LICAP
Long Island Commission for Aquifer Protection

STATE OF THE AQUIFER

2022 UPDATE

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MESSAGE FROM THE CHAIRMAN

The following update to the Long Island Commission for Aquifer Protection's (LICAP) State of the Aquifer report covers many of the topics integral to our understanding of the status of the sole source aquifer that provides 100% of Long Island's drinking water, including groundwater pumpage, hydrologic conditions and groundwater monitoring.

But the two primary features provided in the report focus on topics less directly connected to our aquifer system: nitrogen pollution caused by untreated wastewater from unsewered areas and the impact of the upcoming revisions to the U.S. Environmental Protection Agency's Lead and Copper Rule.

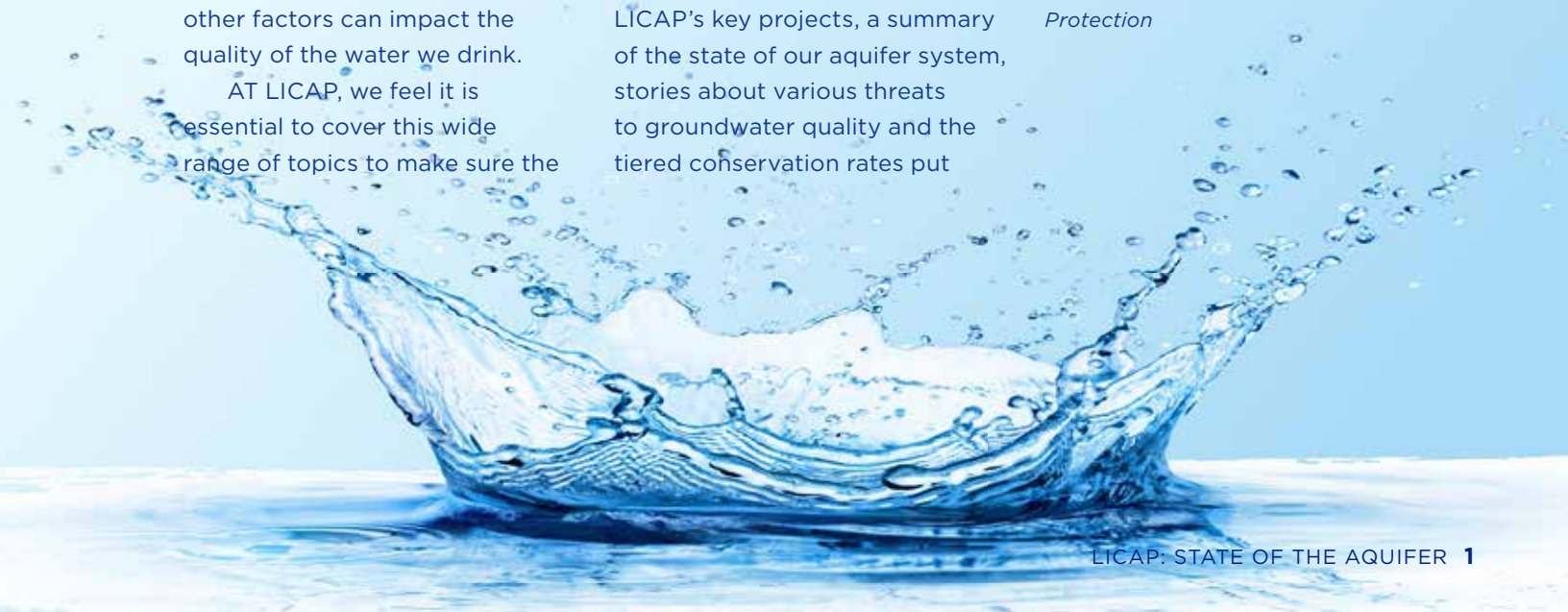
We have decided to focus on these issues, along with the many other important updates, to emphasize the interconnectedness of all aspects of water supply and water use; the way we dispose of waste, the pipes we employ to bring drinking water into our homes and many other factors can impact the quality of the water we drink.

AT LICAP, we feel it is essential to cover this wide range of topics to make sure the public is educated about our water systems, our aquifer and any connected issues that could impact the quality of the water we all drink. So the feature on the Lead and Copper Rule revisions focuses on how homeowners can identify whether they have lead components in their service lines, how to test for the presence of lead in their home plumbing and how to remove the threat of lead if present. The cover story regarding untreated wastewater charts all aspects of the issue and the solutions being employed by our health officials.

There is of course much, much more, including some of LICAP's key projects, a summary of the state of our aquifer system, stories about various threats to groundwater quality and the tiered conservation rates put in place by LICAP's members to make sure that those using extremely high quantities of water pay more for the privilege of doing so.

We hope you'll find the report enlightening and it will encourage you to get involved in the protection of our aquifer system, our greatest natural resource.

Paul Granger
2022 Chairman,
Long Island Commission for Aquifer Protection



The State of the Aquifer

Much of the focus on Long Island's aquifer system in 2022 centered on a quantity, not quality issue: the intense demand for groundwater caused by the drought that hit the island during the peak pumping season, the hot and dry summer months when concentrated use of early morning automatic lawn watering systems pushed water delivery systems to the edge.

But a bright spot emerging from the situation was the massive and sustained media coverage that brought home the point all summer that Long Island residents need to start, right now, to take their water usage habits seriously and learn to take daily measures to reduce water use.

A number of water quality issues concerning our aquifer system also emerged in 2022, perhaps most notably a proposal from the New York State Department of Health to regulate 23 additional emerging PFAS contaminants, including setting new drinking water standards for four PFAS chemicals and requiring testing, reporting and public notification for 19 more.

As this report was being finalized, a public review and comment period on the state's proposal was coming to an end.

LICAP
Long Island Commission for Aquifer Protection

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.

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.

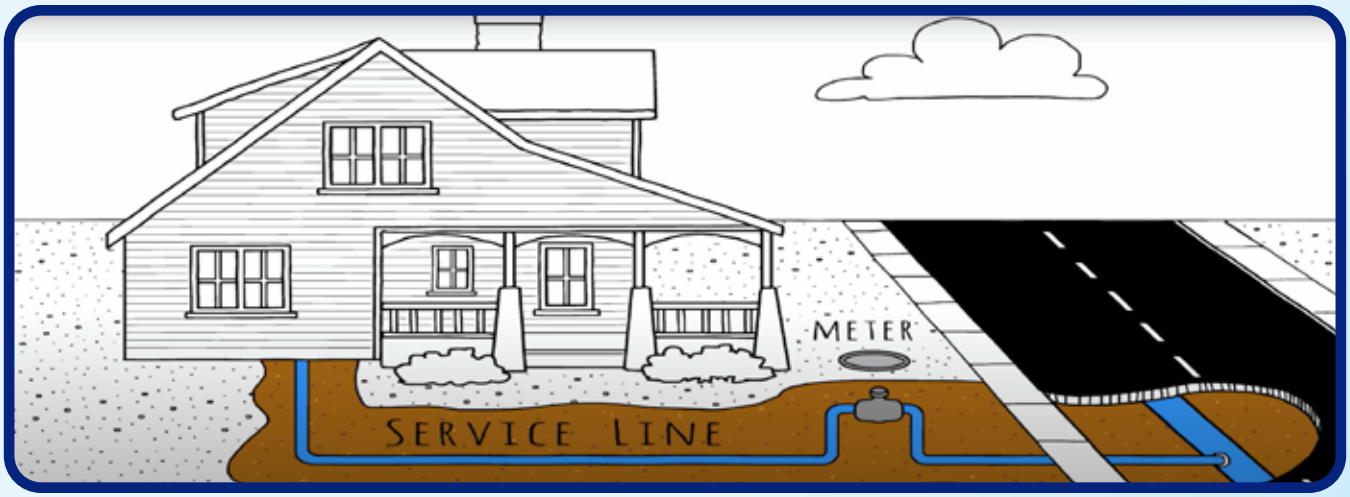
Committee Structure

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.

THE LATEST CHALLENGE FOR LONG ISLAND'S WATER SUPPLIERS: A DAUNTING LEAD SERVICE LINE INVENTORY



It is the ultimate race against the clock.

The Suffolk County Water Authority maintains nearly 400,000 customer accounts, and each customer maintains a service line connecting its home plumbing to the public water system. And each connection also has a service line and components maintained by the water supplier connecting to the water main.

And every single one of these lines must be added to a lead service line inventory required to be compiled by water systems all across the country as perhaps the most daunting challenge included in the Lead and Copper Rule revisions that went into effect under the guidance of the U.S. Environmental Protection Agency in December of 2021.

