Quality Assurance Program Plan (QAPP)

Citizen Science Environmental Investigation - The Health of Our Local Ecosystem.

RIVERHEAD - RIVERSIDE WATER SAMPLING STUDY PROGRAM

Sampling to begin May 15, 2023

Prepared October 7, 2022
Draft submitted: 5/23/2023

LONG ISLAND SCIENCE CENTER
401 TANGER MALL DR, RIVERHEAD, NY 11901

Project Management

Approval Sheet

Cailin A. Kaller Date: 5/2/23
Cailin Kaller - Program Manager
Long Island Science Center Executive Director

Judy Rentas Date: 5/24/23
Judith Rentas – Project/Education-Training Manager
Long Island Science Center Program Director

Anna Lando Date: 5/24/23
Anna Lando - QA Manager
Long Island Science Center Education and Administrative Associate

QAPP Update Log

Prepared/Revised By:	Date:	Revision Number:	Summary of Changes:
Anna Lando	10/7/22	0	Original Draft
Cailin Kaller	3/31/23	1	Final Draft
Cailin Kaller	4/28/23	2	Revised Draft
Cailin Kaller	5/22/23	3	Response to EPA comments

No substantive changes include updating references, correcting typographical errors, and clarifying certain language to make the document more useful and effective.

This QAPP will be approved by the EPA before work commences.

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Distribution List

The following individuals must receive a copy of the approved QAPP as part of their role in this project.

Name	Title	Org	Email	Phone	Type
Cailin Kaller	Project/Program Manager	LISC	cailin@sciencecenterli.org	631-849-6502	Hard Copy
Judith Rentas	Education Manager	LISC	judy@sciencecenterli.org	631-849-6503	Electronic Copy
Anna Lando	Site and QA Manager	LISC	anna@sciencecenterli.org	631-849-6500	Electronic Copy
Tasha Frazier	EPA R2 Project Officer	EPA	Frazier.tasha@epa.gov	212-637-3861	Electronic Copy
Supriya Rao	EPA R2 Quality Assurance Officer	EPA	rao.supriya@epa.gov	732-321-4461	Electronic Copy
Sampling Staff	Sampling Staff	LISC			Electronic Copy
Volunteers	Volunteers	LISC			

Introduction

Project Summary
Project Title: Citizen Science Environmental Investigation - The Health of Our Local Ecosystem.
Project Location: Riverhead and Riverside, NY 11901
Project Organization: The Place for Learning, Inc. Dba/ Long Island Science Center
Address: 401 Tanger Mall Drive, Riverhead, NY 11901
Main Contact: Cailin Kaller, email cailin@sciencecenterli.org, direct phone (631) 208-8000

Project Abstract: Provide Citizen Scientist Green Jobs, Education to undeserved, diverse students and families by teaching Public Health workforce skills in areas of monitoring, testing, investigating, and reporting while learning about the health of our local ecosystem. Provide hands-on field exploration and data collection programs in both English & Spanish to create an accessible bi-lingual community resource and teaching tool that will create job pipelines for participants to interact and solve problems collectively with professional scientists and projects around the world. Educate and build STEM career pipelines for diverse, underrepresented populations (50% Hispanic, 12% Minority in K-12; 75% Hispanic, 9% minority in Riverside Elementary - source NYS Education Data) located in the 11901-zip code designated as NYS DEC Potential Environmental Justice Areas. Our project will explore fresh recreational water quality, test for the presence of cyanobacteria and water quality, inform on potential health effects, monitor, and educate the public on air quality issues (covered in our Air QAPP) and health effects, and search for potential aquatic invasive species. We will engage community awareness, track information, empower community members to minimize impact, and spot/report issues. We will engage 250 students in hands on activity over the course of the project year with additional online educational efforts targeting 1,000+ residents. Short-term outcome Use education & training to create awareness of how critical environmental issues impact health of residents and our local ecosystems. Intermediate outcome Increased citizen participation, identification, and reporting of these issues; Green workforce skill development. Long-term outcome: Reduce growth of these issues; Create Green STEM career opportunities for underrepresented youth.

The Riverhead-Riverside area is an identified Environmental Justice Area. Recently, neighboring wealthy areas have begun to sample and identify cyanobacteria blooms in local freshwater bodies. As HAB occurrences increase throughout local waterbodies, our goal will be to increase public awareness and monitor local waterbodies for potential issues. Our program has identified 6 local water bodies in the Riverhead-Riverside area that we will be sampling from on a weekly basis from the same GPS coordinates for 3 purposes. 1) to collect water samples for analysis at the Stony Brook SOMAS lab for the potential presence of cyanobacteria. 2) To conduct on site testing of nitrate, phosphate, pH, and dissolved oxygen levels and record those findings. 3) To conduct on-site educational programs that discuss the significance of the data we have collected and to instruct participants on how to use iMapInvasives and bloomWatch to monitor their areas and share their citizen science findings.

