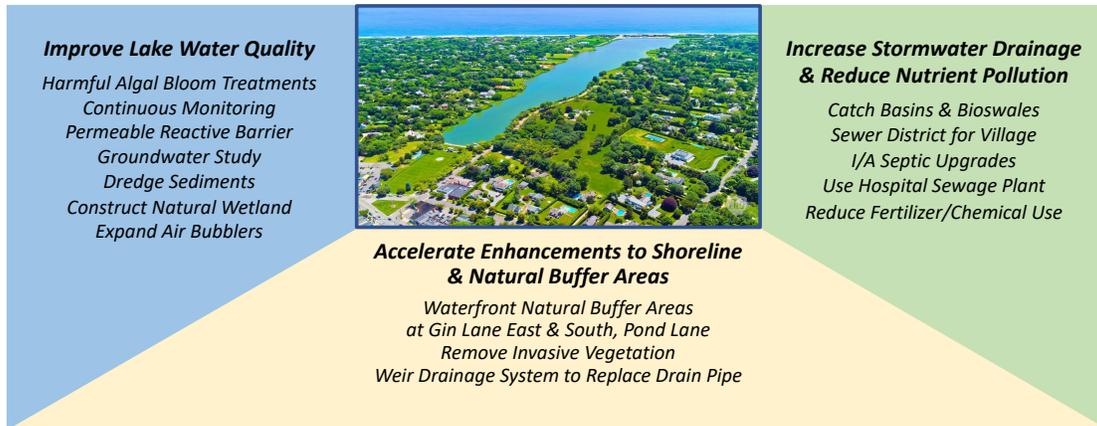


## NEW HOPE FOR LAKE AGAWAM

Village of Southampton, NY  
Lake Agawam 2020 Management Plan

*Three integrated strategies to restore Lake Agawam*



### Summary of Lake Agawam Management Recommendations

**A joint public hearing on the New York State Department of Environmental Conservation, Lake Agawam April 2020 Harmful Algal Bloom (HAB) Action Plan, was held by Southampton Town Trustees & Southampton Mayor/Village Trustees on June 10, 2020.** The HAB Action Plan was adopted by the Town Trustees in Resolution 2020-135 on June 15, 2020 and by the Mayor/Village Trustees by resolution on June 23, 2020. The Lake Agawam 2020 Management Plan was adopted by Mayor/Village Trustees on July 21, 2020. The Lake Agawam April 2020 Harmful Algal Bloom Action Plan is complementary to the Lake Agawam 2020 Management Plan:

<https://www.southamptonvillage.org/DocumentCenter/View/770/DEC---Lake-Agawam---Harmful-Algal-Bloom-Action-Plan---April-2020>

#### ***Improve Water Quality***

**Application of Hydrogen Peroxide and ultrasonic technologies to reduce algae growth and improve water quality:** Hydrogen peroxide and ultrasonic devices will be applied for Harmful Algal Bloom treatment of Lake Agawam. One of the key groups of algae that can bloom in freshwaters, marine and brackish waters is cyanobacteria (also known as blue-green algae). In June 2020, the Town Trustees authorized the Village to submit DEC permits for both methods.

Cyanobacterial blooms, or cyanoHABs, can be toxic. Their toxins (cyanotoxins) can have diverse health effects on people and animals, ranging from mild to serious, and impacts on whole ecosystems. A popular chemical for controlling cyanoHABs is hydrogen peroxide. When administered at the correct dose and distributed homogeneously, this chemical can preferentially kill or inhibit cyanoHABs without affecting other algae, aquatic animals and plants. The advantage of this chemical is that it quickly converts to water and hydrogen, so it has no lingering effects. The amount of chemical needed for each cyanobacterial species and in each waterway varies, so it requires trials to optimise dosages.

In 2018, under the New York Governor's HAB initiative, the Department of Environmental Conservation (DEC) piloted ultrasonic devices on two waterbodies in New York State. Ultrasonic devices emit high frequency sound waves that impact cyanobacteria movement in the water column - the sound waves damage the gas vacuoles that allow the algae to move up and down. This prevents the algae from rising to the surface for light, causing them to sink to the bottom, resulting in die-off.

