STATE OF THE AQUIFER

LICAP
Long Island Commission for Aquifer Protection

2021 UPDATE

THE MULTI-BILLION DOLLAR INVESTMENT IN LONG ISLAND'S DRINKING WATER

TABLE OF CONTENTS

Cover Photo (taken at Hicksville Water District): Advanced oxidation process (AOP) treatment systems are the key to removing 1,4-dioxane from Long Island's groundwater in order to meet a new health-protective New York State regulation. Water suppliers from all over Long Island are incorporating the systems into their infrastructure, along with additional granular activated carbon filters to remove PFOS/PFOA, also the subject of a new state regulation. Representatives from numerous water districts and other water suppliers joined LICAP Chairman Paul Granger (not pictured) for a photo shoot in front of the Hicksville Water District's AOP system at its plant located on Bethpage Road, Hicksville.

MESSAGE FROM THE CHAIRMAN

This space last year was devoted almost entirely to the COVID-19 pandemic, understandably since the pandemic was front and center in all of our minds, both here on Long Island and all around the world.

And while the pandemic—unfortunately—has yet to fully recede into the past, water suppliers and the other agencies and offices that make up the Long Island Commission for Aquifer Protection continue to do what they do best, even in difficult circumstances—make sure Long Islanders have uninterrupted access to a drinking water supply that meets or surpasses all water quality regulations.

That topic is front and center in this year's report, as water suppliers from one end of Long Island to the other add treatment systems to their infrastructure to adhere to new state regulations on perfluorinated compounds and 1,4-dioxane, some of the most protective water quality standards in the country. The regulations will ensure that Long Islanders will continue to enjoy high quality drinking water, but at a very high cost and through an extremely complex process of adding the needed treatment systems. That effort is featured in the report's cover story.

The report also takes a look at how Long Island's water infrastructure may benefit from the massive federal infrastructure packages currently being crafted in Washington, D.C; the U.S. Environmental Protection Agency's upcoming UCMR 5 emerging contaminant monitoring program; revisions to the federal Lead and Copper Rule; efforts in New York State to expand the list of emerging contaminants in need of monitoring; and the latest water pumpage, water conservation and groundwater monitoring information.

It is, we believe, as detailed and focused a report on these important topics as you will find anywhere, and we hope it provides you with a greater awareness of, and appreciation for, the sole source aquifer that provides 100% of our drinking water on Long Island.

Paul Granger
2021 Chairman,
Long Island Commission for Aquifer Protection

The State of the Aquifer

Though this section is called “State of the Aquifer” and is meant to encapsulate in summary form the most significant current threats to our underground drinking water supply, it may be more apt to call it “State of the Drinking Water Supply” this year.

This is because 2021 is all about what water suppliers and others responsible for making sure Long Islanders have access to safe drinking water are doing to meet new state drinking water standards for perflourinated compounds and 1,4-dioxane. This effort, covered extensively in this report, is the most impactful news of the year pertaining to Long Island’s sole source aquifer.

This is not to say that new threats to the aquifer system’s health are not on the horizon—a bill establishing a list of 40 new emerging contaminants to be monitored is awaiting the governor’s signature at the time of this writing—but there may never have been a sharper focus on the distinction between groundwater quality and the drinking water supplied to Long Islanders post-treatment.

LICAP
Long Island Commission for Aquifer Protection

Mission

To advance a coordinated, regional approach to the protection of Long Island's sole source aquifer through the preparation of a State of the Aquifer report, updated annually, and a Groundwater Resources Management Plan.

Founded

By unanimous votes of the Suffolk County and Nassau County Legislatures in 2013. Reauthorized in 2018 and extended through 2023.

Members

LICAP has 11 voting members. The Suffolk County Water Authority, the Long Island Water Conference, the Nassau-Suffolk Water Commissioners Association and the Nassau and Suffolk Departments of Health are permanent members. Additionally, the Nassau County and Suffolk County Executives each appoint one member, as do the Presiding Officers of the Nassau and Suffolk Legislatures and the Nassau and Suffolk Soil and Water Conservation Districts. There are also ex officio members with no voting power.

Committee Structure

LICAP maintains four standing subcommittees: The 2040 Water Resources and Infrastructure Committee identifies long-term risks to the water supply industry created by global climate change. The Water Resource Opportunities Subcommittee identifies and quantifies short-term risks to groundwater resources. The Conservation Subcommittee develops strategies to educate Long Islanders about the importance of conserving our groundwater. The fourth subcommittee works in conjunction with the Long Island Nitrogen Action Plan (LINAP) working group.

Meetings

LICAP is required to meet at least quarterly and hold one public hearing in each county annually.

TAKING ACTION

THE MULTI-BILLION DOLLAR INVESTMENT IN LONG ISLAND'S DRINKING WATER

The headline above is a broad estimate; the truth is, the precise financial impact to Long Island of cleaning up groundwater pollution caused by contaminants that until recent years few people had ever heard of—1,4-dioxane and the perfluorinated compounds PFOS and PFOA—is still not fully known.

One recent estimate put the figure at approximately $1.5 billion, but noted that was strictly for the upfront capital costs of treatment systems; lifetime operating costs would likely exceed that figure. All across Long Island, water suppliers, faced with new state regulations for these chemicals that are among the most protective in the country, were forced to come up with plans to raise revenues for new treatment systems needed to remove the chemicals, while also joining legal battles to make the polluters pay for the damage they caused.

So how we did we get here? Below is a brief look.

1,4-Dioxane Is First Tested on Long Island

The contaminant driving the bulk of the above-mentioned clean-up costs is 1,4-dioxane, due to its resistance to standard granular activated carbon treatment used by water suppliers to remove a wide variety of contaminants from groundwater before it is served to Long Island residents. But where did it come from and how did it get into Long Island's sole source aquifer?

Suffolk County Water Authority Laboratory Manager Christopher Niebling was one of the chemists at SCWA who began testing for the chemical nearly 20 years ago.

"1,4-dioxane came to our attention in 2003. We were finding detections of 1,1,1-trichloroethane, which is used primarily as an industrial degreaser, in drinking wells in our service territory. 1,4-dioxane is used as a stabilizer for 1,1,1-trichloroethane, so we began testing for 1,4-dioxane as well."

This was many years before the U.S. Environmental Protection Agency required water providers to test for 1,4-dioxane or New York State began the process of regulating it in drinking water. In addition to its use in industrial processes, 1,4-dioxane is also formed as a by-product during the manufacturing of household products such as detergents, shampoos and cosmetics.

Today, 1,4-dioxane is a pervasive problem in Long Island wells. At SCWA, approximately, 45% of the utility's nearly 600 wells have detections; across Long Island, detections have been found in more than half of public supply wells..

Treatment a Major Challenge

The bigger issue to emerge, once it became known that the chemical could cause a variety of health problems, was how to remove it from groundwater. It became clear that standard granular activated carbon treatment would not work on 1,4-dioxane—the chemical, almost immediately after new carbon is installed in a filter, fails to attach to the carbon and emerges from the filter—and so an alternative was needed.

The innovative solution turned out to be advanced oxidation process treatment, in which an oxidant such as hydrogen peroxide is added to raw groundwater, which then passes through an ultraviolet light reactor. The peroxide reacts with ultraviolet light to form a high energy oxidant, or hydroxyl radical. The hydroxyl radicals destroy the 1,4-dioxane particles—systems used on Long Island have reported greater than 99% of the contaminant removed from groundwater after AOP treatment.

Since the treatment was a novel solution to the contamination problem—and since its effectiveness at any given location varies depending on site-specific water characteristics—each individual system needed to go through a rigorous approval process with state officials. And that process can take years, hence why more than 20 water suppliers on Long Island confronted with 1,4-dioxane detections sought (and were granted) deferrals from the new state regulation of 1,4-dioxane—1 part per billion.

Cost Another Major Challenge

Water suppliers, whose professional lives revolve around making sure Long Islanders always have high quality drinking water, were generally supportive of the new regulation of 1,4-dioxane (as well as PFOS/PFOA at 10 parts per trillion). But they also knew that the cost would be staggering. Depending on a number of factors, designing, constructing, testing and putting into service an AOP system can cost $1 million, or in some cases, considerably more.

To raise the revenues needed for the new treatment systems, some water suppliers began to charge a set per-customer fee with all revenues going directly to the construction of the systems; not having the revenues tied directly to water consumption meant they did not have to worry about revenues fluctuating wildly with different weather patterns impacting usage during any given period. Others issued debt or raised rates and/or taxes.

The state came through with grants (to date) totaling in the neighborhood of $160 million—helpful, but a fraction of the costs needed to build and operate the systems.

Water treatment infrastructure at a Hicksville Water District plant.

Many also applied for state grants, and the state came through with grants (to date) totaling in the neighborhood of $160 million—helpful, but a fraction of the costs needed to build and operate the systems.

Lawsuits are Pursued

In order to make sure the parties who caused the problem in the first place—and not ratepayers—ultimately pay the bill for the damage done, water suppliers all over Long Island initiated lawsuits against the companies responsible for the products that caused the pollution. Defendants in the 1,4-dioxane case, which as of this writing is still working its way through the courts, include The Dow Chemical Company; Ferro Corporation; Vulcan Materials Company; Proctor & Gamble Company; Shell Oil Company; and Shell Chemical LP.

Legal actions have also been taken against the makers of products including PFOS/PFOA, which are fluorinated organic chemicals used in treatments to protect carpets, clothing, furniture fabrics, paper packaging for food and non-stick cookware. They are also found in firefighting foams. The defendants in these cases include The 3M Company; E. I. DuPont de Nemours & Co.; The Chemours Co.; Buckeye Fire; Tyco Fire Products LP; and National Foam Inc.

Unlike 1,4-dioxane, PFOS and PFOA are removed with GAC treatment. Since many water suppliers have GAC filtration already in place at wells to remove other contaminants, in some cases new systems did not need to be purchased. However, the impact of PFOS and PFOA contamination is vast as well—approximately 35% of Long Island's public supply wells have detections of PFOS and/or PFOA. Approximately 50% of those wells have detections over one-half of the new state maximum contaminant level and are planned for treatment. Approximately 20% of those wells have detections above the MCL and require treatment in order to comply.

1,4-Dioxane Levels Around Long Island

The far bigger issue, from a cost perspective, for reasons covered above, is 1,4-dioxane, which is found in more than half of Long Island's public supply wells. The Suffolk County Water Authority, with more than 600 wells, has seen 1,4-dioxane detections in more than 275. Of those, more than 50 wells have detections above the 1 ppb MCL, and more than 100 have detections greater than 0.5 ppb. Franklin Square Water District has just five wells, but all have detections of the chemical, with more half over the MCL. South Huntington has 18 wells, most of which have 1,4-dioxane detections, but just one over the MCL and several with detections greater than 0.5 percent. The contaminant has impacted water supplies all over Long Island—in total, more than 530 wells have detections of 1,4-dioxane, more than 130 have detections over the MCL and more than 230 have detections greater than 0.5 ppb.