We will conduct most of the sampling from public access areas. There is one water body that has no public access. We have obtained permission from two homeowners to access the water via their backyards. The goal is to collect data and track it through a GIS system that the public will have access to. The sampling sites with public access include: the freshwater part of the Peconic River in Grangebel Park, Riverhead, NY; Wildwood Lake, Northampton, NY; Unnamed Water Bodies in the Riverwoods Mobile Home Community, Riverside, NY; Cranberry Bog

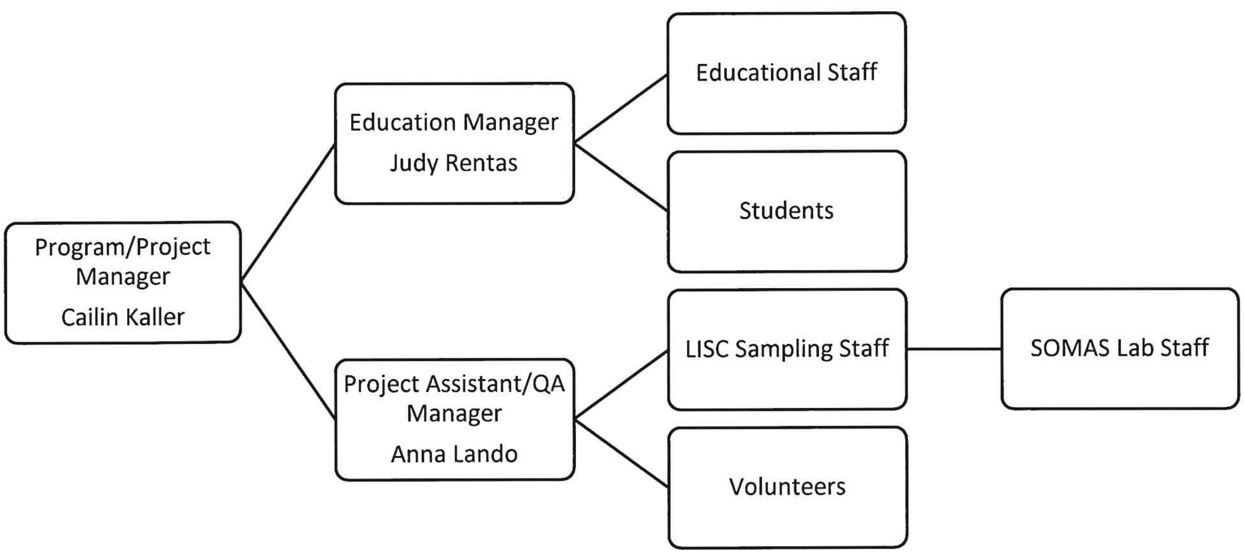
Riverside, NY. The other water body has no public access, but we have permission to sample from homeowners on both the North and South side of Merritts Pond in Riverhead, NY.

This Quality Assurance Project Plan has been written to fulfill the requirements based on QA/R5, EPA Requirements for Quality Assurance Project Plans, as applicable, and to include those QAPP elements deemed to be pertinent to the successful implementation of this program. The (QAPP) was written in conjunction with the Ecosystem Monitoring Team Generic Quality Assurance Project Plan (QAPP), January 2017. In addition to fulfilling the QA/R-5 requirements and QAPP elements, the structure of this QAPP is designed to fulfill the purpose of being directly usable as a general program operation manual. The key QAPP elements can be found within this context.

Organization/Responsibilities

The following outline describes the staff involved with the LISC Water Sampling Study and their respective roles.

Organization Chart



Key Roles

Project Coordination
Cailin Kaller, Program Manager
LISC Executive Director

General oversight and management of the water quality monitoring program for the Water Sampling Study.

Develop and revise the QAPP, QAPP custodian; Monitoring project and staff coordination, assist coordination of sampling staff to ensure proper sample collection methods are used and discuss problems and/or needs, assistance with research design, data quality review, analysis, and reporting.