The published literature that DEC has reviewed indicated mixed results, prompting the Agency to undertake laboratory and field experiments to evaluate the efficacy of ultrasonic units and potential biological impacts. DEC is currently working up the biological impact data, and preliminary results indicate the technology did not significantly affect the fish communities. Based on these preliminary results and additional research questions, DEC is planning to deploy multiple, larger ultrasonic devices on a waterbody in 2020.

Sources: Solutions for Managing Cyanobacterial Blooms, M.A. Burford, C.J. Gobler (Stony Brook University), et al. A scientific summary for policy makers. IOC/UNESCO, Paris (IOC/INF-1382). New York State Department of Environmental Conservation, Bureau of Water Assessment and Management, Division of Water.

Wastewater plays a large role in the degradation of groundwater and surface waters that support Harmful Algal Blooms (HABs) in Lake Agawam.

- Lake Agawam has confirmed HABs from 2013 – 2020
- NY State Department of Environmental Conservation issued a Harmful Algal Bloom Action Plan for Lake Agawam in April 2020, adopted by Town Trustees & Village Mayor/Board of Trustees.

Nitrogen is the leading cause of water quality deterioration in Long Island's surface and groundwater. February 2017 study by Dr. Christopher Gobler, Stony Brook University, "Quantifying Nitrogen Loading from Southampton Village and their Mitigation by Creating a Sewer District," concludes that a sewer district for the Village could reduce nitrogen load in Lake Agawam by 20% - 50%, depending on the time frame.

Suffolk County's Reclaim Our Water program makes it clear that traditional septic systems are a primary source of excess nitrogen and degraded groundwater throughout the county. An estimated 50 percent of parcels located within the highest priority areas for wastewater upgrades – including Southampton Village – could benefit from sewerage as the preferred means for wastewater treatment.

**Permeable Reactive Barrier along North end of Lake Agawam:** A Permeable Reactive Barrier (PRB) is an underground barrier constructed of an engineered mixture of aggregate (sand and/or gravel) and woodchips. PRBs are placed in the path of subsurface flows and allow microbes to utilize the carbon in the woodchips and nitrates in the water as food sources, converting the nitrates into harmless nitrogen gas. One or more PRBs could be placed along the northern end of Lake Agawam.

It would intercept groundwater contaminated with legacy nitrate and convert it to a gas before it enters the lake. An in-depth groundwater study is required to understand groundwater flow and nitrogen content. In June 2020, the Village Board approved a grant application to NYS Empire State Development to fund this project.

**Continue water quality and cyanobacteria monitoring:** Monitoring determines the effectiveness of management recommendations and tracks trends in water quality. The Village of Southampton Board of Trustees agreed to share the costs of in-water monitoring buoys with the Southampton Town Trustees; installed in July 2019, and replaced with an updated, real-time buoy in Spring 2020. Note the Southampton Town Community Preservation Fund Plan, Village Water Quality Improvement Project plan, Village of Southampton map on page 53, showing Village lake, ponds & creeks:

<http://www.southamptontownny.gov/DocumentCenter/View/7318/Water-Quality-Improvement-Plan-CPF-Referendum-PDF?bidId=>

**Dredging of Sediments:** Lake Agawam is a freshwater lake that is groundwater fed and also receives stormwater, which is being controlled and reduced through upland drainage improvements. Past stormwater influx has resulted in sediment deposition in the lake that is a major threat to the lake's water quality. Muddy sediments are up to 8 feet deep and represent a major source of phosphorus to Lake Agawam. Because of the sediments and ongoing deposition, the lake experiences high nitrogen and phosphorus loading which results in harmful algal blooms and low dissolved oxygen, which impair the water body. Removal of soft sediments, particularly where there is an accumulation in the northern end of the lake, is expected to remove a major pollution source and deepen the lake. This will also improve the water column profile by maintaining cooler temperatures, improving conditions for the lake's fish population.

