New York City Department of Environmental Protection
Long-Term Watershed Protection Plan

December 2021

Vincent Sapienza, P.E., Commissioner

Paul V. Rush, P.E., Deputy Commissioner

Bureau of Water Supply

Table of Contents

List of Figures

List of Tables

List of Acronyms

AUV	autonomous underwater vehicle
AWSMP	Ashokan Watershed Stream Management Program
BMP	best management practice
BODR	Basis of Design Report
CAT/DEL	Catskill/Delaware
CATUEC	Catskill Upper Effluent Chamber
CDIC	Catskill/Delaware Interconnection Chamber
CDUV	Catskill/Delaware Ultraviolet Disinfection Facility
CE	conservation easement
CP	Forest Management Plan Conservation Practices
CREP	Conservation Reserve Enhancement Program
CRISP	Catskill Regional Invasive Species Partnership
CSBI	Catskill Streams Buffer Initiative
CUNY	City University of New York
CUNRF	City University of New York Research Foundation
CWC	Catskill Watershed Corporation
CWMP	Community Wastewater Management Program
DEM	Digital Elevation Model
DEP	New York City Department of Environmental Protection
DMAP	Deer Management Assistance Permit
DOHMH	New York City Department of Health and Mental Hygiene
EAB	emerald ash borer
EFC	New York State Environmental Facilities Corporation
EIS	environmental impact statement
ELAP	Environmental Laboratory Approval Program
EOC	Emergency Operations Centers
EOH	East of Hudson
EOHWC	East of Hudson Watershed Corporation
EWP	Emergency Watershed Protection
FAD	Filtration Avoidance Determination
FBO	Flood Buyout
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FMP	New York City Forest Management Plan
GI	gastrointestinal illness
GIS	Geographic Information System
GPS	Global Positioning System
GWLF	Generalized Watershed Loading Functions
HEFS	Hydrologic Ensemble Forecast Service
HMGP	Hazard Mitigation Grant Program
IRSP	individual residential stormwater plan
ISAC	Invasive Species Advisory Committee

ISC	New York State Invasive Species Council
ISWG	Invasive Species Working Group
JV	Joint Venture
LAP	Land Acquisition Program
LFA	Local Flood Analysis
LiDAR	Light Detection and Ranging
LIMS	Laboratory Information Management System
LT2ESWTR	Long-term 2 Enhanced Surface Water Treatment Rule
MAP	Management Assistance Program
MFO	Master Forest Owner
MGD	million gallons per day
MMI	Milone & MacBroom, Inc.
MOA	New York City Watershed Memorandum of Agreement
NHD	National Hydrography Dataset
NMP	nutrient management plan
NRCS	Natural Resources Conservation Service
NTU	nephelometric turbidity unit
NWI	National Wetlands Inventory
NYC	New York City
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOT	New York State Department of Transportation
OECD	Organization for Economic Cooperation and Development
OST	Operations Support Tool
PRISM	Partnership for Regional Invasive Species Management
ROV	remote operated vehicle
RWBT	Rondout-West Branch Tunnel
SAP	Streamside Acquisition Program
SEQRA	State Environmental Quality Review Act
SMIP	Stream Management Implementation Program
SMP	Stream Management Program
SPDES	State Pollutant Discharge Elimination System
SSMP	Septic System Management Program
SSTS	subsurface sewage treatment system
SUNY	State University of New York
SWCD	Soil and Water Conservation District
SWE	snow water equivalent
SWPPP	stormwater pollution prevention plan
SWTR	Surface Water Treatment Rule
THM	trihalomethane
TP	total phosphorus
TSI	Trophic State Index
TTHM	Total trihalomethane

UFI	Upstate Freshwater Institute
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USGS	United States Geological Survey
WAC	Watershed Agricultural Council
WaLIS	Watershed Lands Information System
WAP	Watershed Agricultural Program
WCDEF	Westchester County Department of Environmental Facilities
WDRAP	Waterborne Disease Risk Assessment Program
WFP	Whole Farm Plan
WOH	West of Hudson
WRF	Water Research Foundation
WRRF	Water Resource Recovery Facility
WR&R	New York City Watershed Rules and Regulations
WSP	Water Supply Permit
WSPS	Water and Sewer Permitting System
WWQMP	Watershed Water Quality Monitoring Plan

Acknowledgements

The New York City Department of Environmental Protection (DEP) is charged with providing an ample supply of clean water to nearly 10 million people every day. DEP meets this mandate through the efforts of hundreds of dedicated professionals. This plan provides DEP's vision for the next phase of its comprehensive program to protect water quality and public health. Although the staff members who help make all this possible are too numerous to mention here, their efforts are recognized and appreciated. We acknowledge the Bureau of Water Supply, under the direction of Deputy Commissioner Paul V. Rush, P.E., and its directorates of Source Water Operations, Treatment Operations, Water Quality & Innovation, Watershed Protection Programs and Planning. The vital support of Management Services and Budget, and Compliance staff, along with the bureaus of Police and Security, Legal Affairs, Information Technology, Engineering Design and Construction, and the NYC Law Department is also acknowledged.

1. Introduction

This report presents New York City's Long-Term Watershed Protection Program (the Program), submitted to the New York State Department of Health (NYSDOH) in support of a revised filtration waiver for the Catskill/Delaware systems. Through periodic assessments, the New York City Department of Environmental Protection (DEP) has demonstrated the ongoing effectiveness of the overall program in preserving the high quality of the Catskill/Delaware waters. The City's most recent assessment, issued in March 2021, confirms that water quality status and trends continue to point to a safe, reliable supply of drinking water for half the population of New York State.

This document should be viewed in context of the City's long-running source water protection program. Since its first filtration waiver was issued by New York State nearly 30 years ago, DEP has produced a multitude of reports detailing program progress and documenting the continued high quality of the Catskill/Delaware supply. For specifics about the implementation of watershed protection programs, refer to the annual reports prepared pursuant to the FAD. DEP also produces dozens of semi-annual and annual reports on FAD programs, publishes reports on special studies, and prepares an annual water quality statement which gives detailed information about water quality (www.nyc.gov/dep/watershed_protection).

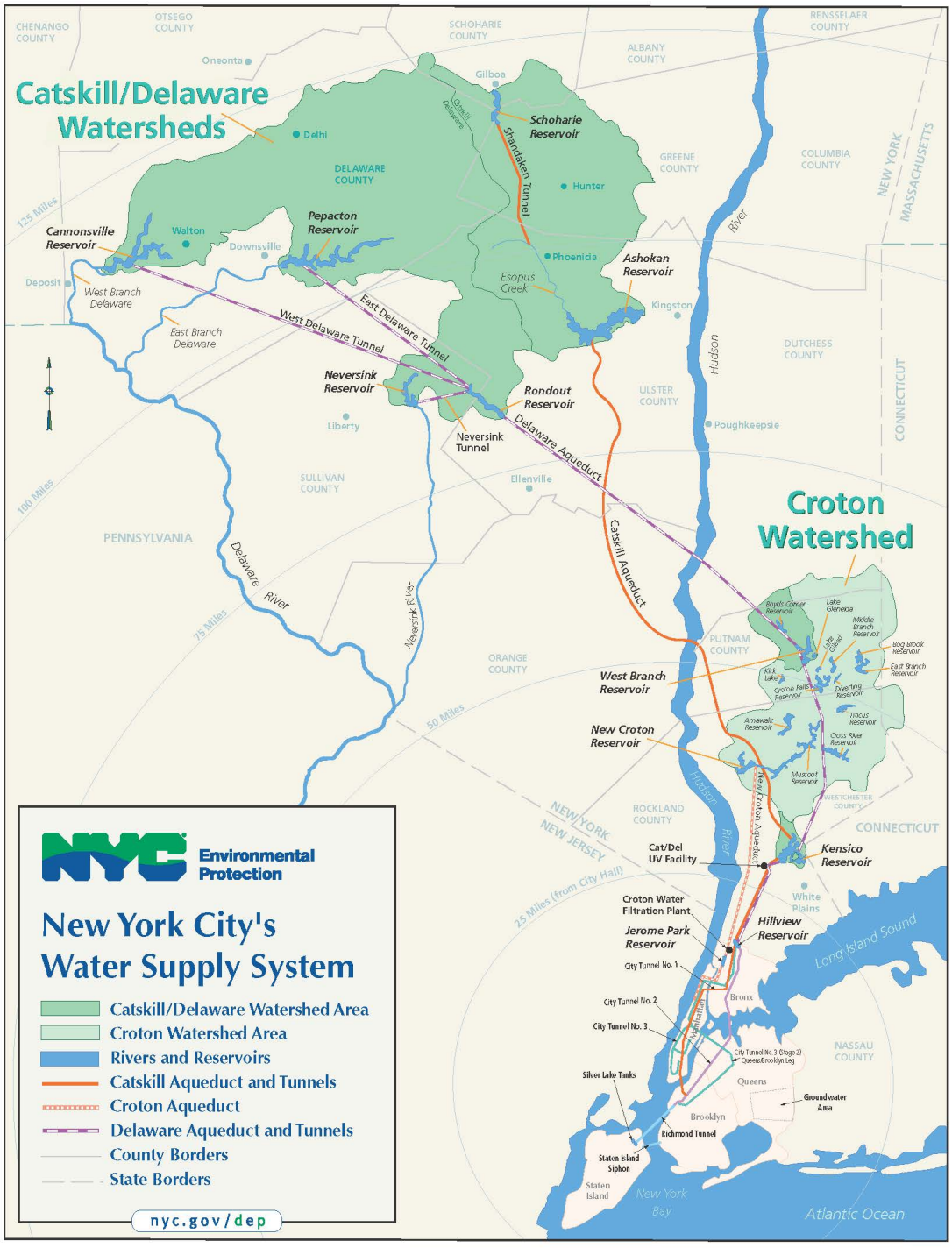

Figure 1.1 Map of the New York City water supply system.

1.1 Water Supply System Overview

The New York City (NYC or City) water supply system consists of three surface water sources (the Croton, the Catskill, and the Delaware) and a system of wells in Queens (the Queens Groundwater System) (see Figure 1.1). The three upstate water collection systems include 19 reservoirs and three controlled lakes with a total storage capacity of approximately 580 billion gallons. They were designed and built with various interconnections to increase flexibility to meet quality and quantity goals and to mitigate the impact of localized droughts and water quality impairments. The system provides more than 1 billion gallons of high-quality water each day to nearly 10 million New Yorkers. Demand in 2020 was at a 60+ year low, due in part to the COVID-19 pandemic. Since 2009, average daily demand has been below the 1960s drought of record (1,045 MGD) as a direct result of significant investments by DEP in demand management. Figure 1.2 shows water demand in New York City since 1960, documenting a 35% decrease in the past 25 years, despite rising population.

The Croton watershed is located entirely east of the Hudson River in Westchester, Putnam and Dutchess counties, with a small portion in the State of Connecticut. The oldest of the three systems, the Croton system, has been in service for more than 170 years. The watershed covers approximately 375 square miles. Croton's 12 reservoirs and three controlled lakes are

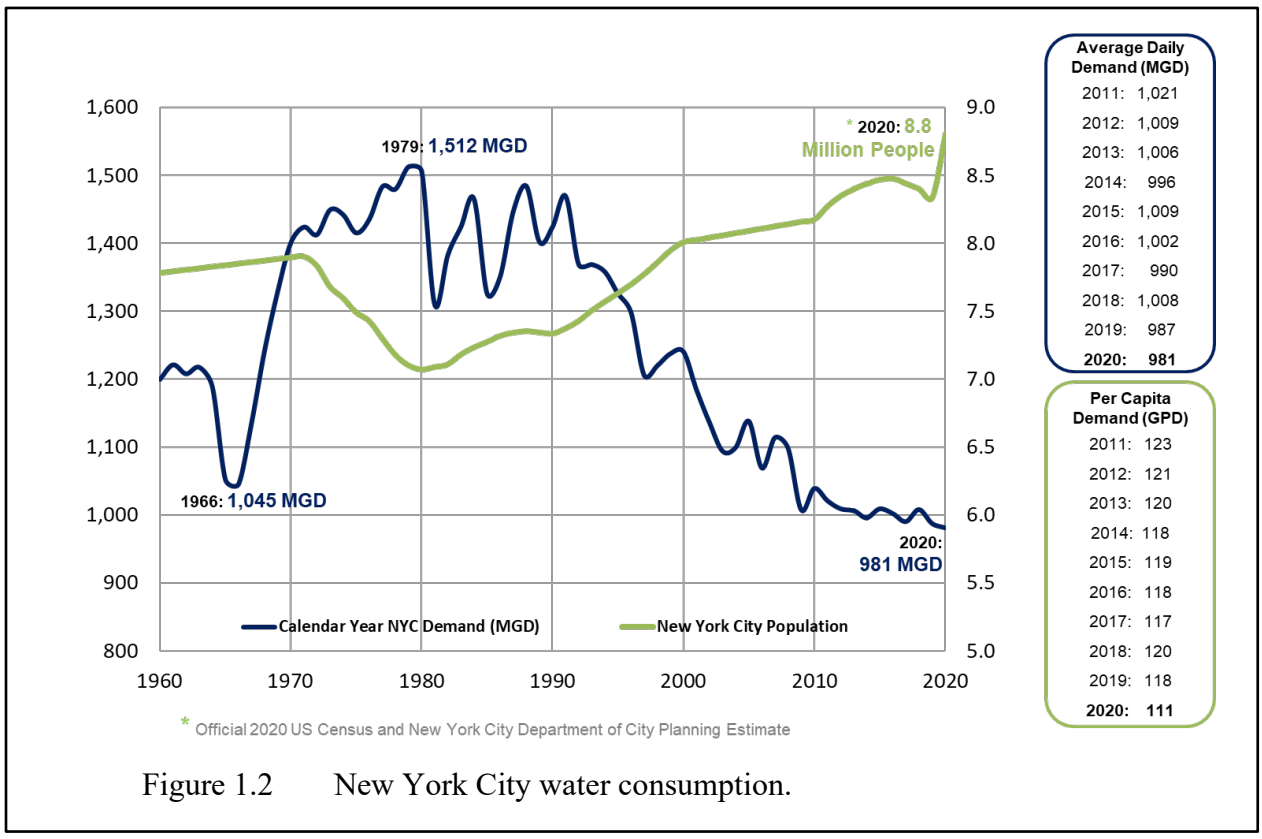

Figure 1.2 New York City water consumption.

connected primarily via streams and rivers, and ultimately drain to the New Croton Reservoir in Westchester County. Historically, approximately 10% of the City's average daily water demand has been supplied by the Croton, although in times of drought the Croton system may supply significantly more water.

In 2015, DEP completed construction and began operation of a water treatment plant to filter the Croton supply. While the Croton System usually met all current health-based regulatory standards for an unfiltered surface water supply, it has experienced periodic violations of the aesthetic standards for color, taste and odor. In addition, DEP did not believe that the Croton system would be able to meet stricter disinfection byproduct rules recently promulgated. Now that the Croton Water Filtration Plant is in service, with a capacity of 290 million gallons per day (MGD), DEP can once again reliably deliver Croton water to NYC consumers.

The Catskill System consists of two reservoirs located west of the Hudson River – Ashokan Reservoir in Ulster County and Schoharie Reservoir in Schoharie, Delaware and Greene counties. The Catskill System was constructed in the early part of the 20th century, and Ashokan Reservoir went into service in 1915. Since Schoharie Reservoir was completed in 1926, water travels through the 18-mile Shandaken Tunnel, which empties into the Esopus Creek at Allaben and then travels 12 miles to the Ashokan Reservoir. Water leaves Ashokan via the 75-mile- long section of the Catskill Aqueduct, to reach Kensico Reservoir in Westchester County. The Catskill System supplies, on average, 40% of the City's daily water supply.

The Delaware System was completed in the 1950s and 1960s, and is comprised of four reservoirs: Cannonsville, Pepacton and Neversink reservoirs which are built on tributaries to the Delaware River, and Rondout Reservoir which is formed by damming Rondout Creek, a tributary to the Hudson River. Water travels through tunnels from each of the Delaware basin reservoirs into Rondout Reservoir; water then leaves Rondout and travels to West Branch Reservoir in Putnam County via the Rondout-West Branch Tunnel portion of the Delaware Aqueduct. Water from West Branch then flows through another section of the Delaware Aqueduct to the Kensico Reservoir. The Delaware System provides the remainder of the City's supply. Because waters from the Catskill and Delaware watershed are commingled at Kensico Reservoir, they are frequently referred to as one system: the CAT/DEL System.

In the late 1980s, the City decided to apply for filtration avoidance for the Catskill/Delaware System under the terms of the Surface Water Treatment Rule (SWTR; see "Regulatory Context," below). Since that time, DEP and its partner agencies and organizations have developed and deployed a comprehensive watershed monitoring and protection program designed to maintain and enhance the high quality of CAT/DEL water. This program has been recognized internationally as a model for watershed protection and has allowed the City to secure a series of waivers from the filtration requirements of the SWTR.

1.2 Regulatory Context

The Safe Drinking Water Act (SDWA) amendments of 1986 required the United States Environmental Protection Agency (USEPA) to develop criteria under which filtration would be required for public surface water supplies. In 1989, USEPA promulgated the SWTR, which requires all public water supply systems supplied by unfiltered surface water sources to either provide filtration or meet certain criteria. The filtration avoidance criteria are comprised of the following:

- Objective Water Quality Criteria – The water supply must meet certain levels for specified constituents including coliforms, turbidity and disinfection by-products.
- Operational Criteria – A system must demonstrate compliance with certain disinfection requirements for inactivation of *Giardia* and viruses; maintain a minimum chlorine residual entering and throughout the distribution system; provide uninterrupted disinfection with redundancy; and undergo an annual on-site inspection by the primacy agency to review the condition of disinfection equipment.
- Watershed Control Criteria – A system must establish and maintain an effective watershed control program to minimize the potential for contamination of source waters by *Giardia* and viruses.

The City first applied for a waiver for the CAT/DEL system from the filtration requirements of the SWTR in 1991. This first application was filed with NYSDOH, because at the time the City and NYSDOH believed that NYSDOH had primacy to administer the SWTR for all water supply systems in New York State (NYS). NYSDOH granted a one-year filtration waiver. Subsequently, it was determined that USEPA had retained primacy for the SWTR. In mid-1992, DEP submitted a 13-volume application to USEPA, describing in detail the City's plans for protecting the CAT/DEL supply. On January 19, 1993, USEPA issued a conditional determination granting filtration avoidance until December 31, 1993. The waiver incorporated many elements of the program the City had described in mid-1992, and was conditioned upon the City meeting 66 deadlines for implementing studies to identify potential pollution sources, developing programs to ensure long-term protection of the watershed, and addressing existing sources of contamination in the watershed. USEPA also imposed substantial reporting requirements on the City, to monitor the City's progress.

DEP submitted a second application for continued avoidance to USEPA in September 1993. This application was based upon the knowledge gained by the City through initiation of its watershed studies and programs and laid out a long-term strategy for protecting water quality in the Catskill/ Delaware System. Again, USEPA determined that the City's program met the SWTR criteria for filtration avoidance, although it did express concerns about the program's ability to meet the criteria in the future. On December 30, 1993, USEPA issued a second conditional determination, containing 150 requirements related primarily to enhanced watershed protection and monitoring programs. USEPA also required that the City proceed with design of a

filtration facility for the CAT/DEL supply, so that no time would be lost should USEPA decide that filtration was necessary in the future.

Two critical pieces of the watershed protection program that DEP described in September 1993, and that USEPA incorporated into the December 1993 Determination, were implementation of a land acquisition program and promulgation of revised watershed regulations. Primarily due to the objections of watershed communities over the potential impact that those programs might have on the character and economic viability of their communities, DEP was unable to move forward with implementation of those key program elements. It was against this backdrop that Governor Pataki convened a group of stakeholders to try to come to an accord. The negotiations involved the City, the state, USEPA, representatives of the counties, towns and residents of the watershed, and representatives from environmental groups. This unique coalition came together with the dual goals of protecting water quality for generations to come and preserving the economic viability of watershed communities. In November 1995, the parties reached an Agreement in Principle that set forth the framework of an agreement that would allow the City to advance its watershed protection program while protecting the economic viability of watershed communities. It took another 14 months to finalize the details of an agreement. In January 1997, the parties signed the Watershed Memorandum of Agreement (MOA). The MOA supplemented the City's existing watershed protection program with approximately $350 million in additional funding for economic and environmental partnership programs with upstate communities, including a water quality investment program and a regional economic development fund. The MOA established the institutional framework and relationships needed to implement the range of protection programs identified as necessary by the City, the state, and USEPA. The state issued a water supply permit to allow the City to purchase land in the watershed and approved a revision to the City's Watershed Rules & Regulations (WR&R) governing certain aspects of new development in the watershed. The City also secured a 5-year waiver from the filtration requirements for the CAT/DEL System.

In March 2006, the City submitted to USEPA a rigorous, science-based assessment of Catskill/Delaware water quality, followed in December 2006 by an enhanced, comprehensive long-term plan for watershed protection efforts. That long-term plan represented a significant enhancement to the City's watershed protection efforts and relied in part on the continued support and cooperation of the City's partners. The plan formed the basis of an updated FAD, issued by USEPA in July 2007. Significantly, the 2007 FAD was the first FAD to cover a full 10-year period, signaling the growing confidence of all parties that source water protection has become a sustainable alternative to filtration for the City's CAT/DEL supply.