Program Manager
Cailin Kaller, 631-849-6502
LISC Executive Director
General oversight and management of the water sampling and educational program

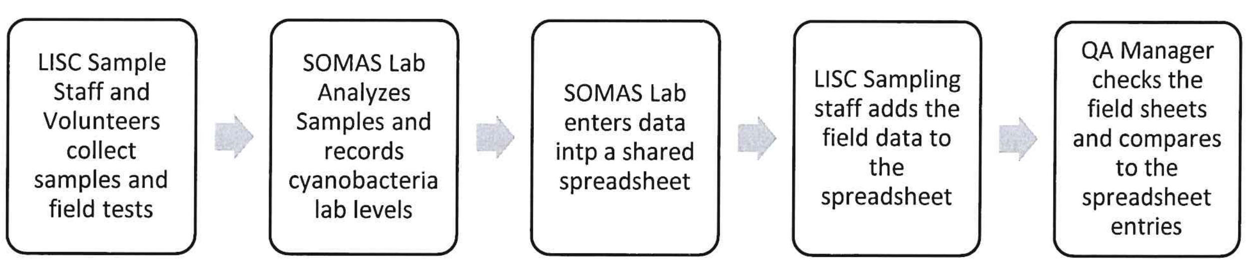
Lab Water Testing Quality Control
Lab-based research organizer – Contact changes year to year.
SUNY Stony Brook, SOMAS lab Southampton.
Oversight and management of water testing and required reporting for cyanobacteria.

Project Educational/Training Manager
Judy Rentas, Program Director
Develops, reviews, and implements public education in relation to the project. Trains sampling staff and volunteers on field procedures and data collection.

Project Assistant, Quality Assurance Manager
Anna Lando, Educator and Administrative Assistant
Oversees sampling staff and coordinates public programs. Review quality assurance/quality control plans for the project, review water quality and quality control data results for adherence to appropriate specifications and assist in reporting.

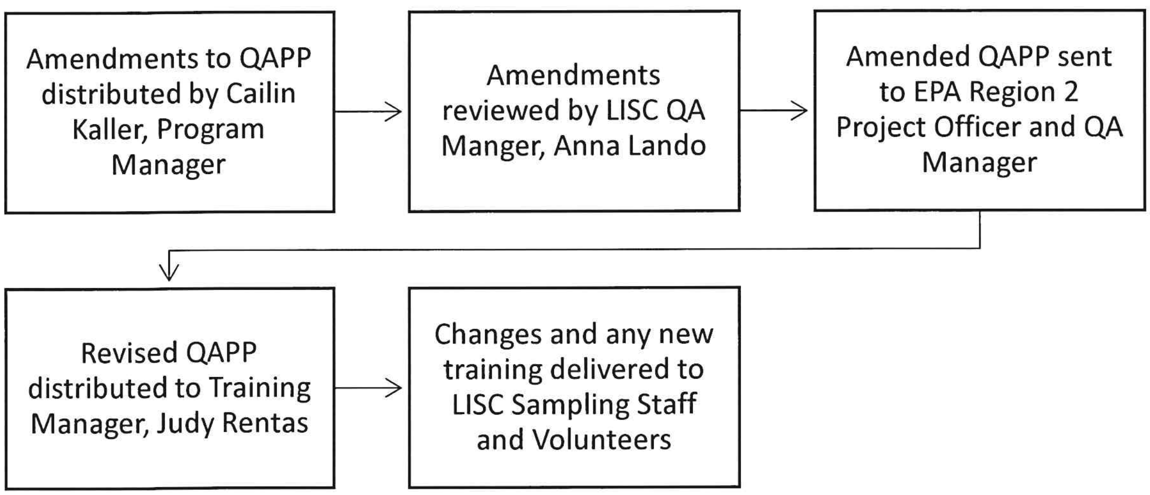
Primary Samplers
Long Island Science Center (LISC) Staff – Records data
Citizen Scientist Volunteers

Process of Data Chart:



QAPP Distribution and Organization

Generally, all individuals currently listed in the program group page will be able to receive electronic copies of the Quality Assurance Project Plan and any updates as they arise and as requested. Since the list fluctuates based on participation interest and need, the distribution list will only be updated within this QAPP on an annual basis. The current distribution list can be found in Appendix A, along with projected levels of member participation in the program. An up-to-date version of this QAPP will be posted on the Long Island Science Center webpage and will be kept current for immediate reference. All members participating in the program are responsible for following the procedures outlined in this QAPP and in any relevant SOPs. Flowchart of distribution provided below:



Program/Task Organization

The LISC Water Sampling program is an ad hoc organization with a voluntary membership that consists of SOMAS lab researchers, LISC staff, citizen scientists, academic researchers, and other interested groups. The study is not constrained by geographic region or by organization affiliation. The program is moderated by LISC staff and is guided by national and global research on the topic. Roles and responsibilities are dependent on the interest and objective of the individual workgroup member or organization to meet his or her needs with the underlying premise that sampling, data, and respective quality assurance guidelines remain consistent throughout the workgroup as outlined in this QAPP. Open communication to exchange ideas throughout the workgroup is commonplace and strongly encouraged.