The Village of Southampton will complete a Lake Agawam Dredging Feasibility Study to provide a plan for dredging as a Best Management Practice for in-waterbody control of nutrients, funded by a New York State Department of Environmental Conservation, Non-agricultural Nonpoint Source Planning grant. The Lake Agawam Dredging Feasibility Study will compile information on the lake, outline alternative material removal technologies, and arrive at a recommended method to facilitate final design, project permitting and implementation.

**Lake Water Extraction and Treatment Through a Natural Wetland:** The Village of Southampton is identifying all possible land opportunities for recharge facilities in the watershed, including a constructed natural wetland, buffer zones and rain gardens where feasible. Wetlands are natural aquatic ecosystem with a large capacity for assimilating nitrogen and phosphorus. Lake water from the north end of Lake Agawam can be run through such a system to remove these nutrients and then returned to the lake. This approach could be coupled with an algae skimmer which would remove blue - green algae but leave behind water with excess nutrients. New York State Department of Environmental Conservation, Water Quality Improvement Program, grant request submitted July 26,2019; the Village will consider making a supplemental request in 2020.

**Algae Harvester:** Lake Agawam has been plagued by recurrent toxic blue-green algal blooms, which most commonly occur between the months of May-November. These blooms tend to be most concentrated in surface waters due to their tendency to float and are fueled by pollutants including fertilizer runoff and nitrogen entering the lake through groundwater. Governor Cuomo and officials from the NY State Department of Environmental Conservation announced a pilot program conducted from October 5, 2019 to October 19, 2019 in Lake Agawam using new algae harvesting technology to combat Harmful Algal Blooms (HABs). The harvester draws algae from the surface of the water, and it is disposed of at a Suffolk county treatment facility. The remaining water is treated for toxins and returned.

A 2020 and 2019 Stony Brook University report shows Long Island water quality impairments and HABs:

<https://content.govdelivery.com/accounts/NYSDEC/bulletins/2658400>

<https://www.newsday.com/long-island/environment/long-island-water-quality-toxic-report-1.50037558>

**Floating Islands:** Native plants with roots growing on floating treatment wetlands structures would be deployed on Lake Agawam to create floating wetlands. These islands would provide valuable surface area for beneficial microbes to proliferate and the vegetation would remove nutrients from the water. In addition, the islands would provide shade that would inhibit the growth of algae and the plants would also provide wildlife habitat. Floating islands are used and approved by U.S. Environmental Protection Agency for nutrient removal:

<https://www.epa.gov/sciencematters/epa-uses-floating-vegetated-islands-remove-excess-nutrients-water>

**Air Bubblers & Water Circulation Equipment:** Maintain and expand air bubblers and other water circulation equipment to improve oxygen levels in Lake Agawam. Hose and equipment for broader aeration was installed in Spring 2020.

**Fish Populations:** Native fish populations (bass, perch & blue gill) will be stocked in Lake Agawam when water quality and overall health of Lake Agawam improves.

### ***Increase Stormwater Management and Reduce Nutrient Pollution to the Watershed***

**Gin Lane Stormwater Drainage Improvements:** The Gin Lane project is a drainage improvement initiative on Gin Lane at the south end of Lake Agawam. Green infrastructure and subsurface leaching will be used to treat stormwater that would otherwise flow directly to Lake Agawam through an existing curb inlet and discharge pipe. The project includes bio-infiltration (rain garden measuring approx. 1,967 Square Feet), bio-retention systems, and installation of 13 leaching basins to capture and treat flows from the drainage area. Eastern Long Island native plants will be used. The Gin Lane project is designed to reduce discharges of pollutants from stormwater runoff along Gin Lane before entering Lake Agawam. The Gin Lane project has grant awards from Suffolk County Water Quality Protection and Restoration Program & New York State Department of Environmental Conservation, Water Quality Improvement Program.

