



One Water NYC: 2022 Demand Management Annual Update



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Please print this plan using the double-sided printer setting.

Cover photograph: Ashokan Reservoir

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Introduction

In 2021, despite challenges associated with the ongoing pandemic, DEP’s Water Demand Management Program has continued to make progress towards achieving the water savings goals established in the 2018 Water Demand Management Plan. For example, in August 2021, DEP in partnership with the NYC Department of Education initiated over 1,000 fixture retrofits in 30 New York City public schools. Additionally, DEP successfully updated rate incentives for water reuse systems, transferred funding for retrofits at City College of New York, and continued to coordinate with agency partners to advance projects such as a water recirculation project in Central Park, a valve replacement project in Prospect Park, and fixture retrofits at New York City Health and Hospitals Corporation.

DEP has been tracking water demand trends throughout the pandemic. An analysis of water demand trends in residential and non-residential sectors demonstrated how work-from-home protocols sharply increased residential water use while decreasing non-residential water use throughout the city. Similarly, as New York implemented a phased reopening and vaccines became widely available, people returned to work and school and water demand trends began to shift closer to pre-pandemic levels,

indicating a slow-but-steady recovery. Overall, demand has begun to rebound, with residential water use returning to pre-pandemic levels, while non-residential water use continues to remain lower.

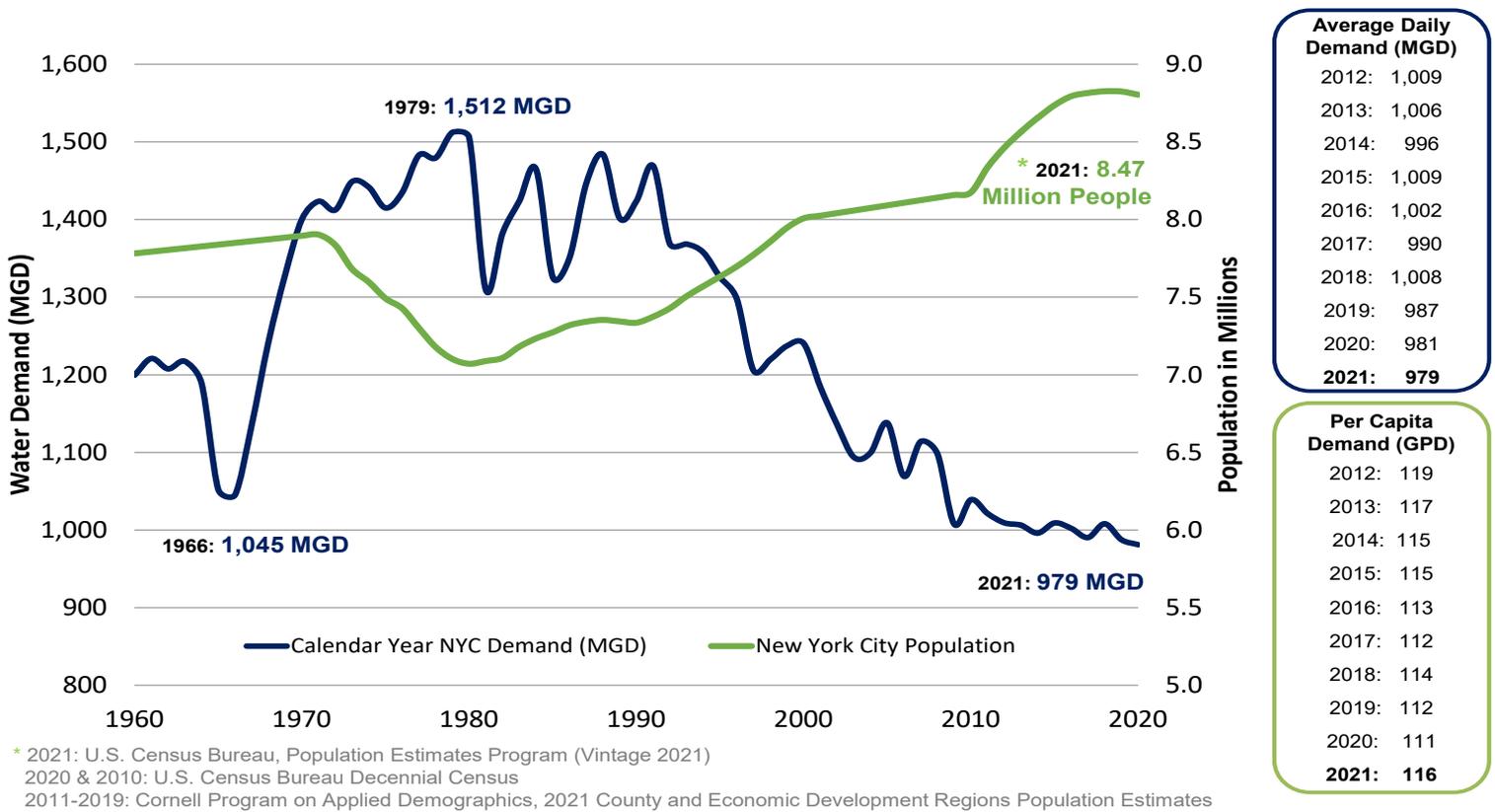
Continued water savings will help provide a critical buffer prior to and during the repair of the Delaware Aqueduct, and beyond to optimize reservoir water levels during times of drought and reduce the energy and greenhouse gas emissions associated with conveyance and treatment of water and wastewater. As of May 2022, DEP’s water efficiency programs have led to a reduction of 50 metric tons (MT) CO₂ equivalent (CO₂e) per year from reductions of potable water demand and 144 MT CO₂e per year from reductions of volume to Wastewater Resource Recovery Facilities. This is equivalent to 51 standard passenger cars (10,000 miles per year) or 4,132 60-Watt lightbulbs (used for 8 hours per day, every day), and a total energy cost savings of approximately \$80,000 per year.

Demand Management Program: Progress to Date and Anticipated Savings

Strategy	Savings Achieved to Date (MGD)	Total Savings Anticipated (MGD)
Municipal Water Efficiency Program	8.12	9.3
Residential Water Efficiency Program	1.03	1.03
Non-residential Water Efficiency Program	0.21	0.41
Water Distribution System Optimization	1.89	1.89
Water Supply Shortage Management*	0	0
Wholesale Customers Demand Program	5.31	5.31
TOTAL	16.56	17.94

* 5 MGD contingency savings from Water Shortage Rules not included in total savings estimate.

This annual report describes DEP’s program highlights from the past year and plans for the coming year, and measures progress toward our goals. This report, along with an interactive online map (see Appendix C) that shows the location of DEP’s projects, the estimated demand savings, and the estimated energy and greenhouse gas reductions from each project, are available at nyc.gov/dep/conservation. DEP is working diligently to advance initiatives under each of our six strategies for water demand reduction, and will continue to leverage our partnerships, promote leak detection, and optimize our own infrastructure. These strategies will help ensure the reliability of the City’s water resources as we continue to pave our way towards a low-carbon, resilient future.



* 2021: U.S. Census Bureau, Population Estimates Program (Vintage 2021)
 2020 & 2010: U.S. Census Bureau Decennial Census
 2011-2019: Cornell Program on Applied Demographics, 2021 County and Economic Development Regions Population Estimates

Figure 1: New York City Water Demand and Population Growth



Municipal Water Efficiency Program



New York City's government workforce is comprised of over 350,000 employees working in over 50 city agencies, in dozens of City-owned facilities and buildings. Each employee uses water for daily operational needs and to carry out responsibilities that are critical to New York City. Through the Municipal Water Efficiency Program (MWEP), DEP works with City agencies to retrofit and replace inefficient water fixtures and implement water reuse projects to ensure that water is used as efficiently as possible in City-owned facilities. Nine years into implementation, the largest share of savings from DEP's Water Demand Management Program is attributable to MWEP initiatives, in part due to the sheer size of the City's building stock.

Partner Agencies/Departments	Project
New York City Department of Education (DOE)	Bathroom Fixture Retrofits
New York City Health + Hospitals Corporation (HHC)	Bathroom Fixture and Vacuum Pump Retrofits
City University of New York (CUNY) - Queens College	Bathroom Fixture Retrofits
New York City Department of Parks and Recreation (DPR)	Water Recirculation and Valve Replacement

Table 1: Ongoing MWEP Partnership Projects



As the city continues to recover from the ongoing pandemic, DEP made progress advancing multiple municipal projects in 2021. In August 2021, DEP and the Department of Education initiated fixture retrofits in 30 schools with over 1,000 new and efficient fixtures implemented to date. DEP also transferred funding for retrofits in City College of New York facilities and executed a Memorandum of Understanding to implement water efficiency fixture upgrades at 5 public hospitals with the NYC Health and Hospitals Corporation. Additionally, DEP continued work with partners at the Central Park Conservancy and Prospect Park Alliance to advance the design of a recirculation project in Central Park and service line valve replacement project at Prospect Park.