How Water Suppliers Are Addressing the Issue

Water suppliers in Nassau and Suffolk are all facing different challenges from 1,4-dioxane and PFOS/PFOA.

According to Bob Santoriello, superintendent of the Greenlawn Water District, PFOS exceeds the MCL at one well in his district, but it is removed effectively by existing GAC treatment. The district is planning AOP treatment for 1,4-dioxane at a different well.

Paul Granger, superintendent of the Hicksville Water District, said his district's cost of treatment is projected to be $70 million over the next five years. As of September, the district had invested $25 million already. To do so, the district needed to divert resources from other sources, such as water main replacement, to make sure enough funds were available for water treatment.

In Port Washington, due to the pollutants, only one-quarter of the district's wells are currently being used.

By one estimate, water suppliers impacted by 1,4-dioxane pollution have to date performed a total of 50 pilot programs to test AOP systems. It is anticipated that 18 water suppliers will install treatment for at least 61 wells by 2022.

What is clear is that these systems won't be implemented overnight. This has been an issue an long time in the making, and it will take time—and a lot of money—to eradicate.

From left, LICAP Ex Officio Member Sarah Meyland, LICAP Member Brian Schneider, Nassau County Executive Laura Curran, Nassau Legislator Siela Bynoe, Nassau Commissioner of Consumer Affairs Greg May, Port Washington Water District Commissioner Mindy Germain and Former New York State Assemblywoman Michelle Schimel at a press conference promoting reimbursement for the use of smart sprinkler controllers.

A Boon to Long Island's Water Infrastructure:
FEDERAL FUNDING ON THE WAY

The Long Island Commission for Aquifer Protection (LICAP) and environmental groups such as Citizens Campaign for the Environment, Operation SPLASH, Long Island Residents Forward, Western Nassau County Aquifer Committee, Stony Brook Center for Clean Water Technology, the South Shore Estuary Reserve and many more, have raised awareness of the importance of investment in water infrastructure, water conservation and innovation in how we utilize, treat and even think about this precious resource.

Long Island stands united in regard to the sanctity of our water supply and the need to preserve this essential resource. Innovative and transformational projects are already underway to further this goal. Long Islanders saw the need for them, mustered the resources to fund them—with support from our state and federal partners—and planned, designed, funded, and constructed or are currently constructing investments in Nassau County and Suffolk County's water infrastructure.

Funding from both the American Rescue Plan Act and the upcoming federal infrastructure bill emphasize sustainability of our water supply by making funding opportunities for water resources attainable to municipalities like Nassau and Suffolk. These funding sources cover diverse aspects of water investment and improvements covering infrastructure upgrades, water quality improvement and water conservation.

AMERICAN RESCUE PLAN ACT (ARPA)

The American Rescue Plan Act (ARPA) provides broad support to local governments nationwide to support the extraordinary costs associated with the COVID-19 pandemic. In addition, ARPA allows for funds to be utilized for "necessary investments in water, sewer and broadband infrastructure." ARPA will fund a broad range of projects that improve access to clean drinking water, improve wastewater and stormwater infrastructure systems.

The federal appropriations authorized by ARPA include funding from the Coronavirus State and Local Fiscal Recovery Funds (CSLFRF) to Nassau County of $385,003,440 in two equal distributions. The first distribution, in the amount of $192,501,720, was received on May 19, 2021. The second distribution is expected in 2022. Nassau County has appropriated $9 million of this funding for water quality improvement and groundwater conservation programs.

$3 million for Septic Grant Program

Nassau County offers a program that reimburses property and small business owners who replace their aging or failing onsite cesspools/septic system, the largest single cause of degraded groundwater and surface water quality, with an Innovative/Alternate On-Site Wastewater Treatment System, which are more effective at removing nitrogen from the effluent. This program is supported by a $2 million grant from the New York State Environmental Facilities Corporation. This grant caps the award for each property owner at $10,000.

Based on a similar program in Suffolk County, these systems can cost between $22,000 to $25,000 installed. The resulting out-of-pocket expense is viewed as a deterrent to moving forward with the upgraded system. Suffolk County provides additional grant funds making it much more attractive to upgrade. The use of ARPA funds as a match to the EFC grant, increasing the total award to $20,000 per property owner, will make Nassau's program much more appealing. Additionally, Nassau County has contracted with the Nassau County Soil and Water Conservation District to administer this grant program for the next three years. It is anticipated that additional resources may be added for marketing, publicity, contractor training/certification.

The county anticipates the current ARPA allocation will result in up to 200 properties receiving funding assistance to convert aging septic systems to advanced septic systems.

$6 Million for Multi-Year Regional Groundwater Conservation Program

$6 million of funds will also be available for a multi-pronged, five-year phased plan that draws upon the resources and expertise of the New York State Department of Environmental Conservation to protect groundwater and address practices that will lower regional water demand, lay the foundation to change the water use culture on Long Island and advance needed technology and water infrastructure to conserve groundwater. Around the U.S., per capita water use is declining, even as populations increase. On Long Island, however, per capita water use continues to increase.

The Multi-Year Regional Groundwater Conservation Program includes a variety of initiatives and implementation strategies such as expanding Nassau County's Smart Sprinkler Rebate program to incentivize homeowners to install water saving devices and updated water bills will show water consumption and seasonal demand with year-to-year comparisons to make sure water consumers are better informed about their usage.

Groundwater contamination from legacy pollutants as well as emerging contaminants such as 1,4-dioxane have and will continue to impact our public water supply wells. Providing funds to water suppliers to address current contamination and future emerging compounds will protect our only source of drinking water on Long Island.

The county has allocated $1.55 million of the $6 million total to help water suppliers address their current challenges in providing potable drinking water to customers due to contamination of source water from emerging contaminants such as 1,4-dioxane and perfluorinated compounds with grants up to $50,000. Water suppliers are tasked with constructing expensive water treatment facilities in order to meet federal and state drinking water standards specific to removing these emerging contaminants.

Funding will be used to assist with eligible costs associated with treatment and removal of contaminants. These tasks could include activities such as:

- Administration and oversight of distribution of grant funds to ensure compliance with ARP/U.S. Treasury guidelines;
- Evaluation of new emerging contaminants detected within water districts;
- Purchase of equipment, materials and supplies to advance removal of emerging contaminants from water districts;
- Installation of equipment to advance removal of emerging contaminants from water districts;
- Purchase of support equipment such as information technology related to systems integral to treatment process within the distribution system of water districts;

South Shore Water Reclamation Facility Active Projects


Sidestream Centrate Treatment


Level 1 BNR Improvements


Effluent Screening & Disinfection


Effluent Pumping Facility Improvements


Engine Facility Auxiliary Upgrades


Electrical Distribution Phases E3 and E4


Raw Sewage Pump Facility


Secondary Flood Protection & Hardening


PS8 East Avenue Ejector Station Conversion


PS11 Roslyn Village, Morgan Park & Shore Rd

The South Shore Water Reclamation Facility (formerly known as the Bay Park Sewage Treatment Plant) and all pumping stations throughout the sewershed has undergone an full scale facility upgrade (some shown here) after Superstorm Sandy. With an infusion of federal and state and local dollars in excess of $830 million, the storm hardened plant will meet the needs of the community, protect ground water quality, improve the quality of the surrounding embayments all while addressing coastal resiliency, and climate change.

- Development of operations manuals/guidelines/ materials for use by water supplier personnel specifically related to the removal of emerging contaminants;
- Maintenance activities of systems already online and removing emerging contaminants, such as the removal of spent materials used in the treatment of contamination or the purchase of new materials to be used in the treatment process, such as granular activated carbon;
- Defraying the cost of laboratory testing for emerging contaminants.

Additionally, water conservation and protection programs are currently being developed by the county. For example, the "WATERVISION" program proposed by Nassau County is a pilot program to develop and implement a multi-year groundwater conservation program for the Long Island region.

The Next Water and Sewer Infrastructure Priorities

Nassau County is also currently developing programs for the second infusion of ARPA funds. Wastewater infrastructure, such as sewer system improvements and additional funds to incentivize homeowners and businesses to convert from aging septic systems to advanced septic systems are all being considered.

FEDERAL INFRASTRUCTURE PROGRAM

The $1 trillion infrastructure bill approved by the U.S. Senate on August 1, 2021 includes $55 billion for water infrastructure improvements nationwide. $10 billion will be set aside to address water contamination from polyfluoroalkyl substances and other emerging contaminants. The bill specifically references new funding for drinking water system improvements, such as technical assistance, infrastructure resilience and sustainability assistance, advanced drinking water technologies, cybersecurity and state revolving loan funding. The bill also specifically references funding for clean water preservation, such as sewer overflow and stormwater reuse municipal grants, clean water resiliency and sustainability programs, construction of decentralized wastewater systems, enhanced aquifer use and recharge and state revolving loan funding.

A Regional Approach

In May, Nassau County and Suffolk County together with regional partners took the unprecedented step of submitting a joint assessment of Long Island regional infrastructure stimulus needs to New York's federal representatives in Congress for their consideration as the American Jobs Plan is finalized.

The joint assessment included comprehensive water and wastewater initiatives put forth by Nassau County which provide opportunities to reduce nitrogen in our local waters, improve water quality, strengthen our resilience from the impacts of climate change and restore vital marine ecosystems. Collectively, these diverse and comprehensive infrastructure solutions will benefit residents and visitors of Nassau County for generations to come. The $1.27 billion water and wastewater needs include funding for Bay Park Conveyance, the expansion of the septic grant program, the design and installation of a sewer system in Point Lookout initiation of an inflow and infiltration program and the rehabilitation of stormwater drainage infrastructure.

Select proposals are summarized below:

Point Lookout

The hamlet of Point Lookout relies upon onsite sanitary wastewater treatment and disposal systems. This project would replace onsite septic systems with a new sewer system that is connected to the nearby Nassau County Lido Beach Sewage Collection System. The conversion from onsite septic systems to sewers in Point Lookout would reduce the potential for nitrogen pollution into Reynolds Channel, increase wastewater system reliability, increase property values and improve overall surface water quality in the vicinity of the Long Beach Barrier Island. The design phase is expected to be completed in 2023 and construction is expected to commence in 2024 and last for 12 to 18 months. The project is estimated to cost $40 million.

Inflow and Infiltration

Nassau County recognizes the need to continuously maintain its significant underground network of sewage collection pipes and prevent inflow and infiltration, known as I and I.