Currently, flow into the lake is eliminated at Lake Agawam playground pipe and reduced 50% at the culvert on Pond Lane. The Gin Lane stormwater drainage improvement project at the south end of Lake Agawam will eliminate inflow to the lake from the Gin Lane pipe.

See the Surfrider web site for Gin Lane Beach bacteria testing data:

<https://www.surfrider.org/blue-water-task-force/beach/589>

**Establish Rain Gardens at Nugent Street/Windmill Lane, Bowden Square, Linden Lane:**

A rain garden collects rainwater from a street and allows it to soak into the ground. Planted with grasses and flowering perennials, rain gardens can be an effective way to reduce stormwater runoff. Rain gardens can also help filter out pollutants in runoff and provide food and shelter for butterflies, birds and other wildlife. See the U.S. Environmental Protection Agency web site for more details:

<https://www.epa.gov/green-infrastructure/what-green-infrastructure#raingardens>

**Southampton Village Sewer District:** Current septic systems represent 70% of the nitrogen load to Lake Agawam. See the Lake Agawam 2017 Water Quality Study, page 72:

<https://www.southamptonvillage.org/DocumentCenter/View/188/Lake-Agawam-Water-Quality-Study-Feb-2017PDF?bidId=>

See also, Suffolk County Reclaim Our Water Plan, water quality characterization map of Lake Agawam, on page 701:

<https://suffolkcountyny.gov/Portals/0/formsdocs/planning/CEQ/2019/Appendix%20B%20-%20SWP%20Appendices%20August%202019.pdf?ver=2019-08-16-131447-917>

The Village Sewer District area encompasses properties located within the core commercial area of the Village, which is impacted by shallow groundwater. This portion of the Village has been identified as a significant contributor to the degradation of the Lake Agawam's water quality. See the 2015 Village Sewer District Plan – the Village sewer district map is on page 41:

<https://www.southamptonvillage.org/DocumentCenter/View/189/Map-and-Plan-for-Formation-of-Village-of-Southampton-Sewer-System-2015-PDF?bidId=>

Lombardo Associates is preparing a proposal for Village business district cluster wastewater systems in parking lots and the back of business buildings. The Planning Commission is recommending that this be made available to interested property owners who would join together and contribute to the cost based on use. The Village currently generates about 150,000 gallons of wastewater per day. Cluster systems will allow these property owners to immediately address their issues. These cluster systems have been used by property owners elsewhere on the East End.

The Village Planning Commission has more broadly been examining the issue of treatment of effluents from the Village Business District and North Sea Road watershed into Lake Agawam. Addressing this issue would both contribute to improving water quality and make it possible to revitalize the Business District by making possible a diversity of land uses.

The Village needs to initiate the creation of a sewer district (as has been done in the Villages of Sag Harbor and Westhampton Beach and is being considered in East Hampton). A centralized sewage treatment plant (“STP”) is likely needed to address the district-wide needs. An STP is the favored method for multiple reasons:

1. The effluent quality from the STP could be brought to either potable water standard or recycled water quality standard so it may be reinjected into the water table or reused using the very latest technologies available. An STP will treat toxic organic compounds and metals in secondary and tertiary treatments in a way that other systems, using only microbial cultures, do not. The reduction in nitrogen, phosphorous, sulfur and other nutrients is also superior with an STP.
2. The development of an STP can be done with a Public Private Partnership (“P3”) with private companies and/or with the Suffolk County DPW which operates most STP’s in the County. The financing of the development of an STP for the Village Business District and surrounding area can be achieved by utilizing the historically low interest rates and be structured with the involvement of the Town or County.

Village Board of Trustees on April 9, 2020 authorized the Mayor to enter into a professional services agreement with H2M Architects and Engineers, to conduct a Village wastewater and sewer district study.