Wastewater Resource Recovery Facilities

Savings Achieved: 2.73 MGD

Since 2013, DEP has been organizing Water Challenges to promote water conservation in DEP’s own facilities and identify opportunities to improve operational efficiency. Overall, these Water Challenges have achieved total savings of 2.73 MGD.

DEP’s fifth Water Challenge began in January 2020 and was completed in January 2021. This Water Challenge was the first time all 14 Wastewater Resource Recovery Facilities (WRRFs) were encouraged to reduce their daily water consumption by 10 percent over the course of a year. Of the 14 WRRFs, eight were able to reduce water

consumption by at least 10%. The fifth Water Challenge resulted in a total savings of approximately 0.9 MGD.

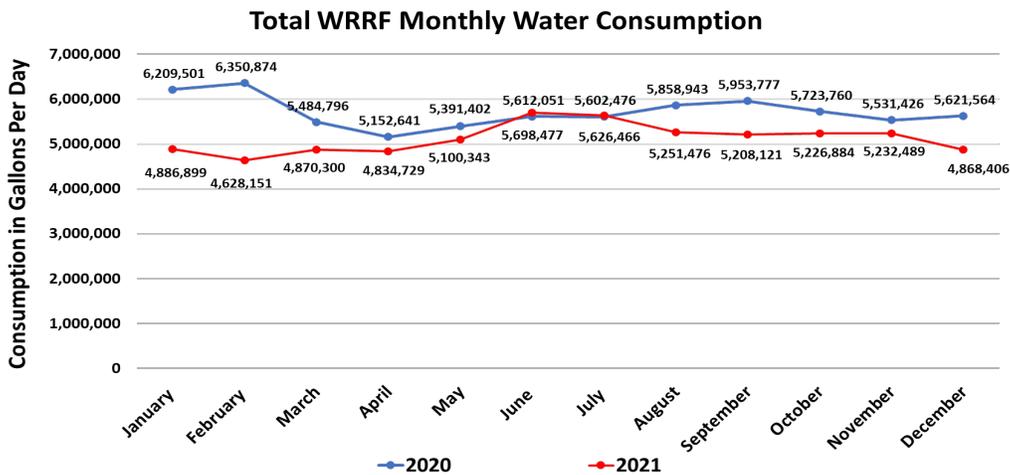
To determine how effective the Water Challenge was at achieving sustained savings, in 2021 DEP continued to monitor WRRF consumption. Consumption data was pulled from January 2021 (the end of the Water Challenge) to December 2021 and compared to consumption over the course of the Water Challenge. This data showed a decrease of 10% in total consumption at WRRFs between 2020 and 2021, indicating that savings from the Water Challenge have been sustained (Figure 2).

New York City Department of Education

Savings Achieved (May 2022): 3.4 MGD

Potential Savings: 3.86 MGD

Since 2013, DEP and the Department of Education (DOE) have partnered to upgrade bathroom fixtures in DOE facilities. To date, 432 schools have been retrofitted with over 35,600 new and efficient fixtures for a savings of 3.43 MGD. In 2021, DEP and DOE fully executed a Memorandum of Understanding to mobilize construction crews and continue retrofitting up to an additional 200 schools. In 2021, 30 schools were retrofitted with over 1,000 new and efficient fixtures. Additional retrofits are currently underway and are expected to be complete by December 2022.



2021 Percent change from 2020 Baseline Average	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	-21%	-27%	-11%	-6%	-5%	2%	0.4%	-10%	-13%	-9%	-5%	-13%

Figure 2: Total Monthly Wastewater Resource Recovery Facility



New York City Health and Hospitals Corporation

Savings Achieved (May 2022): 0.07 MGD

Potential Savings: 0.17 MGD

The New York City Health and Hospitals Corporation (HHC) operates the City's public hospitals and clinics and is the largest municipal healthcare system in the United States. Critical healthcare services are provided to more than 1.3 million New Yorkers in HHC facilities. Considering the size and scale of HHC's facilities, coupled with the water-intensive nature of hospitals, DEP's ongoing partnership with HHC remains a promising opportunity to increase water efficiency.

DEP received capital funding to complete retrofits of bathroom fixtures and vacuum pumps at Jacobi Hospital, Woodhull Hospital, Elmhurst Hospital, Bellevue Hospital, and North Central Bronx Hospital. In early 2020, HHC's contractor began surveying these facilities to identify the precise count and type of fixtures that are eligible for replacement or upgrade. These surveys were paused in Spring 2020 due to the pandemic, however, DEP and HHC resumed their partnership in 2021 and are currently moving forward to initiate fixture retrofits.

City University of New York

Savings Achieved (May 2022): 0.04 MGD

Potential Savings: 0.07 MGD

The City University of New York (CUNY) is part of New York State's public university system and is comprised of 25 colleges across the five boroughs, making it the largest urban public university in the United States. In 2014, DEP completed 780 fixture upgrades at CUNY City College for a demand savings of 0.04 MGD. In 2021, DEP and CUNY extended their partnership and executed an Interagency Agreement to replace inefficient fixtures at Queens College. Due to delays caused by the pandemic, DEP anticipates beginning these upgrades in 2022, which will result in additional savings of 0.03 MGD.

New York City Department of Parks and Recreation

Savings Achieved (May 2022): 1.1 MGD

Potential Savings: 2.38 MGD

The New York City Department of Parks and Recreation (DPR) is the steward of more than 30,000 acres of land — 14 percent of New York City — including more than 5,000 individual properties. DEP has partnered with DPR since 2013 on water conservation projects in City parks, beginning with retrofitting 400 spray showers and nine recreation centers. In 2021, DEP and DPR's non-profit partners made considerable progress on design for water conservation initiatives in Central Park and Prospect Park.

Central Park

In 2021, DEP continued coordinating with Central Park Conservancy (CPC) on the North End Recirculation Project. The project is currently in design and will save up to an estimated 0.48 MGD of potable water by recirculating stormwater between the park's northern waterbodies, including the Harlem Meer. DEP and CPC continue to meet and coordinate regularly to discuss design alternatives, operation and maintenance, and to quantify the multiple benefits of this integrated, One Water project. In addition to the potable water reduction, other benefits include a combined sewer overflow (CSO) reduction of up to 3 million gallons per year to the East River, and improved water quality in the park's northern waterbodies. DEP also continued coordinating with DPR to execute a Memorandum of Understanding (MOU) to facilitate the funding transfer from DEP to DPR.



Central Park

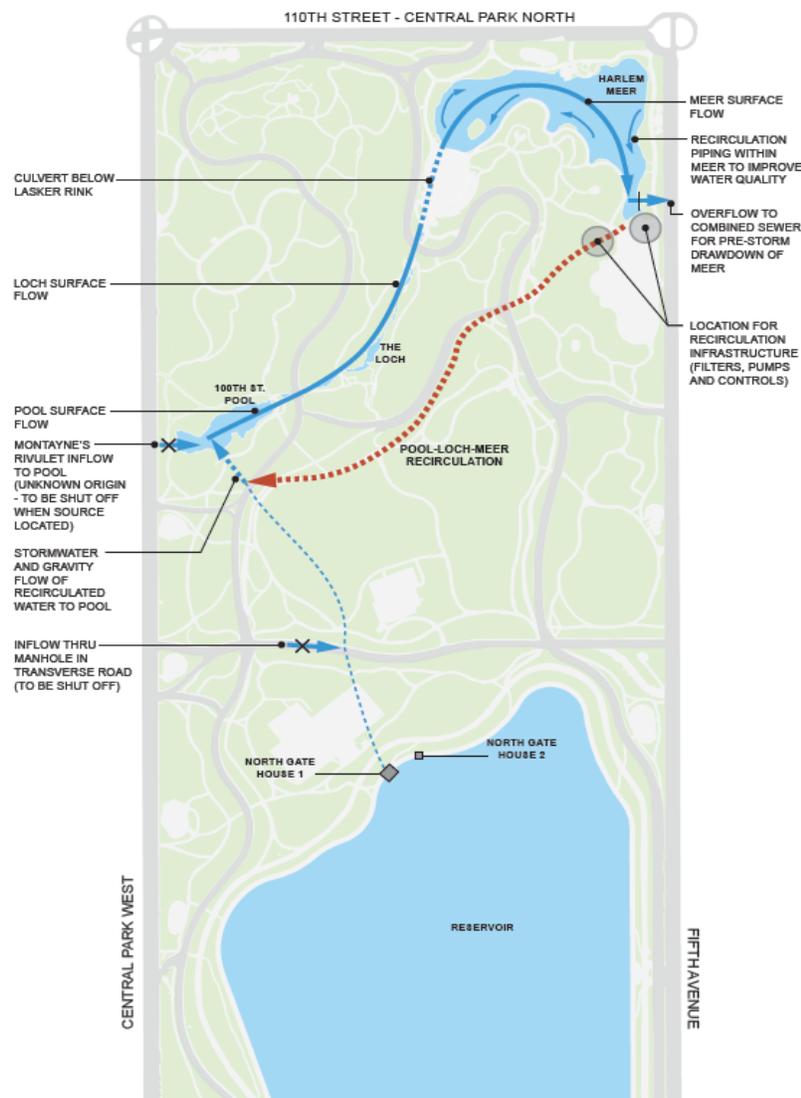


Prospect Park

In 2021, DEP continued coordinating with Prospect Park Alliance (PPA) to replace an existing service line valve in Prospect Park with an estimated demand savings of 0.8 MGD. The service line supplies potable water to Prospect Park Lake, and during rain events, PPA staff discharge water from the lake into the combined sewer system to avoid flooding the park. Additionally, during summer when evaporation occurs, Prospect Park Lake is supplied with an estimate 1 MGD or more of potable water to maintain health and aesthetics. As an integrated, One Water project, this valve replacement is expected to reduce CSOs during rain events to Gravesend Bay and the Upper Bay by up to 12 million gallons per year. In December 2020, DEP and DPR executed a MOU for this project and completed the funding transfer from DEP to DPR. PPA hired an engineering firm and design is currently underway.