"Between now and October of 2024 all water suppliers are required to identify all service line materials within their service territory, whether they be copper, lead, galvanized steel or plastic," said Joseph Pokorny, SCWA's deputy chief executive officer for operations. "It's a major undertaking. The first bite of the apple is determining what you can find through available records. And we have field people who know, for instance, that certain materials were used in certain areas. It's kind of an 'all hands on deck' approach."

Pokorny said SCWA has completed approximately 50% of its inventory. Water suppliers all around Long Island are at various stages of the work. If records are not up to date and seasoned staff are not able to help, Pokorny said the next step may be to dig up service lines where needed, or provide homeowners with the knowledge tools to determine what type of service line they have.

Though the inventory is the primary current focus of both the EPA and water suppliers, there are many other components to the rule revisions—the first revisions in 30 years—that Pokorny said would be taken up once the inventory work is complete. These additional aspects may include requiring water suppliers to test for lead in elementary schools and child care facilities; improving tap sampling procedures to locate elevated levels of lead in drinking water; triggering actions to get community water systems to implement corrosion control actions to prevent lead from entering drinking water; closing loopholes to ensure that more lead service lines are replaced; and ensuring that homes found to have substantial lead levels are notified promptly.

A current priority is to make sure the public fully understands the importance of the issue, and the guide on the following page provided by the American Water Works Association covers the topic thoroughly.

What is lead and how are we exposed to it?

Lead is a common, naturally occurring metal found throughout the environment. Lead seldom occurs naturally in water supplies like rivers, lakes or aquifers and lead is rarely present in water coming from a treatment plant. Lead enters drinking water primarily because of corrosion in lead pipes that connect some older homes to the water system and household plumbing that contains lead. The Agency for Toxic Substances and Disease Registry also notes that "children can be exposed to lead by putting their hands that have touched lead-containing soil or dust into their mouths."

According to the U.S. Environmental Protection Agency (EPA), "Children are exposed to lead in paint, dust, soil, air, and food, as well as drinking water." The EPA estimates "drinking water can make up 20 percent or more of a person's total exposure to lead. Infants who consume mostly mixed formula can receive 40 percent to 60 percent of their exposure to lead from drinking water."

Is exposure to lead a health concern?

Lead is a concern because it is a toxic metal that can cause immediate effects at high doses and long-term effects if it builds up in the body over many years. Lead can cause brain and kidney damage in addition to effects on the blood and vitamin D metabolism. Children are more vulnerable to lead because their bodies are smaller, and because they are still developing. Pregnant women and their unborn babies are also at higher risk for negative health effects associated with lead exposure.

If you are concerned that you or a family member may have been exposed to lead, consult with your family doctor or pediatrician to receive a blood test for lead and learn more about the health effects associated with exposure.

How is lead in drinking water regulated?

The federal Lead and Copper Rule requires all public drinking water systems regularly test a sample of high-risk homes for lead at the tap. If more than 10 percent of homes tested have lead concentrations higher than EPA "action level" of 15 parts per billion, individual water utilities are required to notify area residents. If the lead level remains consistently above the action level, the water supplier must take steps to control corrosion.

A revised Lead and Copper Rule became final in December 2021 and is designed to be more protective. Under the new rule, water systems are required to map out where lead is present in their service areas, and publicly share that information. Utilities are also required to inform all customers within 24 hours if their sampling shows an exceedance of the action level. They are also required to test in schools and child-care facilities. The new rules go into effect in October of 2024.

The new rule is part of the broader Biden-Harris Administration Lead Pipe and Paint Action Plan. EPA intends to propose and then promulgate further revisions by Oct. 16, 2024.

Could I be at risk of lead exposure from water?

The water leaving the treatment plant and traveling through water mains is almost always free of lead. However, lead is sometimes present in pipes connecting older homes to the water system or in fixtures and home plumbing. Water utilities adjust the water's chemistry at the treatment plant to minimize the possibility of lead dissolving into the water.

If your drinking water never comes into contact with lead materials, you are not at risk. Most lead materials were effectively banned in 1980s, so if your home was built after that decade, lead is unlikely to be a concern. If you live in an older structure, there are steps you can take to see if you may be at risk. Contact your water provider to see if it has home testing options available. If not, it can help you find a certified laboratory to test your water.

Your utility may or may not know if you have a lead service line. If not, you can find out yourself or with the help of a licensed plumber. Service lines typically enter the home in the basement or crawl space. If the pipe is lead, it will have a dull finish that shines brightly when scratched with a key or coin. Using a magnet can also help you identify a lead pipe, because even a strong magnet will not cling to lead.

A licensed plumber can inspect both your service line and other materials in contact with your drinking water.

Water systems that deliver soft water, which has fewer dissolved minerals, and water that is more acidic and higher in dissolved oxygen, can be more corrosive, increasing the risk of lead contamination. Watch for frequent leaks, discolored water and stained dishes or clothes, as these are all signs of corrosive water. Also, check with your local water utility to find out more about whether your water is corrosive.

What can I do to protect my household from lead in water?

If you're concerned about lead in your drinking water, you can take several steps to limit possible exposure. Read AWWA's Lead - Keep Your Water Safe brochure for guidance.

- Testing at the tap is the only way to measure the lead levels in your home or workplace. You can't see, smell or taste lead in your water. If you choose to have your tap water tested, be sure to use a properly certified laboratory. Testing usually costs between $20 and $100. To find a state certified laboratory, contact a state certification officer.
- Flush your tap water. Flushing the tap is particularly important when the faucet has gone unused for more than a few hours. It takes time for lead to dissolve into water, so the first water drawn from the tap in the morning or after a long period of non-use can contain higher levels of lead. Flushing clears standing water from your plumbing and home service line to ensure you are getting drinking water from the main, where lead is rarely present. Let the water run from the tap until it is noticeably colder (this may take up to two minutes or more) before using it for cooking or drinking. Remember, you must flush EACH drinking water faucet after long periods of non-use for this strategy to be effective. Use the flushed water for non-potable purposes such as watering plants or washing dishes.
- Use only cold water for cooking or drinking. Lead leaches more easily into hot water than cold water.
- Boiling water DOES NOT remove lead.
- After moving into a new home, remove faucet strainers and rinse them to remove any debris. This should be done periodically to remove accumulated debris as well.

Treatment and Removal Devices

Some home treatment devices remove lead, but not all do. In order to make a well-informed and cost-effective decision, consider:

- checking with your water system or consumer confidence report to learn if your household is at risk

*Identifying a device that has been independently certified to remove lead.

NSF International, the Water Quality Association, Underwriters Laboratories and CSA International all certify home treatment products for removal of contaminants. If a home treatment device is used, it is very important to follow the manufacturer's operation and maintenance instructions carefully in order to make sure the device functions properly.

So How Do you Know What Kind of Service Line Material You Have?

With a major push underway to educate Long Islanders about the problems associated with lead in drinking water and how to find out if they have a lead service line at home, water suppliers and health officials are providing handy "do it yourself" guides to help residents find out. The New York State Department of Health provides an excellent guide in a YouTube video found at this address: https://www.youtube.com/watch?v=PcO5FCE9Vfw.

Here's how it works:

1. **Locate your water service line.** Look for where the pipe enters the home. It may be near the meter. Call your water supplier if you're having trouble locating it.

2. **Bring a screwdriver and magnet.** These will help you to determine what type of material your service line is made of.

3. **Use the edge of the screwdriver to scratch the service line.** Do this in an area located before the line reaches a meter or valve.

4. **Identifying a copper service line.** You'll know the service line is made of copper if the scraped material is the color of a new penny. A magnet will not stick to a copper service line.

5. **Identifying a galvanized steel service line.** Galvanized pipe is very hard and does not scratch easily. A magnet will stick to a galvanized steel pipe.

6. **Identifying a plastic service line.** Plastic is fairly easy to distinguish from metal. A magnet will not stick to a plastic service line.

7. **Identifying a lead service line.** If the scratched area is shining and silver colored, the service line is made out of lead. Lead is also softer and easier to scratch than copper or steel. A magnet will not stick to a lead service line.

Remember to share your findings with your water supplier! For more information, go to www.health.ny.gov/DrinkingWater

How Water Suppliers are Preparing Their Inventories

With a mandate to prepare inventories of all service lines by October of 2024 as part of the upcoming revisions to the Lead and Copper Rule, water suppliers on Long Island are approaching the task in a variety of ways.