Inflow is stormwater that enters into sewer systems at points of direct connection to the systems, including footing/foundation drains, roof drains or leaders, downspouts, drains from window wells, outdoor basement stairwells, drains from driveways, groundwater/basement sump pumps and streams. Infiltration is groundwater that enters sewer systems through cracks and/or leaks in the pipes. Cracks or leaks in pipes or manholes may be caused by age-related deterioration, loose joints, damage, or root infiltration. Groundwater can enter these cracks or leaks wherever sanitary sewer systems lie beneath water tables or the soil above the sewer systems becomes saturated. The task of maintaining these pipes has become more critical as the county begins to see the effects of climate change and experiences more extreme rainfall in the region, causing greater I and I and increasing the flow to its treatment plants. In order to mitigate the effects of climate change, the county estimates that $100 million will need to be spent, specifically in Long Beach, the Bay Park District and the Cedar Creek District.

Stormwater Drainage Infrastructure

Nassau County is responsible for thousands of miles of drainage infrastructure—including inlets, pipes, outfalls and recharge basins—which serve as flood protection to public facilities and private properties throughout the county. The county's drainage infrastructure also performs primary treatment and management of pollutants to protect the quality of its beautiful bays and waterways. Through increased development and a greater frequency of severe storm events over the past several decades, the county's stormwater system needs systematic upgrades and expansion. The design and construction of stormwater infrastructure within large tributary areas throughout the county is estimated to cost $30 million.

Suffolk Seeks Sewer Funds

Suffolk County is also seeking an infusion of funding from the federal infrastructure bill to address the lack of sewers in Suffolk and the resulting impact on groundwater quality. The lack of sewers continues to present an obstacle to redevelopment and revitalization. Suffolk County relies on 380,000 individual disposal systems, which discharge partially-treated wastewater into the environment. Investing in wastewater infrastructure leverages several follow-on benefits, including economic development, new jobs, environmental revitalization, disaster resiliency and improved quality of life for residents. Furthermore, several of these investments are located in distressed historic downtowns, which will assist in providing much needed targeted economic opportunities and services to those most impacted by COVID-19.

Suffolk's funding proposal includes a request for $2.6 billion to transform the county's sewer and wastewater treatment capabilities and preserve its environment for future generations, and would result in an estimated 5,924 jobs and $4.7 billion in economic output.

Below is a table of Suffolk County's funding requests:

PROJECT	FUNDING REQUEST ($M)	CATEGORY	CONGRESSIONAL DISTRICT	JOBS	ECONOMIC OUTPUT (M)
Ronkonkoma: Midway Crossing TOD	$236.4	Regional Significance	2	376	$359.1
Suffolk County Coastal Resiliency Initiative	$118.0	Water & Wastewater	1,2,3	1,264	$814.2
Innovative Alternative Wastewater Treatment	$225.0	Water & Wastewater	1,2,3	215	$346.2
Southeastern Islip Connection to Sewer District #3	$600.0	Water & Wastewater	2	943	$911.6
Mastic-Shirley-Mastic Beach Phases III and IV	$635.0	Water & Wastewater	1	992	$958.8
Carlls River Watershed Connection	$650.0	Water & Wastewater	2	1,019	$984.5
Ronkonkoma: Regional Sewer Connection	$100.9	Water & Wastewater	2	159	$154.3
Vibrant Downtowns: Patchogue	$11.8	Water & Wastewater	1	56	$18.2
Vibrant Downtowns: Smithtown	$50.0	Water & Wastewater	1	221	$107.0
Vibrant Downtowns: Huntington Station	$65.0	Water & Wastewater	3	255	$102.6
Vibrant Downtowns: Riverside	$26.6	Water & Wastewater	1	233	$56.7
Vibrant Downtowns: Central Islip	$10.0	Water & Wastewater	2	73	$17.7
Vibrant Downtowns: North Bellport	$19.4	Water & Wastewater	1	62	$30.0
Vibrant Downtowns: Port Jefferson Station	$30.0	Water & Wastewater	1	99	$47.7
Vibrant Downtowns: Innovation Park at Hauppauge	$15.0	Water & Wastewater	1	62	$25.0
Vibrant Downtowns: Holbrook	$8.0	Water & Wastewater	1,2	48	$15.5
Vibrant Downtowns: Montauk	$61.5	Water & Wastewater	1	233	$107.6

The availability of stimulus programs such as ARPA and the upcoming federal infrastructure bill coupled with an awareness of the urgency of investments that conserve, protect and improve Long Island's water resources create a unique opportunity for Nassau County and Suffolk County to drive critical infrastructure investments that might otherwise be unattainable.

HYDROLOGIC CONDITIONS

This section of the State of the Aquifer report provides a snapshot of current hydrologic conditions on Long Island. The analysis was compiled by reviewing published National Oceanographic and Atmospheric Administration (NOAA) precipitation records and U.S. Geological Survey (USGS) groundwater and streamflow records from key stations located in Nassau and Suffolk Counties. Precipitation is the only natural means by which water enters Long Island's aquifers. Approximately half of all precipitation that falls recharges the aquifers; roughly one million gallons of water per day for each square mile of land. Most recharge on Long Island generally occurs during the non-growing season (October to May); from June through September, aquifer recharge is minimal.

Precipitation In Recent Years

Normal—or long-term average precipitation for a given site—is calculated based on weather statistics from the previous three decades (climatic normal). These statistics are updated at the beginning of each new decade. For example, normal precipitation levels for the current decade (2011 to 2020) are the average values from 1981 to 2010. In 2021, these normal levels will be updated using averages from the period 1991 to 2020. In this manner, changing climatic patterns are accounted for, but do not skew the data excessively for any given decadal period. The current value for normal annual precipitation for Long Island MacArthur Airport is 46.24 inches.

For this update, rather than utilizing calendar years, precipitation records from MacArthur Airport were examined in one-year increments for the period September 1 to August 31 for each year. This period was selected to provide the most recent hydrologic conditions at the time of publication of this report. Data for the MacArthur Airport precipitation gauge was downloaded from this NOAA website: www.ncdc.noaa.gov. Precipitation at MacArthur Airport was 58.14 inches for the 2018-19 period, 41.87 inches for the 2019-20 period, and 50.23 inches for the 2020-21 period. While these values are not directly comparable to the 30-year climatic normal of 46.24 inches calculated by calendar year, they can be used to indicate general periods of above or below normal precipitation. The data presented above indicates that both the 2018-19 and 2020-21 periods were wetter than normal, while the 2019-20 period was drier than normal.

DATA FOR THE MACARTHUR AIRPORT PRECIPITATION GAUGE

2018-19 Period
58.14”

2019-20 Period
41.87”

2020-21 Period
50.23”

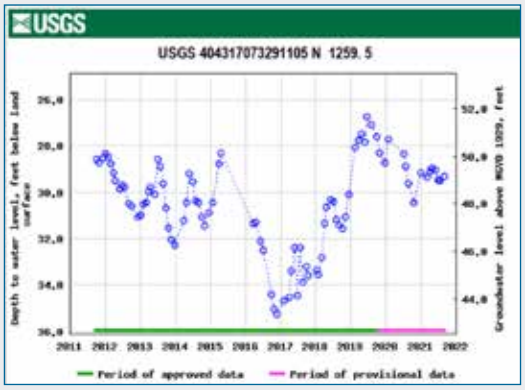
Groundwater Levels

Background information pertaining to specific wells and streamflow gauges represented in this section can be obtained from the USGS report entitled "Statistical Analysis of Long-Term Hydrologic Records for Selection of Drought-Monitoring Sites on Long Island, New York," accessible at the following web address: https://pubs.er.usgs.gov/publication/sir20045152.

Aquifer levels on Long Island have fluctuated historically due to human influences such as pumping and sewering and fluctuate seasonally due to precipitation, recharge, and evapotranspiration. Regardless of these stresses, groundwater levels beneath most of Long Island are usually highest in March, April, and May and lowest in September, October, and November. The following is a snapshot of hydrologic conditions in the aquifer system of Long Island, with the focus being on the 10-year period from September 2011 to the present.

Generally, groundwater levels and streamflows have declined from recent highs reached in 2019 after a period of well above normal precipitation, to more average levels over the past year in response to a period of closer average precipitation. A more detail look at these trends are shown in the figures on the following pages.

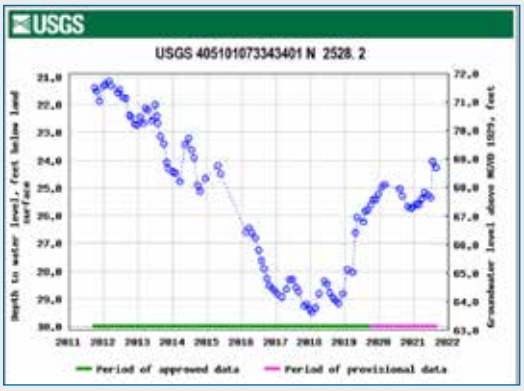
Well N 1259.5, located in Plainedge in southeastern Nassau (41 ft deep).



The 10-year hydrograph on the bottom left of the page shows that water levels in the upper glacial aquifer in this portion of Nassau County increased sharply to above normal levels in 2019 from the lows reached in late 2017. This was in response to higher-than-normal precipitation during 2018 and 2019 after a three-year period of well below normal precipitation. Since then, water levels have been slowly declining from those recent highs to more normal levels, as precipitation since 2019 has been closer to average.

Source: https://nwis.waterdata.usgs.gov/usa/nwis/gwlevels/?site_no=404317073291105

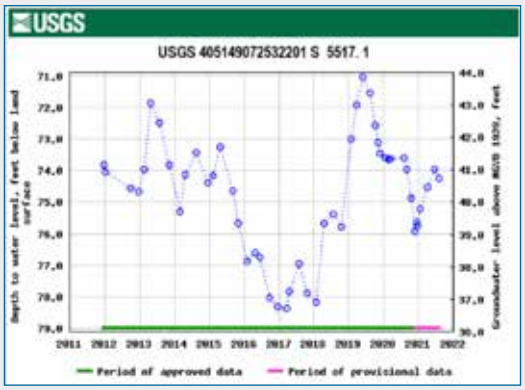
Well N 2528.2, located in Old Brookville in northeastern Nassau County (328 ft deep).



The 10-year hydrograph above shows that water levels in the Magothy aquifer in this portion of Nassau County increased sharply to more normal levels in 2020 from the lows reached in early 2018. This was in response to higher-than-normal precipitation during 2018 and 2019 after a three-year period of well below normal precipitation. Since then, water levels have remained generally steady with a sharp rise indicated over the past few months, probably due to changes in local pumpage.