Prospect Park Lake





Residential Water Efficiency Program



Residential water demand in New York City accounts for the highest water use by land use type. In Fiscal Year 2021, residential properties accounted for 86 percent of the City’s total meter-billed water demand (Figure 3). DEP’s 1994 Toilet Rebate Program and 2014 Toilet Replacement Program were two key initiatives that targeted increased fixture efficiency in Residential buildings and were critical in reducing Residential demand from inefficient fixtures. More than 13,600 toilets were replaced through the Toilet Replacement Program, achieving a demand savings of 0.63 MGD. Although the Toilet Replacement Program concluded in 2019, DEP has achieved savings of 1.03 MGD through these two initiatives.

While the pandemic caused many changes in water usage across the city (Appendix A) including increases in meter-

billed Residential demand during widespread work-from-home protocols, in 2021, meter-billed Residential water demand had returned to pre-pandemic levels. Toward the end of 2021, water demand decreased below pre-pandemic usage, which may be driven by widespread return to public schools or increased travel during the holidays.

Home Water Savings Kits

Savings Achieved: 0.4 MGD

DEP works with Honeywell to provide building owners with complimentary household water conservation surveys to help identify opportunities for water savings and detecting leaks. In 2021, home surveys were suspended due to the pandemic. However, since the program started, home surveys are estimated to have saved 0.4 MGD.

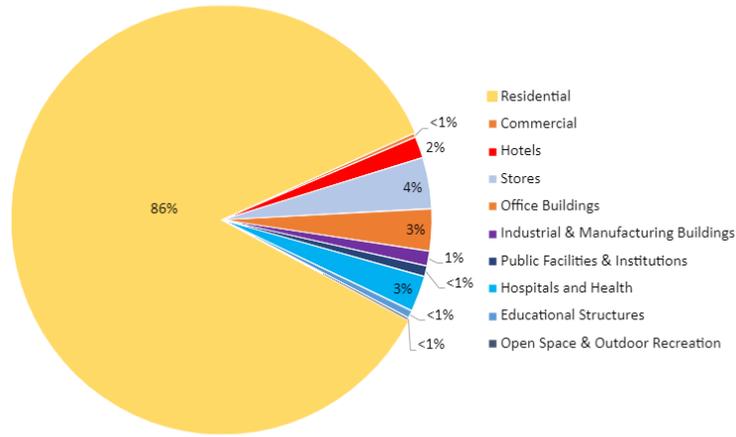


Figure 3: Fiscal Year 2021 Meter-billed Water Consumption by Land Use

Case Study: Residential Water Demand Trends During COVID-19

In March 2020, DEP began tracking water use to explore the short and long-term effects of the coronavirus emergency. Over the course of 2021, meter-billed residential demand returned to pre-pandemic levels from the increases in water use observed in 2020 when New Yorkers were spending more time at home. The return to pre-pandemic residential water use is consistent with the reopening of schools and offices, and as of December 2021, meter-billed residential water use was lower than before the pandemic.

However, looking at the effect of the pandemic in each borough, residential demand reveals more nuances (Figure 4). Four of the boroughs, Brooklyn, Bronx, Queens, and Staten Island, experienced similar residential water use increases in 2020, and then a return to pre-pandemic water use in 2021. Manhattan, however, experienced significant decreases in residential water use in 2020, which did not fully rebound to pre-pandemic levels in 2021. This Manhattan trend is consistent with reports of New Yorkers leaving the city but demonstrates that this phenomenon occurred primarily in Manhattan. As of December 2021, Manhattan residential water use had still not fully rebounded.

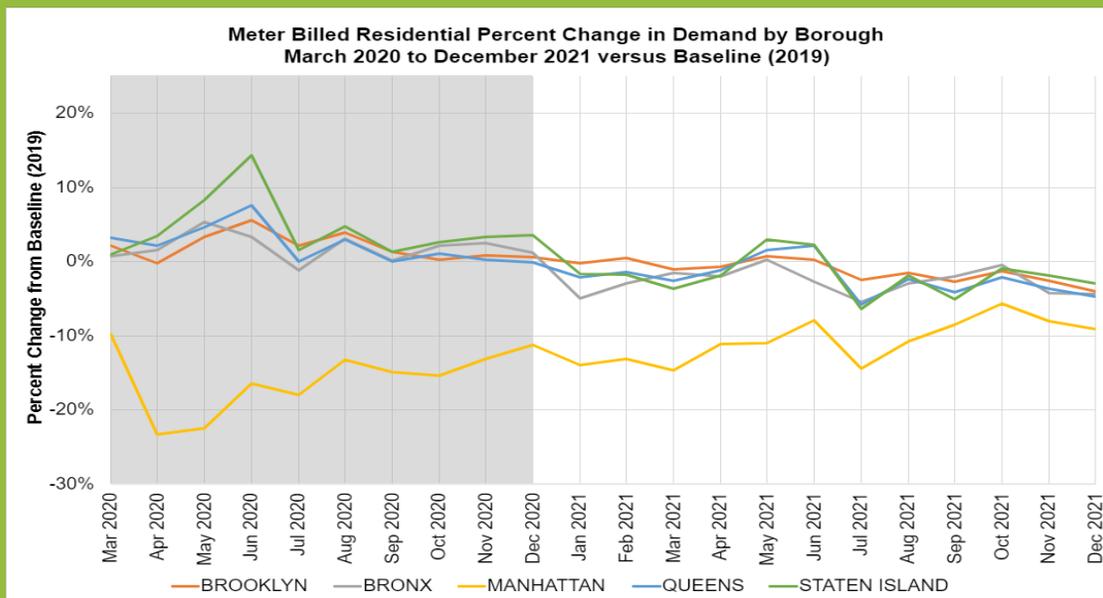
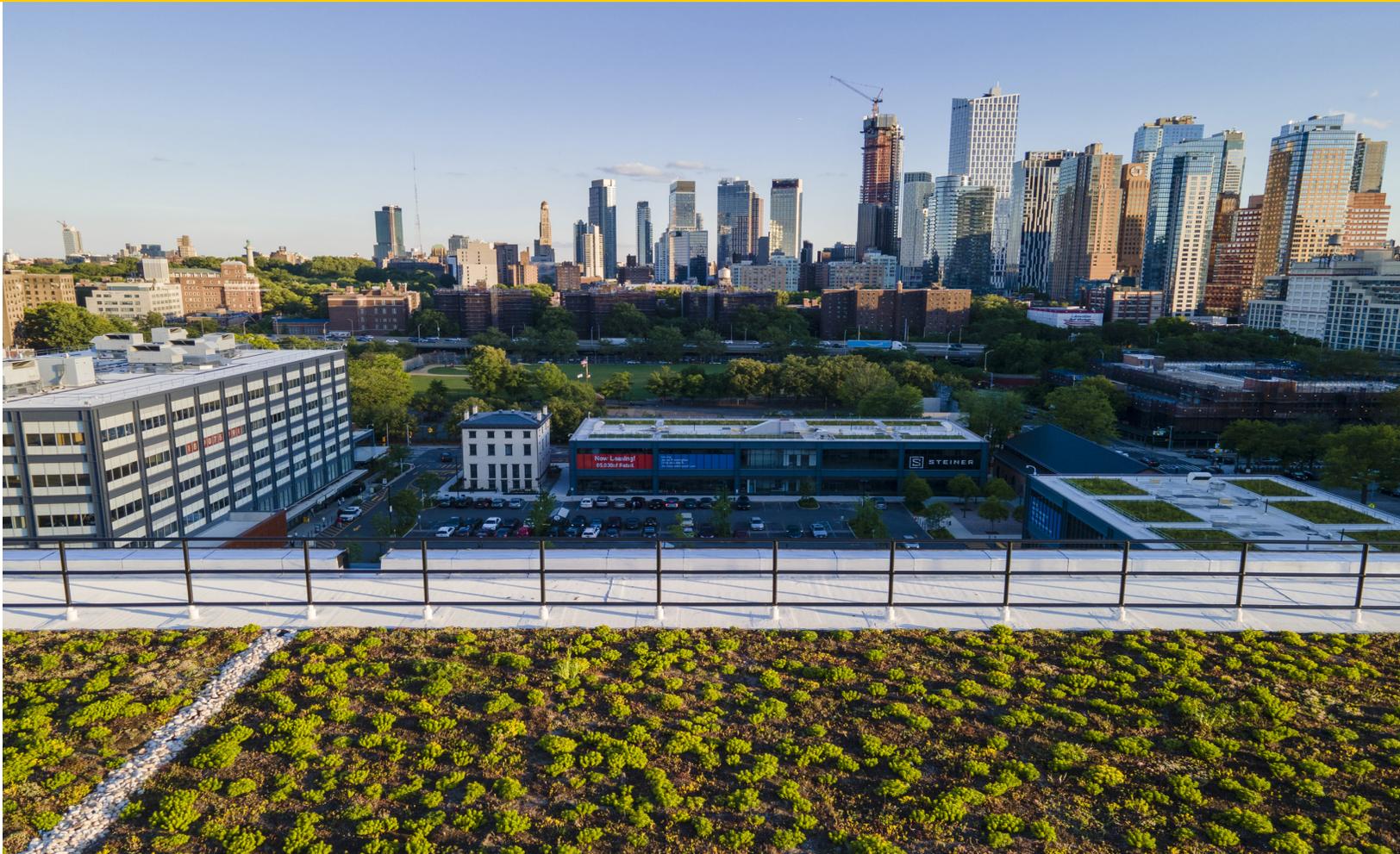