**Encourage residents to upgrade to Innovative/Alternative septic systems in the Lake Agawam High Priority Area:** Town of Southampton Community Preservation Fund & Suffolk County Department of Health services rebates, Town Code Chapter 123, are available to homeowners for upgrading septic systems at little or no cost. The Town has a rebate brochure:

<https://southamptontownny.gov/DocumentCenter/View/15534/IA-OWTS-Brochure-PDF>

The Suffolk County “Reclaim Our Water” initiative aims to turn the tide on nitrogen pollution and protect our waters. The common link between water quality damage on Long Island is nitrogen, primarily the result of poorly treated sewage from outdated cesspools and septic tanks. Suffolk County has a Reclaim Our Water web site for Homeowners on Septic Improvement Program Grants & Frequently Asked Questions:

<https://www.reclaimourwater.info/homeowners.aspx>

<https://reclaimourwater.info/Portals/60/docs/SepticImprovementProgramFAQ-021919.pdf>

**Reduce Use of Fertilizers/Chemicals; Promote Sustainable, Green Landscaping Methods:**

Homeowners should consider using nitrogen & phosphorous-free fertilizers. Legislation regulating Southampton Village landscaper contractors, including requirements to inform homeowners of fertilizers and pesticides used, Village Ord. No.4-2019, was adopted on April 11, 2019. Businesses that use chemicals, pesticides or fertilizers must provide certificates from the New York State Department of Environmental Conservation (DEC) and for fertilizer, proof of a certificate of completion of a Suffolk County Nitrogen Fertilizer Turf Management Course. Workshops on the legislation were held in January 2020 with Village landscapers and homeowners.

In February 2020, Southampton Village officials postponed a March 1, 2020 effective date for the landscaper registration law. The law requires that a landscaper shall submit proof of a valid and current Suffolk County Home Improvement License. The Village Board of Trustees will work to pursue an intermunicipal agreement with Southampton Town to enforce licenses instead of Suffolk County.

Fertilizer is the second leading source of nitrogen contamination of Long Island waters. The Long Island Nitrogen Action Plan (LINAP) recommends that residents' balance the desire for a healthy lawn with the need to significantly reduce nitrogen loads to Long Island's waterbodies. New York State is leading the way by calling for lower nitrogen application rates and fertilizers with a large fraction of slowly available nitrogen to minimize nitrogen leaching to groundwater.

When these recommendations are implemented, there will be up to a 40 percent reduction in fertilizer-sourced nitrogen entering the environment. See the LINAP recommendations for more details: [https://www.dec.ny.gov/docs/water\\_pdf/linapfertilizer.pdf](https://www.dec.ny.gov/docs/water_pdf/linapfertilizer.pdf)

Suffolk County has launched a Healthy Lawns, Clean Water campaign to reduce nitrogen pollution to groundwater and surface waters through the overall reduction and better management of fertilizer applications; Suffolk County Local Law No. 41-2007: <https://www.suffolkcountyny.gov/Departments/Economic-Development-and-Planning/Planning-and-Environment/Water-Quality-Improvement/-Healthy-Lawns-Clean-Water-Fertilizer-Reduction-Program>  
<https://apps2.suffolkcountyny.gov/legislature/resos/resos2007/i2117-07.htm>

New York homeowners are encouraged to practice sustainable lawn care and to choose native plants and grasses, which are adapted to the local climate and soil conditions. Organic lawn care can easily be implemented on any lawn and safe and effective alternatives exist for most chemical pesticides and fertilizers. Organic lawn care treatments promote deep root systems, natural photosynthesis, and longer grass growth. See the DEC website for more details on sustainable landscaping and go chemical free: <http://www.dec.ny.gov/public/44290.html>