Jason Belle, Superintendent, West Hempstead Water District

"We are building a lead service line inventory using our GIS system. At the moment, we are noting service line material based on visual inspection during other tasks, such as meter changes, service leaks, etc. However, at some point next year, we will make it a priority to complete the survey using existing documentation and a service line inspection program."

Frank Mancini, Water District Superintendent, Town of Riverhead

"The Riverhead Water District received a $750,000 grant for lead service line replacements. We used some of those funds to digitize all the service line tap cards that the district had and overlaid them as a layer on our existing GIS maps. This has allowed us to be more efficient in locating and replacing lead service lines in Riverhead and prepare for the upcoming changes to the Lead and Copper Rule."

John Reinhardt, Commissioner, Town of Hempstead Department of Water

"The Department of Water has recently engaged the services of a consulting engineering firm to assist with its Lead and Copper Rule revision program. Our program will begin with a records search of the department's files as well as the local building department and the county clerk's office, followed by field investigations by our metering personnel during their routine backflow compliance inspections."

Paul Granger, Superintendent, Hicksville Water District

"We have a three-pronged approach underway. We have digitized and analyzed all paper records; data was uploaded into our GIS and spreadsheets for analysis. We were able to document approximately 90% of all water service material through records review. We are also contacting customers with unknown water service line material via email blast and direct mailing to promote to self-inspection of their water service lines. The district also set up a field template using ESRI survey 123 and developed inspection routes using the district's GIS. The survey 123 is set up to capture data and phots on an iPad in a uniform and consistent manner."

Paul Schrader, Superintendent, Manhasset-Lakeville Water District

"The district conducted a lead survey back in the '90s and removed all lead services. Having said that, we are reviewing all water main and service line installation histories in an attempt to develop the inventory. We expect to use GIS and installation dates to cull our list of house-to-house inspections."

Robert Santoriello, Superintendent, Greenlawn Water District

"We are working on the inventory with H2M. We are presently in the investigative stage on the lead service line inventory using tap cards, existing town records and institutional knowledge."

THE NITROGEN PROBLEM, AND AN INNOVATIVE SOLUTION

Suffolk county targets a growing threat to surface and groundwater

"Nitrogen is water quality enemy number one," Suffolk County Executive Steven Bellone declared in 2014 upon launching the mission to 'Reclaim Our Water'. "The major source of nitrogen pollution emanates from the 74% of households in Suffolk County with cesspools and conventional septic systems that do not effectively treat wastewater. This threat to our water quality has been decades in the making and it will take decades to correct."

It is a water quality threat ultimately caused by mismanagement and corruption.

The Southwest Sewer District—once a promising first step in addressing the lack of sewers and resulting wastewater issues in Suffolk County—became mired in controversy in the years following its approval in 1969 as a project that would span the Town of Babylon and some of the Town of Islip. As noted by Newsday in a story four years ago, costs for the system ballooned from $291 million to more than $1 billion, with 14 years passing "before the first flush went through the system," wrote David Schwartz. The project was plagued by bid rigging, poor materials and whitewashed audits, eventually ending with the murder of an official ready to tell all (though the murder, according to *Newsday*, concerned a love affair and not the sewer project).

"The Southwest Sewer District was the biggest scandal in the county's history," Bellone said. "The appetite politically to do anything on this issue was nonexistent after that. It effectively killed sewering here for decades."

Little wonder, then, that the word "sewer" became a dirty word in Suffolk for many years.

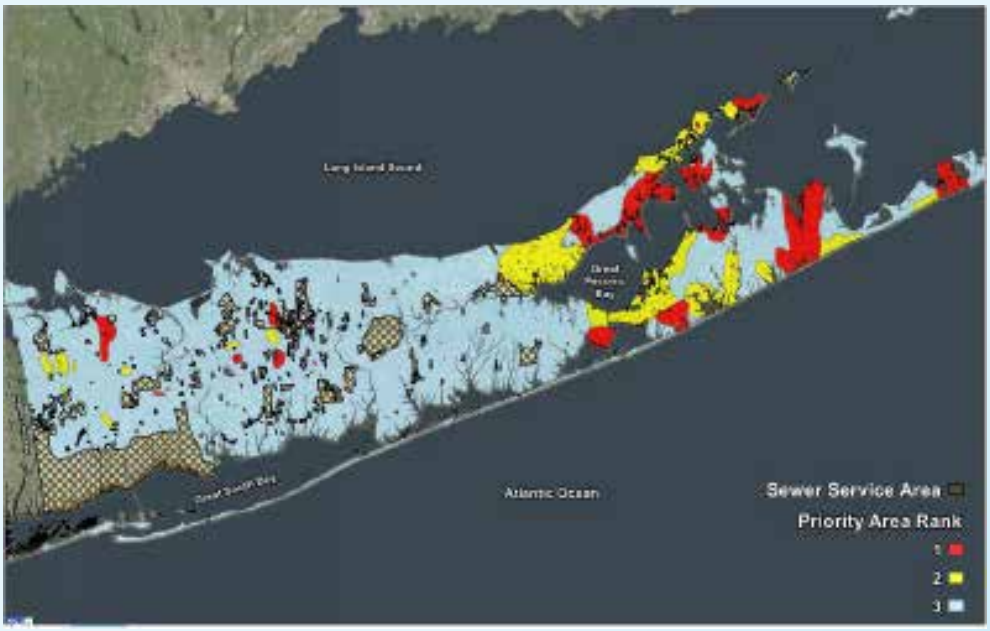
"The plan was always to extend sewers for wastewater treatment," said Suffolk Deputy County Executive Peter Scully. "The old plans had sewers extending to Orient and Montauk, but the Southwest Sewer District killed it. No one wanted to hear about sewers anymore."

Until recently, anyway. The Suffolk County Department of Health under the administration of Suffolk County Executive Bellone has charted an ambitious course to address untreated wastewater. Reclaim Our Water, which is outlined in the county's Subwatersheds Wastewater Plan, was developed in conjunction with the Long Island Nitrogen Action Plan and others, "seeks to arrest and reverse the existing trend of degrading water quality over a ten-year period."

The roadmap to Reclaim our Water runs through the neighborhood of 380,000 wastewater disposal systems in Suffolk, both septic tanks and cesspools, are releasing untreated nitrogen into groundwater at enormous concentrations—an order of magnitude greater than coastal systems can handle. The pollution is not only devastating marine life in surface waters, according to county officials and scientific experts, but is also impacting Long Island's sole source aquifer, from whence Long Island draws its drinking water. Owing to greater depth, few public well fields are treated for wastewater, according to Suffolk County Director of Environmental Quality Walter Dawydiak. Historically about 10% of private wells exceed maximum contaminant levels for nitrogen, although extension of public water to priority areas has reduced that number. Stony Brook University Professor Chris Gobler notes that evolving analysis points to nitrogen as a potential cancer risk.

Suffolk's Subwatersheds Wastewater Plan plots out groundwater/drinking water priority areas, which are mostly located on the East End, with pockets in other areas of concern further west. The primary areas of concern on the East End cover mostly coastal areas on both the North and South Forks, where aquifers are much shallower than in the western portion of the county.

"Suffolk County Department of Health Services' 2015 Comprehensive Water Resources



Management Plant rang the alarm on the nitrogen problem," said Dawydiak. "It found that nitrogen levels had increased by about 40% in the upper glacial aquifer and 90% in the Magothy aquifer over the preceding two decades, with no end in sight."

So what to do?

County health officials have promoted the use of Innovative/Alternative Onsite Wastewater Treatment Systems, which they say have been proven via rigorous testing by Suffolk County and other jurisdictions to remove more than 70 percent of the nitrogen in wastewater. The systems, they say, must meet a stringent effluent concentration of 19 mg/l, meeting that 70% criteria.

Though the plan to introduce such systems in large numbers in Suffolk is an ambitious one, county officials estimate that increasing nitrogen numbers in shallow groundwater can be reversed in as short as five to ten years. The county has introduced a phased approach to the challenge, seeking to upgrade all conventional onsite wastewater systems and cesspools in the most vulnerable areas of the county within 30 years. The plan sets as its top priority the establishment of a stable and recurring revenue source with additional priorities including the prohibition of wastewater disposal systems that do not remove nitrogen, promotion of voluntary participation and advancement of approved sewer projects.

The plan is ambitious in another way, as well, given that no governmental approval process was in place when the county set about proving the systems work a number of years ago, then providing grant funding in collaboration with New York State. With support and approval of the New York State Department of Environmental Conservation and the New York State Department of Health, Suffolk County established a county-based Responsible Management Entity and implemented sanitary code changes and other key aspects of the program.