Source: https://nwis.waterdata.usgs.gov/nwis/gwlevels?site_no=405101073343401

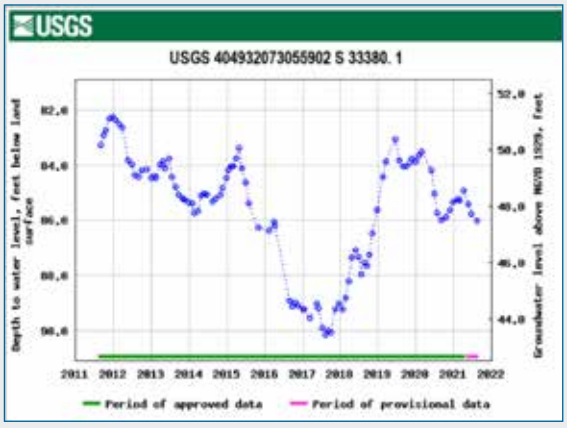
Well S 5517.1, located at Brookhaven National Laboratory in east-central Suffolk County (91 ft deep).



Similar to the wells in Nassau County, the 10-year hydrograph above indicates that water levels in the upper glacial aquifer in this portion of Suffolk County increased sharply to above normal levels in 2019 from the lows reached in late 2017. This was in response to higher-than-normal precipitation during 2018 and 2019 after a 3-year period of well below normal precipitation. One difference to the wells in Nassau County is the significant decline in water levels in late 2020 that is related to much drier conditions on the east end during that year. Since then, water levels have again recovered to more normal levels.

Source: https://nwis.waterdata.usgs.gov/nwis/gwlevels?site_no=405149072532201

Well S 33380.1, located in Ronkonkoma in central Suffolk County (855 ft deep)



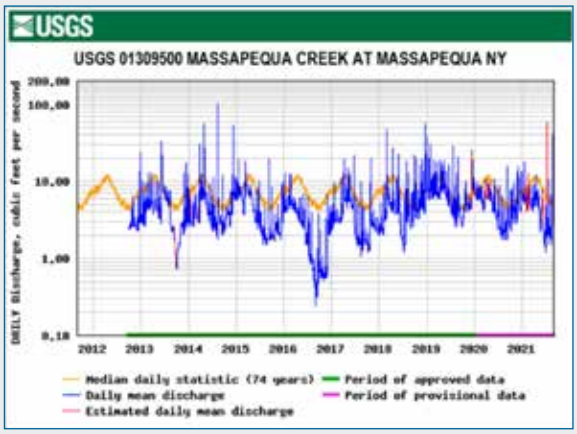
Similar to the other wells on Long Island, the 10-year hydrograph on the bottom left of the page indicates that water levels in the Magothy in this portion of Suffolk County increased sharply to more normal levels in 2019 from the lows reached in late 2017. This was in response to higher-than-normal precipitation during 2018 and 2019 after a three-year period of well below normal precipitation. Since then, water levels have been slowly declining from those recent highs, as precipitation since 2019 has been closer to average.

Source: https://nwis.waterdata.usgs.gov/nwis/gwlevels?site_no=404932073055902

Streamflows

Since all of Long Island's streams are in direct hydraulic contact with the upper glacial aquifer, their flows closely reflect changes in the water table altitude. As with groundwater levels, streamflow (stream discharge) fluctuates throughout the year, from their highs in the spring to their lows in late summer. For each of the hydrographs shown below, the orange line represents the historical average stream discharge, and the blue line represents the actual recorded discharge. The three streams shown below are reflective of different conditions of development or urbanization, with Massapequa Creek being located in the most highly developed area, Connetquot River located in an area of intermediate development, and the Peconic River located in the most minimally developed area.

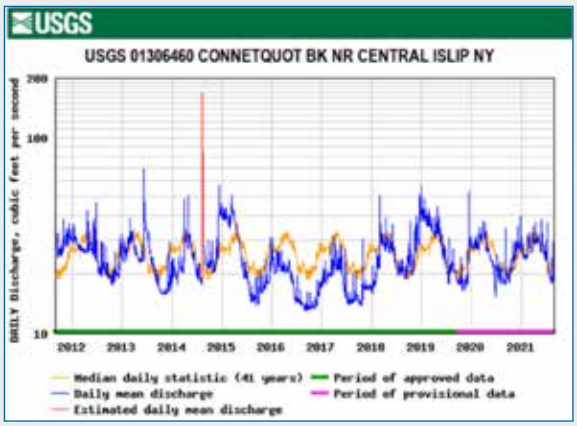
Massapequa Creek. Streamflow at most Nassau County streams, including Massapequa Creek, reflect the long-term effects of significant human impacts from sewering and pumping on water levels within the upper glacial and deeper aquifers. Discharges in most streams in Nassau County have decreased markedly since the 1960s and have not recovered due to these impacts.



The 10-year hydrograph above shows that stream discharge at Massapequa Creek prior to 2016 fluctuated around the long-term average, with a few more pronounced periods of above or below average related to changes in precipitation. However, in response to the three-year period of well-below-normal precipitation during 2015, 2016, and 2017, stream discharge declined significantly over that period reaching a low in late 2016. Since that time, stream discharge has recovered to near the long-term average, but has declined to slightly below average during the past year.

Source: https://nwis.waterdata.usgs.gov/ny/nwis/dv/?site_no=01309500

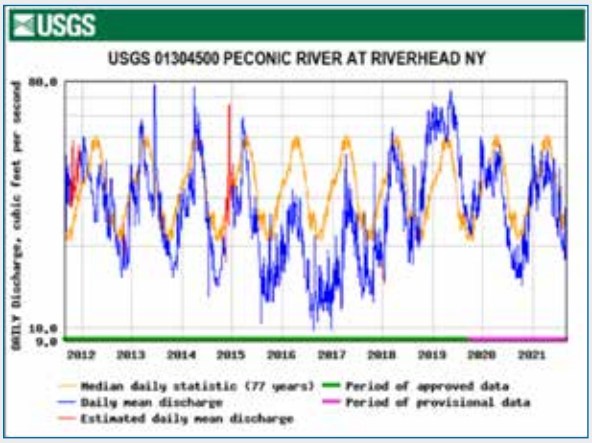
Connetquot River. This stream located in south-central Suffolk County borders areas showing significant human impacts (to its west) and minimal human impacts (to its east). Therefore, it is a good stream to use as a comparison to the more urbanized streams to the west and less human impacted streams to the east.



Similar to Massapequa Creek, the 10-year hydrograph on the bottom left of the page shows that stream discharge at Connetquot Brook prior to 2016 fluctuated around the long-term average, with a few more pronounced periods of above or below average related to changes in precipitation. However, in response to the three-year period of well-below-normal precipitation during 2015, 2016, and 2017, stream discharge declined significantly over that period reaching a low in late 2016. Since that time, stream discharge has recovered to near long-term average.

Source: https://nwis.waterdata.usgs.gov/ny/nwis/dv/?site_no=01306460

Peconic River. This stream located in eastern Suffolk County is situated in an area with minimal human impact. It is also the one major stream on Long Island that flows from west to east, discharging into Peconic Bay. Most other streams on Long Island flow north or south, depending on what side of the groundwater divide they are situated in.



Similar to the other two streams, the 10-year hydrograph above shows that stream discharge at Peconic River prior to 2016 fluctuated around the long-term average, with a few more pronounced periods of above or below average related to changes in precipitation. However, in response to the three-year period of well-below-normal precipitation during 2015, 2016, and 2017 that was somewhat more pronounced in eastern parts of Long Island, stream discharge declined significantly over that period reaching a low in

late 2016. Since that time, stream discharge has recovered to near the long-term average, and was generally above average for most of 2019.

Source: https://nwis.waterdata.usgs.gov/ny/nwis/dv/?site_no=01304500

The data displayed in the hydrographs in this section show that Long Island has experienced the full spectrum of hydrologic conditions in a very short time frame, from record or near-record lows as recently as 2017 to generally above to well above normal conditions in 2019. The abundance of groundwater and surface-water data collected by the U.S. Geological Survey and other agencies over a long period of time ensures that water suppliers, regulatory agencies and the public are well informed about groundwater and surface-water conditions at any given time. This data is an invaluable aid in making decisions to protect both public health and the health of the environment.

How Can I Find More Information About Long Island's Hydrologic Conditions?

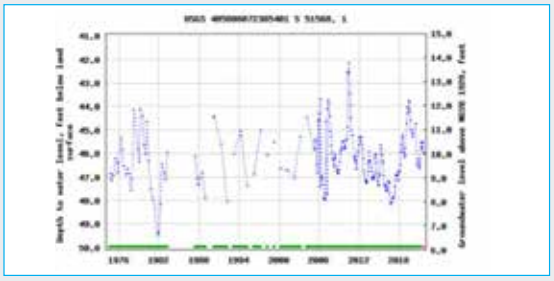
The USGS has a website providing data and resources from their ongoing cooperative groundwater and surface-water hydrologic monitoring program on Long Island that can be accessed at: https://www.usgs.gov/centers/ny-water/science/us-geological-survey-hydrologic-monitoring-long-island-new-york.

The USGS also maintains a depth-to-water map for Nassau and Suffolk Counties. The map is shown below the figure, with the color-coded intervals to its right. Each color represents an interval of depth below land surface, below which groundwater will be encountered. Also shown below (as black dots) are the locations of USGS monitoring wells that were utilized in creating the map.

The map is fully interactive and available at the following web address: https://ny.water.usgs.gov/maps/li-dtw.

To use it, click on a monitoring well to get a measured depth to water, or click elsewhere on the map to get an estimated depth to water. The map allows the user to zoom in to a particular area for greater detail.

Below is an example of a close up of the depth to water in eastern Suffolk County. When the user clicks on a particular monitoring well (in this case well number S-15568.1), its information is displayed, including a link to its historical water-level record. Clicking on the "NWIS web link" will display the hydrograph shown below the figure. The user can then specify a particular time period for which data is desired and see a graph of water levels within that time period.



By utilizing this and other publicly-available websites and web tools, anyone can obtain instant information on hydrologic conditions anywhere in Nassau and Suffolk Counties and compare current data with past trends.

GROUNDWATER PUMPAGE

Groundwater pumpage statistics, which are vital in providing a window into the demands put on our sole source aquifer, are maintained by the New York State Department of Environmental Conservation (NYSDEC). All public water suppliers and other large users of groundwater—such as golf courses, commercial establishments and most farms—are required to submit pumpage records to the NYSDEC on a monthly or annual basis.