Primary SOMAS Lab Analysis Team (as of October 2022 to be updated May 2023)
Christopher Gobler, 631-632-5043 (christopher.gobler@stonybrook.edu)
AnneMarie Famularo, (annmarie.famularo@stonybrook.edu)
Jennifer Goleski, 848-702-5346 (Jennifer.Goleski@stonybrook.edu)

Background

As technology and urban-suburban developments become increasingly established in Long Island as well as other regions, there has been a rising concern about the overall impact this has had on the water purity and quality. We would like to investigate the seasonal and annual changes in local water systems, as well as water systems integral to residential communities.

NYS Department of State (DOS) designated the Peconic River Corridor in downtown Riverhead a Brownfield Opportunity Area (BOA) which consists of a 452-acre area along the Peconic River (one of 18 federally designated estuaries of national significance) characterized by 18 potential brownfield (hazardous substance and/or petroleum contamination) and vacant sites. A 468-acre portion of Riverside received NYS designation as a Brownfield Opportunity Area (BOA) in August 2016 and identified 20 brownfield sites as well as underutilized and vacant properties that contribute to disinvestment in the community and blight conditions. The Riverside brownfield sites are proximal to residences and disrupt neighborhood connectivity and general well-being. Their presence, combined with crime prevalence, negatively impacts accessibility, safety, quality housing, recreation access and social capital.

Existing development generates nitrogen pollution that negatively impacts the Peconic Estuary, an EPA designated Estuary of National Significance. The waterway is closed for shell fishing and listed as a 303d Impaired Waterbody for nitrogen due to dissolved oxygen depletion. After fish kills in 2015 and 2016, residents were observed collecting dead bunker fish to use for food, without regard for any potential health impacts. Social isolation occurs as the elderly experience greater levels of illness and are unable to maintain community-related activities. As younger generations move away from the community, elders often find themselves isolated from family and friends, placing them at greater risk for negative health outcomes and exacerbated by Pandemic effects. The 11901 zip-code experiences a severely disproportionate share of violent and property crime, including robbery, assault, rape, sexual assault, and homicide. Open air, daytime drug dealing, and prostitution are commonplace. Arrests relating to firearms, drugs and prostitution are highly concentrated here.

Our project seeks to address Water Quality issues identified as a concern in the Community Health Survey funded by a 2018 NYS DEC Environmental Justice grant award to the Flanders, Riverside & Northampton Civic Association (FRNCA). The purpose of the survey was to collect community resident preferences regarding the use of the 14-acre space along the Peconic River in Riverside. The respondents were 62% white, 14% black, 1% Asian/Pacific Islander, and 8% preferred not to answer the question. One-third (33%) of respondents reported being of Hispanic origin. Top identified community problems included drugs, crime, addiction, homelessness, pollution, lack of access to healthcare and prostitution. Respondents top three aspects of a healthy community were Safety, Air & Water Quality, and Children's Activities. Our proposed project responds in a culturally sensitive way to local community sourced priorities.

There is an identified need for more quality job opportunities in our region. By providing STEM education opportunities for our diverse underserved community, we also provide ladders to success. Not enough children pursue STEM; by high school, only 36% boys and 11% girls are interested in STEM. Research conducted on behalf of Junior Achievement and Ernst & Young released in 2017 shows 91% of teenagers ages 13-17 know what kind of job they want after they graduate from high school. This is a problem for education and the future workforce. We need STEM education to develop the next generation of innovators and to train our future workforce. According to the Bureau of Labor Statistics, STEM jobs are experiencing 5x faster growth than other types of roles. STEM jobs garner 30% higher wages. The national average wage for all STEM occupations was $87,570, nearly double the national average wage for non-STEM occupations ($45,700). Ninety-three out of 100 STEM occupations had wages significantly above the national average wage for all occupations of $48,320. Employment in STEM occupations grew by 10.5%, or 817,260 jobs, between May 2009 and May 2015, compared to 5.2% growth in non-STEM occupations. Our programs are fun, engaging and provide workforce skills that can lead to jobs.

Problem Statement

From urban-suburban locations like Long Island to indigenous people's reservations in Northwest Canada, there is a ubiquitous concern regarding the state and health quality of the locally occurring aquatic systems. Freshwater systems are sensitive to change and have recently proven useful to act as important ecological indicators for the wellbeing of global ecosystems. The contents and quality of the water may indicate imbalances from several disruptors such as pollutants, shifts in endemic biodiversity, and changes associated with shifting climate patterns. It is our aim to periodically record the state and quality of the water systems through journal logs and test the water's quality through water sampling in the participants' localities to better understand the temporal changes to further assess the overall health and vitality of the ecosystem or identify potential causes for shifts in the system's health. The concept is to engage citizens directly in the process to develop a deeper understanding of their local ecosystems. Monitoring and studying the water quality in a consistent manner could be utilized to determine the relative risks to human and ecological health that have been unclear at spatial scales larger than individual waterbodies in relatively small geographic areas. This may limit the utility of data for determining regional "problem pools," and more specific detrimental land use practices, and impacts from changing climate patterns.