"Sanitary Code Article 19 was created in part to designate the Suffolk County Department of Health Services as the agency responsible to oversee the design, construction and implementation of these systems," said Ken Zegel, Chief of the health department's Office of Ecology. "The second thing it did was to create the most rigorous approval system in the country."

One major issue to be addressed, of course, is the cost of these systems. The Subwatersheds Wastewater Plan indicates that the full realization of the plan will not move forward absent the establishment of a revenue stream to minimize the cost of implementation of these systems to the homeowner. But In the meantime, homeowners can take advantage of existing county, town and state grant programs to install nitrogen-reducing wastewater systems by going to www.ReclaimOurWater.info.

In Nassau County, which is largely sewered, the challenges are quite different.

"The Nassau County Department of Health supports the use of Innovative and Alternative Onsite Wastewater Treatment Systems since their design is intended to reduce nitrogen loading into the ground," said Angela Pettinelli, Director of Nassau County Department of Health's Division of Environmental Health. I agree, Nassau and Suffolk wastewater treatment infrastructure is different since approximately 85% of Nassau is served by sewers and the remaining 15 percent are properties where on-site sanitary disposal is overseen by either the Nassau County Department of Health or local building authorities. The installation of sanitary sewers has helped to reduce negative impacts to the aquifer. There are approximately 5% of the drinking water wells in Nassau County that require nitrate removal.

"The Nassau County Department of Health regulates the design of new sanitary systems to serve realty subdivisions of five or more lots. The department also requires and approves engineering plans for commercial sanitary sewage disposal systems having a design flow of 1,000 gallons per day or more and issues State Pollutant Discharge Elimination System permits under the delegated authority of the New York State Department of Environmental Conservation. The department does not, however, regulate the design of individual replacement sanitary systems for single family homes but does require that engineering plans be submitted to the Department for regulated commercial modified or replacement sanitary systems.

"The Nassau County Soil & Water Conservation District administers Nassau County's Septic Environmental Program to Improve Cleanliness grant program intended for the replacement of on-site sanitary disposal systems for single family, two-family, not for profit organizations, and small businesses where the sanitary design flow is less than or equal to 1,000 gallons per day. This grant program incentivizes the replacement of on-site sanitary disposal systems with enhanced treatment units to reduce nitrogen."

In Suffolk, county officials see a future with nitrogen-reducing systems throughout the county as essential to the county's fiscal and environmental health.

"As we are an island surrounded by water, nitrogen pollution threatens our way of life in Suffolk County," said Dorian Dale, Director of Sustainability and Chief Recovery Officer for Suffolk. "Strong support for the initiatives outlined in the Subwatersheds Wastewater Plan will lead to the protection of public health, an increase in property values, an increase in economic prosperity and enhanced protection against storm surges. It is vital that all Suffolk residents learn more about the challenge and play a role in Reclaiming Our Water."

An Important Aspect of the Subwatersheds Wastewater Plan: Surface and Groundwater Monitoring

In order to monitor the improvements to the environment achieved over time through implementation of the Subwatersheds Wastewater Plan, the county is in the process of developing a long-term monitoring plan, which will include robust monitoring of groundwater and surface water from a wide range of subwatersheds throughout the county. In addition, an adaptive management plan is being prepared to react to changing conditions as new information is collected over the life of the program. Together, these efforts will help ensure that the Subwatersheds Wastewater Plan is achieving its goals.

In addition to nitrogen, the Subwatersheds Wastewater Plan also considers wastewater as a source of emerging contaminants, such as 1,4-dioxane and PFAS. Therefore, the long-term monitoring plan will include monitoring of emerging contaminants as well. Since 2019, the Suffolk County Department of Health Services has collected data on emerging contaminants in wastewater in the County. This is a coordinated effort with multiple agencies and organizations, including but not limited to: New York State Department of Environmental Conservation, New York State Department of Health, United States Geological Survey and Stony Brook University. The objectives are to determine if wastewater is a significant source of emerging contaminants; which site uses are the largest source; and understanding the removal efficiencies of different wastewater treatment technologies. The results will be incorporated into the adaptive management strategy of the Subwatersheds Wastewater Plan.

HYDROLOGIC CONDITIONS

HYDROLOGIC CONDITONS IN NASSAU AND SUFFOLK COUNTIES

This section of the SOTA 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, current normal precipitation levels are the average values from calendar years 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 reported by the National Weather Service (NWS) for Long Island MacArthur Airport is 45.99 inches.

For this SOTA update, rather than utilizing calendar years, precipitation records from MacArthur Airport were examined in one-year increments for the period October 1 to September 30 for each year, or the water year. A water year is defined as the 12-month period October 1, for any given year through September 30, of the following year. The water year is designated by the calendar year in which it ends, and which includes 9 of the 12 months. MacArthur Airport precipitation data was downloaded from the National Centers for Environmental Information (NCEI) website at www.ncei.noaa.gov.

Precipitation at MacArthur Airport for the 2022 water year was 36.23 inches, compared to the two prior water years of 2021 (51.58 inches) and 2020 (45.13 inches). While these values are not directly comparable to the 30-year climatic normal of 45.99 inches calculated for the calendar year, they can be used to

DATA FOR THE MACARTHUR AIRPORT PRECIPITATION GAUGE

2020 Period	2021 Period	2022 Period
45.13"	51.58"	36.23"

indicate general periods of above or below normal precipitation. The data presented above indicates that water year 2022 was much drier than normal, water year 2021 was wetter than normal, and water year 2020 was about normal.

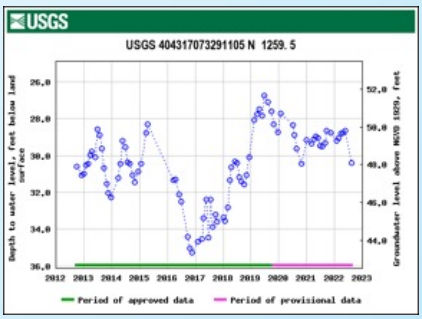
Groundwater Levels

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.

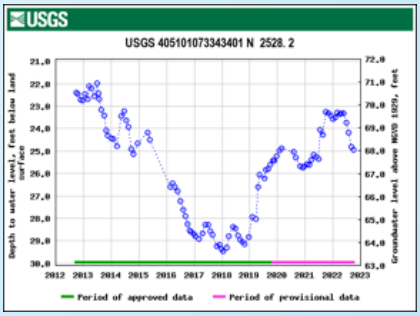
Well N 1259.5, located in Plainedge in southeastern Nassau (41 ft deep).



The 10-year hydrograph above 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 3-year period of well below normal precipitation. Water levels returned to more normal levels in 2020 as precipitation totals for 2020 through early 2022 were closer to average. A sharp decline in water levels began later in 2022 as conditions became significantly drier.

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

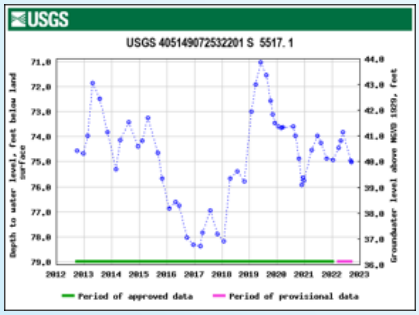
Well N 2528.2, located in Old Brookville in northeastern Nassau County (328 ft deep).



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 3-year period of well below normal precipitation. Water levels sharply increased in 2021, probably due to changes in local groundwater pumpage, and remained at these levels through early 2022. A sharp decline in water levels began later in 2022 as conditions became significantly drier and local groundwater pumpage increased.

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

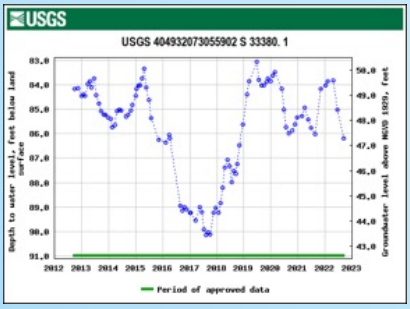
Well S 5517.1, located at Brookhaven National Laboratory in east-central Suffolk County (91 ft deep).



Similar to the wells in Nassau County shown above, this 10-year hydrograph 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. Water levels then varied seasonally through early 2022, during a period of relatively average precipitation, but began to decline later in 2022 as conditions became significantly drier.

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 hydrographs shown above, this 10-year hydrograph indicates that water levels in the Magothy aquifer 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 3-year period of well below normal precipitation. Water levels varied seasonally with changes in precipitation and groundwater pumpage through early 2022. A sharp decline in water levels began later in 2022 as conditions became significantly drier and local groundwater pumpage increased.