Public Supply Pumpage

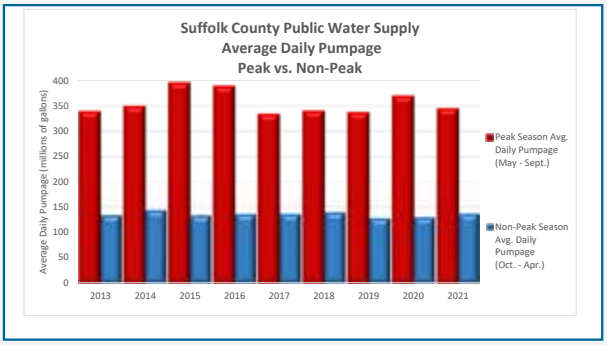
Groundwater used for public supply purposes is the largest use on Long Island. The below chart and graphs track public supply pumping records in Nassau and Suffolk Counties for the past eight years in various ways, including average daily usage; peak vs. non-peak usage; average daily pumpage vs. precipitation levels; and peak usage vs. precipitation levels. For each calendar year referenced, the period captured begins on October 1 of the prior year and continues through September 30.

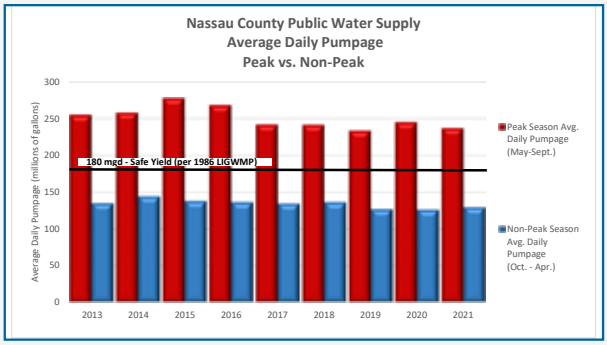
	Suffolk County Public Water Supply Non-Peak Avg. Daily Pumpage	Suffolk County Public Water Supply Peak Avg. Daily Pumpage (mgd)	Suffolk County Public Water Supply Avg. Daily Pumpage (mgd)
Year*	Oct.-April	May-Sept.	All Months
2013	133.62	339.03	219.72
2014	143.56	348.74	229.57
2015	133.52	394.83**	243.05
2016	135.98**	388.23**	241.43**
2017	136.33**	333.51**	218.99**
2018	139.50**	339.83	223.47**
2019	127.67	336.75*	215.31
2020	129.83	368.96	229.79**
2021	136.55	344.25	223.62
Avg.	135.17	354.91	227.22

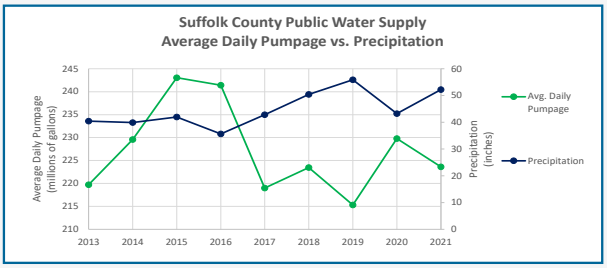
* Yearly pumpage estimates are provided from October – September (i.e. 2013 reporting year contains data from October 2012 through September 2013).
**Updated from last year's SOTA report based on corrected and newly submitted public water supply pumpage reports.

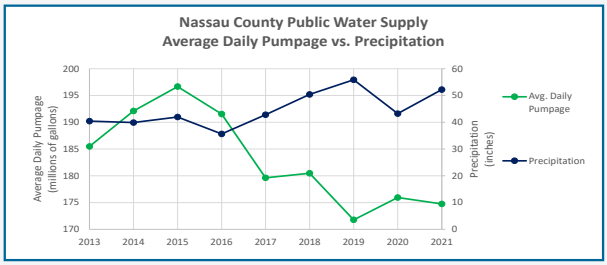
	Nassau County Public Water Supply Non-Peak Avg. Daily Pumpage	Nassau County Public Water Supply Peak Avg. Daily Pumpage (mgd)	Nassau County Public Water Supply Avg. Daily Pumpage (mgd)
Year*	Oct.-April	May-Sept.	All Months
2013	135.22	255.12**	185.48**
2014	144.49	258.11**	192.12
2015	138.26	277.61	196.67
2016	136.46	268.21	191.54
2017	134.69	241.21	179.63
2018	136.46	241.89	180.48
2019	127.09	233.66	171.77
2020	126.26	245.11	175.95**
2021	129.70	237.19	174.75
Avg.	134.29	250.93	183.15

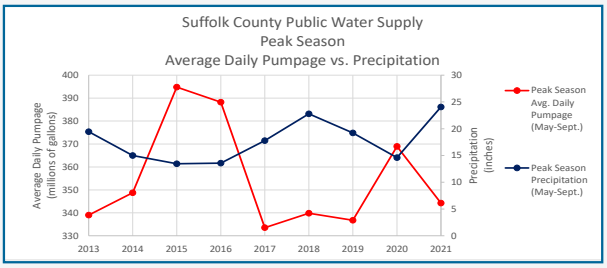
* Yearly pumpage estimates are provided from October – September (i.e. 2013 reporting year contains data from October 2012 through September 2013).
**Updated from last year's SOTA report based on corrected public water supply pumpage reports.

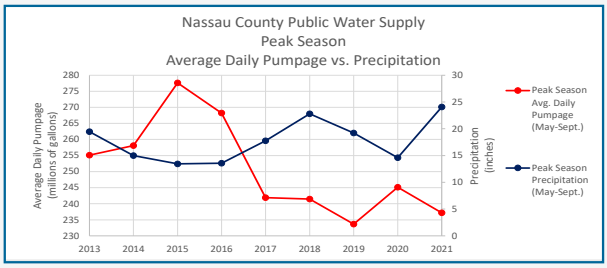

Suffolk County Public Water Supply
Average Daily Pumpage
Peak vs. Non-Peak
Average Daily Pumpage (millions of gallons)
Peak Season Avg. Daily Pumpage (May - Sept.)
Non-Peak Season Avg. Daily Pumpage (Oct. - Apr.)

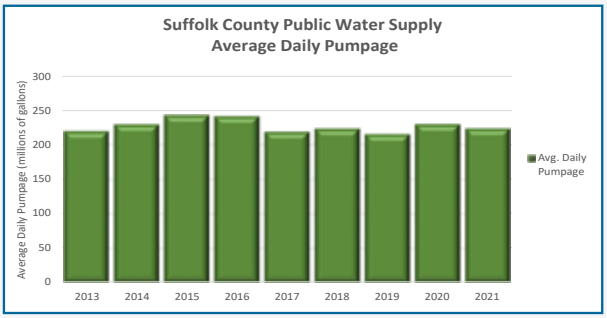

Nassau County Public Water Supply
Average Daily Pumpage
Peak vs. Non-Peak
Average Daily Pumpage (millions of gallons)
180 mgd - Safe Yield (per 1986 LIGWMP)
Peak Season Avg. Daily Pumpage (May-Sept.)
Non-Peak Season Avg. Daily Pumpage (Oct. - Apr.)

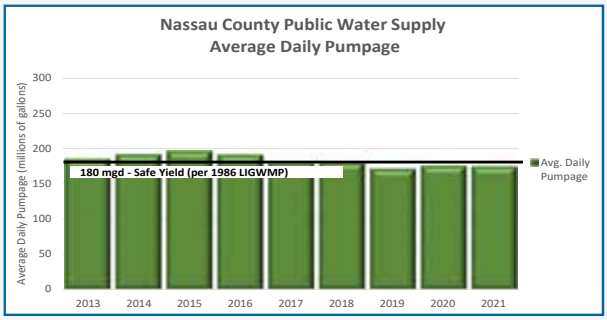

Suffolk County Public Water Supply
Average Daily Pumpage vs. Precipitation
Average Daily Pumpage (millions of gallons)
Precipitation (inches)
Avg. Daily Pumpage
Precipitation

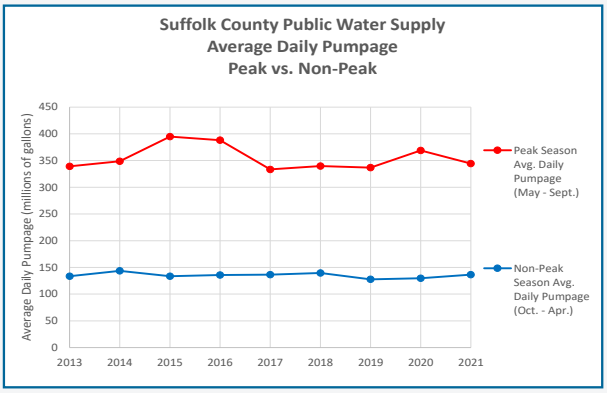

Nassau County Public Water Supply
Average Daily Pumpage vs. Precipitation
Average Daily Pumpage (millions of gallons)
Precipitation (inches)
Avg. Daily Pumpage
Precipitation

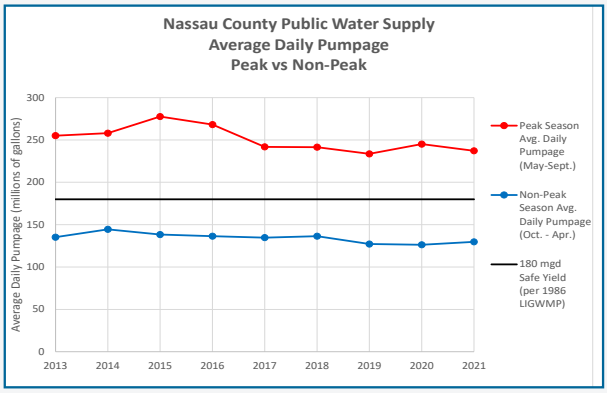

Suffolk County Public Water Supply
Peak Season
Average Daily Pumpage vs. Precipitation
Average Daily Pumpage (millions of gallons)
Precipitation (inches)
Peak Season Avg. Daily Pumpage (May-Sept.)
Peak Season Precipitation (May-Sept.)


Nassau County Public Water Supply
Peak Season
Average Daily Pumpage vs. Precipitation
Average Daily Pumpage (millions of gallons)
Precipitation (inches)
Peak Season Avg. Daily Pumpage (May-Sept.)
Peak Season Precipitation (May-Sept.)


Suffolk County Public Water Supply
Average Daily Pumpage
Average Daily Pumpage (millions of gallons)
Avg. Daily Pumpage


Nassau County Public Water Supply
Average Daily Pumpage
Average Daily Pumpage (millions of gallons)
180 mgd - Safe Yield (per 1986 LIGWMP)
Avg. Daily Pumpage


Suffolk County Public Water Supply
Average Daily Pumpage
Peak vs. Non-Peak
Average Daily Pumpage (millions of gallons)
Peak Season Avg. Daily Pumpage (May - Sept.)
Non-Peak Season Avg. Daily Pumpage (Oct. - Apr.)