Figure 4: Meter-billed Residential Sector Water Demand Trends, March 2020 to December 2021 versus Baseline (2019)



Non-Residential Water Efficiency Program



In 2021, DEP advanced several components of its Non-Residential Demand Management Program. DEP's Water Conservation and Reuse Grant Pilot Program, which launched in July 2019, continued moving forward with its first selected grant recipient. While the primary goal of this program is to conserve potable water, onsite water reuse also offers opportunities for achieving co-benefits and is an important part of DEP's One Water approach towards managing water resources. In addition to conserving water, these projects also reduce flows to the sewer system and wastewater facilities, which can contribute to reductions in combined sewer overflows. To further recognize the co-benefits that reuse systems provide, DEP recently expanded water and wastewater rate discount programs to provide further incentive for their installation on private property. DEP will continue to

explore ways to increase water efficiency across all private sectors through innovative One Water solutions and partnerships.

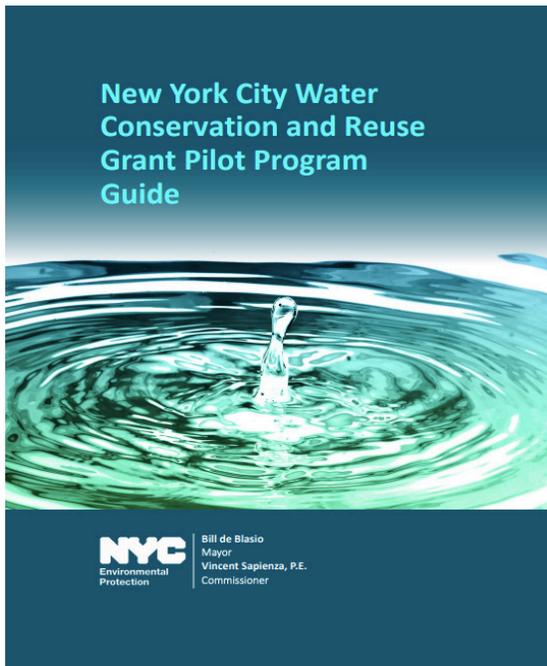
Water Conservation and Reuse Grant Pilot Program

Potential Savings: 0.2 MGD

In 2021, the Water Conservation and Reuse Grant Pilot Program continued to be available for commercial and residential water conservation projects including, but not limited to, retrofits and on-site water reuse systems that achieve a minimum water savings of 2,740 gallons per day, or one million gallons per year. The grant funding covers up to 100 percent of equipment costs for basic water efficiency retrofits, including water fixture replacements,



or the fixed maximum unit price for WaterSense-certified fixture replacements. DEP has offered grant funding to one applicant and is currently in the process of confirming their funding and legal agreements. The project includes a 400,000 gallon per day water reuse system that contributes not only water conservation benefits, but also combined sewer overflow reductions. DEP is accepting new applications through June 1, 2022, and anticipates announcing additional application rounds in the future.



Water Conservation and Reuse Grant Pilot Program Guide

Recognizing that water reuse systems reduce the amount of wastewater discharged to the sewer, New York City was an early leader in water reuse implementation, policies, and incentives. DEP has established a powerful business case for reuse by showing that it can help achieve potable water savings, reduce combined sewer overflows, save property owners money, and create green jobs. As such, DEP is also working to optimize the return on investment for property owners through rate discounts. In addition to the Water Conservation and Reuse Grant program, the City recently updated water rates to offer an additional 76 percent wastewater bill discount for systems that significantly reduce wastewater flows, in addition to the existing 25 percent water bill reduction for properties that reduce at least 25 percent of water used through reuse. Eligibility criteria for these discounts were also updated to apply to district-scale systems.

DEP has also coordinated closely with the New York City Department of Buildings (DOB) and Department of Health and Mental Hygiene (DOHMH) to provide more clarity on plumbing code requirements and allowable end uses for reuse. Reuse was officially incorporated into the Plumbing Code in 2014, and DEP has worked closely with DOHMH to develop new standards for Onsite Non-potable Water Systems. In 2019, City Council unanimously voted to bring the New York City Plumbing Code up to date, which will go into effect in late 2022. These policies have played a critical role in advancing water reuse in New York City.

Water Challenge to Breweries

Potential Savings: TBD

Over recent years, New York City has seen a sharp increase in its number of local craft breweries, with over 40 breweries open today. This not only provides New Yorkers with a number of options for where to grab a cold one (made with NYC's award-winning tap water), but also represents an opportunity to reduce citywide water demand. According to the Brewers Association, while craft breweries are becoming more water efficient, the average water use ratio for a brewery is approximately 294 gallons of water to 42 gallons of beer. Additionally, a significant amount of water used at breweries is discharged as effluent. Effluent from breweries can be a challenge for WRRFs due to a comparatively high nutrient loading from organics and solids associated with ingredients used during the brewing process.

DEP is exploring the potential for a Water Challenge to Breweries to help improve water efficiency and wastewater management, which presents environmental and economic opportunities to brewers. The Challenge would encourage participating breweries to voluntarily reduce their water usage and wastewater discharges by targeted goals. DEP has begun to conduct initial outreach by administering surveys to breweries to gauge interest in the program and to learn ways to better work with breweries to achieve and sustain long-term water savings, reduce wastewater discharges, and promote resource recovery.



Case Study: Non-Residential Water Demand Trends During COVID-19

The COVID-19 pandemic has caused disruptions across the world, and even two years later many aspects of life have not returned to pre-pandemic operations. DEP has been tracking meter-billed non-residential water use since March 2020 to assess the impacts of the pandemic. Overall, meter-billed non-residential demand decreased significantly in March and April of 2020 and as of December 2021, non-residential demand had still not returned to pre-pandemic levels.

Exploring month-to-month water demand trends for different non-residential sectors shows that most non-residential sectors experienced similar impacts (Figure 5). The healthcare sector, understandably, was the only sector to see minimal water use declines, but all other sectors experienced significant declines in water use during the pandemic. In 2021, all non-residential sectors experienced some rebound but none of them have fully returned to pre-pandemic water use. The continued declines are likely driven by the increased prevalence of work-from-home-options.