Following issuance of the 2007 FAD, USEPA granted NYSDOH primary regulatory responsibility for the SWTR as it applies to the CAT/DEL supply. In March 2011, DEP issued another detailed assessment of program activity and water quality, which formed the basis of a revised long-term plan submitted to NYSDOH in December 2011. In late summer 2011, two significant storms swept through the region, devastating communities and significantly

impacting water quality in portions of the NYC supply. In the wake of the storms, a large group of watershed stakeholders came together to discuss developing and enhancing certain programs to promote flood resiliency and minimize water supply impacts from future events. Following these discussions, NYSDOH issued a Revised 2007 FAD in May 2014.

Following the release of the Revised 2007 FAD, DEP and watershed stakeholders continued discussions to further refine and enhance certain elements of the overall source water protection program. In parallel, DEP developed a proposal for ongoing program activities that would span a full 10-year term. DEP's proposal was in part based on the March 2016 comprehensive water quality assessment, which confirmed the continued high quality of the Catskill/Delaware source waters. In 2017, NYSDOH issued a new FAD which for the first time included program requirements and milestones for 10 years. The 2017 FAD also incorporated many adjustments that resulted from the stakeholder negotiations. The 2017 FAD demonstrated DEP's ability to continue to implement proven programs, as well as the ability to adapt strategies as needed to anticipate and respond to changing conditions. DEP's source water protection program continues to be an international model for sustainable water supply management and public health protection.

Also, after the 2007 FAD was issued, the state issued a new 15-year Water Supply Permit to allow the City to continue to purchase lands for source water protection. At the time, the MOA parties reaffirmed their commitment to the partnership and executed a supplemental agreement updating certain commitments.

1.3 New York City's Source Water Protection Program for the Catskill/Delaware Systems

DEP is responsible for operating, maintaining and protecting the City's water supply and distribution system. This document, *New York City's 2021 Long Term Watershed Protection Plan,* has been prepared to comply with NYSDOH's 2017 FAD for the Catskill/Delaware Water Supply System.

To demonstrate its eligibility for a filtration waiver, DEP advanced a program to assess and address water quality threats in the Catskill/Delaware System. DEP's strategy is based on a simple premise: it is better to keep the water clean at its source than it is to treat it after it has been polluted. To meet the goal of public health protection, DEP has designed and deployed a mix of remedial programs (intended to clean up existing sources of pollution) and protective programs (to prevent new sources of pollution). These efforts provided the basis for the series of waivers from the filtration requirements of the SWTR described above

1.3.1 Assessing the Potential Threats to the Water Supply

Since the inception of the program in the early 1990s, the City has made great progress in assessing potential sources of water contamination and designing and implementing programs to address those sources. Each year, DEP collects and analyzes tens of thousands of samples from

more than 450 sites throughout the watershed – at aqueducts, reservoirs, streams and water resource recovery facilities (WRRFs). The purpose of this intensive monitoring effort is to help operate and manage the system to provide the best possible water at all times, to develop a record to identify water quality trends, and to focus watershed management efforts. This robust monitoring program provides the scientific underpinnings for the source water protection program.

Based on the information collected through the monitoring program, DEP developed a comprehensive strategy for the protection of source water quality, designed to address existing sources of pollution and prevent new sources. Each element of the watershed protection effort is conducted at a specific spatial and temporal scale to ensure the maintenance of the already high quality of the Catskill/Delaware waters. This effort yields benefits for water consumers as well as the tens of thousands of people who live, work and recreate in the watershed, and the millions in communities downstream of the reservoirs.

1.3.2 Highlights of the Watershed Protection Program

Effective implementation of this multi-faceted program depends on support from and cooperation with the City's watershed partners. DEP regularly works with many agencies, organizations and communities throughout the region to advance initiatives. These partnerships are vital to the continued success of the source water protection program and recognize the need to strike a balance between protecting water quality and preserving the communities in the watershed. The contributions of many of these groups are acknowledged throughout this report.

As the source water protection program has matured, focus has begun to shift away from intensive program implementation toward efforts to sustain excellent water quality. At the same time, program enhancements have been made to address the evolving threat of climate change and changes in hydrologic patterns. Steady progress continues on implementation of several core watershed protection initiatives: the Watershed Agricultural Program; the acquisition of sensitive watershed lands; the enforcement of watershed regulations; the Stream Management Program (SMP); and the continuation of environmental and economic partnership programs that target specific sources of pollution in the watershed. In addition, DEP continued its enhanced watershed protection efforts in the Kensico Reservoir basin and completed the upgrades of non-City owned watershed WRRFs. Figure 1.3 and Figure 1.4 map the myriad projects completed by DEP and its partners in the Catskill/Delaware and Croton watersheds since 1997. Key watershed protection program highlights include:

Watershed Agricultural Program

Since 1992, the Watershed Agricultural Program (WAP) has promoted a non-regulatory, voluntary, incentive-based and farmer-led approach to controlling agricultural sources of pollution while supporting the economic viability of farming in the watershed. Working through the Watershed Agricultural Council (WAC), the City funds development of farm pollution prevention plans and implementation of structural and non-structural best management practices

(BMPs). Through December 2020, a total of 326 active farms have Whole Farm Plans, including 259 WOH farms and 67 EOH farms. The WAP has implemented approximately 8,586 BMPs on all participating farms at a cumulative cost of $72 million, not including planning, design and administrative expenses. The Conservation Reserve Enhancement Program (CREP), which pays farmers to take sensitive riparian buffer lands out of active farm use and re-establish a vegetative buffer, has enrolled more than 1,687 acres. This number is down slightly from prior years due to a recent change to federal CREP rental payment rates, which resulted in the voluntary early termination of over 30 CREP contracts in the watershed.

Land Acquisition

The Land Acquisition Program (LAP) seeks to protect sensitive lands from development through willing seller/willing buyer transactions. Through September 2021, DEP has secured 123,389 acres in fee simple or conservation easement (CE) in the Catskill/Delaware watersheds, with another 31,270 acres of farm and forest CEs secured by WAC; the fee simple acres include all lands acquired through the Streamside Acquisition Program and the New York City-Funded Flood Buyout Program (including municipally-owned parcels). Overall, nearly 40% of lands in the Catskill/Delaware watersheds are protected by the City, state and other entities. While the overall level of protection is impressive, even higher levels of protection have been achieved in the key basins – Ashokan, Rondout, West Branch and Kensico – which range from nearly 42% to nearly 68% protected.

Watershed Regulations

Since 1997, DEP has reviewed more than 16,800 applications for projects that proposed one or more regulated activities, as well as performed routine compliance inspections at regulated wastewater facilities and active construction sites and responded to violations of permit standards to enforce corrective actions. DEP works with applicants to ensure new development in the watershed is undertaken in a manner that is fully protective of critical water supply resources; overall more than 98% of DEP's regulatory determinations are project approvals.

Wastewater Programs

DEP has implemented an array of programs intended to improve the treatment of wastewater across the watershed. The City, in conjunction with its partners, has continued to implement programs that have remediated more than 6,100 failing septic systems through September 2021. All WRRFs in the FAD-covered basins – including City- and non-City-owned – have been upgraded to tertiary treatment, and DEP funds a significant portion of ongoing operation and maintenance. New WRRFs, or other community wastewater solutions, have been implemented in 19 communities, resulting in more than 2,500 septic systems being decommissioned through October 2021.

Stream Management Program

The Stream Management Program promotes the protection and restoration of stream system stability and ecological integrity by providing for the long-term stewardship of streams and floodplains. To achieve this broad goal, DEP works closely with federal, state and local partners to implement a variety of SMP projects in each WOH reservoir basin. Through December 2020, the SMP completed 174 stream projects (including full channel restoration, streambank stabilization, floodplain restoration, stormwater and infrastructure), 270 riparian planting projects (including 248 Catskill Stream Buffer Initiative projects), and awarded 275 Stream Management Implementation Program (SMIP) grants. The SMP also completed 22 Local Flood Analyses (LFAs) that recommend flood hazard mitigation strategies for 34 WOH population centers, with a focus now on the implementation of LFA-recommended projects.

Ultraviolet (UV) Disinfection Facility

In 2012, DEP began operation of a UV disinfection facility to treat all water from the Catskill/Delaware supply. The facility, the largest of its kind in the world, provides an additional barrier for public health protection and complements DEP's efforts to keep the water clean at the source.

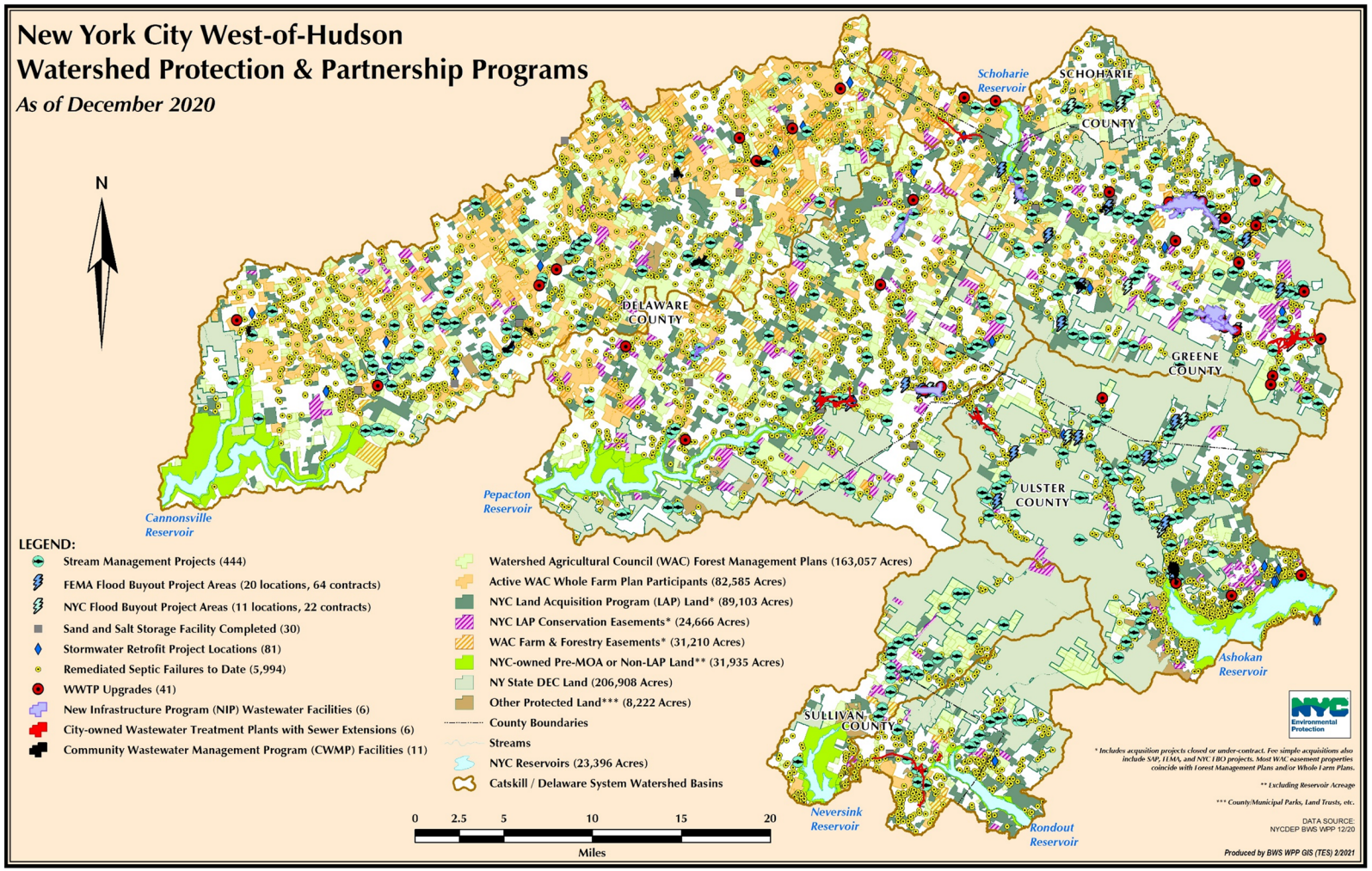

Figure 1.3 Map showing status of the partnership programs West of Hudson.

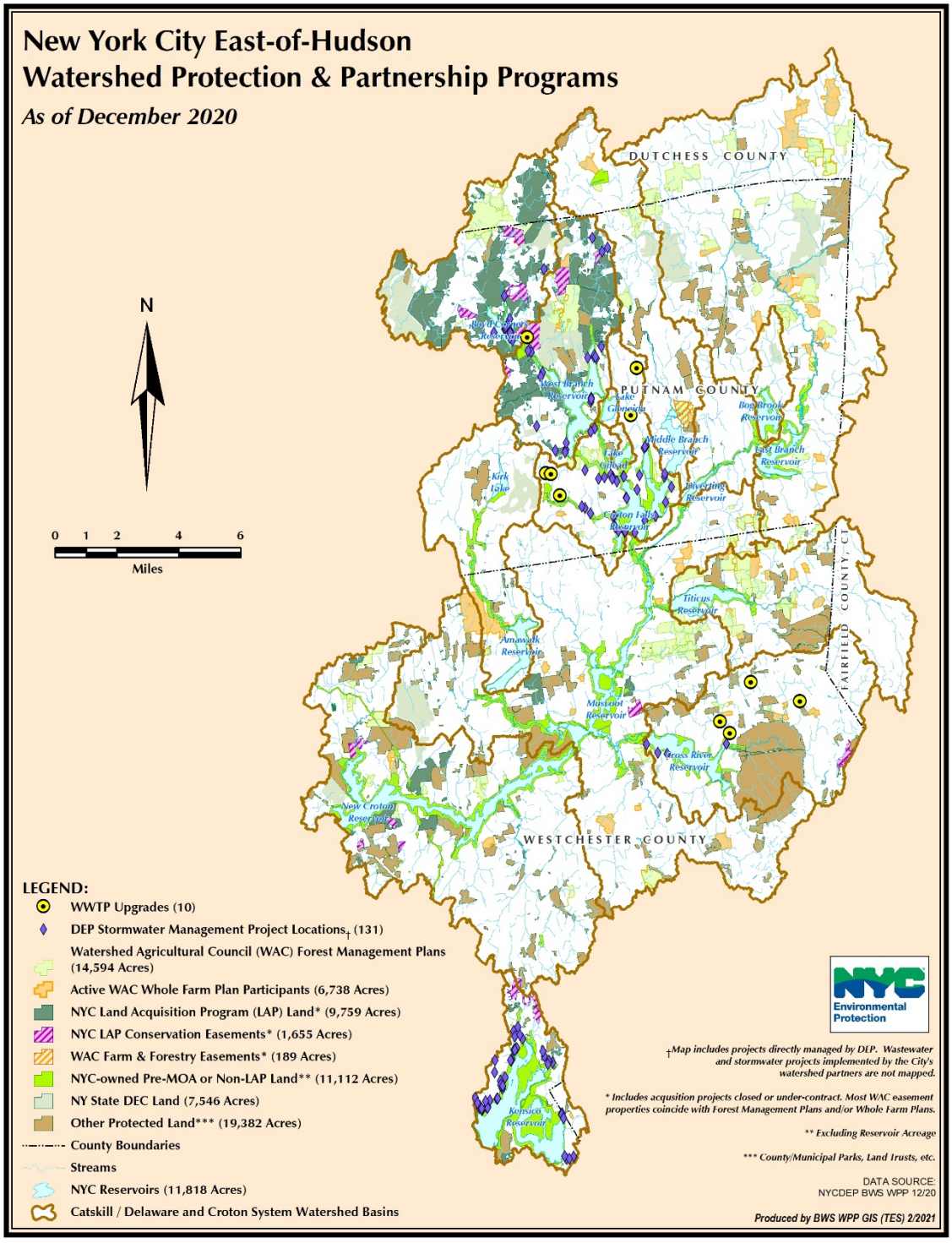

Figure 1.4 Map showing status of the partnership programs East of Hudson.

Waterborne Disease Risk Assessment Program

The Waterborne Disease Risk Assessment Program (WDRAP) continues to track in-City disease rates, with a goal of identifying whether there are any outbreaks that can be linked to the water supply. The program evaluates multiple data streams daily and over longer periods and has continued to refine surveillance activities. There was no evidence of an outbreak of waterborne disease in NYC during this period.

1.3.3 Water Quality Conditions

Every five years, DEP undertakes a comprehensive review of water quality conditions throughout the Catskill/Delaware System. That review, most recently completed and published in March 2021, incorporates a massive amount of water quality data, collected at different spatial and temporal scales, to provide a complete picture of water quality status and trends. DEP then compares those water quality results with information on implementation of source water protection programs, to evaluate program effectiveness and guide decision making on future program implementation. The March 2021 assessment, available on DEP's web site, confirms the continued excellent quality of water from the Catskill/Delaware System and points to certain localized improvements that are a result of program implementation. A summary of those water quality findings is provided below.

Water Quality Monitoring Overview

DEP conducts extensive water quality monitoring throughout the watershed. The 2018 Watershed Water Quality Monitoring Plan (WWQMP) describes this monitoring plan. The plan and its associated addenda are designed to meet the broad range of DEP's many regulatory and informational requirements. The overall goal of the plan is to establish an objective-based water quality monitoring network, which provides scientifically defensible information regarding the understanding, protection, and management of the New York City water supply. The objectives of this monitoring plan have been defined by the requirements of those who ultimately require the information, including DEP program administrators, regulators, and other external agencies. As such, monitoring requirements were derived from legally binding mandates, stakeholder agreements, operations, and watershed management information needs. The plan covers four major areas that require ongoing attention: compliance, FAD program evaluation, surveillance monitoring, and modeling support, with many specific objectives within these major areas.

As New York City's water supply is one of the few large water supplies in the country that qualifies for filtration avoidance, based on both objective water quality criteria and subjective watershed protection requirements, NYSDOH has specified many requirements in the 2017 FAD that must be met to protect public health. These objectives form the basis for the City's ongoing assessment of watershed conditions, changes in water quality, and ultimately any modifications to the strategies, management, and policies of the long-term watershed protection program. The City also conducts a periodic assessment of the effectiveness of the watershed protection program. DEP's water quality monitoring data, including data relating to stream

benthic macroinvertebrates, are essential to perform this evaluation. Program effects on water quality are reported in the Watershed Protection Summary and Assessment reports which are produced every five years.

Samples collected under the auspices of the WWQMP are brought to DEP laboratories for analysis. The laboratories are certified by NYSDOH's Environmental Laboratory Approval Program (ELAP) for over 100 environmental analyses in the non-potable and potable water categories. These analyses include physical analytes (e.g., pH, turbidity, color, conductivity), chemical parameters (e.g., nitrates, phosphates, chloride, chlorine residual, alkalinity), microbiological parameters (e.g., total and fecal coliform bacteria, algae), trace metals (e.g., lead, copper, arsenic, mercury, nickel), and organic parameters (e.g., organic carbon).

In addition to the water quality monitoring discussed above, DEP has developed a continuous water quality monitoring program and continues to update a Robotic Water Quality Monitoring Network (RoboMon) in the watershed. Continuous monitoring data are obtained at key aqueduct and intake locations, key upstate reservoirs, and selected watershed tributaries to provide critical data for immediate use in decision making by water supply managers, as well as for water quality model development and model forecasting.

In summary, the monitoring plan has been designed to meet the broad range of DEP's regulatory obligations and informational needs. These requirements include the following: compliance with all federal, state, and local regulations to ensure safety of the water supply for public health; watershed protection and improvement to meet the terms of the 2017 FAD; the need for current and future predictions of watershed conditions and reservoir water quality to ensure that operational decisions and policies are fully supported over the long term; and that ongoing surveillance of the water supply will continue to ensure delivery of the best water quality to consumers.

Water Quality Data Analysis

The accumulation of a long-term database has allowed DEP to identify and address existing water quality conditions, identify long-term trends, guide operations, and determine effectiveness of watershed programs. The 2021 Watershed Protection Program Summary and Assessment provides the most recent evaluation of water quality conditions and uses all data available since the beginning of DEP's first FAD in 1993. This allows DEP to examine trends over more than two decades. It provides a view of water quality changes in the context of variation caused by natural events such as floods and droughts, which are not sufficiently represented in a five-year period. Long-term data are needed to show the effects of the watershed protection programs because there are time lags between program implementation (causes) and water quality changes (effects). The water quality data from the early 1990s represents conditions at the outset of filtration avoidance when many watershed protection programs were in their infancy. Sufficient time has now passed since programs have been in place that the major effects of programs on water quality have become apparent. Since many programs were

implemented in the decade between 2000 and 2010, the current conditions are a phase when the effects of the watershed programs are reflected in water quality, as surface water reaches its new 'steady state' with watershed conditions.

There are several important factors that govern water quality over the long term. Perhaps the two most important are climate, as a determinant of precipitation and therefore water residence times, and land use, as a determinant of substance loadings. Given the general environmental conditions in each basin, DEP has examined the effectiveness of watershed protection programs to maintain a clean water supply through a series of analyses. These include the status and trends of water quality in streams and reservoirs as indicated by various analytes or indices, the trophic response of reservoirs, and pathogen assessment. This has allowed DEP to demonstrate central tendencies and trends in the water quality data over an extended period during and after watershed protection program implementation.

In addition to water quality samples, macroinvertebrate indices were calculated to provide insight into the ecological conditions of streams and changes in water quality. Macroinvertebrates biologically integrate conditions over time so they are seen as important indicators of stream water quality. The impact of the waterfowl management program and its ability to control and reduce fecal coliform bacteria have been demonstrated over the past 25 years. Finally, a prior analysis of pathogen transport through the system provided much insight into the benefit of NYC's sequential system of reservoirs and the natural processes that improve water quality as it travels towards distribution. With these approaches, DEP has examined the relationships between watershed protection and water quality changes.