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

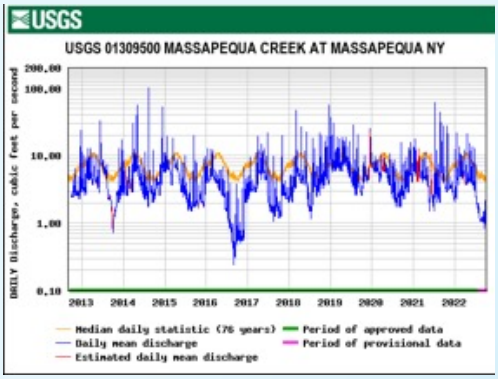
Streamflows

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 steams in Nassau County have decreased markedly since the 1960s and have not recovered due to these impacts.

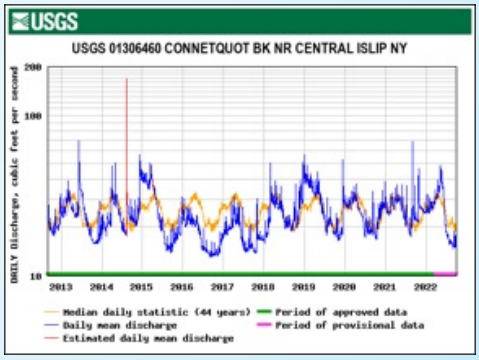
The 10-year hydrograph above shows that stream discharge at Massapequa Creek prior to 2016 fluctuated around the long-term average, with a few more pronounced periods of above or below average related to changes in precipitation. However, in response to the 3-year period of well-below-normal precipitation during 2015, 2016, and 2017, stream discharge declined significantly over that period reaching a low in late 2016. Since that time, stream discharge increased to above normal in 2019, and then remained near the long-term average until mid-2022, when stream discharge declined sharply to well-below average in response to below-normal precipitation.

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.

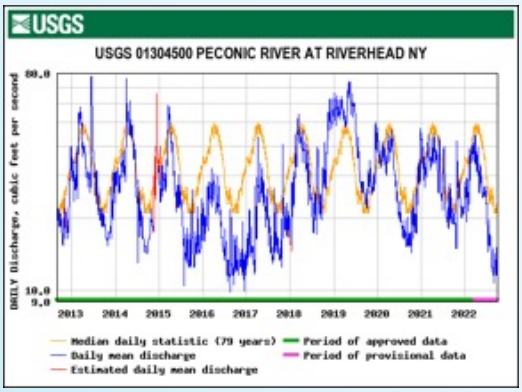
Similar to Massapequa Creek, the 10-year hydrograph above shows that stream discharge at Connetquot Brook prior to 2016 fluctuated around the long-term average, with a few more pronounced periods of above or below average related to changes in precipitation. However, in response to the 3-year period 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 increased to above normal in 2019, and then remained near the long-term average until mid-2022, when stream discharge declined sharply to well-below average in response to below-normal precipitation.



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 the 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 3-year period of well-below-normal precipitation during 2015, 2016, and 2017, which 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 increased to above normal in 2019, and then remained near the long-term average until mid-2022, when stream discharge declined sharply to well-below average in response to below-normal precipitation.



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 USGS 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.

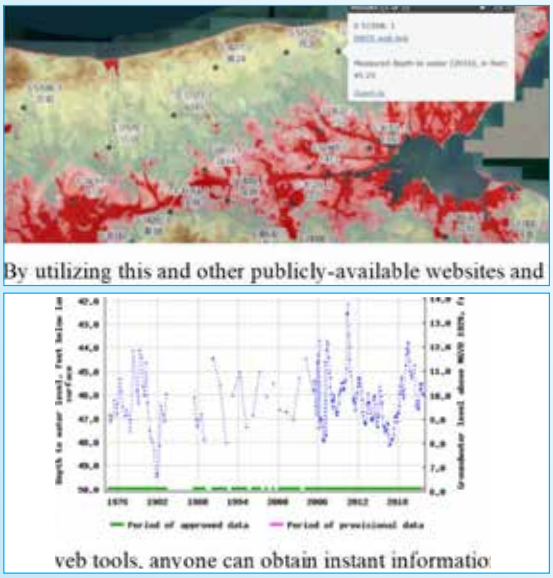
How can I find out more information on Long Island's hydrologic conditions?

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, 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 to the right of 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

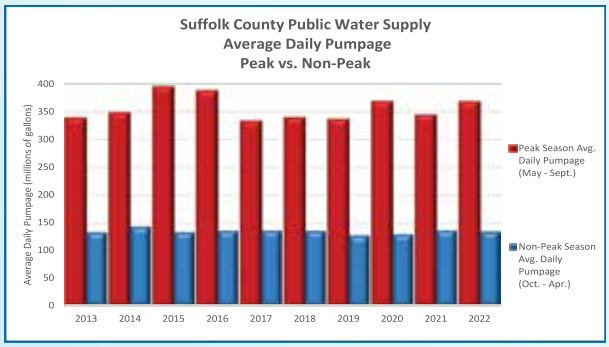
Groundwater used for public supply purposes is the largest use on Long Island. The below chart and graphs track public supply pumping records in Nassau and Suffolk Counties for the past eight years in various ways, including average daily usage; peak vs. non-peak usage; average daily pumpage vs. precipitation 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.

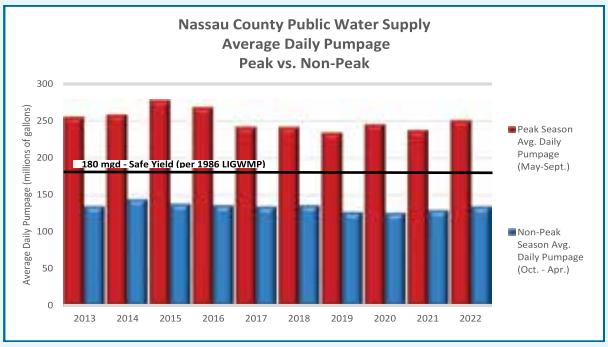
	Suffolk County Public Water Supply Non-Peak Season Avg. Daily Pumpage (mgd)	Suffolk County Public Water Supply Peak Season Avg. Daily Pumpage (mgd)	Suffolk County Public Water Supply Avg. Daily Pumpage (mgd)
Year*	Oct.-April	May-Sept.	All months
2013	133.31**	339.08**	219.56**
2014	143.57**	348.74	229.57
2015	133.52	394.83	243.05
2016	135.98	388.23	241.43
2017	136.33	333.51	218.99
2018	135.72**	339.83	221.28**
2019	127.67	336.75	215.31
2020	129.83	368.96	229.79
2021	136.55	344.25	223.61**
2022	134.80	368.26	232.66
Avg.	134.73	356.25	227.53

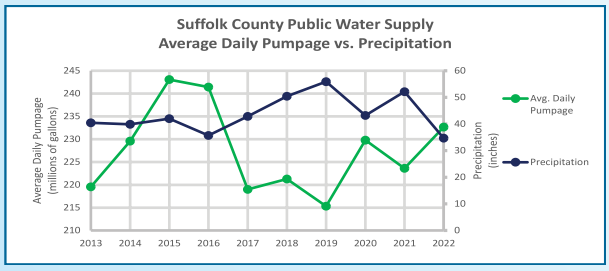
*Yearly pumpage estimates are provided from October – September (i.e. 2013 reporting year contains data from October 2012 through September 2013).
**Updated from last year's SOTA report based on data corrections and newly submitted public water supply pumpage reports.

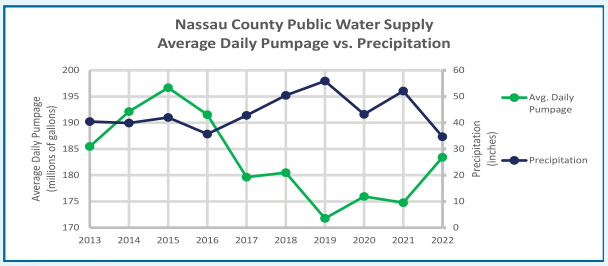
	Nassau County Public Water Supply Non-Peak Season Avg. Daily Pumpage (mgd)	Nassau County Public Water Supply Peak Season Avg. Daily Pumpage (mgd)	Nassau County Public Water Supply Avg. Daily Pumpage (mgd)
Year*	Oct.-April	May-Sept.	All months
2013	135.22	255.12	185.48
2014	144.49	258.11	192.12
2015	138.26	277.61	196.67
2016	136.46	268.21	191.54
2017	134.69	241.89	179.63
2018	136.46	241.47	180.48
2019	127.09	233.66	171.77
2020	126.26	245.11	175.95
2021	129.70	237.18	174.75
2022	134.87	250.68	183.42
Avg.	134.35	250.90	183.18

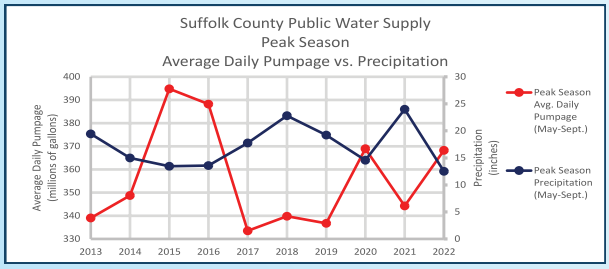
*Yearly pumpage estimates are provided from October – September (i.e. 2013 reporting year contains data from October 2012 through September 2013).
**Updated from last year's SOTA report based on data corrections and newly submitted public water supply pumpage reports.