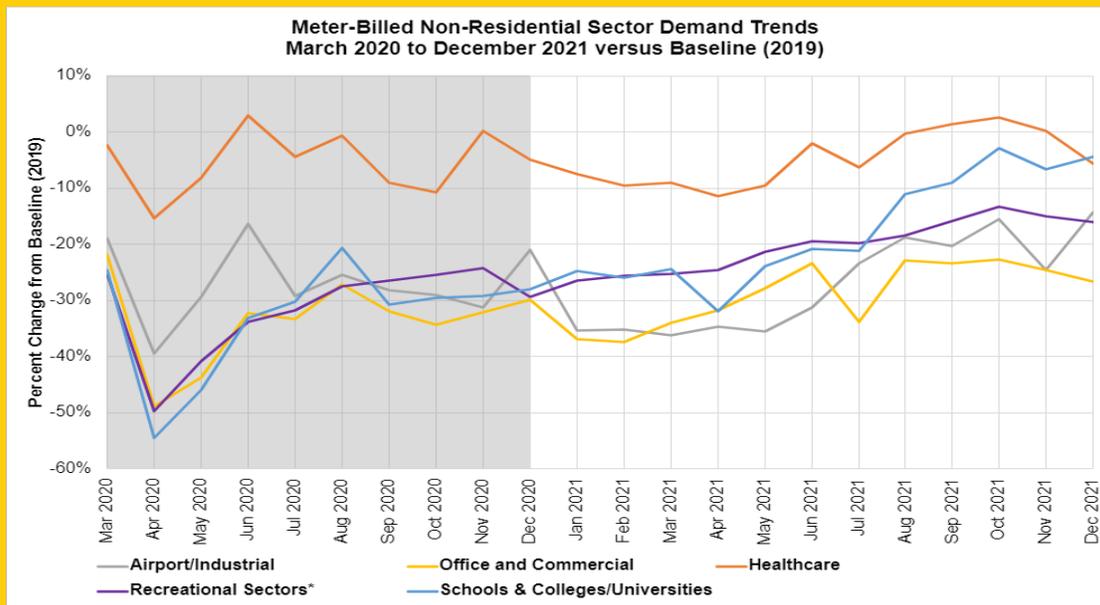


Figure 5: Meter-billed Non-Residential Sector Water Demand Trends, March 2020 to December 2021 versus Baseline (2019)



Water Distribution System Optimization



Each day, one billion gallons of water are delivered from DEP's 19 upstate reservoirs to over 830,000 service lines in residential and non-residential buildings, which provide this water for use by New York City's over 8.8 million residents. For operating and maintaining this vast infrastructure system, much of which is underground, DEP employs system-wide best practices. These practices include pressure management, system-wide leak detection and repair, meter replacement, Automated Meter Reading (AMR) software, and providing an online platform for customers to track and monitor water use and detect leaks in their buildings.

Leak Detection Program

Savings Achieved: 1.89 MGD

DEP has a large service area with approximately 7,000 miles of pipes that distribute water to end users. As water travels through these underground pipes, undetected leaks can occur, therefore constant maintenance, leak detection, and metering optimization is key to efficient management of New York City's water supply. DEP's goal is to increase leak survey efforts by modernizing the leak detection program to detect, locate, and stop water leakage by leveraging best in class technology to pinpoint hard to find and unreported leaks. Additionally, DEP's goal is to increase the number of miles surveyed by increasing staffing to reinstitute multiple, proactive surveys of high-risk mains.



Hydrant Maintenance and Controlling Illegal Use

New York City has over 109,500 hydrants located throughout the five boroughs. These critical fire suppression assets can discharge up to 1,000 gallons per minute. When opened by New Yorkers in the summer to cool off without an approved spray cap, local water pressure can be negatively impacted. Therefore, DEP sponsors the Hydrant Education Action Team (HEAT) to educate New Yorkers about the risks of illegally opening hydrants.

DEP ensures proper maintenance by performing assessments, testing pressure, and repairing hydrants when necessary. In 2021, DEP repaired 7,301 hydrants, replaced 1,047 and provided other maintenance services to 10,985 additional hydrants.

Optimize Pressure Management

DEP continually works to improve maintenance of the pressure zones within the city's water distribution system. In 2021, the number of breaks per 100 miles was 6.23, slightly below the City's 10-year average of 6.8, and below the accepted industry average of 25 breaks per 100 miles annually. In 2021, DEP completed 4,970 preventive maintenance inspections/calibrations on pressure regulating valves. DEP also overhauled 2 of the 437 pressure regulating valves that are in use citywide.

Automatic Meter Reading Infrastructure

In 2009, DEP launched its AMR program and largely completed that effort in 2012. DEP has installed approximately 829,000 AMR transmitters, representing 99% of DEP's AMR installation target. All customers whose accounts have been upgraded for AMR can now access details of their water usage through DEP's website.



Hydrant Education Action Team (HEAT) Members Educating the Public on the Dangers of Illegally Opening Fire Hydrants



Optimize Metering and Replace Large Water Meters

DEP's efforts to achieve universal metering of all DEP water and sewer accounts is motivated by the need to reduce non-revenue water and promote conservation among water users by providing accurate consumption information. The universal metering initiative is also critical to measuring the success of many other demand management strategies. Accurate consumption data enables DEP to determine whether target consumer groups have achieved projected consumption reductions or how demand management strategies may be adapted to improve their effectiveness. In 2021, DEP replaced 3,815 large meters (i.e., those over 2 inches in diameter).

Provide Customers with Easy and Timely Access to Water Usage Data

DEP's Bureau of Customer Services provides customers online access to their water consumption data, allowing customers to view their consumption and identify leaks and other inefficiencies. By becoming familiar with their consumption trends, customers can correct identified leaks in their own homes to save money and water.

To date, approximately 370,000 customers have signed up for My DEP to view their bills, water usage, and payment history online. This service also allows customers to pay their bills online and sign up for automatic billing (eBills); approximately 114,000 customers have signed up for eBills.

Customers who sign up for My DEP also have the option to receive leak alerts, which are sent when consumption triples for five consecutive days. To date, over 629,000 customers have signed up for leak alerts. DEP continues to promote My DEP and leak detection alert enrollment as an ongoing initiative.



New York City Fire Hydrant Spray Cap Demo



Water Supply Shortage Management



DEP continually examines water use restriction best practices to adapt to future water supply conditions. These future conditions include changing hydrologic conditions due to climate change, aging infrastructure, unplanned water supply shortages caused by events such as drought or infrastructure outages, and planned temporary, non-emergency infrastructure repairs, such as the approaching Delaware Aqueduct shutdown. New York City has encountered approximately nine drought periods of record, with the most recent being 20 years ago in 2001. Although Water Supply Shortage Management does not provide permanent demand savings, this strategy plays a key role in temporarily reducing demand when needed most when supply is limited.

Updated Rules and Plan to Allow for Planned Infrastructure Repairs

In May 2022, amendments to DEP’s “Drought Emergency Rules” (15 RCNY Chapter 21) were formally adopted and promulgated. As amended, the rules are now titled the “Water Shortage Emergency Rules.”

New York City’s rulemaking process is governed by the procedure set forth in the City Administrative Procedure Act (CAPA). DEP first initiated the process of amending the Drought Emergency rules in July 2013. In January 2022, the Mayor’s Office of Operations and the New York City Law Department certified DEP’s final draft amendments to the “Drought Emergency Rules” (“Water Shortage Emergency Rules” as proposed by the amendments), and DEP subsequently noticed them for



public review and comments, and held a public hearing on the draft amendments in February 2022 as required under CAPA. The amendments to the rules were deemed final and effective as of May 13, 2022.

The revisions to the rules expand their scope and applicability to include water shortages caused not only by hydrological droughts, but also other types of events such as planned and unplanned infrastructure outages. The revisions also add, remove, and change certain water use prohibitions during the different stages of a water shortage emergency, to provide more clarity and better reflect DEP's understanding of city water use. Although this action does not apply to routine residential water use such as drinking, bathing, or dishwashing, DEP expects that public awareness of the restrictions would lead to decreased residential water use during a declared water shortage emergency.



Kayaking at Neversink Reservoir



Wholesale Customers Water Demand Management Program



The Wholesale Customer Demand Management Program was launched by DEP in 2014 to extend demand reduction strategies to its wholesale customers (Utility Partners). The goal of this program is for Utility Partners to implement demand management projects to reduce demand by 5 percent from their 2013 baseline demand. To achieve this, DEP partnered with some of its largest utility partners to develop custom Water Demand Management Plans (WDMP) tailored to each Utility Partner's water system. These Utility Partners include the Town of Greenburgh, the Village of Ossining, the Village of Scarsdale, the Village of Tarrytown, Westchester Joint Water Works (WJWW), the City of White Plains, and the City of Yonkers.

As part of the WDMP development, each Utility Partner selected specific demand management measures based on feasibility, cost-effectiveness, and combined ability to achieve the 5 percent reduction goal. Each WDMP includes a water system profile, a non-revenue water analysis, a summary of current demand management practices, an evaluation of potential demand management measures, and an implementation plan comprised of selected demand management measures for implementation. To ensure the implementation of each WDMP, DEP and Utility partners intended to enter into intergovernmental funding agreements to allow DEP to provide funding for selected measures.



Due to unforeseen circumstances brought on by the COVID-19 pandemic, anticipated funding for this program was reallocated to help offset the fiscal impacts brought on by the pandemic. As such, DEP and its Utility Partners agreed to terminate existing contracts under this program. Utility Partners were encouraged to continue utilizing tools that were introduced and discussed during prior collaboration, including continuing to improve their efforts to address non-revenue water.