Cyanobacteria blooms are increasingly frequent, concerning occurrences in our area. Wealthier citizens in neighboring Hamptons towns have been able to privately monitor recreational water for these blooms. Cyanotoxins can cause gastrointestinal, neural, hepatic, or dermal toxicity through ingestion, inhalation, skin contact and eye exposure. According to emerging research presented at a recent Cyanobacteria Monitoring Collaborative mini conference, it is now believed that toxins from blooms can be carried up food chains. Many local residents use our freshwater bodies for recreational swimming, fishing, and mollusk gathering without information on the water quality. Additionally, there is growing concern over invasive species in our water bodies that are being consumed and spread to neighboring water bodies inadvertently by humans. We intend to use a grass-roots community-based process that will engage advocacy and mentoring groups we currently work with to engage underserved students and families. We will amplify the effect of community-based decision making as we develop programming to educate and raise awareness of the most pressing environmental harms and health risks in the 11901-zip community.

Cyanobacterial sampling will take place biweekly from May through October with increased frequency in July and August. We will also test dissolved oxygen, pH, total phosphate, nitrates, temperature, and turbidity and the results and cyanobacteria results will be tracked. In addition, we will be scrapping up sediments to see if we can find evidence of invasive species. We found an invasive Asiatic clam species in 2021 in Wildwood Lake. The identification was made through the SOMAS Lab. We will be looking to see if this invasive species has spread to other waterbodies. Additionally, we will be using Seek by iNaturalist app when we have students in the field to have them document flora and fauna in the area. The data will be uploaded to a GIS map that will be on our website along with informative information on what the information means and preventive measures residents employ.

Project/Task Description

This program is being developed to establish a water monitoring program. It is a continuous work in progress and is constantly evolving. It will provide the needed consistency in field sampling equipment and methods and generate data that compliments existing monitoring programs. The program will establish the consistency necessary to aggregate data for interpretations of water quality, pollutant concentration, and its associated toxicity. Although developed initially for the Northeastern United States, it can be applied anywhere, and its widespread use is encouraged. The program will provide an educational component through training in field instrumentation use as well as field sampling, collection, and preservation protocols. Judy Rentas, our program manager, as well as the trained LISC Sampling Staff will provide field trainings to volunteer Citizen Scientists, as well as schools and families who are interested in learning more about how to collect field data and this project specifically. Citizen Science training would consist of training at our location in Riverhead, NY on QAPP procedures followed by at least 3 field visits with our program manager to ensure volunteers understand the Quality Assurance procedures. While most of the waterbodies we will be visiting do not have public data to compare to, one does. We will be able to compare results from our visit to data collected by the Peconic Estuary Partnership that records on their website water clarity, total nitrogen, and dissolved oxygen by year for our visit to Grangebel Park.

The educational program for families and students will last about 2 hours each and will include field procedures followed by the ability to actively help in sample collection and testing. Student data will not be used in official data reporting but will be used for students to compare their results with what results our staff has collected. The program architecture is designed to be used in one of three collection strategies, listed below. This outline provides a baseline of information that can be added to in more detail and complexity as the level of resources and time allow and based on the desires of the entities involved. This approach embraces a broad spectrum of involvement, from the citizen scientist monitoring population to being able to expand to large public water suppliers, beach programs, and overseers of large recreational waterbodies. The effort is designed to complement existing water quality monitoring programs that may currently reside at federal, state, and local levels, and to assist in establishing quality monitoring programs for any public water supplies that may wish to participate to further develop their programs. This approach provides the flexibility needed to integrate across various existing programs and associated budgets yet provides enough uniformity that generated data can be aggregated across geopolitical and program boundaries. The water sampling study program has three components of overlapping tiers: continuous water monitoring practices, weekly monitoring processes, and one time sample collection and analysis.

(Strategy 1)

The LISC Sampling Staff and Volunteers will take a sample from their selected water body and measure the temperature, turbidity, pH, nitrate, and dissolved oxygen of the waterbody biweekly over an extended period. See below for the selected locations. Samples will be collected in buckets. Temperature will be taken with a thermometer immediately from the bucket of water collected and recorded. The water will be transferred to amber storage bottles and stored in a cooler for the same day delivery to the SOMAS Lab to test for cyanobacteria levels. Test tubes will be used to collect the pH, TDS, nitrate, phosphate, and DO utilizing the field equipment specified in Table Z. A secci disc will be used for turbidity where applicable.