Water Quality Conditions for the Catskill and Delaware Systems

Overall, the water quality in the Catskill and Delaware reservoirs remains excellent, which reflects the ongoing investment in watershed protection. Total phosphorus reductions from a combination of wastewater treatment plant upgrades, septic system improvements, and extensive implementation of agricultural BMPs have been significant. For example, Cannonsville Reservoir geometric mean total phosphorus was 26.8 µg L-1 in 1991 and was 14.3 µg L-1 in 2020. While the Catskill System encounters intermittent increases in turbidity and phosphorus associated with storm events, the system recovers rapidly.

Water Quality Conditions for the East of Hudson Catskill/Delaware Basin System

Water quality in West Branch and Kensico basins continues to be excellent. Decreasing trends in turbidity, fecal coliforms, and total phosphorus in the inputs to West Branch were attributed to improvements made through watershed protection programs. The Cross River and Croton Falls basins are classified as "potential" Delaware System basins because water from these basins only enters the Delaware Aqueduct when intentionally pumped into it, and this is a rare occurrence. Water quality in the Cross River and Croton Falls basins has been generally good. The median Trophic State Index (TSI) was in the eutrophic range for both reservoirs and the basins remain listed as phosphorus-restricted in 2020. Trends in turbidity were downward for

the output from Cross River basin and attributed primarily to recovery from drawdown related to dam repairs. Additional details on the water quality assessment and long-term trends can be found in the 2021 Watershed Protection Summary and Assessment Report.

Trophic Response of Reservoirs

The trophic response of reservoirs to the combined effects of watershed protection programs and major environmental events was examined through four relationships selected from the Programme on Eutrophication sponsored by the Organization for Economic Cooperation and Development. These analyses highlight the biological responses to major environmental drivers such as hurricanes and floods, as well as overall shifts in nutrients, algal biomass, and transparency over the course of time and have supported the policy of reducing total phosphorus as a means of eutrophication control.

There have been vast improvements in the Cannonsville Reservoir over the past 25 years for mean and maximum chlorophyll, phosphorus, and Secchi depth. More subtle changes have taken place in the other reservoirs and the trends statistics are appropriate for characterization of those changes. In contrast, the variations in the Catskill System reservoirs are highly dependent on extreme hydrological events and turbidity that can persist in the reservoirs for several months. Kensico appears to have slowly decreasing phosphorus levels, while West Branch seems to drift up, which may be due to operations. In the East of Hudson (EOH) reservoirs equipped with pump stations that can supplement the Delaware Aqueduct, Cross River and the main basin of Croton Falls generally have similar water quality; however, the upstream sites of Croton Falls tend to be more eutrophic.

Water Quality Modeling Program

In addition to statistical analysis, DEP conducts extensive modeling analyses. Models are used by DEP to manage water quality over both long- and short-term periods. Model analysis using the long-term database allows DEP to separate the effects of important natural factors that influence water quality from the effects of watershed protection programs. Further, it allows DEP to estimate the relative effects of different watershed protection programs and may be used to guide priorities. DEP employs models for short-term events (on the order of months) to optimize reservoir operations and to determine when treatment may be necessary. Model application is thus used at DEP for diagnostic analysis and water supply decision support.

DEP continues to aggressively build its modeling capabilities. In the near future, calibration and validation of the spatially distributed models will provide greater insight into the effects of specific watershed protection measures so that DEP can continue to refine project implementation for maximum effectiveness.

1.4 DEP's Long-Term Program

Over the past 30 years of source water protection, the City has developed and implemented a multi-faceted, comprehensive long-term program that forms the basis for its

continued filtration waiver. DEP's plan for the next five years is outlined in the following sections of this document. The proposed program represents DEP's continued commitment to long-term watershed protection.

DEP continues to review and refine programs, based on accomplishments to date and watershed and water quality conditions. As described above, virtually every program element has achieved a very high level of implementation, and direct water quality benefits have been observed. In many cases, programs have transitioned from intensive implementation to a maintenance phase. In other cases, program focus has shifted geographically or greater emphasis has been placed on certain types of activities. These program modifications are to be expected – in fact, they are necessary – as DEP's efforts have matured. In the coming years the City will continue to evaluate and adjust programs as needed to ensure the continued effectiveness and cost-effectiveness.

The long-term plan submitted by DEP in December 2016 represented the first-ever 10-year source water protection plan developed by DEP. It included a full suite of programmatic commitments through 2027. This plan retains the vast majority of the commitments made by DEP in the 2016 plan, many of which have been completed, and offers certain modifications to select program activities. Many of the modifications stem from the expert panel review of the source water protection program undertaken by the National Academy of Sciences, Engineering and Medicine (NASEM). In 2000, a National Academy of Sciences panel reviewed the City's proposed watershed management plan and provided a strong endorsement of the approach to public health protection. A new panel was convened to evaluate DEP's implementation of that plan and to offer suggestions on the next phase of source water protection. This panel report, issued in 2020, confirmed the effectiveness of DEP's overall strategy and concluded that the program could be expected to continue to protect water quality. Further, the panel determined that there are a number of options for combinations of future program implementation which are all likely to achieve the same water quality protection benefits. With that in mind, the panel offered recommendations for program modifications that take cost-effectiveness and community vitality into consideration.

With this plan, DEP continues to demonstrate the City's long-term commitment to support activities that sustain and protect public health. The scope of the plan also provides stakeholders – watershed communities, contracting partners, water supply consumers, environmental parties and regulators – certainty about the levels of implementation across a range of programs for the coming five years. Since the initiation of the source water protection program in the early 1990s, the City has spent or committed in excess of $2.7 billion to protect water quality and public health.

Independent of and reinforcing DEP's commitments under the FAD, the 2010 Water Supply Permit requires DEP to fund and implement many of these same programs. Consistent with the language of the Surface Water Treatment Rule, the FAD requires DEP to implement its

watershed control program without regard to cost and does not characterize requirements in terms of monetary commitments. Similarly, while the partnership between the City and the watershed communities, among other entities, is an important element of DEP's ability to implement the watershed control program effectively, and therefore important to filtration avoidance, the FAD itself focuses on program implementation rather than specifically on partnership commitments. DEP will comply with its commitments under the Water Supply Permit but notes that these requirements are not themselves enforceable requirements of the FAD.

Support from and cooperation with watershed partners is essential to the successful implementation of the City's program. It is important to emphasize that no protection program for the City's water supply, no matter how carefully crafted, can succeed without support and involvement of the City's partners and watershed stakeholders. Perhaps the greatest achievement of the past quarter century has been the development of vital, locally-based organizations working with the DEP on the common goal of watershed protection. Initially the City was reluctant to cede responsibility for program implementation to others, but the development of successful partnerships with organizations like the Catskill Watershed Corporation (CWC), the Watershed Agricultural Council (WAC), and county Soil and Water Conservation Districts, led the City to recognize that long-term watershed protection can and will be advanced through such partnerships. Continued cooperation with DEP's implementation partners is an integral part of the City's long-term vision for protecting the water supply. To promote collaboration, DEP has occupied a new office with CWC in Arkville. By sharing workspace – centrally located in the heart of the watershed – DEP and CWC can further improve coordination and responsiveness to watershed communities.

2. Long-Term Watershed Protection Program

2.1 Filtration Avoidance Criteria Requirements

The Surface Water Treatment Rule (SWTR) and the Long Term 2 Enhanced Surface Water Treatment Rule (LT2) established requirements for unfiltered surface water supply systems, some specifically identified as filtration avoidance criteria, which require that all surface water supplies provide filtration unless certain source water quality, disinfection, and site-specific avoidance criteria are met. In addition, the supplier must comply with (1) the Revised Total Coliform Rule (RTCR), and (2) the Stage 1 Disinfectant and Disinfection Byproducts Rule. The 2007 FAD required ongoing monitoring and periodic reporting related to SDWA compliance activities.

DEP will continue to report to NYSDOH and USEPA on two items not specifically required by the SWTR as conditions of filtration avoidance. The FAD items are to (1) report on the operational status of the Catskill/Delaware Ultraviolet Disinfection Facility, as required by LT2; and (2) notify NYSDOH and USEPA within 24 hours of learning that a sample from a distribution system RTCR compliance site has tested positive for *E. coli*.

2.1.1 Expert Panel Review

The 2017 FAD continued the requirement from the Revised 2007 FAD that the City convene an expert panel to review the City's Long-Term Watershed Protection Plan, water quality and water quality trends, and anticipated future activities that might adversely impact the City's water supply. The City achieved this requirement through a contract with the National Academies of Science, Engineering, and Medicine (NASEM) which commenced in March 2018. The 17-member expert panel met a total of eight times from 2018 through early 2020, received public comments, met with stakeholders, reviewed extensive documentation, conducted site visits and analyzed water quality and programmatic data. The final report was released in December 2020. The report contains numerous recommendations for enhancement, integration and evaluation of watershed programs. Following the release of the NASEM report, DEP convened five stakeholder meetings in January, February and April 2021 to discuss the major recommendations and potential changes to the City's Long-Term Watershed Protection Plan and, correspondingly, some requirements of this Long-Term Watershed Protection Plan.

DEP will continue the above monitoring requirements as specified in the SWTR, and in accordance with the milestones contained therein, and in accordance with any additions/clarifications below.

Table 2.1 Filtration Avoidance Criteria Requirements

Requirement	***Due Date***
Continue to meet SWTR filtration avoidance criteria (40 CFR §141.71 and §141.171, and 10 NYCRR §5-1.30) and submit reports and certification of compliance on: • §141.71(a)(1) and §5-1.30(c)(1) - Raw water fecal coliform concentrations • §141.71(a)(2) and §5-1.30(c)(2) - Raw water turbidity sampling • §141.71(b)(1)(i)/§141.72(a)(1) and §5-1.30(c)(3) - raw water disinfection CT values • §141.71(b)(1)(ii)/§141.72(a)(2) and §5-1.30(c)(4) - Operational status of Kensico and Hillview disinfection facilities, including generators and alarm systems. • §141.71(b)(1)(iii)/§141.72(a)(3) and §5-1.30(c)(5) - Entry point chlorine residual levels • §141.71(b)(1)(iv)/§141.72(a)(4) and §5-1.30(c)(6) - Distribution system disinfection levels (The City will include a discussion of any remedial measures taken if chlorine residual levels are not maintained throughout system.) • §141.71(b)(5) and §5-1.30(c)(10) - Distribution system coliform monitoring, including a summary of the number of samples taken, how many tested positive for total coliform, whether the required number of repeat samples were taken at the required locations, and which, if any, total coliform positive samples were also *E. coli* positive. For each *E. coli* positive sample, include the investigation of potential causes, problems identified and what has or will be done to remediate problems. Include copies of any public notices issued as well as dates and frequency of issuance.	Monthly
All requirements described in §141.71(b)(4) and §5-1.30(c)(8) must continue to be met. Notify NYSDOH/USEPA within 24 hours of any suspected waterborne disease outbreak.	Event Based
All requirements described in §141.71(b)(6) and §5-1.30(c)(9) must continue to be met. Submit report on disinfection byproduct monitoring results.	Quarterly
Notify NYSDOH/USEPA within 24 hours, if at any time the chlorine residual falls below 0.2 mg/l in the water entering the distribution system.	Event Based
Notify NYSDOH/USEPA by the close of the next business day, whether or not the chlorine residual was restored within 4 hours.	Event Based

Requirement	*Due Date*
Report on the operational status of Kensico Reservoir, West Branch Reservoir (on-line or by-pass), Hillview Reservoir, and whether any of these reservoirs experienced unusual water quality conditions.	Monthly
Regarding the emergency/dependability use of Croton Falls and Cross River source water: • The City shall not introduce Croton Falls or Cross River source water into the Catskill/Delaware water supply system without the prior written approval of NYSDOH. • As a condition of approval, the City must demonstrate continuing, substantial compliance with the watershed protection program elements being implemented in the Croton Falls and Cross River watersheds that are contained in this determination. • As a condition of approval, the City will submit water quality data and monitor water quality at Croton Falls and/or Cross River, pursuant to the approved sampling plan submitted to NYSDOH/USEPA in November 2019, or as revised thereafter. NYSDOH approval under this section may include additional conditions, including, but not limited to, project schedules or specific operating goals or parameters for the City's water supply facilities (such as maximizing use of the Croton Filtration Plant, or operation of the Catskill/Delaware UV Plant at 3-log inactivation). As used in this section, the term "NYSDOH" is defined as the primacy agency. In evaluating requests for approval from the City, the primacy agency shall consult with USEPA.	Continuous
Contract with the NASEM (formerly known as the National Research Council, NRC) to conduct an expert panel review of the City's Long-Term Watershed Protection Plan, water quality and water quality trends, and anticipated future activities that might adversely impact the water supply and its ability to comply with 40 CFR §141.71 and §141.171, and 10 NYCRR §5-1.30. Evaluate the adequacy of the City's Watershed Protection Programs for addressing these concerns and provide recommendations, as necessary, for improving programs. • Issue Commence Work notice to NASEM. • Upon request of the NASEM provide any necessary background information and respond to any pertinent questions within the scope of the review.	1/31/2018 Completed Completed

Requirement	*Due Date*
• Ensure the schedule for public meetings is widely available either on a project-specific website, NRC website or the DEP website.	Completed
• Report on the status of the Expert Panel review in the FAD Annual Report.	Annually, 3/31 Completed
• Provide the final report to NYSDOH, USEPA and NYSDEC.	12/15/2020 Completed
• Convene a public meeting with the regulators and watershed stakeholders to discuss the major findings and recommendations of the NRC Expert Panel review.	Completed

Table 2.2 Filtration Avoidance Criteria Reporting Milestones

Report Description	*Due Date*
Report on program implementation in the FAD Annual Report.	Annually, 3/31

2.2 Environmental Infrastructure

2.2.1 Septic and Sewer Programs

DEP implements a comprehensive set of programs that serve to reduce the number of failing or potentially failing septic systems in the watershed. The goals for the Sewer and Septic Program under the Revised 2017 FAD are the following:

- Provide adequate funding for the Septic Remediation and Replacement Program.
- Provide adequate funding for the Small Business Program.
- Continue to fund the Septic Maintenance Program.
- Complete the currently active Sewer Extension Projects.

In all the septic system programs, where sewer extensions to City-owned WRRFs or to WRRFs not owned by the City are more cost-effective than stand-alone solutions, the City will support the design and construction of such sewer extensions. The City will charge households served by a sewer extension to a City-owned WRRF no more in annual operation and maintenance costs than the maximum for households served by WRRFs in the New Infrastructure and Community Wastewater Management Programs pursuant to MOA Paragraph

122. Where a sewer extension to WRRF not owned by the City is warranted, the City will provide additional funding to the owner of the WRRF to cover any annual operation and maintenance costs above the household maximum established in MOA Paragraph 122. Where a sewer extension serves an entity other than a household, the City will provide supplemental funding to ensure that the entity's annual operation and maintenance costs are comparable to those of non-residential sewer users served by WRRFs in the New Infrastructure or Community Wastewater Management Programs.

Septic Remediation and Replacement Program

The Septic Remediation and Replacement Program provides for pump-outs and inspections of septic systems serving single or two-family residences in the WOH watershed; upgrades of substandard systems; and remediation or replacement of systems that are failing or reasonably likely to fail in the near future. Participation is available to all residential properties with provisions for prioritization based on distance to watercourse or within the 60-day travel time area. The goal is to ensure funding is in place to remediate or replace approximately 300 failing or likely-to-fail septic systems per year. DEP and CWC are discussing potential modifications to the septic contract to provide additional funding to ensure the program stays open to new applicants.

The City previously funded the alternate design Septic Program under the 1997 MOA to address the incremental compliance costs of the septic provisions of the WR&Rs. In 2019, CWC incorporated the balance of alternate design funding into the Septic Remediation and Replacement Program.

Expanded Septic Program

The Expanded Septic Program (formerly the Small Business Septic System Rehabilitation and Replacement Program) helps pay for repair or replacement of failed septic systems serving small businesses, not-for-profit organizations, and governmental agencies in the WOH watershed. The City and CWC expanded the program per the 2017 FAD to include funding for 100% of the costs of repairs and qualifying alterations and modifications to septic systems for: small businesses with 20 or fewer employees; not-for-profit organizations with 5 or fewer locally-based employees; and governmental entities. The City also funded 75% of the costs of repairs of, and qualifying modifications to, septic systems up to $100,000 for a single system, plus 100% of any cost over $100,000 for small businesses with 21 or more employees; and not-for-profit organizations with 6 six or more locally-based employees. For any equipment or methods of operation required solely by the WR&Rs and not otherwise required by state or federal law, the City will fund 100% of the cost for a septic system serving a population center or an entity that is "public" for purposes of Public Health Law (PHL) Section 1104.

Cluster System Program

The Cluster System Program was established in 2008 to fund the planning, design, and construction of cluster systems in 13 communities in the WOH watershed. Through CWC,

eligible communities were afforded the opportunity to establish septic districts that would support cluster systems and tie multiple properties to a single subsurface disposal system located on larger sites with sufficient treatment capabilities. Since there has not been a demonstrated need for this program in the 13 years since it was established, DEP will work with CWC to conclude the standalone Cluster Program and explore options for utilizing the $2 million in available Cluster Program funds already paid to CWC for eligible septic projects, including cluster systems should future projects materialize.

Septic Maintenance Program

The Septic System Maintenance Program is a voluntary program open to eligible participants who constructed new septic systems after 1997 or participated in the one of the septic repair programs; it is intended to reduce the occurrence of septic system failures through regular pump-outs and maintenance. Through CWC, participants are reimbursed 50% of eligible costs for pump-outs and maintenance. As part of the program, CWC also develops and disseminates septic system maintenance educational materials. The goal is to continue to fund 50% of the cost for septic pump-outs to qualified properties to enhance the function, and reduce the incidence of failures, of septic systems throughout the WOH watershed.

Sewer Extension Program

The Sewer Extension Program has funded the design and construction of wastewater sewer extensions connected to City-owned WRRFs discharging in the WOH watershed. The goal of this program is to reduce the number of failing or potentially failing septic systems by extending WRRF service to priority areas. The City has completed projects in the towns of Roxbury (Grand Gorge WRRF); Hunter-Haines Falls (Tannersville WRRF); Neversink (Grahamsville WRRF); Hunter-Showers Road (Tannersville WRRF) Shandaken (Pine Hill WRRF); and Middletown (Margaretville WRRF). This program is concluded.

Table 2.3 Septic and Sewer Program Planned Activities/Milestones

Activity	***Due Date***
In accordance with CWC Program Rules, contract with CWC to provide adequate funding in support of the Septic Remediation and Replacement Program at a funding level sufficient to address 300 septic systems per year and to cover the future costs of additional septic systems as they are identified and enrolled in the program.	Ongoing

In accordance with CWC Program Rules, contract with CWC to provide adequate funding in support of the Expanded Septic System Program provided that the need for such funding has been demonstrated • Make additional funding available to the Expanded Septic System Program to address a total of 15 systems per year. A minimum of $13 million shall be made available to this program through 2027. • Reimburse CWC for funding used to support the Expanded Septic System Program prior to contract execution.	Ongoing 6/30/2019 Ongoing 6/30/2019 Completed
In accordance with CWC Program Rules, contract with CWC to provide adequate funding in support of the Cluster System Program component of the Septic Remediation and Replacement Program provided that the need for such funding has been demonstrated. • Work with CWC to modify the Cluster System Program Rules, if the City and CWC conclude that modifications are necessary to facilitate implementation of cluster systems. Such modifications may include, but are not limited to: (1) incorporating defined time frames for milestones in project schedules (e.g., Study phase to be completed 1 year after community agrees to participate in the program; funding for project to be approved or denied within 90 days after receipt of completed Study Phase report.); (2) indicating that if the study phase determines that a cluster system(s) is not the most cost-effective wastewater solution for an area identifiedwith septic system failures, then the consultant may recommend a more cost-effective solution (e.g., sewer extension or other wastewater management system); (3) clarifying that where a sewer extension to a City-owned WRRF or to a WRRF not owned by the City is the most cost-effective solution, the City will provide funding to ensure that operation and maintenance costs charged to the entities served by such a sewer extension are comparable to what they would be under the New Infrastructure and Community Wastewater Management Programs; and (4) identifying operation and maintenance costs of cluster systems that are eligible for funding under the program. Make an additional $1 million available to the Cluster System Program to cover the eligible operation and maintenance costs of	Ongoing 6/30/2018 Completed 6/30/2019

cluster systems that are implemented under the program. The need for additional funding for this program will be assessed annually.	Completed
Contract with CWC to provide funding, if necessary, to allow maintenance each year of 20% of the total number of septic systems eligible under the Septic Maintenance Program Rules.	Ongoing
Construct sewer extension projects in Shandaken (Pine Hill WRRF), Middletown (Margaretville WRRF).	Completed
Support the use of the already provided funding to cover the eligible incremental costs for septic systems serving population centers or entities that are "public" for purposes of PHL Section 1104 to comply with the septic system provisions of the WR&Rs to the extent that they are not otherwise required by state or federal regulations.	Ongoing

Table 2.4 Septic and Sewer Program Reporting Milestones

Report Description	***Due Date***
Report on program implementation in the FAD Annual Report, until completed: • Septic Remediation and Replacement Program • Expanded Septic Program • Septic Maintenance Program	Annually, 3/31

2.2.2 Community Wastewater Management Program

The Community Wastewater Management Program (CWMP) funds construction of community septic systems and/or septic maintenance districts in communities identified in Paragraph 122 of the MOA (the 8-22 communities).