Despite pandemic-related impacts, DEP's robust outreach and engagement, coupled with the determination and initiative of Utility Partners,

considerable demand savings were achieved because of this program. To evaluate the long-term impact of this program on Utility Partners overall demand, DEP continued to monitor consumption throughout 2021. An analysis of this consumption data demonstrated a 2-year sustained average savings of 5.31 MGD has been maintained since the program ended. DEP would like to thank and recognize its participating Utility Partners for implementing conservation projects and water loss control strategies to achieve these savings.

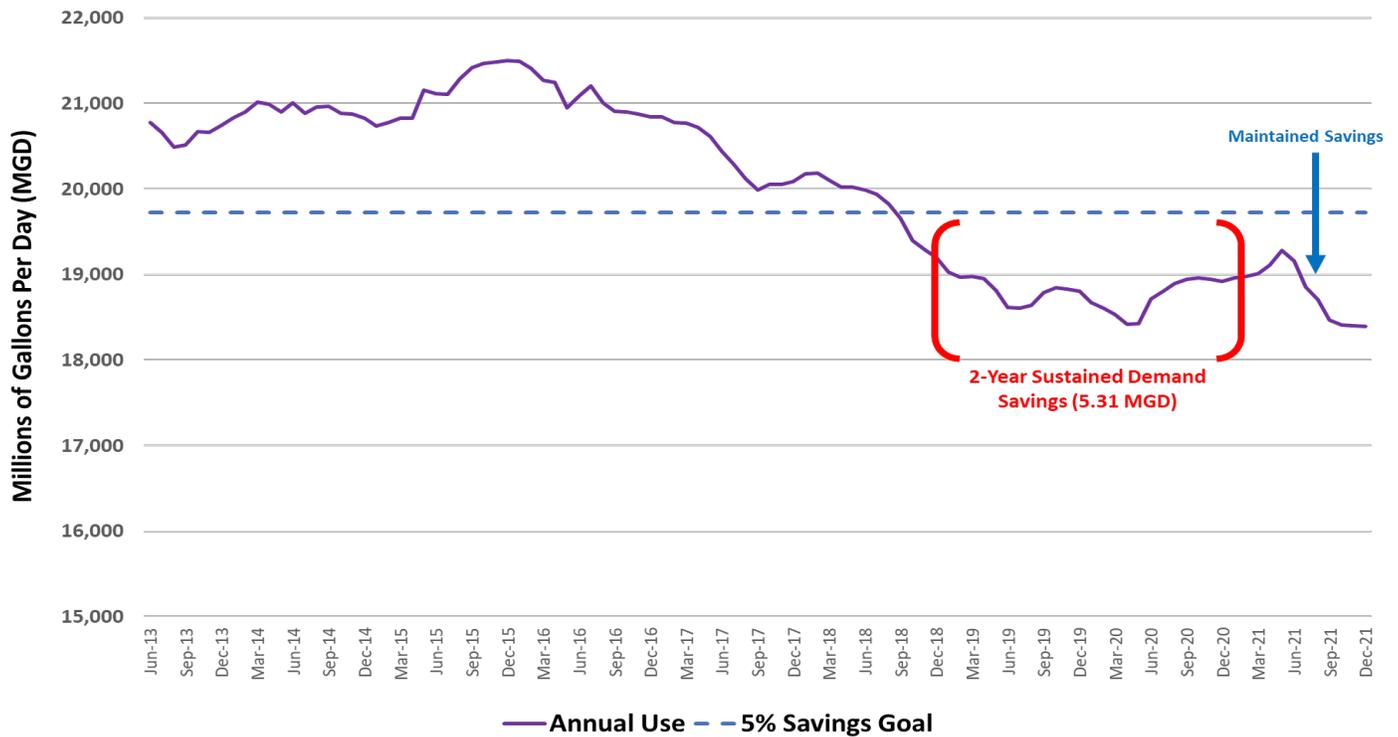


Figure 6: Wholesale Demand Management Program Consumption

Appendix A: Water Demand Trends

Over the past two years, the ongoing COVID-19 pandemic has had irrevocable effects on all areas of life. Through the many different waves of the pandemic, New York City’s water demand has tracked how New Yorkers have adapted and responded to changes in safety protocols. For example, water demand trends captured lower Non-Residential water demand in 2020 and 2021 compared to pre-pandemic water-use while Residential water use in 2020 increased compared to pre-pandemic use during times of widespread work-from-home protocols and public school closures. As New York implemented a phased reopening, vaccines became widely available, and people returned to work and school, water trends shifted again, indicating a slow but steady recovery. Residential water use has largely returned to pre-pandemic use, while Non-Residential water use has remained lower than water use before the pandemic.

In March and April 2020, water distribution citywide declined about 5% (nearly 50 million gallons per day) compared to March and April 2019 water use. Citywide water distribution remained declined through May, and

then began to rebound in June 2020, consistent with the phased reopening of New York State. Through the latter part of 2020 and all of 2021, citywide water distribution trends rebounded and continued to stay comparable to the pre-pandemic baseline (Figure 7).

Unlike the water distribution trends, meter-billed demand has stayed lower than the 2019 baseline from March 2020 through December 2021 which has been largely driven by sustained declines in Non-Residential sectors and more recent declines in Residential water use (Figure 8). In March and April 2020, meter-billed Non-Residential water demand dropped as low as 41% below March and April 2019 (pre-pandemic) water use (Figure 9). Over the course of 2020 and 2021, Non-Residential demand started to increase as businesses reopened and lockdown restrictions were eased. However, as of December 2021, meter-billed Non-Residential water use remained 16% lower than December 2019.

**Citywide Average Daily Water Distribution by Month
January 2020 to December 2021 versus Baseline (2019)**

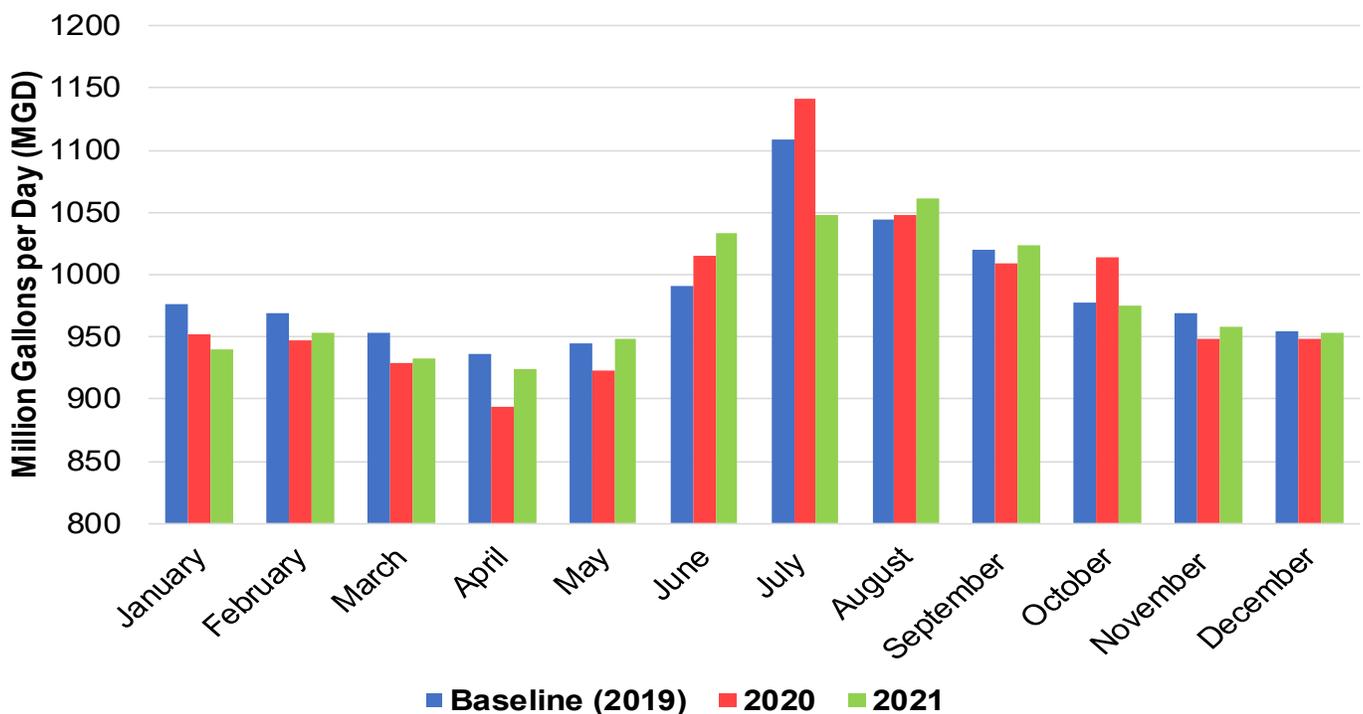


Figure 7: Citywide Daily Water Distribution: March 2020 to December 2021 versus Baseline (2019)