Testing for cyanobacteria is limited by the lab to mid-May to mid-September. The lab communicates the start and end date to us about 2 weeks in advance. Testing for the other parameters will run from mid-May to mid-October (dependent on weather). Water bodies and GPS coordinates are listed below.

Table U. Water Sampling Locations Strategy 1 Table

Type	Location ID	Latitude	Longitude
River	GP-01 (Grangebel Park)	40.91577 N	72.66408 W
Lake	WP-01 (Wildwood Lake)	40.895969 N	72.67815 W
Lake	RIV-01 (Riverwoods 1)	40.90680 N	72.65705 W
Lake	RIV-02 (Riverwoods 2)	40.90682 N	72.66038 W
Pond	CB-01 (Cranberry Bog)	40.90487 N	72.67234 W
Pond	MP-01 (Merritts Pond North)	40.92822 N	72.66823 W

(Strategy 2)

The program manager will take a sample from their selected water body and measure the temperature, clarity, pH, nitrate, TDS, and dissolved oxygen of the waterbody once a month with public citizen scientist assistance where current data and results will be discussed. A bucket will be utilized to collect the sample and the field instrumentation described in Table Z will be used to demonstrate to the participants what we are measuring as well as how and why. A secci disc may be used for turbidity based on the depth of water from the public access spot. Water bodies and GPS coordinates are listed below.

Table V. Water Sampling Locations Strategy 2 Table

Type	Location ID	Latitude	Longitude
River	GP-01 (Grangebel Park)	40.91577 N	72.66408 W
Lake	WP-01 (Wildwood Lake)	40.895969 N	72.67815 W
Lake	RIV-01 (Riverwoods 1)	40.90680 N	72.65705 W
Pond	CB-01 (Cranberry Bog)	40.90487 N	72.67234 W

(Strategy 3)

This team will take a sample from their selected water body and measure the temperature, turbidity, pH, nitrate, and dissolved oxygen of the waterbody in one instance for analysis at a lab to ensure the accuracy of the field equipment we are using. A bucket will be used to collect the water and amber collection bottles will be used to transfer the water. The bottles will be brought to a private laboratory in Holbrook, NY immediately after collection is completed. Water bodies and GPS coordinates are listed below.

Table W. Water Sampling Locations Strategy 3 Table

Type	Location ID	Latitude	Longitude
River	GP-01 (Grangebel Park)	40.91577 N	72.66408 W
Lake	WP-01 (Wildwood Lake)	40.895969 N	72.67815 W
Lake	RIV-01 (Riverwoods 1)	40.90680 N	72.65705 W
Lake	RIV-02 (Riverwoods 2)	40.90682 N	72.66038 W

Pond	CB-01 (Cranberry Bog)	40.90487 N	72.67234 W
Pond	MP-01 (Merritts Pond North)	40.92822 N	72.66823 W

Project Schedule

Task	Start Date	Completion Date
Work plan		April 2021
Final QAPP		May 2023
Equipment Purchase	May 2023	May 2023
Training	May 2023	Ongoing as needed
Sample Collection Begins	Mid-May 2023	Mid-October
Education content development and school outreach	May 2023	October 2023
Community Recruitment	May 2023	July 2023
Interns Hired	May 2023	May 2023
Field Classes Begin	June 2023	October 2023
GIS Map Creation	August 2023	November 2023
Data Analysis	November 2023	December 2023
Participant meeting to review data collected	November 2023	November 2023
Community engagement activities related to the data results	December 2023	February 2024
Invitations and prep for student symposium	January 2024	January 2024
Student symposium	February 2024	February 2024
Data Reports	February 2024	February 2024
Final Reports	February 2024	March 2024

Quality Objective and Criteria

Data quality requirements including criteria for accuracy and precision for discrete and in situ water chemistry parameters are listed in the table below. The application of the requirements is described below.

Precision will be measured by evaluating field duplicate water samples. Field duplicates will be collected immediately after collection of the environmental sample, using the same sampling equipment and procedures followed for the collection of the environmental sample.

Bias Our samples are being taken in an area where some of the water bodies are part of an interconnected system. We will take a baseline sample of the spillway versus the public access area where applicable to see if there is a variation in results between the two areas where applicable. Some of the locations are not connected to any other direct source. To ensure accuracy, we will take two samples per location. Additionally, at least 1 location has a continuous water quality monitoring station several miles upstream that we will be able to check our results against to see if there is variation. The equipment appears to currently be in a state of malfunction and has not been providing public data since 12/28/2022. We would check directly with the Peconic Estuary Partnership to see if they can provide us with private data or conduct a field test with us to make sure our equipment is recording accurate data.