Table 2.5 Status of Community Wastewater Management Program projects

Community	*Project*	*Design Flow (gpd)*	*Status*
Bloomville	Community Septic w/ Sand Filter	30,000	Completed 2009
Boiceville	Collection System w/ WRRF	75,000	Completed 2010
Hamden	Community Septic w/ Sand Filter	26,000	Completed 2009
DeLancey	Septic Maintenance District	NA	Completed 2007
Bovina	Community Septic System	25,000	Completed 2006
Ashland	Collection System w/ WRRF	26,000	Completed 2011
Haines Falls	NA – Sewer Extension Program	NA	Completed 2006
Trout Creek	Community Septic w/ Sand Filter	16,000	Completed 2014
Lexington	Community Septic w/ Sand Filter	19,000	Completed 2016
South Kortright	Collection System pump to Hobart	20,000	Completed 2016
Shandaken	Septic Maintenance District	NA	Completed 2020
West Conesville	Community Septic System	15,000	Completed 2021
Claryville	Septic Maintenance Districts	NA	Completed 2020
Halcottsville	Pump to Margaretville WRRF	14,075	Design Completed 2021
New Kingston	Community Septic System	9,000	95% Design Completed 2021

This program is designed to improve water quality and protect public health by reducing the transport of pathogens, nutrients and organic matter into waterways. Much of this work has already been completed and final projects have been completed for the following communities: Bloomville, Boiceville, Hamden, DeLancey, Bovina, Ashland, Haines Falls, Trout Creek, Lexington, South Kortright, Shandaken, Claryville, and West Conesville. The New Kingston and Halcottsville projects have received block grant approval, completed design, and are eligible to start the construction phase. However, construction bids exceed the initial estimate and a CWC

contract change order is underway to provide additional funding. During the initial five years of the 2017 FAD, the City consulted with CWC to update design and construction dates for several CWMP projects that were subsequently approved by NYSDOH as revised 2017 FAD milestones; where applicable, these revised dates are indicated as such to distinguish from the original estimated dates.

The potential need for a community wastewater management system for the Hamlet of Shokan was identified subsequent to the MOA. The Revised 2007 FAD required the City to complete a study to determine that potential need. Under the 2017 FAD, NYSDOH directed the City to fund an engineering study to determine the appropriate community wastewater management system to serve the Hamlet of Shokan in the Town of Olive, as well as to fund the design and construction of that system. The Shokan project scope has since been expanded beyond the Hamlet of Shokan to also include the Boiceville wastewater service area. The City issued the block grant for the Shokan project in August 2020.

Table 2.6 Community Wastewater Management Program Planned Activities/Milestones

Activity	***Due Date***
Complete preliminary study for Halcottsville and New Kingston.	Completed
Approve block grant for Halcottsville.	Completed
Approve block grant for New Kingston.	Six months from date of completed study phase (estimated 3/31/2018) Completed
Complete design for the following projects:	One year from date of town approval to enter design phase
• Shandaken	Estimated 9/30/2018 Completed
• Claryville	Estimated 10/31/2018 Revised 5/31/2019 Completed
• West Conesville	Estimated 12/31/2018

	Revised 3/31/2020 Completed
• Halcottsville	Estimated 12/31/2018 Revised 3/31/2021 Completed
• New Kingston	Estimated 6/30/2019 Revised 6/30/2021 Completed
Complete construction for the following projects:	Two years from date of completed Design Phase
• Shandaken	Estimated 9/30/2020 Completed
• Claryville	Estimated 10/31/2020 Completed
• West Conesville	Estimated 12/31/2020 Revised 9/30/2021 Completed
• Halcottsville	Estimated 12/31/2020 Revised 6/30/2024
• New Kingston	Estimated 6/30/2021 Revised 6/30/2024

Community Wastewater System for the Hamlet of Shokan	
• Work with CWC to provide funding for the engineering study for a community wastewater system for the Hamlet of Shokan.	Completed
• Contract with CWC to provide funding to implement the Shokan project.	12/31/2018 Completed
• Complete preliminary study for Shokan, which includes the proposed service area to be approved by NYSDOH, USEPAand NYSDEC.	3/31/2019 Completed
• Approve block grant for Shokan project.	Six months from date of completed study phase (estimated 9/30/2019) Completed
• Contract with CWC to provide balance of block grant funding for the Shokan project.	12/31/2022
• Complete design for Shokan.	One year from date of town approval to enter design phase (estimated 12/31/2020; revised 12/31/2022)
• Complete construction for Shokan.	Two years from date of completed design phase (estimated 12/31/2022; revised 12/31/2024)

Table 2.7 Community Wastewater Management Program Reporting Milestones

Report Description	*Due Date*
Report on program implementation in the FAD Annual Report, until completed: • West Conesville • Halcottsville • New Kingston • Shokan	Annually, 3/31

2.2.3 Stormwater Programs

As part of the MOA, the City established two stormwater cost-sharing programs: (1) Future Stormwater Controls paid for by the City for Single Family Houses; Small Businesses and Low Income Housing Program; and (2) the WOH Future Stormwater Controls Program. These programs provide financial support for the cost of designing, constructing and, in some cases, maintaining stormwater controls that are required by the WR&Rs, but not otherwise required by federal or state law, for certain new development projects.

The Stormwater Retrofit Program was established in the MOA. The program addresses existing stormwater runoff problems in the WOH watershed through the construction of stormwater BMPs. Funding is provided for design, permitting, construction, and maintenance of BMPs that address runoff from concentrated areas of impervious surfaces, as well as community-wide stormwater infrastructure assessment and planning. Program funding can also be used for retrofit projects installed in coordination with the CWMP. Additionally, DEP provided CWC with funds for an appropriate position at CWC to assist applicants undertaking regulated activities to comply with the stormwater provisions of the WR&R.

The goals for the Stormwater Program under the Revised 2017 FAD are as follows:

- Fund eligible incremental costs to comply with the stormwater provisions of the City's WR&R.
- Ensure funding for a position at CWC to assist applicants in complying with the stormwater provisions of the City's WR&R.
- Provide funding for nine stormwater retrofit projects per year.
- Fund operations and maintenance of retrofit projects completed under the Stormwater Retrofit Program.
- Contract with CWC to fund payments under MOA Paragraph 145 via CWC instead of directly from the City.

Table 2.8 Stormwater Controls Programs Planned Activities/Milestones

Activity	*Due Date*
Contract with CWC to provide $4,720,869 to CWC to replenish the Future Stormwater Funds to be used in accordance with MOA Paragraph 128.	On or Before 5/31/2019 Completed
Fund, in accordance with the MOA, and consistent with the CWC program rules, as amended, the eligible incremental costs to comply with the stormwater provisions of the WR&R to the extent that they are not otherwise required by federal or state law.	Ongoing
Contract with CWC to provide adequate funding for an appropriate position at CWC to assist applicants undertaking regulated activities to comply with the stormwater provisions of the WR&R.	Ongoing
Continue to contract with CWC to provide the funding needed to allow the Stormwater Retrofit Program to construct nine stormwater retrofit projects per year, consistent with the StormwaterRetrofit Program Rules. Selection and implementation of eligible projects will be based on potential to benefit water quality protection. These projects are in addition to those installed in coordination with CWMP projects.	Ongoing
Support the use of program funding for retrofit projects installed in coordination with CWMP projects.	Ongoing
Continue to contract with CWC to provide the funding needed forthe operations and maintenance of retrofit projects funded throughthe Stormwater Retrofit Program consistent with the Stormwater Retrofit Program Rules, provided the demonstrated need for such funding continues.	Ongoing

Table 2.9 Stormwater Programs Reporting Milestones

Report Description	*Due Date*
Report on implementation of the Future Stormwater Controls Programs and the Stormwater Retrofit Program in the FAD Annual Report.	Annually, 3/31

2.3 Protection and Remediation

2.3.1 Waterfowl Management Program

Surveys of Kensico Reservoir in 1992 established a strong relationship between avian populations and bacteria (fecal coliform) levels in untreated water. As a result, the City instituted a Waterfowl Management Program to reduce or eliminate, where possible, all waterbird activity to mitigate seasonal elevations of fecal coliform bacteria. A similar program was established at Hillview Reservoir, and was expanded on an "as needed" basis to several more reservoirs.

"Bird dispersal" refers to use of pyrotechnics, motorboats, airboats, remote control motorboats,propane cannons, and other methods employed to physically chase or deter waterbirds from inhabiting the reservoirs.

"Bird deterrence" refers to preventative methods employed to prevent waterbirds from inhabitingthe reservoirs, such as: nest and egg depredation, overhead bird deterrent wires, bird netting on shaft buildings, meadow maintenance, and other methods.

"As needed" refers to implementation of bird management measures based on criteria includingfecal coliform concentrations approaching or exceeding 20 colony-forming units at reservoir effluent structures coincident with elevated bird populations. Other criteria include current bird populations, recent weather events, operations flow conditions within the reservoir, reservoir ice coverage and watershed snow cover, and determination that active bird management measures would be effective in reducing bird populations and fecal coliform bacteria levels.

The management of waterbird populations will continue to assist New York City in maintaining compliance with the federal Surface Water Treatment Rule standard for fecal coliform bacteria.

Table 2.10 Waterfowl Management Program Planned Activities/Milestones

Activity	***Due Date***
Active Waterbird Dispersal – Kensico Reservoir	Annually, 8/1 to 3/31
Active Waterbird Dispersal – Hillview Reservoir	Year-round
"As Needed" Bird Dispersal – West Branch, Rondout, Ashokan, Croton Falls, and Cross River reservoirs	Annually, 8/1 to 4/15
"As Needed" Bird Deterrent Measures – Kensico, West Branch, Rondout, Ashokan, Croton Falls, Cross River, and Hillview	Year-round

Table 2.11 Waterfowl Management Program Reporting Milestones

Report Description	*Due Date*
Annual summary of Waterfowl Management Program activities at all reservoirs, including wildlife management at Hillview Reservoir (8/1 to 7/31)	Annually, 10/31

2.3.2 Land Acquisition Program

The Land Acquisition Program (LAP) seeks to prevent future degradation of water quality by acquiring environmentally sensitive lands. The overarching goal of the LAP is to ensure that these high priority watershed lands are placed into permanently protected status, either through fee simple purchase or conservation easements (CEs), so that the watershed continues to be a source of high-quality drinking water for the City and upstate counties. In pursuit of this goal, since 1997 the City has secured over 154,000 acres of land and CEs. Prior to 1997, the City owned 34,193 acres of reservoir buffer land. Now more than 39% of the more than one million acres covered by the Catskill/Delaware watershed is currently protected by the City, the state, and/or other entities such as municipalities and land trusts.

DEP's strategy for prioritizing lands for acquisition is defined in its 2012-2022 Long-Term Land Acquisition Plan. This plan focuses its core land acquisition activities for this period toward less-protected basins and sub-basins, in particular the Schoharie, Pepacton, and Cannonsville reservoir basins. The plan also seeks to develop parcel selection procedures that will maximize the water quality benefits of acquisitions. While the long term plan favors the purchase of more cost-effective parcels in the less protected areas of the watershed, DEP has continued to look for opportunities to acquire properties in the well-protected Kensico, West Branch and Boyd Corners reservoir basins when properties important to water quality protection become available.

In addition to the core land acquisition activities, the LAP includes some other important land acquisition efforts in the watershed. The City-funded Flood Buy-Out (NYCFFBO) Program was initiated by the Revised 2007 FAD and allows the City to acquire high-priority improved parcels that are important from a flood mitigation and water-quality perspective, but which did not participate in or qualify for a federal and/or state flood buy-out program. DEP supports, through partnership with WAC, an agricultural and a forest easement program. The Revised 2007 FAD committed the City to fund the costs of stewardship and enforcement of the current and future portfolio of these CEs. The Streamside Acquisition Program (SAP) is being piloted by the Catskill Center, in partnership with the City, to focus on securing, in fee simple or CE, streamside (riparian) buffer lands and floodplains in the Schoharie Reservoir basin. During 2018-2021 the City convened work groups to explore payment approaches and incentives that might increase participation in this program; several were developed and are being implemented. This FAD required an additional $3 million be committed to support the SAP pilot, which the City

completed in 2019. If it is determined that a streamside acquisition program should be continued for the duration of the FAD, the Revised 2017 FAD requires the City to commit an additional $8 million to the program. If needed, additional funding for acquisitions made under the SAP may be drawn from the funding appropriated for the core LAP.

The City has continued to work with land trusts to explore and implement additional ways to enhance the efforts of the LAP. As directed by the FAD, the City convened workgroup meetings with stakeholders to consider the feasibility of a program, in partnership with land trusts and stakeholders, that would protect the majority of each transitioning farm (for example, a farm that is at risk of foreclosure or farms with retiring farmers). This program would seek to secure a conservation easement on the majority of the farm.

The City is authorized to implement the LAP by a Water Supply Permit (WSP) issued by NYSDEC. The current WSP became effective December 2010 and expires in 2025. While the term of the 2017 FAD extends into 2027, solicitation and funding requirements for the LAP beyond 2024 are contingent upon reissuance of the WSP. Application for a WSP to succeed the 2010 WSP is required by June 2022 to ensure adequate time for stakeholder input on the conditions of the successor WSP. In addition, the FAD requires the City to develop a new Long-Term Land Acquisition Plan, which will cover the period 2023-2033 and will consider the findings of the National Academies Expert Panel review of the City's Watershed Protection Program. DEP anticipates that the long term plan and the expert panel findings will also help inform the conditions of the successor WSP.

NYSDOH projects that the funding needed to support the level of solicitation required through 2024 for the City's core LAP will be a minimum of $69.3 million. The City deposited $23 million into a segregated account for land acquisition funds in July 2018 and July 2020; a third deposit of $23 million shall be made in July 2022 or thereafter depending on the City demonstrating a need for this additional funding. Funding for the remaining term of the 2017 FAD will be based on projections for program activity consistent with the 2023-2033 Long-Term Land Acquisition Plan.

Pursuant to discussions with WOH stakeholders, on April 28, 2017, the City provided new or updated town level assessments for 21 WOH towns to NYSDOH, USEPA, NYSDEC, and WOH stakeholders. Following the release of those assessments, the City accepted stakeholder comments for 180 days. Based on the updated town level assessments and its review of comments received, the City evaluated the need for modification of its 2012-2022 Long-Term Land Acquisition Plan and discussed its conclusions with NYSDOH, USEPA, and NYSDEC. The City shared the resulting proposed modifications of its solicitation plan with the WOH stakeholders and adopted the modified solicitation plan in 2019.

The City provides funding through the local consultation funds program, administered by the CWC, to cover the eligible costs to communities related to their review of the City's proposed land acquisitions. The City increased the cap on this funding from $30,000 to $40,000

for each incorporated town and village, and up to $5,000 was made available for municipalities to review the updated town level assessments. The goals for the LAP under the Revised 2017 FAD are as follows:

- Continue to acquire land and CEs in accordance with all program requirements set forth in the MOA, FAD, and WSP.
- Develop a new Long-Term Land Acquisition Plan for the period 2023-2033, which will consider the recommendations of the expert panel review of the City's Watershed Protection Program.
- Continue to work with and support partners to secure properties and CEs pursuant to the applicable programs (i.e., the NYCFFBO Program, the Agricultural and Forest Easement Programs, and the SAP, which are funded outside the traditional land acquisition segregated account) and related requirements.
- Explore, develop and begin reporting on additional program metrics that address the water quality protection values of newly acquired parcels as recommended by the National Academies Expert Panel review of the City's Watershed Protection Program.

Table 2.12 Land Acquisition Program Planned Activities/Milestones

Activity	***Due Date***
Continue to provide sufficient funding to support the LAP in accordance with the 2010 WSP and program objectives.	
• The City shall deposit or cause to be deposited $23 million into the land acquisition segregated account.	7/01/2018 Completed
• The City shall deposit or cause to be deposited $23 million into the land acquisition segregated account.	7/01/2020 Completed
• The City shall deposit or cause to be deposited $23 million into land acquisition segregated account, depending on the City demonstrating a need for this additional funding.	7/01/2022 (or later)
During annual budget discussions with NYSDOH, USEPA and NYSDEC, discuss potential need for any additional monies beyond that already committed to all land acquisition programs. If such funding is needed, sequester the funds within six months from written request by NYSDOH.	Annually, 11/30

Activity	*Due Date*
Submit plans for each two-year period to solicit 200,000 acres through 2024.[1] SAP and NYCFFBO acres may be credited 5 acres for every 1 acre solicited pursuant to the agreed methodology. Up to a total of 20,000 acres per year of WAC, SAP, and NYCFFBO acres may be credited towards solicitation goals.	Biennially, beginning October 2018
Accept stakeholder comments on updated town level assessments. If warranted based on the updated town level assessments and comments received, modify the 2012-2022 Long-Term Land Acquisition Plan and submit to NYSDOH for approval. Such a submission may include recommendations for modifications to the solicitation and funding milestones for the core LAP.	Completed 4/30/2018 Completed
Submit a Long-Term Land Acquisition Plan, subject to NYSDOH approval, for the period 2023-2033. This plan will consider the findings of the National Academies expert panel review of the City's watershed protection programs, including the LAP, as well as public input received in response to the expert panel review. Based on the approved plan, solicitation rates for 2025 through 2027 will be determined by NYSDOH, in consultation with USEPA and NYSDEC.[2]	5/31/2023
Submit application for a WSP to succeed the 2010 WSP.	6/30/2022
Contingent upon issuance of a successor WSP to the 2010 WSP, continue to implement the LAP for the remainder of the 2017 FAD term.	Upon issuance of a successor WSP
The City shall deposit or cause to be deposited into the land acquisition segregated account sufficient funds to support projected program activity based on solicitation rates approved for 2025 through 2027.	7/1/2025

Activity	*Due Date*
Revise program rules for the Local Consultation Funds Program and execute and register contract change with CWC to increase the cap on funding to $40,000 per incorporated town or village.	6/30/2018 Completed
Amend agreement with CWC for the Local Consultation Funds Program to provide $5,000 per municipality to review updated town level assessments.	6/30/2018 Completed
Execute and register a contract or contract amendment with WAC to provide $11 million in funding to continue the WAC Agricultural Easement Program for the entire duration of the 2017 FAD.	3/31/2020 Revised 12/31/2021
Continue to work with stakeholders to explore the feasibility of a program that will protect the majority of each transitioning farm (agricultural land that is at risk of foreclosure or farms with retiring farmers). This program would seek to secure a conservation easement on the majority of the farm.	
• Report on the findings of this workgroup.	6/30/2018 Completed
• Meet with NYSDOH, USEPA, and NYSDEC to discuss findings of the workgroup.	7/31/2018 Completed
• If NYSDOH determines, informed by the findings of the workgroup, that a farm transition program would be feasible, compatible with community goals, and beneficial to watershed protection, the City, in consultation with NYSDOH, USEPA, NYSDEC, and stakeholders, shall propose a plan to implement such a program in the watershed.	1/31/2019 Completed
• If required, submit a request to NYSDEC to modify the Water Supply Permit to incorporate this new program.	2/28/2019

Activity	*Due Date*
Based on the requirements of the 2010 WSP, submit a program evaluation report on the NYCFFBO Program. • First evaluation report • Second evaluation report The City shall ensure that funding for full implementation of this program is continued during the evaluation period.	6/15/2018 Completed 6/15/2021 Completed
<u>WAC Forest Conservation Easement</u> Based on the requirements of the 2010 WSP, submit a written evaluation of the WAC Forest Conservation Easement acquisition program, making recommendations as to whether the program should be continued, modified, or terminated, as well as any proposed improvements to the program. If, in accordance with the City's 2010 WSP, a written determination is made by NYSDEC, in consultation with NYSDOH, the City, and other agencies or local governments, to authorize that the WAC Forest Easement Program be continued,the City shall provide WAC a minimum of $8 million to continue the program for the remainder of the 2017 FAD.[3] Such determination will consider the recommendations of the City's evaluation of its ancillary programs. • Complete contract amendment with WAC, including the transfer of funds. If authorization is not given to continue the program, all unused funds, with any earnings thereon, are to be returned to the City to be deposited in the LAP-segregated account for use by the LAP. Submit a status report on the WAC Forest Conservation Easement acquisition program.	Completed Within 18 months from written determination Revised to 6/30/22 12/15/2020 Completed

Activity	*Due Date*
<u>SAP</u> Continue implementation of a $5 million Pilot SAP.	Ongoing, in accordance with the 2010 WSP
Based on the requirements of the 2010 WSP, submit a written evaluation of the SAP, making recommendations as to whether the program should be continued, modified, or terminated, as well as any proposed improvements to the program.	Completed
The City shall execute and register a contract or contract amendment to make an additional $3 million available to the Catskill Center to continue to implement the SAP through at least 2022.	6/30/2019 Completed
Submit a status report on the SAP.	12/15/2020 Completed
If, in accordance with the City's 2010 WSP, a written determination is made by NYSDEC, in consultation with NYSDOH, the City, and other agencies or local governments, to authorize SAP be continued and expanded beyond the Schoharie reservoir basin, execute and register a contract to make a minimum of $8 million available to the Catskill Center to implement or continue to implement such a program for the remainder of the 2017 FAD.[3] Consistent with the WSP, such written determination will include addressing the City's recommendations for the program.	Within 18 months of such written determination
If such determination is issued by NYSDEC, the City shall submit a status report of the expanded SAP in consultation with the Catskill Center.	6/30/2025
If authorization is not given to continue the program, all unused funds, with any earnings thereon, are to be returned to the City to be deposited in the LAP-segregated account for use by the LAP.	
If NYSDOH determines that additional funding is required for acquisitions under the SAP or other streamside acquisition program, funds may be drawn from the City's LAP-segregated account.	As needed
The City convened several working groups of stakeholders to explore payment approaches and incentives that might increase participation by landowners in SAP.	