Meter-Billed Demand Trends March 2020 to December 2021 versus Baseline (2019)

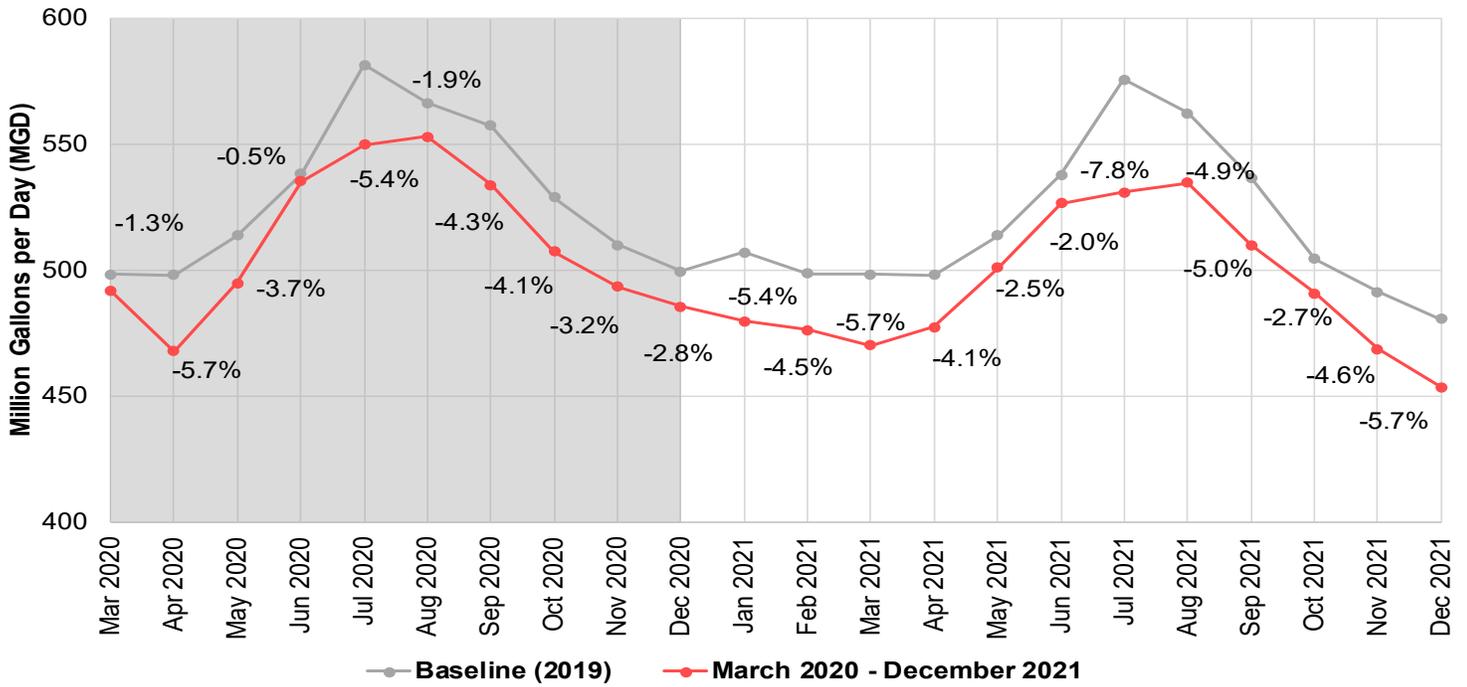


Figure 8: Percent Change in Meter-billed Demand (Residential and Non-Residential), 2020 and 2021 versus Baseline (2019)

Meter-Billed Non-Residential Demand Trends March 2020 to December 2021 versus Baseline (2019)

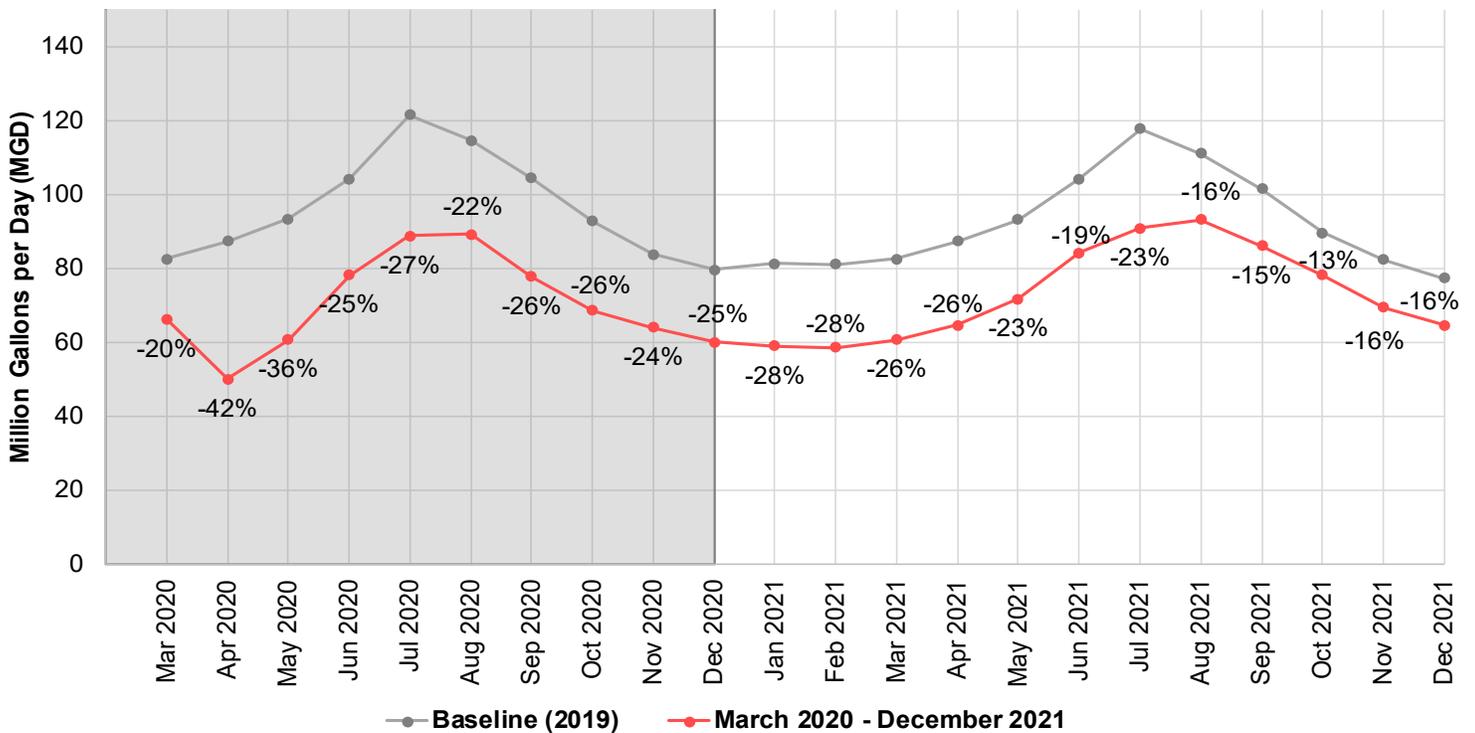


Figure 9: Percent Change in Meter-billed Non-Residential Demand, 2020 and 2021 versus Baseline (2019)

Conversely, meter-billed residential water use increased in March and April 2020 compared to March and April 2019 (pre-pandemic), largely due to widespread work from home protocols and school closures (Figure 10). After the phased New York State reopening in June 2020, meter-billed Residential water use relaxed to pre-pandemic levels

and was comparable with Residential demand in 2019. In 2021, Residential demand continued to decrease to below pre-pandemic use, with a 3.6% decline in December 2021 compared to December 2019.