New York's nutrient runoff law prohibits the use of phosphorus lawn fertilizers unless a new lawn is being established or a soil test shows that the lawn does not have enough phosphorus. Generally, only newly established lawns or those with poor soil need phosphorus. Phosphorus applied to existing lawns should not be used and can cause water pollution. Regardless of the location, excess phosphorus from lawns can wash off and pollute lakes and streams, harming fish, pets, or people that use these waters for recreating and a source of revenue for towns that must close beaches or boating areas. DEC is encouraging consumers to review bag labels for phosphorus content when shopping for fertilizer. The fertilizer bag label has a set of three numbers showing the percentage of nitrogen, phosphorus and potassium. The number in the middle is the percentage of phosphorus in the product, such as: 22-0-15. Homeowners should buy a fertilizer bag with a "0" in the middle. See the DEC "Look for the Zero" website and brochure to get more information about going phosphorus-free when using lawn fertilizer: [http://www.dec.ny.gov/docs/water\\_pdf/fertbrochure15.pdf](http://www.dec.ny.gov/docs/water_pdf/fertbrochure15.pdf)

## ***Accelerate Enhancements to Shoreline & Natural Buffer Areas***

**Establish Waterfront Natural Buffer Areas Among Residents, at Gin Lane East & South, and Pond Lane:** Surface run-off from paved surfaces and lawns is a significant source of nitrogen and phosphorus to Lake Agawam. Buffers are a band of protective vegetation along the edge of a body of water. Naturally occurring plants usually include trees, shrubs and tall, coarse grasses. This stretch of vegetation “buffers” the vulnerable lake and its water from harmful pollutants flowing across the landscape after a rainfall or snow melt.

These non-point source pollutants also include eroded soil from poorly vegetated banks. Well-rooted vegetation holds the banks of the lake in place, stabilizing the soil. Roots also absorb water and some of the contaminants, while the above-ground portions of the plants slow the flow of polluted runoff, allowing the water to seep into the ground, where it is filtered and cleaned. Additionally, buffers provide food and habitat for a variety of wildlife, including birds, butterflies, and even fish when the plants drape over into the water. Planted buffers of up to 50 feet are strongly encouraged and fertilization of lawns within 125 feet of the lake is discouraged. Buffers will help remediate the water quality of Lake Agawam.

There are also opportunities to intercept additional road run-off along the southeast and northwest corners of Lake Agawam with buffers. The Lake Agawam Conservancy partnered with the Southampton Town Trustees and Piazza Horticultural to create a water cleansing buffer filled with native plants in the 8,500 square feet of land that stretches along the south end of Lake Agawam:

<https://lakeagawam.org/lake-agawam-south-end-bioswale/>

Run-off on the south end could be coupled with a weir drainage system to allow lake overflow without need to drain lake directly to the ocean.

**Weir Drainage System:** Due to the prevalence and toxicity of widespread blue-green algal blooms in Lake Agawam, the discharge of untreated water from the lake to the ocean poses a serious potential health risk to the public including bathers, surfers, and fishermen. Pets and marine life are also put at risk. Bacteria and other unmonitored pollutants in the lake are also discharged during these events.

Ocean discharge occurs when deemed needed to prevent property flooding. The bulkhead along the south end of Lake Agawam may present an opportunity to create a weir drainage system to allow sands to slowly filter blue-green algae and pathogens before lake water travels via groundwater to the ocean. This or a similarly designed approach to naturally and slowly filter water on an ongoing basis could allow for the elimination of the discharge pipe and should be explored.

**Remove Invasive Vegetation:** Promote natural habitat areas under controlled re-vegetation restoration programs. Thin aquatic vegetation, lily pads, on West side of lake to enhance flow. Lake Agawam Conservancy website:

<https://lakeagawam.org/water-lily-remediation/>

Lake Agawam Owner's Guide:

<https://www.southamptonvillage.org/DocumentCenter/View/588/Lake-Agawam---An-Owners-Guide?bidId=>

**Control Waterfowl Populations:** Discourage lawns fronting lake shore areas and feeding of waterfowl populations by posted signage.

***For Additional Information***

See the New York State, Department of Environmental Conservation, Lake Agawam 2020 Harmful Algal Bloom Action Plan:

[https://www.dec.ny.gov/docs/water\\_pdf/habapagawam.pdf](https://www.dec.ny.gov/docs/water_pdf/habapagawam.pdf)