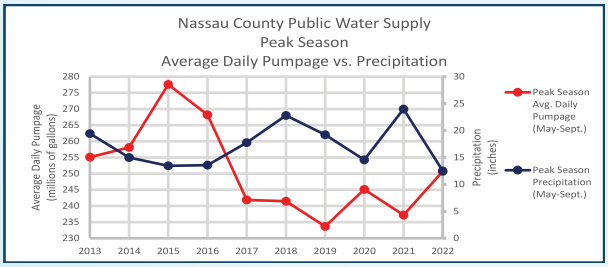

Suffolk County Public Water Supply
Average Daily Pumpage
Peak vs. Non-Peak
Average Daily Pumpage (millions of gallons)
Peak Season Avg. Daily Pumpage (May - Sept.)
Non-Peak Season Avg. Daily Pumpage (Oct. - Apr.)

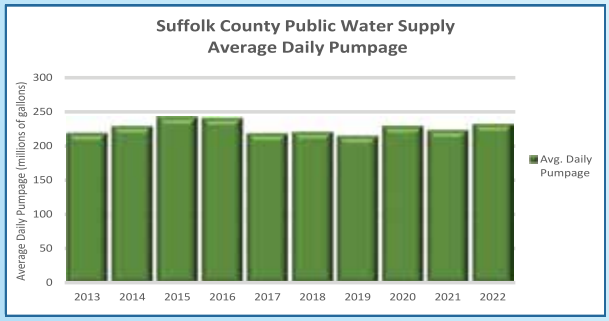

Nassau County Public Water Supply
Average Daily Pumpage
Peak vs. Non-Peak
Average Daily Pumpage (millions of gallons)
180 mgd - Safe Yield (per 1986 LIGWMP)
Peak Season Avg. Daily Pumpage (May-Sept.)
Non-Peak Season Avg. Daily Pumpage (Oct. - Apr.)

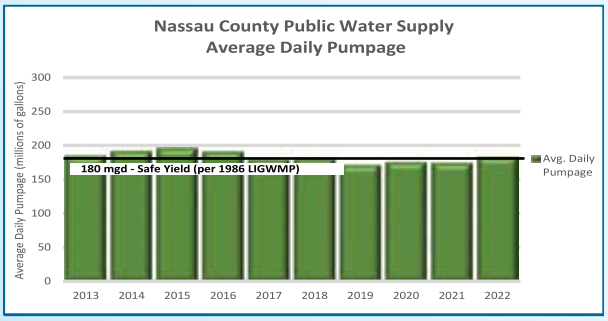

Suffolk County Public Water Supply
Average Daily Pumpage vs. Precipitation
Average Daily Pumpage (millions of gallons)
Precipitation (inches)
Avg. Daily Pumpage
Precipitation

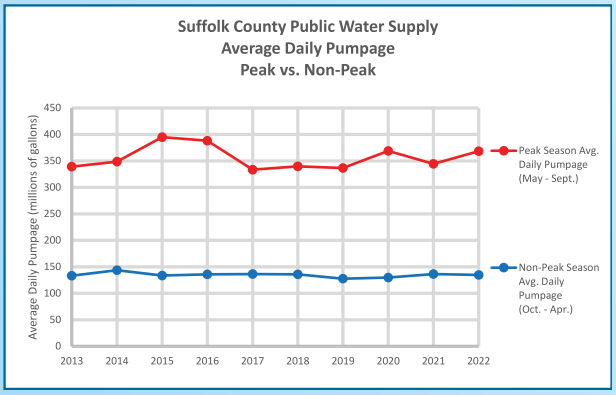

Nassau County Public Water Supply
Average Daily Pumpage vs. Precipitation
Average Daily Pumpage (millions of gallons)
Precipitation (inches)
Avg. Daily Pumpage
Precipitation

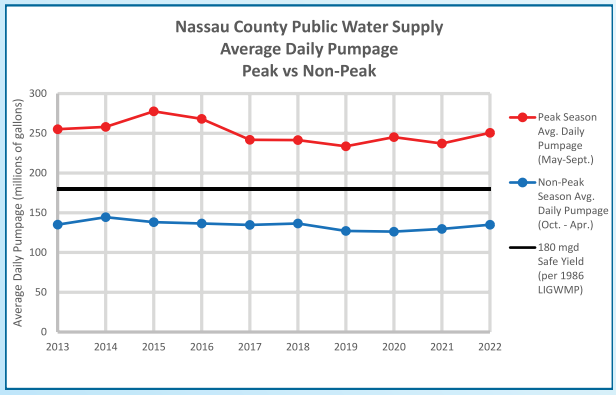

Suffolk County Public Water Supply
Peak Season
Average Daily Pumpage vs. Precipitation
Average Daily Pumpage (millions of gallons)
Precipitation (inches)
Peak Season Avg. Daily Pumpage (May-Sept.)
Peak Season Precipitation (May-Sept.)


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 Proposes Regulations For 23 Additional PFAS Chemicals

The New York State Department of Health, with input from the New York State Drinking Water Quality Council, this fall proposed regulations for 23 additional PFAS chemicals in drinking water. The state in 2020 implemented among the most protective regulations for the PFAS chemicals PFOS and PFOS in the country.

A press release issued by the state Department of Health on October 4 indicated that that October 5 would begin a 60-day public review and comment period after the proposed regulations were entered in the State Register.

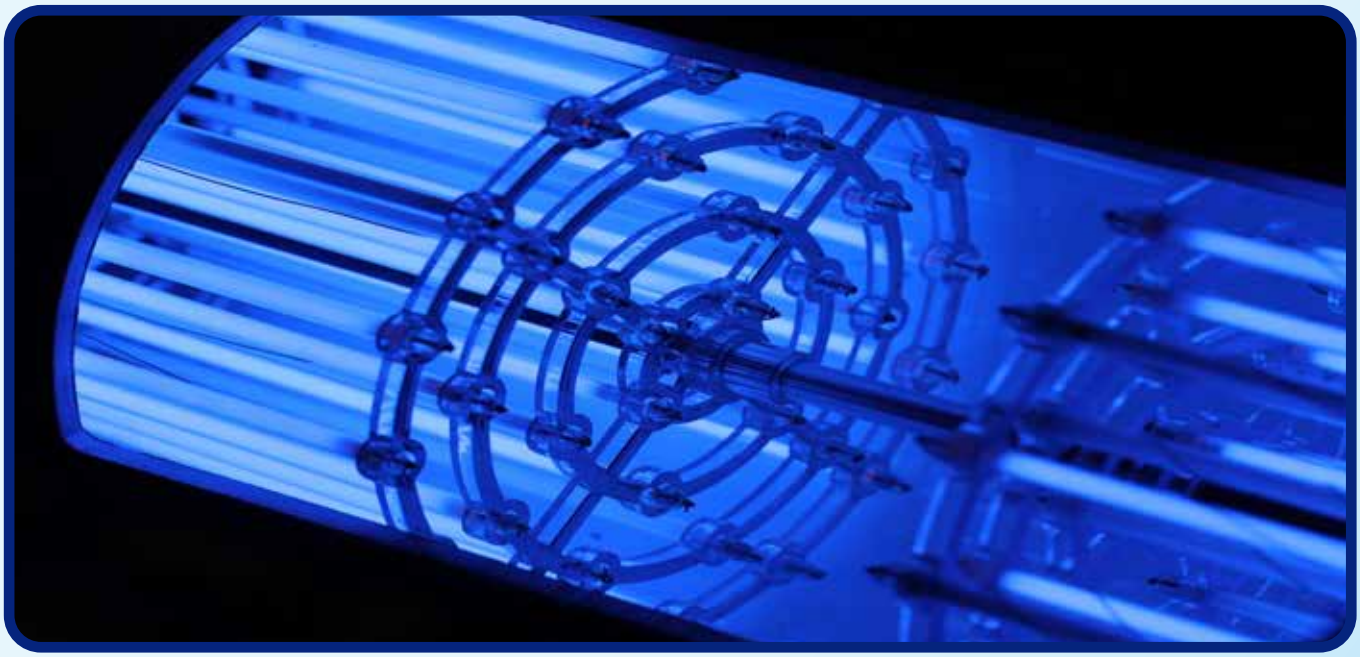
The proposed regulations, if enacted, would set new drinking water standards for four additional PFAS chemicals, which would then require public water suppliers to reduce levels of the chemicals below the approved requirements. The four substances, which under the proposal would be regulated at 10 parts per trillion, are pefluorodecanoic acid (PFDA), perfluoroheptanoic acid (PFHpA), perfluorohexane sulfonic acid (PFHxS) and pefluorononanoic acid (PFNA).