Nassau County Public Water Supply
Average Daily Pumpage
Peak vs Non-Peak
Average Daily Pumpage (millions of gallons)
Peak Season Avg. Daily Pumpage (May-Sept.)
Non-Peak Season Avg. Daily Pumpage (Oct. - Apr.)
180 mgd Safe Yield (per 1986 LIGWMP)

WATER QUALITY

State Bill Expands List of Emerging Contaminants To Be Tested

Less than a year after new regulations for the emerging contaminants 1,4-dioxane and the per-and polyfluoroalkyl substances PFOS and PFOA took effect in New York State, the State Assembly and State Senate approved legislation in June that would expand by 40 the list of emerging contaminants to be tested by water suppliers statewide.

As of this writing in September, the fate of the bill was not yet known.

If signed by the governor, the new law, co-sponsored by Senator James Skoufis and Assemblymember Richard Gottfried, would amend the public health law to expand the list of chemicals to be included on the state's list of emerging contaminants for testing and require the commissioner of the New York State Department of Health to initiate the program within 90 days.

Following is the expanded list of emerging contaminants:

1,2,3-trichloropropane; chloromethane (methyl chloride); 1,1-dichloroethane; bromomethane (methyl bromide); chlorodifluoromethane (HCFC-22); vanadium; molybdenum; cobalt; strontium; chromium-6; chlorate; perfluorononanoic acid (PFNA); perfluorohexanesulfonic acid (PFHxS); perfluoroheptanoic acid (PFHpA); perfluorobutanesulfonic acid (PFBS); hexafluoropropylene oxide dimer acid (HFPO-DA); N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA); N-methyl, perfluorooctanesulfonamidoacetic acid (NMeFOSAA); perfluorodecanoic acid (PFDA); perfluorododecanoic acid PFDoA); perfluorohexanoic acid (PFHxA); perfluorotetradecanoic acid (PFTA); perfluorotridecanoic acid (PFTrDA); perfluoroundecanoic acid (PFUnA); 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS); 9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS0: 4,8-dioxa-3H-perfluorononanoic acid (ADONA); nonafluoro-3,6-dioxaheptanoic acid (NFDHA); perfluorobutanoic acid (PFBA); 1H, 1H, 2H, 2Hperfluorodecane sulfonic acid (8:2FTS); perfluoro(2-ethoxyethane)sulfonic acid (PFEESA); perfluoroheptanesulfonic acid (PFHpS); 1H, 1H, 2H, 2H-perfluorohexane sulfonic acid (4:2FTS); perfluoro-3-methoxypropanoic acid (PFMPA); perfluoro-4-methoxybutanoic acid (PFMBA); 1H, 1H, 2H, 2H-perfluorooctane sulfonic acid (6:2FTS); perfluoropentanoic acid (PFPeA); perfluoropentanesulfonic acid (PFPeS); testosterone; and 4-androstene-3,17-dione.

"New York should be a clean water leader," said Assemblymember Gottfried in a statement after the State Legislature's action. "We must have the strongest commitment to identifying dangerous chemicals and implementing testing and remediation when necessary, including monitoring emerging science about these risks."

Water Suppliers Prepare for Revised Lead and Copper Rule

Major changes are on the way for the U.S. Environmental Protection Agency's Lead and Copper Rule, which is undergoing its first major update in nearly 30 years.

The updates to the rule were published by the EPA in June, at which time the agency set the effective date for the changes for December 16, 2021 and set a compliance date of October 16, 2024. Between now and then, water suppliers will need to ensure compliance with a number of new components to the rule.

In older homes and other buildings, lead can leach from service lines solder and fixtures into tap water and become a significant source of lead exposure. This exposure in children can cause irreversible and life-long health effects, including decreasing IQ, focus and academic achievement. The new Lead and Copper Rule seeks to strengthen regulatory requirements to protect children and communities from lead in drinking water.

The changes to the rule include:

- A requirement that community water systems test for lead in drinking water in elementary schools and child care facilities, which may have lead in their internal plumbing (Note: New York State requires testing for lead in all schools);
- Improved tap sampling procedures that will better locate elevated levels of lead in drinking water;
- Triggering actions to get community water systems, where necessary, to implement corrosion control actions to prevent lead from entering drinking water;
- Closing loopholes to ensure that more lead service lines are replaced;
- Requiring community water systems to identify and make public the location of lead service lines;
- Timely notification of test results to homes found to have substantial lead levels.

The lead service line inventory, in particular, will be an enormous logistical challenge for Long Island water suppliers; as noted in correspondence from the Suffolk County Department of Health Services to water suppliers, the revised rule requires an inventory of all elements of all service lines, whether or not the service line and associated components are under the control of the water supplier or a homeowner. Water suppliers will need to work with all of their customers within the three-year window to gain a full understanding of all components of all service lines.

U.S. Environmental Protection Agency UCMR 5 Testing on Way

The U.S. Environmental Protection Agency is preparing for its latest Unregulated Contaminant Monitoring Rule data collection effort to study how various unregulated contaminants may impact the country's drinking water supply and human health. UCMR testing is conducted every five years.

Under UCMR 5, 30 chemical contaminants will be monitored between 2023 and 2025 by laboratories all around the country and all around Long Island to provide new data critically important to help the EPA understand the occurrence and level at which the contaminants are found in the country's drinking water systems. The process is required under the Safe Drinking Water Act to determine which contaminants should be regulated.

Water suppliers and other entities from Long Island who will be providing data include, in Suffolk: South Huntington Water District; St. James Water District; Greenlawn Water District; Dix Hills Water District; Ocean Beach Water District; Brentwood Water District; Stony Brook Water District; East Farmingdale Water District; Hampton Bays Water District; Riverhead Water District; Smithtown Water District; Suffolk County Water Authority; Brookhaven National Laboratory; and Robert Moses State Park.

Water suppliers and other entities from Nassau who will be providing data include: Town of Hempstead Water Department; Albertson Water District; Bayville Village; Bethpage Water District; Carle Place Water District; Farmingdale Village; Franklin Square Water District; Freeport Village; Garden City Village; Garden City Park Water District; Glen Cove City; Hempstead Village; Hicksville Water District; Water Authority of Western Nassau; Jericho Water District; Locust Valley Water District; Long Beach City; New York American Water-Lynbrook; Manhasset Lakeville Water District; Massapequa Water District; Mineola Village; New York American Water-Merrick; Water Authority of Great Neck North; Old Westbury Village; Oyster Bay Water District; Plainview Water District; Rockville Centre Village; Roslyn Water District; New York American Water-Sea Cliff; South Farmingdale Water District; Westbury Water District; West Hempstead Water District; Williston Park Village; Jones Beach State Park; and Port Washington Water District.

Laboratories seeking to participate in the process must demonstrate quality control in their processes and all must be certified by the EPA. Laboratories, such as the Suffolk County Water

Authority's, are in the process of certification, a process that will take up much of 2022. Participating laboratories are assessed to ensure they meet UCMR 5 requirements for equipment, laboratory performance and data reporting. The SCWA lab, at the time of this writing, was at stage five of a six stage process for EPA approval.

The contaminants to be monitored under UCMR 5 include 29 per- and polyfluoroalkyl substances (PFAS) and one metal/pharmaceutical, lithium.

Evaluation of PFAS/1,4-Dioxane in Public and Private Water Supply Continues in Suffolk County

Per-and polyfluoroalkyl substances (PFAS) and 1,4-dioxane continue to be evaluated in public and private water supply wells in Suffolk County. The Suffolk County Department of Health Services (SCDHS) developed the in-house analytical capability to analyze drinking water and groundwater samples for 1,4-dioxane in 2015. The SCDHS is also working collaboratively with the New York State Department of Health, the New York State Department of Environmental Conservation and others to conduct sampling of public and private water supply wells in Suffolk County for PFAS.

Since 2016, the SCDHS has conducted 43 private well surveys and collected more than 1,350 private well samples for these chemicals, and approximately 190 private wells exceeded current New York State drinking water standards for PFOA and or PFOS and approximately nine private wells exceeded for 1,4-dioxane. As a result, public water has been extended to hundreds of homes in the areas of Yaphank, Westhampton, East Quogue and East Hampton, with additional connections in Suffolk County likely. Analytical results generated from this sampling by the county have further benefitted the public water supply by helping identify impacted wells and prioritizing mitigating measures such as removing wells from service, treatment and blending.

The task reports completed as part of the 2019 Long Island Commission for Aquifer Protection Groundwater Resources Management Plan projected the costs to connect 24,677 Suffolk County private residential wells to public water at approximately $773.5 million including new water main, service connections, wells and storage. The SCDHS estimates a slightly higher total of approximately 30,000 to 35,000 facilities utilizing on-site domestic well systems if commercial and industrial potable use wells are included with the residential private well estimate above.

With the continual threat of groundwater contamination, it remains a priority to identify funding sources to help extend and connect vulnerable private wells to the regulated public water supply in Suffolk County.

Major changes are on the way for the U.S. Environmental Protection Agency's Lead and Copper Rule, which is undergoing its first major update in nearly 30 years.

GROUNDWATER MONITORING

A Quality and Quantity Approach

Long Island's governmental agencies have been monitoring the quality and quantity of groundwater beneath Nassau County and Suffolk County for close to a century. Extensive networks of shallow and deep monitoring wells allow for the monitoring of water levels as well as standard water quality parameters, along with special investigative studies when a specific water quality threat has been detected. This approach has helped to pinpoint aquifer contamination and has often triggered enhanced monitoring of public water supplies as an additional safeguard of public health.

Groundwater Monitoring in Nassau County

Launched in the 1940s and expanded throughout the decades, the Nassau County Department of Public Works (NCDPW) maintains an extensive network of more than 600 monitoring wells screened in each of the major aquifers. Throughout the 1970s and 1980s, the NCDPW conducted its own sampling and testing of these wells and developed an extensive water quality database. In the ensuing decades, this aggressive sampling schedule has been cut back and/or eliminated largely due to budget cuts and loss of personnel. However, the monitoring well network still exists, and is available for others to sample as needed for specific focused groundwater site investigations or for regional studies. Nassau's monitoring wells are currently being sampled by the U.S. Geological Survey in conjunction with cooperative studies and by private consulting companies in conjunction with site cleanups. The monitoring well network is a valuable asset to all who require reliable water quality data.

One current cooperative project funded by the New York State Department of Environmental Conservation (NYSDEC) is being conducted by the NCDPW and the USGS. This project utilizes wells from the Nassau County network that are primarily screened in the Magothy aquifer and samples them for various contaminants of emerging concern, including 1,4-dioxane and PFOS/PFOA. All well information, including sample results, will be stored in the USGS National Water Information System database, located at https://nwis.waterdata.usgs.gov/ny/nwis/nwis. As part of this four-year program, 29 Nassau County monitoring wells were sampled from 2019 to 2020.

