayor's Office of Climate and Environmental Justice
MOR	Mayor's Office of Resiliency
MOU	Memorandums of Understanding
MS4	Municipal Separate Storm Sewer System
MSP	main sewage pump
MTA	Metropolitan Transportation Authority
MTBM	micro-tunnel boring machine
MW	megawatt
M/V	Motor Vessel
NDWAC	National Drinking Water Advisory Council
NOV	Notice of Violation
NPCC	New York City Panel on Climate Change
NRDC	Natural Resources Defense Council
NSC	National Safety Council
NTP	Notice to Proceed
NWS	National Weather Service
NYC	New York City

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NYCDDC	New York City Department of Design and Construction
NYCDEP	New York City Department of Environmental Protection
NYCDOT	New York City Department of Transportation
NYPA	New York Power Authority
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OACE	Office of the Agency Chief Engineer
OERR	Office of Energy and Resource Recovery
OST	Operation Support Tool
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 ₄	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
RWBT	Rondout-West Branch Tunnel
SBU	Sewer Backup
SCADA	Supervisory Control and Data Acquisition
SIRR	Special Initiative for Rebuilding and Resiliency
SOGR	State of Good Repair
SPDES	State Pollutant Discharge Elimination System
SMLP	Storm Mitigation Loan Program
SRSA	Sustainable Rate Structure Analysis
SRF	State Revolving Fund
STW	Sewage Treatment Worker
SWMP	Stormwater Management Program
TBM	tunnel boring machine
TMDL	Total Maximum Daily Load
tpd	tons per day
TRC	Total Residual Chlorine
UER	Upper East River
µg/L	micrograms/L
ULURP	Uniform Land Use Review Procedure

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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
WBE	Women Business Enterprise
WEF	Water Environment Federation
WM	Waste Management
WFP	Water Filtration Plant
WRRF	Wastewater Resource Recovery Facility
WWTP	Wastewater Treatment Plant
WUCA	Water Utility Climate Alliance

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