Activity	*Due Date*
• Convene stakeholder group to develop incentive payments for certain types of properties. • Submit to NYSDOH, USEPA, and NYSDEC for review and NYSDOH approval a proposed approach to provide payment or incentives to increase participation in SAP. If a WSP modification is required to implement this new approach, submit a request to NYSDEC to modify the WSP. • Convene stakeholder subcommittee to develop (1) a proposed subdivision ordinance for towns to consider adopting that would provide waivers for certain SAP configurations and (2) a mechanism to allow third parties to own land acquired through SAP. • Submit proposals on the above two items. • Make incentives available to increase participation in SAP	2/28/2018 Completed 3/31/2019 Completed 6/1/2021 Completed 12/15/2021 Completed Ongoing
Submit a report that evaluates the need, opportunities, and options for enhancing riparian buffer protection efforts in the Kensico and EOH FAD basins, including, but not limited to, establishing a riparian acquisition program for these basins, either through the City's existing programs or another entity. The report shall discuss the metrics used for evaluating these options.	9/30/2018 Completed
Participate in a workgroup convened to assess opportunities to use certain potentially developable LAP-acquired lands that have lower water quality protection value to facilitate relocation of development out of floodplains. • Report on the progress of this workgroup. • Participate in future workgroups if convened by stakeholders.	6/30/2018 Completed Ongoing

Activity	*Due Date*
If requested by a local governmental entity which has applied to FEMA for funding, the City will engage in good faith negotiations to participate in any future federal (FEMA) or state (SOEM) Flood Buy-out (FBO) Program, providing up to 25% of the eligible costs as the local match for each NYC watershed property that is participating in the program and deemed eligible and acceptable by the willing buyer, whether it be the City or local community.	As required by FEMA/SOEM FBO program rules
Continue to implement a NYCFFBO program pursuant to the 2010 WSP, as amended, and agreements with local stakeholders. Properties may be eligible for the program based on municipal concurrence, referral, expected flood mitigation, and water qualitybenefits derived.	Ongoing

[1] Solicitation beyond 2024 is contingent upon re-issuance of a NYSDEC WSP authorizing continuation of the LAP beyond 2025. Solicitation rates beyond 2024 will be evaluated based on the NASEM Expert Panel review of the City's watershed protection programs and public input and will be consistent with the Long-Term Land Acquisition Plan.

[2] Implementation of this Long-Term Land Acquisition Plan beyond 2025 will be contingent upon re-issuance of aNYSDEC WSP authorizing continuation of the LAP beyond 2025.

[3] The requirement to allocate funding for purchases beyond 2025 is contingent upon re-issuance of a NYSDEC WSP authorizing continuation of the LAP beyond 2025. Funding amounts may be re-assessed by NYSDOH based upon the 2023-2033 Long-Term Land Acquisition Plan. With respect to the determinations following the evaluations of the WAC Forest Conservation Easement Program and the SAP, the City will not be required to allocate additional funds for those programs unless and until such acquisitions are also authorized under a NYSDEC WSP.

Table 2.13 Land Acquisition Program Reporting Milestones

Report Description	Due Date
Submit a modified solicitation plan or a statement that the City does not intend to modify the 2012-2022 Long-Term Land Acquisition Plan at this time.	Completed
Submit the first evaluation report on the NYCFFBO Program.	6/15/2018 Completed
Report on progress of workgroup convened to assess opportunities to use LAP-acquired lands to facilitate relocation of development out of the floodplain.	6/30/2018 Completed

Submit report evaluating need, opportunities, and options for enhancing riparian buffer protection efforts in Kensico and EOH FAD basins.	9/30/2018 Completed
Submit proposed approach for providing payments or incentives that might increase participation by landowners in SAP.	3/31/2019 Completed
Submit a status report on the WAC Forest Conservation Easement acquisition program.	12/15/2020 Completed
Submit a status report on the SAP.	12/15/2020 Completed
Submit the second evaluation report on the NYCFFBO Program.	6/15/2021 Completed
Submit a Long-Term Land Acquisition Plan for the period 2023-2033.	5/31/2023
Submit semi-annual reports on program activities and status, including the following: • Acres protected for the categories of riparian buffers, floodplains, wetlands and forest land. • Miles of streambank protected. • Average surface water criteria (SWC) for fee and CE parcels acquired through the core LAP and SAP. • Acres subdivided out of solicited parcels. • Number of solicited acres that result in accepted offers and closed deals.	Semi-annually, 3/31 in FAD Annual Report and 7/31

2.3.3 Land Management Program

The City has made a significant investment in purchasing water supply lands and conservation easements. Purchasing the land is one step. To maximize the utility of these lands in protecting the long-term water supply for the City, however, they must be monitored, managed and secured properly. Effective and routine monitoring of lands and easements is vital to discovering encroachments, timber trespass and overuse of fee lands and potential violations for easements. DEP inspects fee lands on a prioritized basis per its fee monitoring policy (up to once per year) and inspects easements bi-annually, both of which enables DEP to identify and address encroachments expeditiously.

The City supports and provides for many recreational uses of its land. As the second largest public land holder in the watershed, the City has been successful in opening many of its lands and waters for expanded recreational uses, consistent with its mission to protect water quality. Improving some of these lands for recreational access, particularly along the reservoirs, can help address the impacts of overuse if they arise. City lands can also be an important economic component to local communities and the City continues to allow various uses of its lands, such as issuing revocable land use permits and allowing agricultural uses.

The goals for the Land Management Program under the Revised 2017 FAD are as follows:

- Conduct routine monitoring and inspections of City watershed protection lands to meet the primary mission of water quality protection.
- Ensure encroachments and other unauthorized uses of City land are dealt with in a timely manner.
- Facilitate and coordinate the protection and wise use of City lands and natural resources.
- Provide community benefits through allowing compatible recreation and agricultural uses and issuing revocable land use permits.
- Ensure the long-term protection and management of the City's significant investment in fee-lands conservation easements.
- Ensure that all conservation easements - those held by DEP and WAC - are administered effectively including regular monitoring, consideration of activity requests, and documentation and correction of any violations that occur.
- Provide for stewardship funding to WAC as previously agreed.
- Engage recreational users through education and outreach.

Table 2.14 Land Management Program Planned Activities/Milestones

Activity	***Due Date***
Monitor and actively manage water supply lands	Ongoing
Monitor and enforce City watershed conservation easements. Ensure conservation easements held by WAC are inspected as needed, and that violations are addressed in a timely manner for both City and WAC easements.	Ongoing
Continue to assess and implement strategies to increase the public's	Ongoing

recreational use of water supply lands	
When appropriate, inform regulators if and when recreational use policy or proposals are modified to any significant degree	Ongoing
Engage recreational users of City land through outreach and events	Ongoing

Table 2.15 Land Management Program Reporting Milestones

Report Description	***Due Date***
Report on program implementation in the FAD Annual Report.	Annually, 3/31

2.3.4 Watershed Agricultural Program

The Watershed Agricultural Program (WAP) is a voluntary program that represents a successful longstanding partnership between the City and the Watershed Agricultural Council (WAC). The program began as a pilot in 1992 with the main goal of reducing pollution associated with agricultural land use and to protect source water quality. The WAP's primary activities include the development of Whole Farm Plans (WFPs) and the implementation of agricultural best management practices (BMPs), along with the establishment of riparian buffers through the federal Conservation Reserve Enhancement Program (CREP). The WAP also supports nutrient management planning, precision feed management, and diverse educational programs that collectively provide farmers with a comprehensive suite of technical assistance and financial incentives to improve farm management and reduce pollution risks.

After two decades of expansion, the WAP has accumulated technical experience, established strong local leadership, and achieved extensive on-the-ground accomplishments. However, the WAP's historical focus on recruiting new participants and developing WFPs for these participants has resulted in the accumulation of a large BMP workload that needs to be addressed and managed in a more efficient and effective manner moving forward. This should become a greater focus of the WAP during the remainder of the 2017 FAD.

During the Revised 2017 FAD, source water quality protection will remain the WAP's programmatic priority. However, the program will continue to be flexible and responsive to participant needs and pollution risks in the context of shifting farmer demographics and evolving agricultural operations. The priority WAP activities will include the need to repair or replace existing BMPs in a timely manner and managing the growing complexity of an extensive portfolio of voluntary WFPs in various stages of implementation. During the Revised 2017 FAD, the WAP will increase its focus on reducing the backlog of BMPs and improving the timeliness of BMP implementation for already approved WFPs.

To assure effective water quality protection and to sustain working relationships with hundreds of WAP's voluntary participants, the goals under the Revised 2017 FAD include:

- Develop and assess for longer-term continuation a new approach for investigating and repairing certain WAP-implemented BMPs using an in-house field crew of WAP technicians, with a goal of reducing the BMP backlog and becoming more responsive to the BMP repair needs of participants.
- Offer the Nutrient Management Credit Program to all eligible farms.
- Maintain up to 60 eligible farms in the Precision Feed Management Program, ensuring eligible dairy farms are prioritized, while adjusting for evolving trends in watershed dairy and beef operations.
- Engage greater numbers of WAP participants in farmer education programs to improve and enhance farm operation decisions and management behaviors.

Table 2.16 Watershed Agricultural Program Planned Activities/Milestones

Activity	***Due Date***
Manage the current portfolio of active WFPs, including the revision of existing plans and the development of new plans on eligible priority farms based on highest priority water quality concerns.	Ongoing
Conduct annual status reviews on at least 90% of all active WFPs every calendar year, with a goal of 100%.	Ongoing
Continue to implement new priority BMPs on active participating farms with WFPs, with the dual goals of reducing the existing backlog of new priority BMPs and limiting the potential backlog for newly identified BMPs, according to the following milestones: • Design, allocate project funding, and schedule for implementation within a 2-year timeframe at least 50% of all BMPs within pollutant categories I-VI that were identified by WAC as of January 1, 2017. Program funding will be sufficient to achieve a goal of implementing 60% of identified new BMPs based on BMP backlog cost estimates as of January 1, 2017. • Implement all viable BMPs that were designed and scheduled through calendar year 2023.	Ongoing 12/31/2023 12/31/2025
Continue to repair or replace existing BMPs on active participating farms with WFPs, with the dual goals of reducing the backlog of existing BMPs in need of repair or replacement and limiting the	Ongoing

Activity	*Due Date*
potential backlog for newly identified BMPs, according to the following milestones: • Design, allocate project funding, and schedule for implementation within a 2-year timeframe at least 50% of all BMPs needing repair or replacement that were identified by WAC as of January 1, 2017. Program funding will be sufficient to achieve a goal of implementing 70% of identified BMPs needing repair or replacement. • Repair or replace all viable BMPs that were designed and scheduled through calendar year 2022.	12/31/2022 12/31/2024
In consultation with WAC, assess the adequacy of current WAP metrics and submit a report that recommends the continuation of current metrics and/or the consideration of potential new metrics. This report shall also assess the efficacy, cost-effectiveness and contributions of the WAP's in-house field crew towards reducing the BMP backlog and recommend modifications if needed.	6/30/2024
Meet with NYSDOH, USEPA, and NYSDEC to discuss the WAP's metrics and future BMP implementation milestones for calendar year 2025 and beyond.	9/30/2024
In consultation with WAC, develop a Long-Term Management Plan for the WAP that takes into account the evaluation of the BMP backlog reduction metric, existing data on planning and implementation, and recommendations from the NASEM. This plan will include strategies for improving WAP eligibility requirements, prioritizing WFP development and revisions, and more efficiently and effectively implementing BMPs in a timely manner.	3/31/2026
Meet with NYSDOH, USEPA, and NYSDEC to review and discuss adoption of the WAP's Long-Term Management Plan.	6/30/2026
Continue to develop and update nutrient management plans on active participating farms that require such a plan, with a goal of maintaining current nutrient management plans on 90% of all active participating farms that require one.	Ongoing
Continue to offer the Nutrient Management Credit Program to all eligible farms based on water quality protection criteria.	Ongoing

Activity	*Due Date*
Continue to implement the PFM Program on up to 60 eligible beef or dairy farms based on specific benchmarks and eligibility standards that prioritize dairy farms and maximize water quality benefits in a cost-effective manner.	Ongoing
Continue to develop new CREP contracts and re-enroll expiring contracts as needed.	Ongoing
Continue to implement a Farmer Education Program.	Ongoing
Continue to implement an Economic Viability Program.	Ongoing

Table 2.17 Watershed Agricultural Program Reporting Milestones

Report Description	***Due Date***
Report on program implementation in the FAD Annual Report including these benchmarks: • Number of new and revised WFPs completed and approved, as well as the total number of eligible farms awaiting development of a WFP. • Number, types and dollar amounts of both new BMPs and repaired or replaced BMPs implemented each year. • Number, types, and dollar amounts of both new BMPs and repaired or replaced BMPs designed and scheduled for implementation in the following year. • Cumulative percentage of BMP backlog reduced (designed, implemented, or scheduled for implementation). • Number and percentage of annual status reviews completed on active Whole Farm Plans. • Number of new and updated nutrient management plans completed, as well as the percentage of current plans on all active participating farms that require such a plan. • Number of farms participating in the Nutrient Management Credit Program, including number of farms that are eligible for the program at the time of the report and efforts made to offer Nutrient Management Credit to all eligible farms. • Number of farms participating in the PFM Program and a summary of accomplishments. • Number of new and re-enrolled CREP contracts completed, along with a summary of total enrolled and re-enrolled acres. • Summary of Farmer Education Program accomplishments. • Summary of Economic Viability Program accomplishments.	Annually, 3/31
WAP Metrics Assessment and Recommendations Report	6/30/2024
WAP Long-Term Management Plan	3/31/2026

2.3.5 Watershed Forestry Program

The Watershed Forestry Program is a longstanding partnership between the City, WAC, and the United States Forest Service that began in 1997. The primary objective of the Watershed Forestry Program is to encourage long-term management of the watershed forests for both water quality protection and economic viability purposes. A secondary objective is to promote good forest stewardship through the development and implementation of forest management plans; the implementation of BMPs during and after timber harvesting; professional training for loggers and foresters; educational forums for watershed landowners; teacher training and educational programs for upstate and downstate students; and coordination of a watershed model forest program that supports demonstration purposes as well as education and outreach.

The goals of the Watershed Forestry Program under the Revised 2017 FAD are as follows:

- Continue to monitor the use and progress of the new MyWoodlot.com website as a tool for understanding the needs and interests of watershed landowners.
- Explore potential modifications and improvements to the Management Assistance Program (MAP) that may be needed to support and complement the recently redesigned WAC Forest Management Planning Program.

Table 2.18 Watershed Forestry Program Planned Activities/Milestones

Activity	***Due Date***
Continue to support a watershed forest management planning program that encourages landowner participation in New York's forest tax abatement program.	Ongoing
Continue to support the development of forest management plans and the implementation of these plans through the Management Assistance Program (MAP), with a goal of completing at least 60 MAP projects per year.	Ongoing
In consultation with WAC, assess and report on the effectiveness of the MAP in supporting the implementation of forest management plans, including a summary of any modifications that were made to the MAP or additional improvements that may be needed to promote good forest stewardship by landowners.	12/31/2025
Continue to support the implementation of forestry BMPs, with a focus on road BMP projects and forestry stream crossing projects.	Ongoing

Continue to support the Croton Trees for Tribs Program, enhancing program efforts to promote and install riparian plantings in the Kensico, West Branch, and Boyd Corners reservoir basins, with a goal of completing six projects per year in the EOH watershed.	Ongoing
Use MyWoodlot.com and forest landowner education programs to provide family forest owners access to the knowledge they need to make positive conservation decisions for their watershed forests. In consultation with WAC, assess and report on the status and effectiveness of MyWoodlot.com as a tool for understanding the needs and interest of landowners, and providing knowledge to make positive conservation decisions for family forest owners.	Ongoing 12/31/2024
Evaluate the effectiveness of the watershed forest management planning program and landowner education programs once every five years using the Conservation Awareness Index (CAI).	Ongoing
Continue to support professional training for loggers and foresters.	Ongoing
Continue to support educational programs for landowners.	Ongoing
Continue to support school-based education programs for teachers and students in both the watershed and New York City.	Ongoing
Continue to support and coordinate four watershed model forests.	Ongoing

Table 2.19 Watershed Forestry Program Reporting Milestones

Report Description	***Due Date***
Report on program implementation in the FAD Annual Report including: • Number of forest management plans completed, and acres of forestland enrolled in the 480-a program. • Number and types of MAP projects completed. • Number and types of forestry BMP projects completed. • Number of Croton Trees for Tribs projects completed. • Summary of logger and forester training accomplishments.	Annually, 3/31

• Summary of landowner education accomplishments • Summary of school-based education accomplishments • Summary of model forest accomplishments.	
Report on CAI evaluation results for the watershed forest management planning program and landowner education programs.	12/31/2021 12/31/2026
Report on the status and effectiveness of MyWoodlot.com.	12/31/2024
Report on the status and effectiveness of MAP modifications and improvements.	12/31/2025

2.3.6 Stream Management Program

The Stream Management Program (SMP) seeks to improve water quality through the protection and restoration of stream stability and ecological integrity for WOH watershed streams and floodplains. The City will continue to implement the SMP through a series of contractual partnerships with county Soil and Water Conservation Districts (SWCDs) and Cornell Cooperative Extension of Ulster County. Program components include annual action planning based on stream assessments and stakeholder input; water quality-driven stream projects; stakeholder-driven Stream Management Implementation Program (SMIP) projects; the Catskill Streams Buffer Initiative (CSBI); Flood Hazard Mitigation projects; and education, outreach and training.

The goals for the SMP under the Revised 2017 FAD are as follows:

- Conduct stream feature inventories to support project site prioritization.
- Construct at least 24 stream projects.
- Continue stream studies investigating turbidity reduction from stream projects.
- Complete revegetation of at least 5 streambank miles in the WOH watershed.
- Complete Local Flood Analyses (LFAs) and provide funding for the implementation of LFA-recommended projects through SMP and CWC.
- Explore the coordination of CSBI and CREP with local partners to increase riparian buffers on fallow agricultural lands.
- Coordinate in-stream and riparian emergency recovery activities that may become necessary following flooding events with the Statewide Programmatic General Permit for emergency response post-storm recovery activities as jointly issued by NYSDEC and the US Army Corps of Engineers.

- Evaluate the LFHMP for its contribution to the protection of water quality and recommend steps for enhancing this protection in the future.