Accuracy will be measured by comparing the field results with at least one lab analysis per season. Data from equipment with be taken by one staff member and then verified and recorded by a second staff member.

Representativeness of samples in this special study will be based on assumptions regarding the circulation within the selected water bodies inferred at the site. Sampling locations in the water body will be recorded when more than one sample is taken in each lake, and sampling representativeness will be considered in the selection of a sample if the sample is collected from one location within the water body. Temporal representativeness will be considered for lakes in which there will be repeat collections to gauge the long-term effect of weather patterns and seasonal shifts on the abiotic conditions and ecology of the water body.

Comparability is a measure of how data results can be compared between different sampling events at the same location, how data can be compared between different sampling locations, and how data can be compared to water quality standards. In this study, comparability will be achieved by following consistent field protocols (from site to site and event to event) and obtaining analytical data following standardized methods for analyses of water. Only one of our locations has any publicly available data to compare against, the Peconic River in Grangebel Park. The USGS has a continuous water monitoring system upstream, but the equipment has been malfunctioning since 12/28/22. The public web page does seem to indicate that they are transitioning to a new system that will likely to be available "after Summer 2023". Peconic Estuary Partners does have historic yearly values for clarity, total nitrate, and dissolved oxygen available publicly. If the water monitoring station is repaired or a new station implemented, we will utilize that data to compare, if not, we will rely on the historical data. The other water bodies we are sampling do not have any publicly available data to compare against.

Completeness is a measure of the number of samples intended to be collected and analyzed compared to the number of samples collected and analyzed, expressed as a percentage. Generally, 85% of samples at a site is the minimum acceptable level of completeness.

We will collect and test at least 2 samples per week per site for our field parameters. The lab will test 1 sample per week per site. Cyanobacteria testing through the lab is generally available between 15-19 weeks (usually mid-May-mid September) for a total of about 15-19 samples. We will be sampling for our other field parameters for approximately 23 weeks (mid-May through mid-October) for a total of approximately 46 samples.

Sensitivity

Specification Name	Detail
Sku/Product Name	HI98194 - Multiparameter pH/EC/TDS/Salinity/DO/Pressure/ Temperature Waterproof Meter
pH Range	0.00 to 14.00 pH
pH Resolution	0.01 pH
pH Accuracy (@25°C/77°F)	± 0.02 pH
pH Calibration	automatic one, two, or three points with automatic recognition of five standard buffers (pH 4.01, 6.86, 7.01, 9.18, 10.01) or one custom buffer
mV Range	± 600.0 mV
mV Resolution	0.1 mV
mV Accuracy	± 0.5 mV
ORP Range	± 2000.0 mV
ORP Resolution	0.1 mV
ORP Accuracy (@25°C/77°F)	± 1.0 mV
ORP Calibration	automatic at one custom point (relative mV)
Temperature Range	-5.00 to 55.00 °C; 23.00 to 131.00 °F; 268.15 to 328.15 K
Temperature Resolution	0.01 °C; 0.01 °F; 0.01 K
Temperature Accuracy (@25°C/77°F)	± 0.15 °C; ± 0.27 °F; ±0.15 K
Temperature Calibration	automatic at one custom point
EC Range	0 to 200 mS/cm (absolute EC up to 400 mS/cm)
EC Resolution	Manual: 1 µS/cm; 0.001 mS/cm; 0.01 mS/cm; 0.1 mS/cm; 1 mS/cm Automatic: 1 µS/cm from 0 to 9999 µS/cm; 0.01 mS/cm from 10.00 to 99.99 mS/cm; 0.1 mS/cm from 100.0 to 400.0 mS/cm Automatic (mS/cm): 0.001 mS/cm from 0.000 to 9.999 mS/cm; 0.01 mS/cm from 10.00 to 99.99 mS/cm; 0.1 mS/cm from 100.0 to 400.0 mS/cm