The NCDPW will be entering into a new two-year cooperative agreement with the USGS in late 2021. Funding will be provided for the measurement of 15 continuous-recording observation wells, 50 monthly observation wells, 68 annual-synoptic observation wells and 15 water supply wells. Additionally, funds will be provided for six real-time

continuous-recording streamflow stations at five streams, 12 bi-annual streamflow stations and saltwater intrusion monitoring, annual determination of start-of-flow positions at six streams and saltwater intrusion monitoring at up to five outpost wells. Hydrologic data collected by this network of stations is used to monitor long-term conditions of the aquifers, provide data for water level and depth to water maps and provide data used in developing groundwater models. Information about this USGS cooperative program and Long Island Aquifer Sustainability can be found at the following web address: https://www.usgs.gov/centers/ny-water/science/groundwater-sustainability-long-island-aquifer-system?qt-science_center_objects=0#qt-science_center_objects.

Nassau County network monitoring wells have also been used to assist the NYSDEC in groundwater investigations of the refrigerant Freon 22 in Port Washington and in Glen Cove. The NCDPW network monitoring wells are also being utilized to monitor groundwater at numerous U. S. Environmental Protection Agency Superfund sites, including the New Cassel Industrial Area and the Old Roosevelt Field site investigation. Additionally, data collected from NCDPW wells have been used to develop a groundwater model for the village of Farmingdale and to assist in remedial activities in the Bethpage area.

The Nassau County monitoring well network has proven to be an invaluable asset to water suppliers, regulatory agencies and private consultants that require groundwater information for their respective purposes.

USGS Groundwater Monitoring Network

The U. S. Geological Survey has operated a groundwater monitoring network on Long Island since the early 20th Century. This network provides water level information that aids in the development of groundwater elevation maps for Long Island's sole source aquifer as well as valuable water quality information, such as monitoring for both current and legacy pesticides, pesticide degradates and nitrogen and phosphorus compounds.

The Suffolk County Department of Health Services inspects and samples approximately

1,000

public water supply wells to ensure compliance with federal and state drinking water regulations.

PFAS Groundwater Monitoring Investigations in Suffolk County

The Suffolk County Department of Health Services continues to monitor and work with New York State agencies to help manage emerging contaminants. Since 2016, Suffolk County has initiated 12 groundwater investigations in areas of known or suspected PFAS contamination. As part of this work, 195 monitoring and profile wells have been installed and more than 1,040 PFAS samples have been collected.

From the analytical data received to date, 115 groundwater investigation wells have been found with detections above the state's drinking water standards for PFOS or PFOA of 10 parts per trillion. The county's well drilling and sampling efforts have resulted in a number of sites being included or evaluated under the state's Superfund cleanup program as its work to evaluate potential sources of contamination continue.

The SCDHS oversees the public water supply in Suffolk County, inspecting and sampling approximately 1,000 public water supply wells and enforcing the federal and state safe drinking water requirements. This estimate includes wells operated and maintained by large water suppliers, such as the Suffolk County Water Authority, as well as small business owners, such as restaurants and convenience stores that have their own on-site domestic well and meet the regulatory definition of a public water supply system. According to the SCDHS, the major community water suppliers are all delivering water that is of high quality and quite safe, insofar as it meets stringent federal and state standards. Though infrequent exceedances of the new maximum contaminant levels (MCLs) for PFOS, PFOA and 1,4-dioxane occur, they are well within margins of protection used in developing the MCLs.

When an individual well supplying a public water system is found to exceed an MCL, initial steps taken by the water supplier, until a longer-term remedy is implemented, generally include shutting down the well or restricting the use of the well to those periods necessary to meet peak demand. Long-term remedies may include treatment at the well or, for small systems, connecting to a larger public water supply. Public water suppliers are required to notify consumers of their water of any MCL exceedance and the actions being taken. The New York State Department of Health has indicated that MCLs are generally set far below levels that cause health effects. NYSDOH has issued guidance indicating that the levels detected in public water supplies in Suffolk County to date (September 14, 2021) do not pose a significant health risk and the water is acceptable for all uses.

From the analytical data received to date, 115 groundwater investigation wells have been found with detections above the state's drinking water standards for PFOS or PFOA of 10 parts per trillion.

WATER CONSERVATION

Putting Strategies into Action

The importance of the preservation of Long Island's sole source aquifer is understood by water suppliers and the agencies that oversee them alike. And so, when the New York State Department of Environmental Conservation (NYSDEC) issued a call for Long Island's water suppliers to reduce peak season water pumpage by 15%, water suppliers redoubled their efforts to engage with their customers to urge them to adopt efficient water use habits.

The NYSDEC's goal is an admirable one; the agency has indicated that a reduction of 15% will help Long Island achieve safe yield estimates and reduce the need for additional infrastructure to meet peak demand. But achieving it will require wholesale changes of the long-held habits of millions of Long Islanders, many of whom cherish their green and lush lawns and will need substantial convincing that beautiful lawns can be achieved without nearly as much water. The Long Island Commission for Aquifer Protection's Our Water Our Lives campaign, covered in the LICAP Achievements section of this report, is making inroads with residents, but there is a long way to go.

In the meantime, water suppliers all over Long Island have submitted conservation plans to the NYSDEC and have embraced water conservation through a wide variety of measures. To date, reaching the 15% reduction during any given time period has been more contingent on weather patterns—i.e., whether the weather has been hot and dry or colder and wet—than any other factor. But water suppliers are employing a variety of strategies to get their customers to change their water use habits.

Below is a look at the conservation strategies of several Long Island water suppliers:

Hicksville Water District

The Hicksville Water District has launched a Smart Controller Rebate Program to combat the summer spike in water usage. The first fifty qualified applicants receive a $150 rebate in order to promote a reduction in water consumption, which typically triples in Hicksville during the summer months. This program is also intended to combat the 13.2% growth in water usage the district experienced last year. Smart controllers connect to local weather stations and uses forecasts to determine the appropriate amount of irrigation to use on a given day. The technology has been proven to reduce irrigation by up to 30%.

Additionally, the district conducted a leak detection survey to discover and prevent undetected leaks. Six leaks were discovered and fixed, preventing the loss of thousands of gallons of water. Not only does this prevent unnecessary water usage, but it saves money by avoiding the cost of repumping the water in order to deliver it to residents.

The Hicksville Water District makes monitoring water usage easy and accessible to all residents through the EyeOnWater application. The app allows customers to check their water usage and provides alerts if water usage is high. Additionally, it is a helpful tool for detecting leaks, as it monitors all water coming out of the pump.

The district also monitors water usage by driving through residential areas to make sure that the Odd/Even Lawn Watering Ordinance is being upheld. If someone is not compliant with the ordinance, they are educated on how and when to water their lawn. This is to promote a community that values education over enforcement according to district Superintendent Paul Granger.

Port Washington Water District

The Port Washington Water District has a mandate to conserve 20% of water used by the community. This is due to the shutdown of 75% of their wells currently undergoing

treatment for contaminants. In order to reach this requirement, residents are encouraged to decrease watering times by four minutes in every irrigation zone. Additionally, they are complying with the Odd/Even Lawn Watering Ordinance. Under this mandate, watering lawns is prohibited between 10 a.m. and 4 p.m.

District Superintendent Italo J. Vacchio said that the district utilizes publications and social media such as Facebook to educate residents on ways to conserve water. He also shared that residents have been receptive to the Smart Controller Rebate Program, resulting in a significant decrease in water usage this year. On a typical summer day, the community uses between eight and nine million gallons of water. This year, average use is around five million gallons per day. This dramatic turnaround can also be attributed, in part, to increased precipitation this summer.

Greenlawn Water District

The Greenlawn Water District has been putting considerable effort toward increasing awareness about the NYSDEC's mandate to decrease water usage by 15% during the peak watering season. Additionally, the district shares ideas on ways residents can conserve water in their homes to meet this mandate. The four ways they recommend decreasing water usage include: using retrofit plumbing fixtures, modifying lawn sprinklers to include rain sensors, installing water conservation fixtures and repairing leaks in homes.

District Superintendent Bob Santoriello and his team urge customers to decrease their water usage through newsletters and statements on bills. He noted that water conservation can play an important role in ensuring there is sufficient water pressure for fire protection. Additionally, the district is developing a new website with a focus on conservation in order to further educate their customers.

A Little Action Can Save A Lot Of Water

Saving water is easy. In fact, there are a number of small steps you can take to make a HUGE IMPACT. Follow the 10 steps below to lower your water bill and help save Long Island's ONLY drinking water supply.

Roslyn Water District

The Roslyn Water District encourages residents to cut back watering by two minutes per zone, which will result in a 10% decrease in annual water usage assuming that each zone is typically watered for twenty minutes. Roslyn has also announced another initiative that will require a smart irrigation controller on all automatic irrigation systems by 2025. Also, the district communicates with irrigation contractors working within their service territory to notify them of the new smart controller policy as well as the timeframe in which residential irrigation systems should be in use. Additionally, they are promoting the Odd/Even Lawn Watering Ordinance to further reduce water consumption.

Suffolk County Water Authority

The Suffolk County Water Authority engages its customers in a variety of ways to encourage them to conserve Suffolk's groundwater resources. SCWA's WaterWise program offers customer account credits of up to $50 for the purchase of smart irrigation controllers, rain sensors or water-efficient household appliances. The program also offers customers the chance to have an SCWA water professional come to their home, free of charge, to assess their home water usage and guide them on how to save water.

SCWA's Board also recently adopted a tiered rate structure to promote the conservation of water by charging a higher rate to those use excessive amounts of water. This rate structure protects the water rates of customers who use water resources judiciously, the vast majority of SCWA customers.

SCWA also promotes conservation at bi-monthly public education forums called WaterTalk and communicates with customers frequently about the importance of conservation via email, social media and the SCWA podcast, *What About Water?*. SCWA staff also played a huge role in establishing the Long Island Commission for Aquifer Protection's Our Water Our Lives conservation campaign.

South Farmingdale Water District

The South Farmingdale Water District encourages residents to conserve water through small changes in their lifestyles, providing water conservation ideas for every room of the house. The district's website includes multiple pages of information about how residents can conserve water as well as context about why it is important to conserve.

LICAP ACHIEVEMENTS

Nassau County's Theodore Roosevelt Executive and Legislative Building, pictured above, and the Suffolk County's H. Lee Dennison Building were lit in blue to bring attention to the importance of water conservation this summer.