Table 2.20 Stream Management Program Planned Activities/Milestones

Activity	*Due Date*
Ashokan Projects Complete construction of seven stream management projects within the Ashokan basin with a goal of protecting water quality, in particular by reducing turbidity.	11/30/2018 Completed
DEP will execute and register contracts or contract amendments with SMP partners (Delaware County, Greene County, Sullivan County, and Ulster County Soil and Water conservation districts and Ulster County Cornell Cooperative Extension) to ensure continuity of funding sufficient to continue all SMP programs for the duration of the 2017 FAD. Funding shall be, at a minimum, equivalent, on an annual basis, to the level of funding provided to the SMP under the Revised 2007 FAD SMP partner contracts (excluding LFHM funding), with the addition of an annual inflation adjustment. Total funding for the 10-year FAD period shall be a minimum of $90 million.	Ongoing
Water-Quality Based Stream Projects and Site Selection • DEP and contract partners will meet to review water quality analyses to outline the water quality basis for project site selection and to prioritize the main stems and/or sub-basins for stream feature inventories. • Six stream feature inventories will be conducted in the prioritized tributaries/main stems of the major SMP basins (Schoharie, Ashokan, Neversink/Rondout, and Cannonsville/Pepacton) to identify water quality threats and support project site prioritization. • Design and complete construction of at least 24 stream projects that have a principal benefit of water quality protection or improvement. A minimum of three of the 24 shall be in the Stony Clove watershed (Ashokan) to support the water quality monitoring study and a total of at least eight of the 24 projects shall be in the Ashokan watershed. Stream projects will be selected based on a water quality-	12/31/2018 Completed 12/31/2022 12/31/2027

Activity	*Due Date*
based site selection process and in accordance with the review and prioritization of basin-scale water quality priorities described above. Beginning in 2017, projects completed beyond those required for the Revised 2007 FAD will be counted towards this requirement. Stream Projects may be delayed due to flood events which necessitate a shift in program focus to response and recovery operations. Floods can also change project priorities. Delays can also result from shifts in landowner cooperation. • DEP will propose projects for FAD approval in November of each year.	 Annually, 11/30
CSBI Continue implementation of CSBI by providing technical assistance and conservation guidance to riparian landowners. (This program is also included in the Riparian Buffer Protection Program.) • Convene annual meeting of Riparian Buffer Working Group. • Facilitate the supply of native plant materials to the CSBI. • Implement education, outreach, and marketing strategy with partners. • Seek to establish a partnership between the CSBI program and the CREP program to enable CREP to be implemented on fallow agricultural lands through the CSBI. • Within Delaware County, support the use of funding for a pilot program to be administered by DCSWCD and WAC that will coordinate CSBI and CREP programs to implement CREP on fallow agricultural lands in Delaware County. • Establish metrics, agreed upon by NYSDOH, USEPA, NYSDEC, Delaware County SWCD, WAC, and the City, to evaluate the effectiveness of the Delaware County CSBI/CREP pilot program. • Review progress in extending CREP to eligible fallow agricultural lands through CSBI in the WOH watershed, including progress of the Delaware County CSBI/CREP pilot program.	 Annually, 2/28 Ongoing Ongoing Ongoing Completed 11/30/2018 Completed 11/30/2019 Completed

Activity	*Due Date*
• Submit to NYSDOH recommendations for establishment of a permanent program and estimated funding needs, or discontinuation of the program.	11/30/2019 Completed
• Continue to implement and evaluate the effectiveness of the Delaware County CSBI/CREP pilot program based on established metrics while exploring and assessing other SMP partnership opportunities for extending CREP to eligible fallow agricultural lands through CSBI in the WOH watershed. Submit to NYSDOH a report that recommends establishment of a permanent CSBI/CREP partnership program and estimated funding needs, or discontinuation of the program.	11/30/2025
• If NYSDOH determines the Delaware County CSBI/CREP pilot program is an effective tool for riparian buffer protection, execute and register contracts or contract changes with DCSWCD and WAC, if needed, to fund such a program in Delaware County. The City will ensure adequate funding is available to allow continuity of program activities while contract changes are being implemented.	Within 18 months of determination
• Complete revegetation of a minimum of 10 streambank miles throughout the West of Hudson watershed. This metric may be adjusted following the determination regarding the Delaware County CSBI/CREP pilot program.	11/30/2027
SMIP	
• Continue the local funding programs for the enhanced implementation of stream management plan recommendations, including LFA recommended projects, in the Schoharie, Cannonsville, Pepacton, Neversink, Rondout and Ashokan basins.	Ongoing
• Complete commitment of funds for a minimum of 100 SMIP projects throughout the West of Hudson watershed.	5/21/2027

Local Flood Hazard Mitigation Program (LFHMP)	
• Complete LFAs and provide funding toward implementation of LFA-recommended projects through both the SMP and the CWC in the West of Hudson watershed.	12/31/2027
• Execute and register contracts or contract amendments with SMP partners (Delaware County, Greene County, Sullivan County, and Ulster County Soil and Water conservation districts and Ulster County Cornell Cooperative Extension) to make $15 million available to support a minimum of 50 LFA-generated projects.	Ongoing
• Where such projects include relocations of homes and businesses and the corresponding need to relocate sewer infrastructure, DEP will support the use of funding either for onsite sewage disposal or for sewer extensions to City-owned WRRFs or to WRRFs not owned by the City, based on what solutions are most cost-effective. If a relocation results in a sewer extension, DEP will make funding available to ensure that sewer charges are comparable to what they would be under the New Infrastructure and Community Wastewater Management Programs.	Ongoing
• With NYSDOH, USEPA, and NYSDEC, assess use of $10.1 million committed to the SMP and $17 million committed to the CWC for LFHMPs in accordance with the Revised 2007 FAD, and $15 million committed in 2017 FAD for support of LFA-generated projects, and determine if remaining funding is adequate to meet program needs.	Annually, 11/30 (during FAD annual budget meeting)
• Commit additional LFHMP funding, as needed, to meet program needs.	Within 18 months of determination of need
• Coordinate the LFHMP funding with state and federal flood hazard mitigation agencies to maximize funding to WOH watershed communities and support the preparation of matching grant applications to state and federal programs for implementation of LFA-recommended projects.	Ongoing
• Continue to provide technical support, education, and training to watershed communities to support their use of flood insurance rate maps (FIRMs) and their participation in a variety of floodplain management, flood hazard mitigation, and flood preparedness programs.	Ongoing

Activity	*Due Date*
Water Quality Monitoring Studies • Submit the final Esopus Creek watershed turbidity/suspended sediment study design. • Continued collection and analysis of data for the Esopus Creek watershed turbidity/suspended sediment study. • Submit 3 three proposed Stony Clove restoration projects for approval.	1/31/2017 Completed Ongoing 1/31/2019 Completed
Annual Meeting and Action Plans Meet annually with county contracting partners to review progress made in the previous year within each program area (stream projects, CSBI, SMIP, LFHMP, education/outreach/training and water quality monitoring studies) and re-evaluate priorities as the basis for preparing new action plans for the coming year, especially after major flood events. Submit rolling two-year action plans developed by SMP basin partners that outline upcoming projects and program activities that should place priority on projects that will enhance water quality and restore or protect stream system stability.	Annually, 2/28 Annually, 5/31
Addendum A Coordinate with NYSDEC regarding the implementation of Addendum A to the 1993 Memorandum of Understanding between NYSDEC and the City as it pertains to the review of Article 15 Stream Disturbance Permits, to enhance coordination between the agencies with the goal of ensuring consistency with the recommendations in stream management plans and implementation of stream management projects.	As Needed
Education/Outreach/Training Continue to implement the education/outreach/training strategy for municipal officials with program partners and maintain base education and outreach existing programming in the SMP basin programs, including emergency stream intervention training.	Ongoing

Activity	*Due Date*
Progress Meeting Convene progress meetings with NYSDOH, USEPA, and NYSDEC. An office-based meeting shall be held by 8/30, and a field-based meeting shall be held following the construction season by 10/31.	Twice a year, by 8/30 and 10/31

Table 2.21 Stream Management Program Reporting Milestones

Report Description	*Due Date*
Water Quality Based Stream Projects and Site Selection Submit brief basin specific reports outlining the water quality basis for stream project site selection in the basin during the FAD period and that prioritizes main stem and/or sub-basins for stream feature inventories.	6/30/2019 Completed
Submit descriptions of proposed stream projects to be considered toward the required 24 stream projects.	Annually, 11/30
CSBI • Report on metrics that have been established to evaluate the effectiveness of the Delaware County CSBI/CREP pilot program.	11/30/2018 Completed
• Report on progress in extending CREP to eligible fallow agricultural lands through CSBI in the WOH watershed, including progress of the Delaware County CSBI/CREP pilot program. Report will include recommendations for establishment of a permanent program and estimated funding needs, or discontinuation of the program.	11/30/2019 Completed
• Report on cumulative progress of the Delaware County CSBI/CREP pilot program and other SMP partnership opportunities for extending CREP to eligible fallow agricultural lands through CSBI in the WOH watershed. Report will include recommendations for establishment of a permanent program and estimated funding needs, or discontinuation of the program.	11/30/2025

Report Description	*Due Date*
Local Flood Hazard Mitigation Program (LFHMP) Evaluate the LFHMP for its contribution to the protection of water quality and recommend steps for enhancing this protection in the future. • First evaluation • Second evaluation	6/30/2020 Completed 6/30/2023
Water Quality Monitoring Studies • Submit first five-year study findings. • Submit interim research study findings • Submit final study findings.	11/30/2022 3/31/2024 11/30/2027
Action Plans Each year, submit a rolling two-year action plan for each basin that outlines the upcoming projects in the program areas (Stream Projects, CSBI, SMIP, Education/Outreach/Training, LFHMP and Water Quality Studies).	Annually, 5/31
Annual Report Report on program implementation in the FAD Annual Report: • Site selection of water quality-based projects and status of projects. • CSBI, including miles of streambank revegetated. • Stream Management Implementation Projects, including number of projects funded. • Local Flood Hazard Mitigation Program, including number of LFHM and LFA-generated projects funded, funding amounts, and number of completed projects. • Water Quality Studies. • Watershed Emergency Stream Response Plan.	Annually, 3/31

2.3.7 Riparian Buffer Protection Program

The Riparian Buffer Protection Program, initiated under the 2007 FAD, now consists of several separate efforts undertaken by different City-funded programs, including the Land Acquisition, Watershed Agricultural, Stream Management, and Forestry programs. The multi-

program approach to protecting and restoring buffers ensures buffers on both public and private land are protected, managed, and in many cases, restored.

The Riparian Buffer Protection Program is enhanced by the City's Streamside Acquisition Program (SAP) which is currently piloting the acquisition of riparian buffers in designated areas within the Schoharie watershed. The requirement to acquire riparian buffers is included in both this section and the LAP section.

The goals for the Riparian Buffer Protection Program under the Revised 2017 FAD are as follows:

- Continue existing programs that are protective of riparian buffers.
- Continue implementation of the pilot SAP and expand this program to other parts of the West of Hudson watershed as directed by NYSDEC and NYSDOH, and in accordance with the authorizations required under the City's WSP.
- Explore options for synergies between CREP and CSBI to increase riparian buffers on fallow agricultural lands.

Table 2.22 Riparian Buffers Protection Program Planned Activities/Milestones

Activity	***Due Date***
Continue existing programs that are protective of riparian buffers including, but not limited to, watershed regulations, agricultural programs, land acquisition, stream management, and land management	Ongoing
Continue implementation of CREP	Ongoing
CSBI Continue implementation of CSBI by providing technical assistance and conservation guidance to riparian landowners. • Convene annual meeting of Riparian Buffer Working Group. • Facilitate the supply of native plant materials to the CSBI. • Implement education, outreach, and marketing strategy with partners. • Seek to establish a partnership between the CSBI program and the CREP program to enable CREP to be implemented on fallow agricultural lands through the CSBI. • Within Delaware County, support the use of funding for a pilot program to be administered by DCSWCD and WAC that will coordinate CSBI and CREP programs to implement CREP on fallow agricultural lands in Delaware County.	 Annually, 2/28 Ongoing Ongoing Ongoing Completed

Activity	*Due Date*
• Establish metrics, agreed upon by NYSDOH, USEPA, NYSDEC, Delaware County SWCD, WAC, and the City, to evaluate the effectiveness of the Delaware County CSBI/CREP pilot program.	11/30/2018 Completed
• Review progress in extending CREP to eligible fallow agricultural lands through CSBI in the WOH watershed, including progress of the Delaware County CSBI/CREP pilot program.	11/30/2019 Completed
• Submit recommendations to NYSDOH for establishment of a permanent program and estimated funding needs, or discontinuation of the program.	11/30/2019 Completed
• Continue to implement and evaluate the effectiveness of the Delaware County CSBI/CREP pilot program based on established metrics while exploring and assessing other SMP partnership opportunities for extending CREP to eligible fallow agricultural lands through CSBI in the WOH watershed. Submit to NYSDOH a report that recommends establishment of a permanent CSBI/CREP partnership program and estimated funding needs, or discontinuation of the program.	11/30/2025
• If NYSDOH determines the Delaware County CSBI/CREP pilot program is an effective tool for riparian buffer protection, execute and register contracts or contract changes with DCSWCD and WAC, if needed, to fund such a program in Delaware County. The City will ensure adequate funding is available to allow continuity of program activities while contract changes are being implemented.	Within 18 months of determination
Complete revegetation of a minimum of 10 streambank miles throughout the West of Hudson watershed. This metric may be adjusted following the determination regarding the Delaware County CSBI/CREP pilot program.	11/30/2027
Continue to seek enhanced management agreements (voluntary 10-year or purchased perpetual) for all current and future stream restoration projects	Ongoing

Activity	*Due Date*
SAP	
• Continue implementation of a $5 million pilot SAP.	Ongoing, in accordance with the 2010 WSP
• Based on the requirements of the 2010 WSP, submit a written evaluation of the SAP, making recommendations as to whether the program should be continued, modified, or terminated, as well as any proposed improvements to the program.	Completed 6/30/2019
• The City shall execute and register a contract or contract amendment to make an additional $3 million available to the Catskill Center to continue to implement the SAP through at least 2022.	Completed 12/15/2020
• Submit a status report on the SAP.	Completed
• If, in accordance with the City's 2010 WSP, a written determination is made by NYSDEC, in consultation with NYSDOH, the City, and other agencies or local governments, to authorize that a streamside acquisition program be continued and expanded beyond the Schoharie Reservoir basin, execute and register a contract to make a minimum of $8 million available to the Catskill Center to implement or continue to implement such a program for the remainder of the 2017 FAD. Consistent with the WSP, such written determination will include addressing the City's recommendations for the program.	Within 18 months of such written determination
• If such determination is issued by NYSDEC, the City shall submit a status report of the expanded SAP in consultation with the Catskill Center.	6/30/2025
• If authorization is not given to continue the program, all unused funds, with any earnings thereon, are to be returned to the City to be deposited in the LAP-segregated account for use by the LAP.	
• If NYSDOH determines that additional funding is required for acquisitions under the SAP or other streamside acquisition program, funds may be drawn from the City's LAP-segregated account.	As needed

Activity	*Due Date*
Continue to support the Croton Trees for Tribs Program, enhancing program efforts to promote and install riparian plantings in the Kensico, West Branch, and Boyd Corners Reservoir basins, with a goal of completing six projects per year in the EOH Watershed.	Ongoing

Table 2.23 Riparian Buffers Protection Program Reporting Milestones

Report Description	*Due Date*
SAP Submit a status report on the SAP.	12/15/2020 Completed
CSBI • Report on metrics that have been established to evaluate the effectiveness of the Delaware County CSBI/CREP pilot program. • Report on progress in extending CREP to eligible fallow agricultural lands through CSBI in the WOH watershed, including progress of the Delaware County CSBI/CREP pilot program. Report will include recommendations for establishment of a permanent program and estimated funding needs, or discontinuation of the program. • Report on cumulative progress of the Delaware County CSBI/CREP pilot program and other SMP partnership opportunities for extending CREP to eligible fallow agricultural lands through CSBI in the WOH Watershed. Report will include recommendations for establishment of a permanent program and estimated funding needs, or discontinuation of the program.	11/30/2018 Completed 11/30/2019 Completed 11/30/2025
The FAD Annual Report will reference the other FAD programs where the completed Riparian Buffer Protection Program details will be described	Annually, 3/31

2.3.8 Ecosystem Protection Program

The City owns over 174,000 acres of forests, fields, transitional lands, wetlands and reservoirs within the watersheds of the Croton, Catskill, and Delaware reservoir systems. Well-functioning, intact natural ecosystems are critical for maintaining and enhancing water quality. The City provides multifaceted programming for the protection of wetlands and fisheries along with stewardship of forests and management of invasive species through a combination of research, inventories, assessment, and outreach programs. The Ecosystem Protection Program combines goals and activities from three principle areas, consisting of forestry, wetlands, and invasive species.

The goals of the Ecosystems Protection Program under the Revised 2017 FAD are as follows:

- Continue silvicultural activities to increase diversity of species and age structure where needed to promote forest resiliency.
- Conduct forest inventories on newly acquired lands and adopt appropriate management strategies.
- Assess management strategies to foster adequate forest regeneration in lands heavily browsed by deer.
- Maintain data collection and analysis for the Continuous Forest Inventory (CFI) Project.
- Expand the pilot LiDAR wetland mapping and stream connectivity assessment to the entire watershed.
- Enhance the Reference Wetland Monitoring Program.
- Implement key aspects of the Invasive Species Management Strategy to promote sustainable native communities.
- Collaborate with watershed, regional, and statewide partners on invasive species management and planning.

Table 2.24 Ecosystem Protection Program Planned Activities/Milestones

Activity	***Due Date***
Forestry	
• Implement the Watershed Forest Management Plan.	Ongoing
• Continue to conduct forest inventories on City-owned lands, including long-term CFI plots.	Ongoing
• Continue to assess and mitigate deer impacts on forest	Ongoing

Activity	*Due Date*
regeneration on City-owned lands. • Update the Watershed Forest Management Plan. • Revise the Watershed Forest Management Plan.	12/24/2017 Completed 3/31/2027
Wetlands • Update Wetlands Protection Strategy. • Update the wetland GIS data for the watershed using LiDAR- derived data and high-resolution photography. • Continue reference wetland monitoring. • Review federal, state and local wetland permit applications.	3/31/2018 Completed 3/31/2022 Ongoing Ongoing
Invasive Species • Continue to implement the Invasive Species Management Strategy. • Engage watershed partners and residents to coordinate efforts in invasive species prevention and control. • Collaborate with partners to ensure coordination of invasive species management efforts across watershed protection programs.	Ongoing Ongoing Ongoing

Table 2.25 Ecosystem Protection Program Reporting Milestones

Report Description	*Due Date*
Submit updated Watershed Forest Management Plan.	12/24/2017 Completed
Submit revised Watershed Forest Management Plan.	3/31/2027
Submit updated Wetlands Protection Strategy.	3/31/2018 Completed
Summary of wetland mapping and connectivity assessment results for the watershed	3/31/2022

Submit updated Invasive Species Implementation Strategy	3/31/2022
Report on program implementation in the FAD Annual Report including: • Forest inventories • Forest management and regeneration • Wetland protection • Wetland mapping • Wetland permit reviews • Invasive species management	Annually, 3/31

2.3.9 Nonpoint Source Pollution Strategy for East of Hudson Catskill/Delaware Basins

The East of Hudson Nonpoint Source (NPS) Pollution Control Program has been developed to reduce inputs of pathogens and nutrients from sanitary sewers, septic systems, and stormwater to the EOH FAD basins (Boyd Corners, West Branch, Cross River, and Croton Falls reservoirs). The program addresses this concern through the continued implementation of the WR&Rs, involvement in project reviews, and inspection and maintenance of existing stormwater management facilities. The City also supports a grant program to fund the design and construction of stormwater retrofits in the EOH FAD basins.

The goals of the EOH NPS program under the Revised 2017 FAD are as follows:

- Maintain EOH stormwater facilities.
- Complete construction of two stormwater remediation retrofits remaining from the Revised 2007 FAD.
- Support the EOH Stormwater Retrofit Grant Program.
- Facilitate the preliminary planning of community wastewater solutions for areas in the EOH FAD basins where poorly functioning individual septic systems have the potential to impact water quality.
- Support the EOH Septic Repair Program in the four EOH FAD basins, Lake Gleneida basin, and the basins upstream/hydrologically connected to Croton Falls Reservoir, as program capacity allows.
- Inspect sanitary sewers.

Table 2.26 East of Hudson Nonpoint Source Protection Program Planned Activities/Milestones

Activity	*Due Date*
Maintenance of DEP's EOH stormwater facilities	Ongoing
Stormwater Remediation Projects Complete construction of two stormwater retrofits. • Maple Avenue (Cross River) • Drewville Road (Croton Falls)	9/30/2020 Completed
EOH Stormwater Retrofit Grant Program Execute and register a contract or contract amendment with the EOH Watershed Corporation to provide $22 million to support the design and construction of stormwater retrofits in the EOH FAD basins and in basins upstream and hydrologically connected to the Croton Falls Reservoir. A total of $7 million shall be specifically committed to support stormwater retrofits within EOH FAD basins and $15 million shall be specifically committed to support stormwater retrofits within basins upstream and hydrologically connected to the Croton Falls Reservoir or within EOH FAD basins.	9/30/2019 Completed
DEP will continue to make City lands available for stormwater retrofit projects constructed by EOH watershed communities so long as DEP determines that the projects will not pose a threat to water quality or DEP operations related to the water supply.	Ongoing
EOH Community Wastewater Planning Assistance Grants Execute and register a contract with the NEIWPCC to develop and administer a grant program that will provide $3 million for preliminary planning for community wastewater solutions for areas in the EOH FAD basins where poorly functioning individual septic systems have the potential to impact water quality. The grant program will require that municipalities who apply for this funding will complete preliminary planning studies within four years from issuance of the 2017 FAD. Based on preliminary studies conducted by NYSDEC, wastewater planning assistance grants will be made available to identified municipalities in which the following areas have been identified to have the potential to impact water quality from septic systems: areas surrounding Lake Waccabuc, Lake Truesdale, and Lake Kitchawan in the Cross River Reservoir basin; and Palmer Lake, Lake Gilead, Lake Casse, Lake View Road, and Mud Pond Brook in the Croton Falls Reservoir basin. Funds may be used by identified municipalities to finance engineering studies and report generation to assist	12/31/2019 Completed

those municipalities in evaluating wastewater treatment options/solutions that they could undertake to mitigate water quality impacts. The generated reports are intended to be used by the municipalities to appropriately plan and determine costs for the identified wastewater solution project so that municipalities may seek financing through state or federal funding sources, including but not limited to the 2017 Clean Water Infrastructure Act. Prepare a summary report of the preliminary planning studies from the identified municipalities that participated in the grant program.	6/30/2022
East of Hudson Septic Repair Program (SRP) • The City shall provide funding to support the repair, replacement, or connection to a WRRF for at least 35 residential septic systems per year in the four EOH FAD basins, including Lake Gleneida basin, either through a contract with NYS Environmental Facilities Corporation (EFC) or NEIWPCC, or directly with homeowners. • Revise contract with EFC for the EOH SRP to allow eligibility of septic systems located within basins upstream or hydrologically connected to Croton Falls Reservoir. Implementation of the program will be prioritized, with priority given to septic systems in the EOH FAD basins, including Lake Gleneida basin, and expanding within the basins upstream or hydrologically connected to Croton Falls Reservoir as program rules dictate and program capacity allows. • Continue to provide technical assistance in support of EOH septic management programs. • Review strategies used to inform potential SRP participants of the program's availability. Propose ways to improve education and outreach to enhance participation in the program. • Conduct an assessment of the SRP to determine whether funding for at least 35 systems per year is appropriate to meet demand from eligible septic systems in the four EOH FAD basins, Lake Gleneida basin, and the basins upstream/hydrologically connected to Croton Falls Reservoir. Funding made available for this program may be increased or decreased based on this assessment	Ongoing 12/31/2018 Completed Ongoing 3/31/2018 Completed 3/31/2022
Video Sanitary Sewer Inspection • Video sanitary sewer inspection of four CAT/DEL basins located East of Hudson. • Complete mapping of new sewer areas (if any).	12/30/2021

• Complete inspection of targeted areas. • Identify potential defects. • Notify entities responsible for remediation of identified deficiencies.	