**Meter-Billed Residential Demand Trends
March 2020 to December 2021 versus Baseline (2019)**

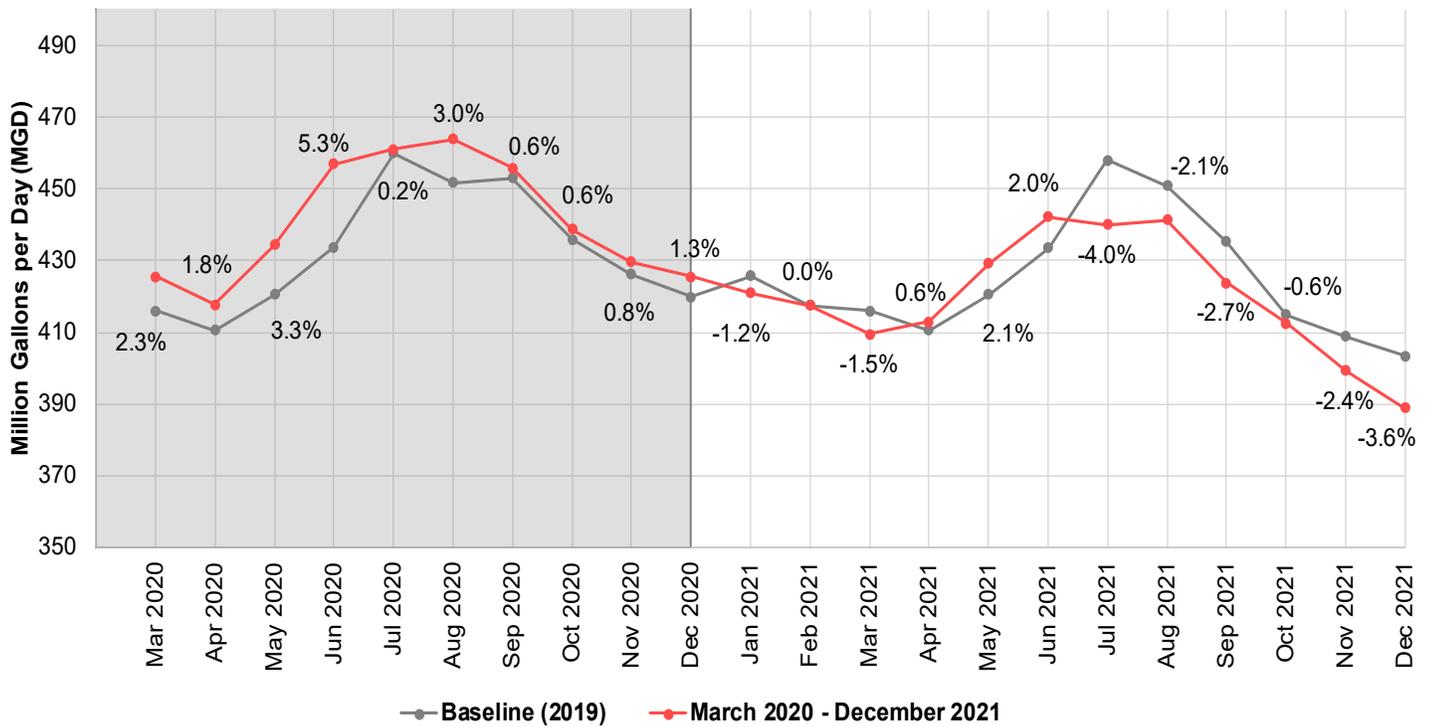


Figure 10: Percent Change in Meter-billed Residential Demand, 2020 and 2021 versus Baseline (2019)

Appendix B: Water Audit

New York City per capita water consumption has remained steady since the first Water Demand Management Plan was released in 2013, from 117 gallons per day per person, to 116 gallons in 2021. As DEP continues to expand AMR and volumetric meter-based billing, overall water demand is expected to remain stable or decrease. This trend could be affected in the future by factors including, but not limited to annual temperature fluctuations, weather, climate, potential drought, and population fluctuations.

To explore these trends, DEP conducts water demand data analyses for our system each year. These analyses help the agency with water supply and wastewater infrastructure planning, revenue analysis, affordability

studies, new growth and rezoning assessments, and analyzing and understanding the effects of water demand on agency operations. Since 2013, DEP has used American Water Works Association (AWWA) M36 water audit software to assess system water balance. The table below illustrates the results of DEP's Fiscal Year 2021 audit. Non-revenue water as a percentage of the volume of water supplied was 18.6% in FY21, higher than seen in previous audits (FY20 was 16.9% non-revenue water).

AWWA Free Water Audit Software: System Attributes and Performance Indicators		WAS v5.0 American Water Works Association. Copyright © 2014, All Rights Reserved.
Water Audit Report for: NYC Department of Environmental Protection		
Reporting Year: 2021 7/2020 - 6/2021		
*** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 78 out of 100 ***		
System Attributes:		
	Apparent Losses:	16,324.908 MG/Yr
	+ Real Losses:	41,926.579 MG/Yr
	= Water Losses:	58,251.487 MG/Yr
	? Unavoidable Annual Real Losses (UARL):	4,094.57 MG/Yr
	Annual cost of Apparent Losses:	\$225,433,950
	Annual cost of Real Losses:	\$22,221,087 Valued at Variable Production Cost Return to Reporting Worksheet to change this assumption
Performance Indicators:		
Financial:	Non-revenue water as percent by volume of Water Supplied:	18.6%
	Non-revenue water as percent by cost of operating system:	35.8% Real Losses valued at Variable Production Cost
Operational Efficiency:	Apparent Losses per service connection per day:	53.52 gallons/connection/day
	Real Losses per service connection per day:	137.45 gallons/connection/day
	Real Losses per length of main per day*:	N/A
	Real Losses per service connection per day per psi pressure:	2.29 gallons/connection/day/psi
	From Above, Real Losses = Current Annual Real Losses (CARL):	41,926.58 million gallons/year
	? Infrastructure Leakage Index (ILI) [CARL/UARL]:	10.24

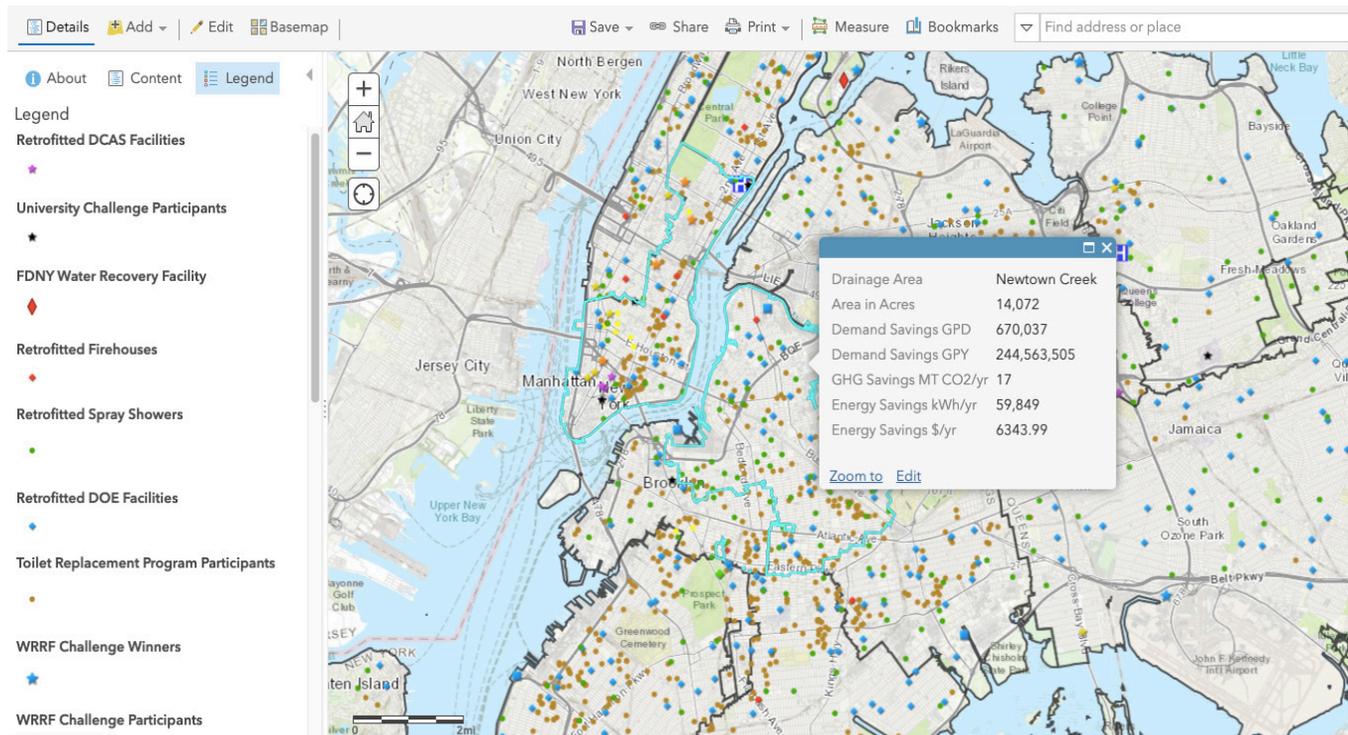
* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline

AWWA Water Audit Results for Fiscal Year 2021

Appendix C: Interactive Map

DEP released a public map of its water conservation projects across New York City in 2018 that is updated upon the completion of new projects. All projects and their respective savings have been mapped and are available to view through DEP's water conservation website. In addition, DEP has used the Water-Energy Nexus Tool to estimate the energy savings and benefits of water conservation,

including the reduction in electricity and greenhouse gases that would have been required to process and treat the water. A screenshot of this interactive map showing conservation projects and associated energy and greenhouse benefits is shown below.



Demand Management Interactive Map