Additionally, the proposal calls for testing, reporting and public notification for 19 additional PFAS compounds.

"New Yorkers should know that their drinking water is among the most protected in the country," said New York State Health Commissioner Dr. Mary T. Bassett. "New York has been leading the way on emerging contaminants and today's announcement represents another milestone."

PFAS chemicals, according to the press release, has been widely used in fabric waterproofing, firefighting foams and non-stick cookware. The chemicals—sometimes referred to as "forever chemicals"—break down slowly in the environment and in some cases have contaminated drinking water supplies, causing concern about health risks.

Once the public review and comment period is completed (the deadline was imminent as this report was being finalized), the Department of Health will review all comments submitted, develop responses and propose a final rule for the Public Health and Health Planning Council to consider for adoption.



Work on AOP Systems Continues

When in 2020 New York State adopted one of the most protective maximum contaminant levels for the emerging contaminant 1,4-dioxane in the country, Long Island's water suppliers were faced with an enormous task: developing treatment systems to remove the contaminant from groundwater at wells all throughout the island.

Unlike many other contaminants that can be removed with granular activated carbon, 1,4-dioxane requires a specialized system using advanced oxidation process (AOP) treatment to be effective. And so a very cumbersome process began, with suppliers impacted by the contaminant in their public supply wells designing, seeking approval for, building, installing, testing and putting into service AOP systems. Due to the extensive work that goes into each, dozens of water suppliers were granted deferrals from the new regulation to implement the systems.

Below is a snapshot of how some of the most impacted water systems are progressing with their AOP systems.

Stephen Moriarty, Superintendent, Plainview Water District

"The Plainview Water District began piloting for different methods of treatment for the removal of 1,4-dioxane back in the summer of 2018. In 2019 the district was awarded many grants from the state through the Department of Health and began construction on interim treatment systems ahead of regulations so that we could treat for 1,4-dioxane at some of our plants. From 2020 to 2021, we constructed and placed six AOP treatment systems into operation at four plant sites. Four were interim systems and two were permanent systems in a building. The interim treatment facilities had the granular activated carbon (GAC) vessels located outside, thus making them seasonal sites (for spring/summer use only). In 2022, we have been in the process of turning the interim treatment systems into permanent systems so that they could be used year-round. To date, the district has been awarded more than $34 million dollars in grant funding from New York State for our efforts and construction projects in combating emerging contaminants such as 1,4-dioxane. Going forward, we are in the process, over the next several years, of building treatment systems for our six additional wells at two plant sites. Over the past three years, the Plainview Water District has remained focused on this effort of supplying the highest quality drinking water to the Plainview-Old Bethpage community for decades to come."

Paul Granger, Superintendent, Hicksville Water District

"The Hicksville Water District's progress in fighting against the threat posed by emerging contaminants over the last four years has been nothing short of remarkable. As of this moment, the district has eight wells up and running, more than any other water district on Long Island. This is because of our immediacy when it comes to installing the necessary treatment systems at our wells to ensure that our water never exceeded any contaminant's maximum contaminant level (MCL). We reached a major landmark last spring with the grand reopening of our Plant 5 and 9 facilities, which now contains AOP treatment systems and GAC vessels. One of our biggest current projects is the installation of AOP and GAC treatment systems at our Plant 8 facility. We expect this to be completed by the end of 2023."

Michael Boufis, Superintendent, Bethpage Water District

"On Jan 31, 2019, I placed an order for five AOP systems in preparation of the proposed MCL on 1,4-dioxane. The district decided we would not ask for a deferral so we moved forward with constructing the five systems before the deadline. Plant-4 has two 1400 gallon-per-minute wells that have 1,4-dioxane that exceeds the MCL. We elected to take the wells out of service back in 2013, due to contamination. We elected not to install AOP and to leave the wells out of service. Plant-5 has one 1400 gpm well. 1,4-dioxane levels exceed the MCL, and we elected to install one AOP system before implementation of the new MCL. Plant-6 has two 1400 gpm wells. 1,4-dioxane levels exceed the MCL, so we elected to install two AOP systems before implementation of the new MCL. Plant-BGD has one 1400 gpm well. 1,4-dioxane levels exceed the MCL and so we elected to install one AOP system before implementation of the new MCL. Plant-South Park Drive has one 2,000 gpm well. 1,4-dioxane levels exceed the MCL, and so we elected to install one AOP system before implementation of the new MCL. Plant-1 has two 1400 gpm wells. 1,4-dioxane levels do not exceed the MCL at this plant, but we elected to purchase one AOP unit and construction is currently underway. The system will be operational for the 2023 pumping system."

Tim Kilcommons, Chief Engineer and Director of Research and Development, Suffolk County Water Authority

"1,4-dioxane work continues to progress on the installation of the seventeen AOP systems in Phase 1 and work continues at Phase 2 sites." (Note: SCWA's progress list on its AOP systems is too lengthy to be included in this report, but monthly reports on progress can be viewed at www.scwa.com/emerging-contaminants/)

Evaluation of PFAS/1,4-Dioxane inPublic 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 Suf folk 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, while currently developing the in-house PFAS analytical capability at the County's Public and Environmental Health Laboratory.

Since 2016, the SCDHS has conducted about 55 private well surveys and collected more than 1,500 private well samples for these chemicals, and approximately 235 private wells exceeded current New York State drinking water stan dards 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 identi-
fy impacted wells and prioritizing mitigating measures such as removing wells from service, treat-
ment and blending.

The task reports completed as part of the 2019 Long Island Commission for Aquifer Pro tection 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. At the time, SCDHS estimated 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.

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 1980s and 1990s, 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.

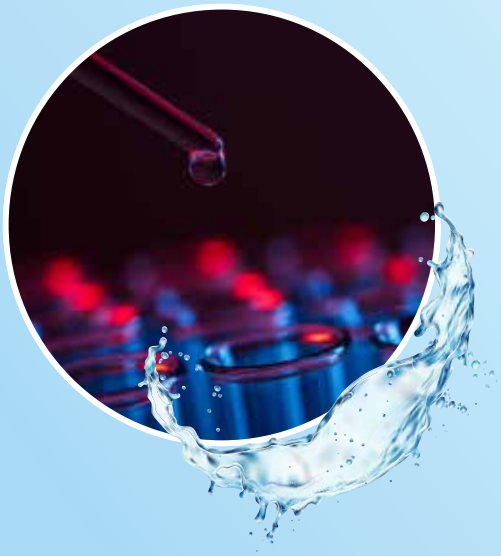
One current cooperative project funded by the New York State Department of Environmental Conservation (NYSDEC) is being conducted by the NCDPW and the USGS. This project utilizes wells from the Nassau County network that are primarily screened in the Magothy aquifer and samples them for various contaminants 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, 78 Nassau County monitoring wells were sampled from 2019 to 2022.

The NCDPW will be entering into a new three-year cooperative agreement with the USGS in late 2022. 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

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.



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.

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 14 groundwater investigations in areas of known or suspected PFAS contamination. As part of this work, approximately 220 monitoring and profile wells have been installed and more than 1,100 PFAS samples have been collected.

From the analytical data received to date, 126 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 level (MCL) for 1,4-dioxane occur, they are well within margins of protection used in developing the MCL.

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 do not pose a significant health risk and the water is acceptable for all uses.

From the analytical data received to date 126 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

When the topic is Long Island's sole source aquifer, the source of all of our drinking water, much of the focus over the years has been on its quality, the various contaminant threats that need to be addressed to ensure its long-term sustainability.