Table 2.27 East-of-Hudson Nonpoint Source Protection Program Reporting Milestones

Report Description	***Due Date***
Report on implementation of two EOH stormwater retrofit projects (Maple Avenue and Drewville Road).	Quarterly until completed Completed
Report on program implementation in the FAD Annual Report, until completed: • Maintenance of EOH Stormwater Facilities • EOH NPS Stormwater Retrofit Grant Program • EOH Community Wastewater Planning Assistance Program • EOH Septic Repair Program, including education and outreach efforts • Video sanitary sewer inspection	Annually, 3/31

2.3.10 Kensico Water Quality Control and Related Programs

The Kensico Reservoir, located in Westchester County, is the terminal reservoir for the City's Catskill/Delaware water supply. Because it provides the last impoundment of Catskill/Delaware water prior to entering the City's distribution system, protection of this reservoir is critically important to maintaining water quality for the City. The primary goal of the Kensico Water Quality Control Program is to reduce non-point source pollution in the reservoir through implementation of various stormwater and wastewater projects. In addition, the City may conduct wildlife scat surveys around Kensico Reservoir in advance of storm events. These surveys include the recording, collecting, and disposing of wildlife latrines. Updates on the City's project to construct the Kensico-Eastview Connection (KEC), including any potential dredging of effluent chambers, are provided via the City's progress reports on KEC project implementation.

The goals of the Kensico Water Quality Control Program for the Revised 2017 FAD are as follows:

- Continue proper operation and adequate maintenance through regular inspections of the existing stormwater management facilities and identification of repair needs to maximize pollutant removal efficiency.
- Reduce the risk of water contamination with pathogens through implementation of the Septic Repair Reimbursement Program, monitoring the early warning sanitary sewer overflow protection system, and inspection of targeted sanitary sewers.
- Minimize turbidity levels at effluent chambers by completion of the shoreline stabilization project at Shaft 18.

Table 2.28 Kensico Water Quality Control Program Planned Activities/Milestones

Activity	***Due Date***
Inspect and maintain non-point source management facilities within the Kensico Reservoir Basin: • Stormwater management facilities • Turbidity curtain and • Spill containment measures.	Ongoing
Oversee remote monitoring system at Westlake sewer extension	Ongoing
Implement Septic Repair Reimbursement Program	Ongoing
Video Sanitary Sewer Inspection Program: • Complete mapping of new sewer areas. • Complete re-inspection of targeted areas. • Identify potential defects. • Notify entities responsible for remediation of identified deficiencies.	12/30/2021
Complete Shaft 18 shoreline stabilization project.	12/31/2022

Table 2.29 Kensico Water Quality Control Program Reporting Milestones

Report Description	*Due Date*
Report on program implementation in the FAD Annual Report, until completed, including: • Operation and maintenance of non-point source management facilities • Westlake sewer monitoring program • Shaft 18 shoreline stabilization • Septic Repair Program • Video sanitary sewer inspection • Kensico Wildlife Scat Sanitary Survey • Westchester County Airport (including capped landfills), as needed	Annually, 3/31

2.3.11 Catskill Turbidity Control Program

High turbidity levels are associated with high flow events, which can destabilize stream banks, mobilize streambeds, and suspend the glacial clays that underlie the streambed armor. The design of the Catskill System takes into account the local geology, and provides for settling within Schoharie Reservoir, Ashokan West Basin, Ashokan East Basin, and the upper reaches of Kensico Reservoir. Under most circumstances the extended detention time in these reservoirs is sufficient to allow the turbidity-causing clay solids to settle out, and the system easily meets the SWTR turbidity standards (5 NTU) at the Kensico effluent. However, occasionally after extreme rain/runoff events in the Catskill watershed, DEP has had to use the coagulant aluminum sulfate (alum) to enhance the settling rate of suspended solids to control high turbidity levels.

Since 2002, DEP has undertaken a number of studies and implemented significant changes to its operations to better control turbidity in the Catskill System. Many of these measures have been implemented pursuant to the 2002 and 2007 FADs and the Shandaken Tunnel and Catalum SPDES Permits. A comprehensive analysis, the Catskill Turbidity Control Study, was conducted by DEP in three phases between 2002 and 2009. Based on the results of this study, DEP selected several implementation alternatives: modifying operations, particularly at Ashokan Reservoir, to manage turbidity; a system-wide Operations Support Tool (OST) that allows DEP to optimize reservoir releases and diversions to balance water supply, water quality, and environmental objectives; an interconnection of the Catskill Aqueduct and the Delaware Aqueduct (CAT/DEL Interconnect, CDIC), to improve overall system flexibility; and structural improvements to the Catskill Aqueduct stop shutter facilities to minimize the amount of water diverted from Ashokan Reservoir to Kensico Reservoir during turbidity events while meeting the

supply needs of wholesale customers with connections to the Catskill Aqueduct. DEP has now completed implementation of all these measures.

In addition to the structural and operational changes listed above, DEP's multi-tiered water quality modeling program provides support to the program to control turbidity in the Catskill System. Water quality models are an integral part of OST and provide valuable information to guide the operation of the water supply to minimize the impact of turbidity events while considering longer-term system operating requirements.

Catalum SPDES Permit and Environmental Review

The Catalum SPDES Permit sets forth the conditions under which the City is allowed to treat Catskill Aqueduct water with alum prior to entering Kensico Reservoir. On October 4, 2013, NYSDEC executed an Order on Consent (DEC Case No.: D007-0001-11) (CO) with the City in connection with the Catalum SPDES permit. The CO was modified in 2018 and 2020. Incorporated into the CO is a modified version of an interim operating protocol for use of the Ashokan Release Channel (ARC), to which the City and NYSDEC had agreed in October 2011. The ARC provides a mechanism for water to be released from the Ashokan Reservoir to the lower Esopus Creek for environmental or economic benefit, flood mitigation, or to mitigate the impacts of turbidity on water diverted to Kensico Reservoir. The protocol seeks to enhance community benefits, improve flood attenuation, and provide better water quality.

In June 2012, consistent with the then proposed Catalum CO, the City requested a modification to the Catalum SPDES Permit to incorporate measures to control turbidity in water sent from the Ashokan Reservoir to the Kensico Reservoir via the Catskill Aqueduct, and to postpone dredging of alum floc at Kensico Reservoir until completion of certain infrastructure projects. This proposed modification to the Catalum SPDES permit required that an environmental impact statement (EIS) be conducted under the State Environmental Quality Review Act (SEQRA).

NYSDEC is lead agency for this review and issued the final scope of work for the EIS on March 22, 2017. Under the CO, the City is required to prepare a draft EIS (DEIS) and a draft Final EIS (FEIS), which will analyze the potential environmental and socioeconomic impacts resulting from the proposed modifications of the SPDES permit. DEP submitted a draft DEIS to NYSDEC on May 30, 2019 and requested a revised modification to the SPDES permit that reflected the analysis in the DEIS. NYSDEC released the DEIS for public comment on December 16, 2020, and the public comment period for the DEIS closed on June 16, 2021. The EIS will evaluate impacts to the Ashokan Reservoir, lower Esopus Creek, and Kensico Reservoir as well as evaluate a suite of alternatives that could be executed at Ashokan Reservoir, along the Catskill Aqueduct, and at Kensico Reservoir, and implementation of the City's turbidity control measures as a whole. Where potential adverse impacts are indicated, reasonable and practicable measures that have the potential to avoid, mitigate, or minimize these impacts will be identified.

OST Expert Panel Review

As required by the Revised 2007 FAD, the City contracted with the National Academies of Sciences, Engineering, and Medicine (NASEM, formerly known as the National Research Council) to conduct an expert panel ("OST Expert Panel") review of the City's use of OST. The NASEM is in a unique position to bring together a group of experts with the breadth of experience and expertise needed to undertake this independent study and to ensure a comprehensive and scientifically objective product.

The goals of the OST Expert Panel were to:

- Evaluate the effectiveness of the City's use of OST for water supply operations and identify ways in which the City can more effectively use OST to manage turbidity.
- Evaluate the performance measures and criteria that the City uses to assess the efficacy of the Catskill Turbidity Control Program, and recommend additional performance measures, if necessary.
- Review the City's proposed use of OST in evaluating the proposed modification to the Catalum SPDES Permit as well as the alternatives to be considered in the environmental review of those proposed modifications.
- Review the City's existing studies of the potential effects of climate change on the City's water supply to help identify and enhance understanding of areas of potential future concern regarding the use of OST.

The goals of Catskill Turbidity Control Program under the Revised 2017 FAD are as follows:

- Continue to use OST to manage water system operations to reduce turbidity levels in the Catskill System water entering Kensico Reservoir, while minimizing adverse environmental impacts and alum use.
- Continue to update OST to account for future climate scenarios as needed.
- Keep NYSDOH informed on plans to manage Catskill turbidity during the planned shutdown of the Rondout-West Branch Tunnel (RWBT) section of the Delaware Aqueduct for repairs.
- Continue to implement the OST Expert Panel recommendations.
- Propose, as necessary, alternative measures for achieving turbidity control based on the Catalum EIS.

Table 2.30 Catskill Turbidity Control Planned Activities/Milestones

Activity	*Due Date*
Continue to utilize and update OST	Ongoing
Conduct the Expert Panel review of DEP's use of OST. • Provide the final report to NYSDOH, USEPA, and NYSDEC and the Watershed Inspector General (WIG). • Submit final revised performance measures and criteria for evaluating the efficacy of Catskill Turbidity Control measures, taking into consideration the Expert Panel recommendations, for review and approval by NYSDOH, USEPA, and NYSDEC.	9/25/2018 Completed 3/25/2019 Completed
Annually convene a progress meeting with NYSDOH, USEPA, NYSDEC, and the WIG to provide a forum for discussion of the status of the Catskill Turbidity Control measures, management of turbidity events reported in the March annual report and subsequent events, use of performance measures to assess program efficacy, status/results of the DEIS and FEIS, and other matters related to turbidity control. In addition, DEP will facilitate discussion of the following items: • The OST expert panel report: Ongoing discussion on implementation of OST Expert Panel recommendations. • The DEIS: This discussion may occur at the next annual meeting after the DEIS is issued by NYSDEC, or NYSDOH may, at its option, request that the City convene a separate meeting to discuss the DEIS, in addition to the annual meetings. • The Catskill Turbidity Control measures report that is due 3 months after issuance of the FEIS. This discussion may occur at the next annual meeting more than three months after issuance of the FEIS or NYSDOH may, at its option, request that the City convene a separate meeting to discuss this report, in addition to the annual meetings.	Annually, 10/31

Table 2.31 Catskill Turbidity Control Reporting Milestones

Report Description	*Due Date*
Report on program implementation in the FAD Annual Report.	Annually, 3/31
Provide the final report on NASEM expert panel to the regulators and the Watershed Inspector General (WIG).	9/25/2018 Completed
Report on final revised performance measures/criteria for evaluating the efficacy of Catskill turbidity controls.	3/25/2019 Completed
Report on Catskill Turbidity Control Rondout-West Branch Tunnel (RWBT) Shutdown Management Plan, including consideration of maintaining water quality during the RWBT repair and shutdown.	One year prior to the planned RWBT shutdown Completed
Report on whether, based on the conclusions of the FEIS, the City intends to modify its use of turbidity control measures identified in the Phase III Catskill Turbidity Control Implementation Plan, and/or implement any other turbidity control measures. If so, the City shall submit a modification of the Phase III Plan, proposing alternative measures for achieving turbidity control and a timeline for implementing those alternative measures.	3 months after NYSDEC issuance of FEIS

2.4 Watershed Monitoring, Modeling, and GIS

2.4.1 Watershed Monitoring Program

DEP conducts extensive water quality monitoring throughout the watershed. Programmatic goals are defined in the 2018 Watershed Water Quality Monitoring Plan, which describes the data gathering protocols for regulatory purposes, FAD program evaluation, modeling, and surveillance (including pathogen surveillance). Significant alterations in the monitoring plan require the City to submit the proposed changes to NYSDOH for review and approval prior to implementation. Changes to the plan are documented using addenda.

Water quality results collected from routine monitoring of reservoirs, streams, and aqueducts throughout the watershed are stored in a database. The database serves both short- and long- term objectives. The daily results are used for regulatory compliance and operational decisions and are compiled by the City each year into the Watershed Water Quality Annual Report. Over the longer term, the data generated through the City's monitoring program, in conjunction with other defensible scientific findings, are used to assess water quality status, water quality trends, and the overall effectiveness of the watershed protection program. This

evaluation is described in the Watershed Protection Program Summary and Assessment Report, which is produced every five years.

The goals of the Watershed Monitoring Program under the Revised 2017 FAD are as follows:

- Provide water quality results collected through routine programs.
- Use water quality data to evaluate the source and fate of pollutants.
- Assess the effectiveness of watershed protection efforts and water supply operations.
- Participate in educational forums on watershed monitoring, research, and management.
- Coordinate a working group on pathogen research.
- Provide after-action reports to NYSDOH and USEPA on all non-routine chemical treatments and other significant or unusual events that could impact water quality.
- Continue to examine various data analysis techniques and, where appropriate, begin to incorporate water quality trends and other findings into the Watershed Water Quality Annual Report.
- Make watershed water quality data publicly available via applicable NYC Open Data policy (NYC Open Data - DEP) and continue to implement a data request protocol for sharing data with government agencies, other researchers, and community groups.

Table 2.32 Watershed Monitoring Program Planned Activities/Milestones

Activities	***Due Date***
Annual participation in educational seminars on watershed monitoring and management	Ongoing
Coordinate Pathogen Technical Working Group meeting.	Annually, 5/31
Provide after action reports on all non-routine chemical treatments and other significant or unusual events that have the potential to impact water quality	Upon completion as specified for each action
Conduct testing for emerging contaminants at key watershed monitoring locations as informed by applicable contaminant candidate lists and/or monitoring rules for unregulated contaminants.	12/31/2025

Table 2.33 Watershed Monitoring Program Reporting Milestones

Report Description	*Due Date*
Submit Watershed Water Quality Annual Report, including comprehensive chapters on: • Kensico Reservoir water quality • Pathogens • Modeling • Educational seminars on watershed monitoring and management • Ongoing research.	Annually, 7/31
Submit the 2021 Watershed Protection Program Summary and Assessment Report.	3/31/2021 Completed
Submit the 2026 Watershed Protection Program Summary and Assessment Report.	3/31/2026
Submit Emerging Contaminant Monitoring Report for monitoring conducted in 2025.	12/31/2026

2.4.2 Multi-Tiered Water Quality Modeling Program

The City conducts extensive modeling analysis to inform long-term water supply planning, watershed program evaluation, and day-to-day operations to ensure FAD compliance and overall system reliability. The models developed and applied by the Water Quality Modeling Program fall into four general classes:

- Watershed models that simulate hydrology and stream water quality, including processes associated with agricultural, forested, and urban lands, and with water quality including turbidity, nutrients, organic carbon, and disinfection byproduct (DBP) precursors.
- Reservoir models that simulate the effects of watershed hydrology, nutrient inputs, and operations on reservoir nutrient levels, chlorophyll levels, and the production and loss of organic carbon.
- System operation models that simulate the demands, storage, transfer, and quality of water throughout the entire NYC reservoir system.
- Stochastic weather generators, which generate synthetic time series of weather variables such as precipitation and air temperature; which, when combined with

watershed, reservoir, and system models, allows evaluation of the impacts of climate change and extreme events on supply system operation and water quality.

These models encapsulate the key processes and interactions that control generation and transport of water, sediment, organic carbon and nutrients from the land surface, through the watersheds and reservoirs, and the supply system. Research and development is an integral component of the Water Quality Modeling Section's mission that leads to improvements to existing models, adaptation of new models and development of model applications to support water supply planning and operations by evaluating the impacts of changing and evolving management and protections programs, climate, land use, population, reservoir operations, and regulatory requirements.

The goals of the Water Quality Modeling Program under the Revised 2017 FAD are the development and application of models in the following areas:

- Prediction of turbidity transport in the Catskill System, and Kensico and Rondout reservoirs, and to provide guidance for reservoir operations to minimize the impact of turbidity events.
- Integration of the Rondout turbidity model into the OST.
- Development and testing of turbidity models for other Delaware system reservoirs, beginning with Neversink.
- Evaluation of the effectiveness between and within watershed management programs implemented through the FAD and MOA on maintenance and improvement of water quality.
- Continuation of model development and application to forecast the effects of climate change on water supply quantity and quality.
- Development and testing of models to simulate watershed sources, and reservoir fate and transport, of organic carbon, disinfection byproduct precursors, and surrogates of precursors.
- Evaluation of impacts of infrastructure improvements (both during and following), including the RWBT repair project.

Table 2.34 Multi-Tiered Modeling Program Planned Activities/Milestones

Activity	***Due Date***
Update and enhance data describing land use, watershed programs, meteorology, stream hydrology and water quality, reservoir quality and operations data to support modeling.	Ongoing

Provide modeling and technical support for Catskill Turbidity Control measures including the applications of OST.	Ongoing
Use reservoir turbidity models and OST to support operational decisions in response to episodes of elevated turbidity.	Ongoing
Explore use of models and applications coupled with statistical analysis of monitoring data to evaluate, optimize, and integrate management and protections programs based on the recommendations of the 2020 NASEM expert panel.	Ongoing
Develop and test fate and transport models for organic carbon, disinfection byproduct precursors, and surrogates of precursors, in Cannonsville and Neversink reservoirs.	Ongoing
Develop future climate scenarios for use as inputs to the City's watershed and reservoir models. Scenarios may be based on: (1) historic time series, and (2) synthetic weather generators.	Ongoing
Develop model applications that simulate the impacts of future climate change on watershed hydrology, reservoir water quality, and water system operations.	Ongoing
Hold an annual progress meeting with regulators to present and discuss modeling results.	Annually, 11/30

Table 2.35 Multi-Tiered Modeling Program Reporting Milestones

Report Description	***Due Date***
Submit program status report, including updates on the modeling activities described above	Annually, 7/31
Report on modeling analysis of FAD programs as either a supplement to the Watershed Protection Program Summary and Assessment Report or a separate report.	03/31/2021 Completed 3/31/2026

2.4.3 GIS Program

DEP's upstate geographic information system (GIS) is used to manage the City's interests in the lands and facilities of the upstate water supply system, and to display and evaluate the potential efficacy of watershed protection programs through maps, queries, and spatial analyses. GIS is also used to support watershed and reservoir modeling of water quantity and quality, as well as modeling of water supply system operations. GIS resources are utilized by staff at offices throughout the watershed, directly and via the Watershed Lands Information System (WaLIS).

WaLIS is a custom database application that manages information about the watershed lands and resources owned by DEP and its neighbors. It is a labor-saving system that uses GIS data analyses, relational database management, document management, workflow and reporting capabilities to support the Watershed Protection Programs Directorate as well as other groups throughout DEP. GIS and WaLIS save users a significant amount of time by automating tasks previously done manually, such as analyzing data, creating maps, tracking/auditing information and generating reports.

GIS will continue to be a useful tool in four primary areas:

- Inventory and track water supply lands and facilities.
- Perform analyses of land use and terrain to map development, agriculture, forest and hydrography.
- Provide estimation of the effects of watershed management programs on long-term water quality.
- Support watershed and reservoir modeling of water quantity and quality, and modeling of system operations.

The goals for the GIS Program under the Revised 2017 FAD are as follows:

- Continue to provide GIS technical support for protection programs, monitoring programs, and modeling applications.
- Continue to develop and update GIS data and metadata, including acquisition of high-resolution aerial data and their derived products.
- Continue to improve and maintain GIS infrastructure to evolve with changing technology and growing database needs.
- Continue to fulfill requests for GIS data from other agencies and watershed stakeholders.

Table 2.36 GIS Program Planned Activities/Milestones

Activity	*Due Date*
Continue to provide GIS technical support for protection programs, monitoring programs, and modeling applications	Ongoing
Continue to develop and update GIS data and metadata, including acquisition of high-resolution aerial data and their derived products as needed	Ongoing
Continue to improve and maintain GIS infrastructure to evolve with changing technology and growing database needs	Ongoing
Continue to fulfill requests for Bureau-specific GIS data from other agencies and watershed stakeholders	Ongoing

Table 2.37 GIS Program Reporting Milestones

Report Description	*Due Date*
Report on program implementation in the FAD Annual Report, including: • GIS technical support for protection programs, monitoring programs, and modeling applications • Completion or acquisition of new GIS data layers and aerial products in the BWS GIS spatial data libraries • GIS infrastructure improvement • GIS data dissemination summaries.	Annually, 3/31

2.5 Regulatory Program

2.5.1 Watershed Rules and Regulations and Other Enforcement/Project Review

DEP administers and enforces the City's Watershed Rules and Regulations (WR&Rs), including the regulations and standards incorporated by reference in these regulations. DEP also participates in environmental reviews under SEQRA for projects in the watershed. The majority of the regulated activities reviewed by the City involve subsurface sewage treatment systems or stormwater pollution prevention plans to prevent the discharge of sediment, turbidity, nutrients, and pathogens from entering the reservoirs.

The program is coordinated through a memorandum of understanding (MOU) between NYSDEC and the City. The MOU established the Watershed Enforcement Coordination Committee (WECC) which meets quarterly to address non-compliance with stormwater pollution prevention plans through formal enforcement and compliance assistance under specific agency protocols. The WECC process is designed to address instances of significant non-compliance in a timely and appropriate manner.

The City, in accordance with Public Health Law Section 1104 and the MOA, is obligated to pay for capital replacement of watershed equipment and methods at all public wastewater treatment plants (also known Water Resource Recovery Facilities, WRRFs), as well as all (public or nonpublic) WRRFs that existed or were under construction as of November 2, 1995, and that are required by the WR&Rs and not otherwise required by federal or state law.