Our Water Our Lives, Part II

In 2019, the Long Island Commission for Aquifer Protection, in conjunction with nearly 30 organizations and agencies, launched an ambitious effort to educate Long Islanders about the importance of preserving the sole source aquifer that provides all of Long Island's drinking water and the steps they can take in their daily lives to conserve water. Launched with a press conference featuring Suffolk County Executive Steven Bellone, the Our Water Our lives campaign kicked off with a paid digital ad campaign linked to a website highlighting all the ways Long Islanders can conserve water and ensure the future sustainability of our groundwater resources.

Since the launch, the campaign has grown tremendously with enhancements to the website, the creation of flourishing social media accounts, massive email outreach efforts and the creation of an internship program featuring some of Long Island's most promising environmental students doing everything they can to spread the word about conserving our aquifer. In addition to their efforts creating top-notch social media content, the interns have presented—both virtually and in person—for numerous organizations and appeared at numerous events to hand out Our Water Our Lives merchandise and find recruits to the campaign's vital mission.

This summer, the campaign received a major shot in the arm via a multi-faceted and coordinated effort to get the word out. Unlike the campaign two years ago—which focused equally on smart sprinkler controllers, odd/even lawn watering, and the use of water-efficient WaterSense faucets and appliances—this summer's campaign was laser-focused on smart sprinkler controllers and how they can save lots of water—and money—through efficient lawn watering.

On a macro level, the campaign received a major boost via funds provided by Nassau County government for a continuation of the original digital ad campaign, only this time with ads that were smart sprinkler controller-focused. The ads ran all summer on a wide variety of digital platforms, including weather.com, CBSspots.com, news12.com and kohls.com. The ads, some of which were static and others animated, focused on environmentally-aware homeowners. By late August, 1,453,073 impressions had been served, driving 1,955 clicks, or a 0.13% clickthrough rate, considerably better than the national clickthrough rate average of 0.08%. The campaign's top performing zip codes were 11758 (Massapequa), 11550 (Hempstead) and 11756 (Levittown).

But the digital ad blitz was just one of five components of the campaign. To create greater awareness about the importance of smart sprinkler controllers, Suffolk Legislator Al Krupski—a member of LICAP's Conservation Subcommittee—hosted a press conference attended by LICAP board members, elected officials and others to announce Krupski's initiative naming July "Smart Lawn Watering Awareness Month," approved by the Suffolk Legislature days before.

A press conference hosted by Suffolk Legislator Al Krupski and Our Water Our Lives in Hauppauge to announce Smart Lawn Watering Awareness Month was held in July.

OUR WATER
OUR LIVES
SAVE LONG ISLAND'S ONLY
DRINKING WATER SOURCE

Our Water Our Lives was created to establish a lasting effort to make water conservation part of the everyday consciousness of Long Islanders, to get everyone to understand the importance of the preservation of Long Island's greatest natural resource.

As announced by Krupski at the press conference, the awareness month would be celebrated in conjunction with a bi-county, eye-catching display: the seats of government in Nassau and Suffolk—the Theodore Roosevelt Executive and Legislative Building and the H. Lee Dennison Building, respectively—lit up in blue the same night to bring even more attention to the cause of water conservation.

"Conservation is one of the most important steps homeowners and businesses can take to protect our only source of drinking water, Long Island's sole source aquifer," said Legislator Krupski. "Utilizing best practices when watering and irrigating lawns, including using devices like smart sprinklers, is one of the most important things we as property owners can do to conserve water. It is up to all of us individually to take responsibility for conserving this vital resource. I was happy to be a part of the efforts to raise awareness of the impacts improper irrigation on our ground water."

An equal effort was made to connect one-on-one with Long Islanders. All summer long, LICAP volunteers appeared at events and at parks and beaches in virtually every town in both counties to hand out Our Water Our Lives-branded merchandise, such as beach towels and tee shirts, and talk about water conservation with all those who would engage with them. Many who heard about the campaign and its goals went straight to the website to fill out a pledge to conserve water. As an additional draw to the volunteer table, volunteers held a raffle at every event with the winner going home with a smart sprinkler controller. (The merchandise, and smart sprinkler controllers, were also funded through the money allocated by Nassau County.)

The final aspect of the campaign will be around long after the digital ads and other aspects run their course. Water suppliers all over Long Island purchased magnets and other signage urging the use of smart sprinkler controllers for their fleet vehicles and properties. The value of having potentially hundreds of trucks rolling through Long Island's neighborhoods adorned with messaging promoting efficient lawn watering is hard to calculate but will undoubtedly provide an enormous boost to the cause.

Our Water Our Lives was created to establish a lasting effort to make water conservation part of the everyday consciousness of Long Islanders, to get everyone to understand the importance of the preservation of Long Island's greatest natural resource. There is a long way to go to convince all Long Islanders to be judicious with their water use, but the campaign is off to a good start.

LOOKING FORWARD

As we wrap up 2021 and look forward to 2022, a number of the key topics concerning Long Island's sole source aquifer and covered in this report will still be very much front and center in the coming year.

Certainly, an enormous amount of progress will be made in the implementation of the advanced oxidation process and granular activated carbon treatment systems to meet new state regulations for 1,4-dioxane and perfluorinated compounds, as water suppliers—many of whom have been awarded time deferrals to navigate the complicated approval process for treatment systems—seek to meet the new standards. This is a multi-year process, and this report will continue to track the progress of water suppliers in achieving this goal.

2022 will also bring the next steps in the revised Lead and Copper Rule; with the effective date of the revisions occurring on December 16, 2021, 2022 will effectively kick off a nearly three-year period in which public water suppliers around the country will be required to make the needed accommodations to come into compliance with the U.S. Environmental Protection Agency's revisions, the particulars of which are covered elsewhere in this report.

Also covered elsewhere in the report is the EPA's upcoming Unregulated Contaminant Monitoring Rule 5 (UCMR 5). Although sample collection for the program is not scheduled to begin until 2023, 2022 will be an extremely busy year for participating water supplies on Long Island, as they demonstrate the capabilities of their equipment, laboratory performance and data reporting to meet the EPA's exacting standards for participation. The six-step approval process will take much of 2022.

Most certainly, in 2022, a greater focus will be placed on the 40 emerging contaminants included in the New York State bill approved by the State Legislature in 2021, particularly if the bill becomes law. The bill would require testing by all New York water suppliers for the contaminants listed, which include perfluorinated compounds, strontium and chromium-6, among other contaminants.

That heightened focus on the most recent threats to our groundwater supply should help to bring greater public awareness of an imperative that we all share: making sure we all do everything we can to ensure the continued sustainability of our aquifer system, our greatest natural resource on Long Island.

REFERENCES

- Busciolano, Ronald, United States Geological Survey, 2021. Personal communication.
- Pilewski, Jennifer, New York State Department of Environmental Conservation, 2021. Personal communication.
- Pokorny, Joseph, Suffolk County Water Authority, 2021. Occurrence, treatment and funding of Emerging Contaminants on Long Island.
- Niebling, Christopher, Suffolk County Water Authority, 2021. Personal communication.
- Roccaro, Joseph, Suffolk County Water Authority, 2018. Personal communication.
- Santoriello, Robert, Greenlawn Water District, 2021. Personal communication.
- Granger, Paul, Hicksville Water District, 2021. Personal communication.
- Vacchio, Italo, Port Washington Water District, 2021. Personal communication.
- Schneider, Brian, Office of the Nassau County Executive, 2021. Personal communication.
- Dawydiak, Walter, Suffolk County Department of Health Services, 2021. Personal communication.
- Hime, Jason, Suffolk County Department of Health Services, 2021. Personal communication.
- United States Geologic Survey, 2021. www.usgs.gov/centers/ny-water/science/us-geological-survey-hydrologic-monitoring-long-island-new-york.
- Long Island Commission for Aquifer Protection, 2021. licaponline.com.
- Environmental Advocates of New York, 2021. "State Legislation Approves Bill to Expand Testing for Toxic Chemicals in Drinking Water." ://eany.org/press_release/state-legislature-approves-bill-to-expand-testing-for-toxic-chemicals-in-drinking-water/
- The New York State Senate, 2021. NY State Senate Bill S1759A (nysenate.gov)
- U.S. Environmental Protection Agency, 2021. "Revised Lead and Copper Rule." Revised Lead and Copper Rule | US EPA; "Proposed Revisions to the Lead and Copper Rule." Proposed Revisions to the Lead and Copper Rule | US EPA
- U.S. Environmental Protection Agency, 2021. "Fifth Unregulated Contaminant Monitoring Rule." Fifth Unregulated Contaminant Monitoring Rule | US EPA
- Flaherty, Michael, Nassau County Department of Public Works, 2021. Personal communication.
- Hicksville Water District, 2021. Conservation and Education | Hicksville Water District
- Port Washington Water District, 2021.
- Our Water Our Lives, 2021. How to Help | Our Water Our Lives
- Roslyn Water District, 2021. Water Conservation—Roslyn Water District
- Suffolk County Water Authority, 2021. Schedule a Waterwise Checkup | Suffolk County Water Authority (scwa.com)
- South Farmingdale Water District, 2021. About Conservation—South Farmingdale Water District (sfwater.com)
- Krupski, Al, Suffolk County Legislator, 2021. Personal communication.

LICAP MEMBERS

Voting Members And The Organizations Or Offices They Represent

Paul Granger
Chairman
Long Island Water Conference

Stan Carey
Vice-Chairman
Nassau-Suffolk Water Commissioners Association

Jeffrey Szabo
Suffolk County Water Authority

Walter Dawydiak
Suffolk County Commissioner of Health

Don Irwin
Nassau County Commissioner of Health

Dorian Dale
Suffolk County Executive

Brian Schneider
Nassau County Executive

Chris Ostuni
Nassau County Legislature Presiding Officer

Michael White
Suffolk County Legislature Presiding Officer

Brian Culhane
Suffolk County Soil and Water
Conservation District

Tara Schneider-Moran
Nassau County Soil and Water
Conservation District

Ex Officio Members And The Offices They Represent

Honorable Tom Cilmi
Suffolk County Legislature Minority Leader

Sarah Meyland
Nassau County Legislature Minority Leader

Christina DeLisi
Suffolk County Legislature Presiding Officer

Chris Schubert
U.S. Geological Survey
Long Island Program Office

Jennifer Pilewski
New York State Department of
Environmental Conservation

Suffolk County Commissioner of Public Works

Suffolk County Commissioner of Parks,
Recreation and Conservation

Nassau County Commissioner of Parks

Nassau County Planning Commission

Long Island Groundwater Research Institute

SUNY Stony Brook: School of Marine
and Atmospheric Sciences

NOTES

LICAP
Long Island Commission for Aquifer Protection

LICAP

Long Island Commission for Aquifer Protection