But in recent years—and particularly in 2022, when a lengthy drought challenged the ability of water suppliers to keep up with demand, a trend followed closely by the regional media—the focus has shifted to encompass issues of quantity—the availability at any given location of a groundwater supply sufficient to meet the needs of residents.

Water suppliers on Long Island, as detailed in recent editions of this section, have embraced the need to reduce the amount of water being pumped out of our aquifer on a daily basis by promoting various conservation programs to their customers, from the use of smart lawn watering controllers to an emphasis on water-saving household appliances.

They've also taken concrete steps with their water rates to encourage smarter water use habits—the adoption of tiered conservation rate structures. Below are the conservation rates employed by various Long Island water suppliers.

TIERED RATES

MANHASSET-LAKEVILLE WATER DISTRICT

GALLONS	RATE PER 1000 GALLONS
0-8,000	$10.80 (Minimum)
0-36,000	$1.35
0-72,000	$1.70
0-216,000	$2.50
Over 216,000	Commercial Rate

TIERED RATES

WEST-HEMPSTEAD GARDENS WATER DISTRICT

GALLONS	RATE PER 1000 GALLONS
0-2,000	N/C
2,000-10,000	$1.50
10,001-25,000	$2.00
25,001-40,000	$2.50
40,001-60,000	$3.00
60,0001+	$3.50

TIERED RATES

GREENLAWN WATER DISTRICT

GALLONS	RATE PER 1000 GALLONS
0-10,000	$16.00 (No Change
10,001-60,000	$1.05 (No Change
60,001-100,000	$1.55
100,001-150,000	$1.95
150,001-200,000	$2.20
200,000+	$2.35

TIERED RATES

TOWN OF HEMPSTEAD DEPARTMENT OF WATER

GALLONS PER DAY	RATE PER 1000 GALLONS
0-20	$1.494
21-40	$1.494
41-60	$1.494
61-80	$1.494
81-100	$1.559
101-120	$1.569

The rate continues with this interval until the intervals increase at 1,001-1,500, 1,001-11,000, 50,001-52,000, 150,001-160,000, 350,000+

Below is information about other districts and the conservation tiers (or plans to install them):

The Suffolk County Water Authority uses a single tier conservation rate that currently charges $2.398 per centi-cubic-foot (CCF). Customers who use more than 120 CCF in a single billing quarter are charged the conservation water rate, and only for usage above and beyond 120 CCF (for up to 1-inch meters; thresholds increase for bigger meter sizes).

The Hicksville Water District has an increasing block structure in place. Customers using between 11,000 and 26,000 gallons of water per quarter are charged $1.30 per thousand gallons; those using between 27,000 and 46,000 gallons are charged $1.70 per thousand gallons; those using between 47,000 and 66,000 gallons are charged $2.40 per thousand gallons; and those using over 67,000 gallons are charged $3.20 per thousand gallons. (Those using up to 10,000 gallons per quarter are charged a $12 minimum.)

In January of 2023, Riverhead Water District will implement a tiered rate structure so that larger users will pay more after a set threshold for each service size. Accounts that are identified as dedicated irrigation services will bill at the higher tiered rate for all water used. These accounts are popular in areas within Riverhead that are sewered because it allows the customer to avoid paying sewer rents on that water usage. The district will also continue its public outreach and education work regarding water conservation within the town.

LICAP ACHIEVEMENTS

Ty Fuller, creator of WaterTraq, reviews groundwater quality.

Potential Hazardous Disposal Site Identification Program To Benefit LICAP-Created WaterTraq

Of the many achievements of the Long Island Commission for Aquifer Protection, one that stands out among the others is the development of the GIS-based WaterTraq, which allows Long Islanders to easily check on groundwater quality anywhere on Long Island.

With a major LICAP achievement for 2022, WaterTraq is about to become far more valuable.

LICAP in 2022 secured funding from Suffolk County for a project to be conducted in conjunction with the Cornell Institute of Resource Information Sciences that will help to map other areas on Long Island of concern for potential groundwater contamination, the Potential Hazardous Disposal Site Identification program.

"With this program, you will get GIS-based coverage that will identify potential hazardous sites and provide potential site descriptions and classification categories including dump sites, lagoons, landfills and other observed items of special interest," said Suffolk County Water Authority Director of Strategic Initiatives and developer of WaterTraq Ty Fuller. "The ultimate goal is to identify potentially hazardous sites that may not have been known, which will allow for more direct investigations and protection of the aquifer."

Fuller said with the $100,000 grant, a LICAP working group that is in the process of being created will work with Cornell staff to develop methodology for identifying sites of concern. The focus, he said, will be on source water contributing areas of public supply wells as well as special groundwater protection areas (areas of recharge).

Work is expected to begin early in 2023. Fuller estimated the work would take approximately one year.

"This has the potential to be a big deal," Fuller said. "A similar program was undertaken 30 years ago, when more than 1,100 sites of concern were identified. Back then, direct photographic analysis stereoscopes were analyzed. This time, we'll be using digital imagery.

Those working on the staff will conduct a comprehensive review of aerial photography, including an analysis of the existing high resolution orthoimagery, light detection and ranging (LIDAR) and satellite data.

And the result of all this work will benefit one of LICAP's signature achievements.

"The end product will be a GIS-based deliverable that will be incorporated into WaterTraq," Fuller said.

LOOKING FORWARD

2022, as noted in this report, featured a heightened awareness about water quantity on Long Island, particularly concerning the availability of water supply during the peak early morning lawn watering hours over an extremely hot and dry summer. We would expect there to be a heightened level of attention to this issue as the spring and summer lawn watering season arrives, and we hope and expect that additional attention helps to change the water use habits of Long Islanders.

In 2023, we know several topics will be at the forefront. As noted in this report's feature on revisions to the Lead and Copper rule, water suppliers across Long Island will be busy assembling inventories of the lead service lines maintained by their customers, a key step in making sure the water supply of Long Islanders is free from lead. Another enormous aspect of the rule revisions will be the education of the public about the potential presence of lead in their home service lines and what they can do about it. (The story in this report on this topic is step toward the public education effort.)

2023 is also the year in which the U.S. Environmental Protection Agency's Unregulated Contaminant Monitoring Rule 5 testing will begin, an enormous step toward identifying the presence of unregulated contaminants that pose threats to the groundwater of citizens all throughout the country, and a process many Long Island water suppliers (and LICAP members) are proud to participate in. Under UCMR 5, 30 chemicals will be tested to help the EPA understand the occurrence and level at which the contaminants are found in the country's drinking water systems.

The 23 new PFAS compounds for which the New York State Department of Health issued proposed regulations will be front and center in 2023. A 60-day public review and comment period ended in December of 2022, meaning that action on these proposed regulations may occur in 2023. The proposal to set new drinking water standards on four PFAS chemicals and require testing, reporting and public notification for 19 additional PFAS compounds come just over two years after the state set among the most protective regulations in the country for the PFAS compounds PFOS and PFOA.

Water suppliers all over Long Island will also continue to install advanced oxidation process treatment systems to remove 1,4-dioxane, another emerging contaminant regulated by the state in 2020. As with the PFAS regulation, the action taken by the state on 1,4-dioxane means New York has among the most protective regulations against this chemical in the country.

LICAP's members, as always, will continue to stay on top of and participate in all developments in 2023 concerning the protection and long-term sustainability of our sole source aquifer.

LICAP MEMBERS

Voting Members And The Organizations Or Offices They Represent

Paul Granger
Chairman
Long Island Water Conference

Jason Belle
Vice-Chairman
Nassau-Suffolk Water Commissioners Association

Jeffrey Szabo
Suffolk County Water Authority

Walter Dawydiak
Suffolk County Commissioner of Health

Angela Pettinelli
Nassau County Commissioner of Health

Dorian Dale
Suffolk County Executive

(Vacant)
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

Derek Betts
Nassau County Soil and Water
Conservation District

Ex Officio Members And The Offices They Represent

Richard Groh
Suffolk County Legislature Minority Leader

Sarah Meyland
Nassau County Legislature Minority Leader

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

Jennifer Pilewski
New York State Department of
Environmental Conservation

Suffolk County Legislature Presiding Officer

Suffolk County Commissioner of Public Works

Suffolk County Commissioner of Parks,
Recreation and Conservation

Nassau County Commissioner of Parks

Nassau County Planning Commission

LIGRI (Long Island Groundwater Research Institute)

SUNY Stony Brook: School of Marine
and Atmospheric Sciences

REFERENCES

NOTES

LICAP

Long Island Commission for Aquifer Protection