In 2019, the City revised the WR&Rs to provide for greater consistency with the state's regulatory program for stormwater and wastewater. Revisions were also incorporated in response to concerns raised by stakeholders in WOH communities, in particular related to noncomplying regulated activities, subsurface sewage treatment systems, holding tanks, Stormwater Pollution Prevention Plans (SWPPPs), and variances.

The goals for Watershed Rules and Regulations and other enforcement/project review under the Revised 2017 FAD are as follows:

- Facilitate optional pre-application meeting requests, receive applications for approval of regulated activities, perform a review of SEQR notices and new projects in accordance with the WR&Rs, and monitor construction activity.
- Investigate possible violations of the WR&Rs, environmental conservation law, and Clean Water Act. Document system failures, illicit discharges, and construction site non-compliance; issue notices of violation as necessary and review corrective action plans for all violations. Observe and document remediation efforts and perform close-out actions.
- Enforce environmental and public health requirements, including petroleum/chemical spills, and hazardous and solid waste dumping.
- Continue the City's commitment to pay for capital replacement of watershed equipment and methods at eligible WRRFs.

Table 2.38 Watershed Rules and Regulations Planned Activities/Milestones

Activity	***Due Date***
Enforce the Watershed Regulations and other applicable regulations. Continue to promote compliance guidance to applicants seeking approval, through pre-application conferences and providing	Ongoing

guidance documents	
Work with NYSDEC, in accordance with Addendum S of the DEP/NYSDEC Memorandum of Understanding, to improve coordination of stormwater enforcement and compliance activities between agencies and with the New York State Attorney General's Office. Such enforcement and compliance coordination will apply, but not be limited to, all effective NYSDEC general permits for construction activity. Stormwater Watershed Enforcement Coordination Committee meetings with involved agencies will be held at least twice per year or more as needed	Ongoing
Submit the proposed changes to the WR&Rs and a timeline for completing the rulemaking process.	2/28/2018 Completed
Update guidance documents affected by WR&Rs changes to assist applicants undertaking regulated activities in complying with the WR&R. Submit the updated guidance documents in accordance with the MOA.	18 months after watershed regulations' effective date 10/18/2021 Completed

Table 2.39 Watershed Rules and Regulations Reporting Milestones

Report Description	***Due Date***
Submit the proposed changes to the WR&Rs and a timeline for completing the rulemaking process.	2/28/2018 Completed
Submit reports consisting of: • Summary table, with corresponding maps, of new project activities that may affect water quality including variance activities and review of new/remediated septic systems in the Catskill/Delaware watershed basins as well as in the Croton Falls and Cross River basins east of the Hudson River. • Summary table (inventory) of all development projects proposed and their SEQRA status, with corresponding maps; and summary table of projects under construction, by basin, with corresponding maps.	Semi-annually, 4/30 and 10/31
Submit reports on the status of the City's regulatory enforcement actions in the Catskill/Delaware watershed basins, including the Croton Falls and Cross River basins.	Semi-annually, 4/30 and 10/31

Report Description	*Due Date*
Submit report on the progress of the proposed changes to the watershed regulations until adopted.	Semi-annually, 4/30 and 10/31 Completed
Submit an update annually on capital replacement of the watershed equipment and methods at eligible WRRFs.	Annually, 3/31
Report on the analyses used to determine the phosphorus-restricted and coliform-restricted status of each reservoir, as part of the Watershed Water Quality Annual Report.	Annually, 7/31

2.5.2 WRRF Compliance and Inspection

The goal of the WRRF Compliance and Inspection Program is to prevent degradation of source waters from the threat of contamination from WRRFs discharging in the watershed. To ensure compliance with the watershed regulations and SPDES permits, the City through the WRRF Compliance and Inspection Group performs onsite inspections, conducts sample monitoring, provides compliance assistance, and takes enforcement actions when needed. The program is coordinated through a MOU between NYSDEC and the City. The MOU established the Watershed Enforcement Coordination Committee (WECC), which meets quarterly to address non-compliance through formal enforcement and/or compliance assistance under specific inter-agency protocols. The WECC process is designed to address instances of significant non-compliance in a timely and appropriate manner. In addition, the City's water quality sampling program regularly monitors the effluent of all treatment plants in the watershed and uses the results of sampling to assist WRRF operators to meet compliance requirements or to initiate enforcement actions as necessary.

The general milestones set forth for the 2007 FAD remain relevant and form the basis for program implementation for the Revised 2017 FAD.

Table 2.40 WRRF Compliance and Inspection Program Planned Activities/Milestones

Activity	*Due Date*
Perform monitoring at all New York City-owned WRRFs in accordance with their SPDES permits, and grab sample monitoring monthly at all non-New York City-owned WRRFs discharging in the Catskill/Delaware watershed. At least once annually, for the non-City-owned WRRFs, samples shall be collected and analyzed in accordance with the monitoring requirements of each facility's SPDES permit. Continue to provide assistance to owner/operators of non-City-owned	Ongoing

Activity	*Due Date*
WRRFs as needed.	
Continue to take timely and appropriate enforcement actions against non-City-owned WRRFs for noncompliance with the WR&R and SPDES discharge permit requirements, in accordance with the WECC enforcement coordination protocol of the NYSDEC/DEP MOU	Ongoing
Conduct at least four on-site inspections for year-round SPDES permitted facilities and at least two on-site inspections for seasonal SPDES permitted facilities per year at all WRRFs in the watershed	Ongoing

Table 2.41 WRRF Compliance and Inspection Program Reporting Milestones

Report Description	*Due Date*
Report on the WRRF Compliance and Inspection Program, including: • WRRF Inspection Summary Reports • Enforcement Actions	Semi-annually, 3/31 (July 1 to Dec. 31) 9/30 (Jan. 1 to June 30)
Submit WRRF Water Quality Sampling Monitoring Report	Semi-annually, 3/31 (July 1 to Dec. 31) 9/30 (Jan. 1 to June 30)
Report by email to NYSDOH all sewage spills exceeding 500 gallons within 24 hours of the City becoming aware of the spill	Ongoing

2.6 Catskill/Delaware Filtration Plant Design

The 1997 FAD required the City to produce a final design and final environmental impact statement for filtration facilities for the Catskill/Delaware water supply. The 2002 FAD required the City to provide biennial updates to the preliminary filtration plant design for the Catskill/Delaware System (in addition to constructing an ultraviolet light disinfection facility, which was placed into full service in October 2012). The 2007 FAD maintained the requirement for the City to provide a biennial report that updated the preliminary design for filtration facilities.

In 2013 and 2015, the City proposed, and NYSDOH agreed, that because no design changes to the 2009 preliminary plans for the Catskill/Delaware filtration facilities were required or issued, no revisions to the 2009 plans were necessary. In recognition that the work supporting the existing preliminary plans is now over 25 years old, the 2017 FAD required the City to contract for a comprehensive review of filtration methods and technologies, resulting in the development of a new conceptual design for a filtration facility or facilities. This will minimize the overall time to commence filtration, in the event that the City or NYSDOH determines that filtration is necessary.

The design review process will include:

- bench studies and modeling
- larger scale pilot studies
- independent review from water treatment experts
- conceptual design that incorporates the latest filtration methods and technologies

Table 2.42 Catskill/Delaware Filtration Plant Design Planned Activities/Milestones

Activity	***Due Date***
Advertise for request for proposals.	12/31/2016 Completed
Issue notice to proceed.	1/24/2018 Completed
Commence paper and bench pilot studies.	6/30/2020 Completed
Commence conceptual design and larger scale pilot studies.	12/31/2021
Complete larger scale pilot studies and submit report.	12/31/2024
Convene a meeting with NYSDOH, USEPA and NYSDEC to discuss the pilot study results.	6/30/2025
Submit conceptual design.	12/31/2026

Table 2.43 Catskill/Delaware Filtration Plant Design Reporting Milestones

Report Description	*Due Date*
Report on status of design review.	Annually, 3/31
Submit larger scale pilot studies report.	12/31/2024
Submit Final Report on conceptual design.	12/31/2026

2.7 Waterborne Disease Risk Assessment Program

To maintain filtration avoidance, the City must continue to demonstrate that water consumers served by the NYC water supply are adequately protected against waterborne disease. In particular, the City's water must not be identified as a source of outbreaks of giardiasis or cryptosporidiosis.

Since the promulgation of the SWTR in 1989, and the initiation of the City's Waterborne Disease Risk Assessment Program (WDRAP) in 1993, significant changes in water quality regulation and water treatment have occurred. The Catskill/Delaware UV plant was constructed and began operation in 2012. Also, the Croton Water Filtration Plant began delivering water to areas of the City in 2015. With these treatment facilities now in operation, the City has major additional protection against any risk of waterborne disease due to pathogens such as Giardia and Cryptosporidium.

Providing an additional level of public health protection, the 2017 FAD continues to require WDRAP implementation to assess and ensure the safety of the City's water supply. The main goal of WDRAP is to track the incidence of and gather relevant demographic and risk factor data on potentially waterborne illnesses, in particular giardiasis and cryptosporidiosis, in the population served by the City's water supply. Also, under WDRAP, syndromic surveillance programs have been developed and implemented as a means for observing general community gastro-intestinal illness trends in New York City, as an additional assurance of the safety of the water supply.

Table 2.44 WDRAP Planned Activities/Milestones

Activity	*Due Date*
Continue to operate Waterborne Disease Risk Assessment Program	Ongoing
In relation to any water quality "event" involving the NYC water supply (e.g., increased turbidity levels, pathogen detection, disruption of operations), the City will provide NYSDOH and USEPA with	Event based

syndromic surveillance system information.	
Notify NYSDOH and USEPA whenever the City is notified by the New York City Department of Health and Mental Hygiene of any signs of community gastrointestinal illness in which public drinking water supply appears to be the source of the illness.	Event based
Perform a quantitative microbial risk assessment that considers the start-up of the Catskill-Delaware Ultraviolet Disinfection Facility in 2012.	6/30/2027
Continue to implement the Turbidity Action Plan. Review and update the plan annually.	Ongoing

Table 2.45 WDRAP Reporting Milestones

Report Description	***Due Date***
Submit annual report on program and program findings, implementation and analysis	Annually, 3/31

2.8 Administration

Beginning in the early 1990s, DEP hired hundreds of professionals in a variety of fields to support its comprehensive watershed protection program. The efforts of this dedicated staff allow the City to successfully implement the elements of the overall protection effort. DEP is committed to maintaining the level of staffing, funding, and expertise necessary to support all elements of the City's Long-Term Watershed Protection Program and annual reporting of staffing, disbursements, and out-year appropriations is important for demonstrating resource levels are sufficient.

In addition to having adequate staffing and funding, the City and its WOH watershed partners have recognized that the establishment of a physical office in the WOH watershed would improve implementation of the City's source water protection programs. Providing a central location for certain operations, maintenance, and infrastructure improvement tasks can help ensure the reliable delivery of water to the City from the Catskill/Delaware watershed. By sharing a centrally located office building in the watershed, the City and CWC can further improve coordination and responsiveness to watershed communities. The City signed a 20-year lease on January 29, 2020, for 16,752 square feet and relocated DEP staff.

The 2017 FAD added a new section in the annual report to provide the status of key partnership contracts, such as those with CWC, SWCDs, and WAC. In addition, the City will convene an annual meeting with FAD program partners to discuss program administration, contract, and/or funding issues. The goal is to maintain continuity in the watershed protection programs and prevent the occurrence of funding gaps.

At part of its 2020 report, the expert panel convened by NASEM concluded that DEP's source water protection program would benefit from analyses of the vitality of watershed communities. The panel acknowledged that many of DEP's substantial investments in watershed protection have resulted in benefits to the regional economy. The panel recommended further study of community well-being and the relative contributions of DEP's various programs elements, with the goal of optimizing the mix of program activities to continue effective source water protection while enhancing the incremental benefits to community vitality. DEP will undertake a study and intends to use the results to inform decisions about program activities to be recommended for the next FAD, now anticipated to be issued in 2027.

Table 2.46 Administration Program Planned Activities/Milestones

Activity	***Due Date***
DEP, in consultation with the City's Office of Management and Budget, will make a presentation to NYSDOH, USEPA, and NYSDEC on the amount of money appropriated and spent for watershed protection programs and its adequacy to meet program objectives and FAD requirements.	Within 60 days of annual report
DEP will convene an annual meeting with key watershed partners, NYSDOH, USEPA and NYSDEC to discuss contract and payment concerns.	Annually, 2/28
Co-location of DEP staff with CWC in new office in Arkville, NY:	
• Sign a binding commitment to lease office space in Arkville, NY for relocation of DEP program staff.	1/29/2020 Completed
• Assign at least 26 DEP staff to new offices in Arkville, NY.	12/31/2020 Completed
• Assign additional staff, as necessary, to ensure that a total of at least 40 DEP staff are assigned to new offices in Arkville, NY.	12/31/2026
Conduct a study of the economic vitality and social character of the communities in the West of Hudson watershed.	12/31/2024

Table 2.47 Administration Program Reporting Milestones

Report Description	***Due Date***
Report annually on: • Actual filled staff position levels versus available positions for each division and section involved in supporting the watershed protection program and confirm that resource levels are adequate to ensure that all program goals/FAD requirements are met. Contractor support staff will be noted. • Amount appropriated in the City budget for watershed protection programs for the upcoming fiscal year, specifically the amount (capital and expense) spent during the previous year, the amount appropriated for the current year, and the amount planned for the year thereafter. The amount spent, appropriated, and planned will be broken down by program, to the extent practicable. The report will also include costs for technical consultant contracts identified in the FAD. • Status of key partnership contracts including contract issues (i.e., change orders, planning for successor contract) and funding projections. • Include an analysis of septic program funding in the 9/30/2025 report.	Annually, 9/30
Report on status of lease details and City approvals, estimated staffing numbers, and timing of occupation of leased space in new offices in Arkville, NY.	Annually, 3/31
Report on economic vitality and social character of the communities in the West of Hudson watershed.	12/31/2024

2.9 Education and Outreach Program

The overall goal of the Education and Outreach Program is to raise awareness about the importance of the New York City water supply system and the critical need to protect its sources for current and future generations. Through this collaborative program, the City works with numerous partners in both the watershed and New York City to educate upstate residents and downstate consumers about the importance of source water protection, and to promote the benefits of environmental protection to public health and quality of life.

Certain elements of the watershed Education and Outreach Program are achieved through individual watershed programs and partnerships that target a specific audience, whereas others involve direct stakeholder engagement or active participation in local community events where information can be effectively disseminated to a broad audience. The continued use of websites, press releases, newsletters, publications, and newer technology, such as social media and e-news, complements all these efforts.

Virtually every watershed protection program funded or supported by the City accomplishes some degree of public education or outreach, which the City attempts to track and quantify with a focus on characterizing the key target audiences reached. The primary watershed programs that focus on education and outreach include the CWC Public Education Grants Program, Watershed Agricultural Program, Watershed Forestry Program, Stream Management Program, and Land Management Program (Watershed Recreation).

The goals of the Watershed Education and Outreach Program under the Revised 2017 FAD are as follows:

- Continue to promote environmental stewardship as means of water quality and public health protection.
- Continue to track and document the estimated numbers and types of audiences reached via targeted watershed education and/or training programs.
- Continue to track and document the diverse range of community public outreach events that are sponsored or attended by DEP and its watershed partners.

Table 2.48 Education and Outreach Program Planned Activities/Milestones

Activity	***Due Date***
Continue to support the following activities: • CWC Public Education Grants Program (through a contract with CWC). • Targeted education and professional training programs for specific adult audiences through the ongoing efforts of existing watershed protection programs.	Ongoing

• School-based education programs for both upstate and downstate audiences (teachers and students). • Watershed community outreach events and public meetings, with participation as needed. • Utilization of websites, press releases, newsletters, publications, social media and remote learning/online meeting platforms to disseminate information about the water supply and watershed protection programs.	

Table 2.49 Education and Outreach Program Reporting Milestones

Report Description	***Due Date***
Report on program implementation in the FAD Annual Report, summarizing key activities and accomplishments related to education and outreach in the following programs: • CWC Public Education Grants Program • Watershed Agricultural Program • Watershed Forestry Program • Stream Management Program • Watershed Recreation.	Annually, 3/31

2.10 Reporting

The proposed reporting milestones from the watershed protection programs are compiled below. Details on each report and program can be found in earlier sections of this Long Term Plan.

Table 2.50 List of Reoccurring Reports

Reporting Milestones	***Due Date***
Filtration Avoidance Criteria Report	Monthly
Trihalomethane Monitoring Report	Quarterly
Waterfowl Management Program	Annually, 10/31
Land Acquisition Program	Semi-annually, 3/31, 7/31
Stream Management Program – Submit descriptions of proposed stream projects to be considered toward the required 24 Stream Projects.	Annually, 11/30
Stream Management Program – Action Plans	Annually, 5/31
Stream Management Program – Water Quality Monitoring Study, status reports	Biennially, commencing 3/31/2019
EOH Stormwater Remediation Project status report	Quarterly until completed, 3/31, 6/30, 9/30, 12/31
Watershed Water Quality Annual Report	Annually, 7/31
Modeling Annual Report	Annually, 7/31
WRRF Monitoring Report	Semi-annually, 3/31, 9/30
WRRF Inspection Report	Semi-annually, 3/31, 9/30
Watershed Regulations Project Review Report	Semi-annually, 4/30, 10/31
Watershed Regulations Enforcement Report	Semi-annually, 4/30, 10/31
Progress Report on Revisions to the Watershed Regulations	Semi-annually, 4/30, 10/31 Completed

Waterborne Disease Risk Assessment Program	Annually, 3/31
FAD Budget and Staffing Report	Annually, 9/30
FAD Annual Report, including status of the following programs: • SWTR Compliance • FAD Expert Panel • Septic Remediation and Replacement Program • Small Business Septic Program • Sewer Extension Program • Community Wastewater Management Program • Stormwater Program • Stormwater Retrofit Program • Land Acquisition Program • Land Management Program • Watershed Agricultural Program • Watershed Forestry Program • Stream Management Program • Riparian Buffer Program • Ecosystem Protection Program • East of Hudson Nonpoint Source Program • Kensico Programs • Catskill Turbidity Controls • Watershed Monitoring Program • Watershed Modeling Program • GIS Program • Watershed Rules and Regulations • WRRF Compliance and Inspection • WRRF Capital Replacement Program • Catskill/Delaware Filtration Plant Design status • Waterborne Disease Surveillance Program • Education and Outreach Program	Annually, 3/31

Table 2.51 List of Significant One-time Reports

Reporting Milestones	***Due Date***
Land Acquisition Program - NYCFFBO Program evaluations	6/15/2021 Completed 6/15/2021 Completed
Land Acquisition Program - Report on progress of workgroup convened to assess opportunities to use LAP-acquired lands to facilitate relocation of development out of the floodplain.	6/30/2018 Completed
Land Acquisition Program - Report evaluating need, opportunities, and options for enhancing riparian buffer protection efforts in Kensico and EOH	9/30/2018 Completed
Land Acquisition Program - Submit proposed approach for providing payments or incentives that might increase participation by landowners in SAP.	3/31/2019 Completed
Land Acquisition Program - Status report on the WAC Forest Conservation Easement acquisition program.	12/15/2020 Completed
Land Acquisition Program - Streamside Acquisition Program Evaluation	6/30/2019 Completed
Land Acquisition Program - Submit a Long-Term Land Acquisition Plan for the period 2023-2033.	5/31/2023
Land Acquisition Program - Application for renewal of the Water Supply Permit.	6/30/2022
Watershed Agricultural Program – Metrics Assessment and Recommendations Report	6/30/2023
Watershed Agricultural Program – Long-Term Management Plan	3/31/2026
Watershed Forestry Program – Report on CAI evaluation results	12/31/2021 Completed 12/31/2026

Watershed Forestry Program – Report on the status and effectiveness of MyWoodlot.com.	12/31/2024
Watershed Forestry Program – Report on the status and effectiveness of MAP modifications and improvements.	12/31/2025
Stream Management Program – basin specific reports	6/30/2019 Completed
Stream Management Program – progress reports on CREP and CSBI partnership	12/31/2017 Completed 11/30/2025
Stream Management Program – CSBI/CREP report on metrics	11/30/2018 Completed 11/30/2021 Completed
Stream Management Program – CSBI/CREP progress report on extending CREP to eligible fallow agricultural lands	11/30/2019 Completed
Stream Management Program – Local Flood Hazard Mitigation Program evaluation	6/30/2020 Completed 6/30/2023
Stream Management Program – Water Quality Monitoring Study progress reports	11/30/2022 3/31/2024 11/30/2027
Updated Watershed Forest Management Plan	12/24/2017 Completed
Revised Watershed Forest Management Plan	3/31/2027
Updated Wetlands Protection Strategy	3/31/2018 Completed
Summary Report on Wetland LiDAR Mapping	3/31/2022
Updated Invasive Species Implementation Strategy	3/31/2022

Catskill Turbidity Controls – Final revised performance measures/criteria	3/25/2019 Completed
Catskill Turbidity Controls – RWBT Shutdown Management Plan	One year prior to the planned RWBT shutdown Completed
Catskill Turbidity Controls – Report on whether the City intends to modify its use of turbidity control measures	3 months after NYSDEC issuance of FEIS
Watershed Protection Program Summary and Assessment Report	3/31/2021 Completed 3/31/2026
Submit Emerging Contaminant Monitoring Report for monitoring conducted in 2025.	12/31/2026
Catskill/Delaware Filtration Plant – pilot studies report	6/30/2024
Catskill/Delaware Filtration Plant – final conceptual design	3/31/2026
Report on economic vitality and social character of the communities in the West of Hudson watershed	12/31/2024