Specification Name	Detail
EC Accuracy (@25°C/77°F)	±1 % of reading or ±1 µS/cm whichever is greater
EC Calibration	automatic single point, with six standard solutions (84 µS/cm, 1413 µS/cm, 5.00 mS/cm, 12.88 mS/cm, 80.0 mS/cm, 111.8 mS/cm) or custom point
TDS Range	0 to 400000 ppm (mg/L); (the maximum value depends on the TDS factor
TDS Resolution	Manual: 1 ppm (mg/L); 0.001 ppt (g/L); 0.01 ppt (g/L); 0.1 ppt (g/L); 1 ppt (g/L) Automatic: 1 ppm (mg/L) from 0 to 9999 ppm (mg/L); 0.01 ppt (g/L) from 10.00 to 99.99 ppt (g/L); 0.1 ppt (g/L) from 100.0 to 400.0 ppt (g/L); Automatic ppt (g/L): 0.001 ppt (g/L) from 0.000 to 9.999 ppt (g/L); 0.01 ppt (g/L) from 10.00 to 99.99 ppt (g/L); 0.1 ppt (g/L) from 100.0 to 400.0 ppt (g/L)
TDS Accuracy (@25°C/77°F)	±1 % of reading or ±1 ppm (mg/L) whichever is greater
TDS Calibration	based on conductivity or salinity calibration
Do Range	0.0 to 500.0 %; 0.00 to 50.00 ppm (mg/L)
DO Resolution	0.1 %; 0.01 ppm (mg/L)
DO Accuracy (@25°C/77°F)	0.0 to 300.0 %: ± 1.5 % of reading or ± 1.0 % whichever is greater; 300.0 to 500.0 %: ± 3 % of reading 0.00 to 30.00 ppm (mg/L): ± 1.5 % of reading or ±0.10 ppm (mg/L) whichever is greater; 30.00 ppm (mg/L) to 50.00 ppm (mg/L): ± 3 % of reading
DO Calibration	automatic one or two points at 0 and 100% or one custom point
Resistivity Range	0 to 999999 Ω·cm; 0 to 1000.0 kΩ·cm; 0 to 1.0000 MΩ·cm
Resistivity Resolution	Depending on resistivity reading
Resistivity Accuracy (@25°C/77°F)	Based on conductivity or salinity calibration
Salinity Range	0.00 to 70.00 PSU
Salinity Resolution	0.01 PSU

Specification Name	Detail
Salinity Accuracy (@25°C/77°F)	±2% of reading or ±0.01 PSU whichever is greater
Salinity Calibration	based on conductivity calibration
Temperature Compensation	Automatic from -5 to 55 °C (23 to 131 °F)
Connectivity	USB to PC with HI9298194 Hanna software installed
GLP	Yes
Power Supply	1.5V AA batteries (4)
Power Consumption	approximately 360 hours of continuous use without backlight (50 hours with backlight)
Environment	0 to 50°C (32 to 122°F); RH 100% (IP67)
Dimensions	185 x 93 x 35.2 mm (7.3 x 3.6 x 1.4")
Weight	400 g (14.2 oz.)

Specification Name	Detail
SKU/Product Name	HI717 High Range Phosphate Colorimeter - Checker® HC
Range	0.0 to 30.0 ppm
Resolution	0.1 ppm
Accuracy @ 25°C/77°F	±1.0 ppm ±5% of reading
Light Source	LED @ 525 nm
Light Detector	silicon photocell
Method	adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, Amino Acid method
Battery Type	(1) 1.5V AAA
Auto-off	after ten minutes of non-use
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Dimensions	86.0 x 61.0 x 37.5 mm (3.4 x 2.4 x 1.5")

Specification Name	Detail
Weight	64 g (2.3 oz)

Specification Name	Detail
SKU/Product Name	HI713 Low Range Phosphate Colorimeter - Checker® HC
Range	0.00 to 2.50 ppm
Resolution	0.01 ppm
Accuracy @ 25°C/77°F	±0.04 ppm ±4% of reading
Light Source	LED @ 525 nm
Light Detector	silicon photocell
Method	adaptation of the Ascorbic Acid method
Battery Type	(1) 1.5V AAA
Auto-off	after two minutes of non-use
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Dimensions	86.0 x 61.0 x 37.5 mm (3.4 x 2.4 x 1.5")
Weight	64 g (2.3 oz)

Health and Safety
When working with potentially hazardous materials, follow EPA, OSHA, and NYS DEC DOW specific health and safety procedures and refer to Material and Safety Data Sheets of hazardous chemicals. Safety data sheets are contained in a binder prominently displayed in the staff room at LISC.

When conducting fieldwork, there should always be at least two people in a field team. A form of emergency communication (e.g., cell phone) and a first-aid kit should be carried with the field team. Preventative measures should be taken to prevent tick bites, wear light colored clothing, keep exposed skin to a minimum, apply repellent, and attempt to avoid areas with overgrown vegetation.

Special Training

LISC staff will follow standard health and safety protocols, requirements, and training. In addition, the QAPP referenced in this document will be made available to LISC staff for reference. All training hours will be entered into Altru by constituent record and include the project, job occurrence, and hours of training completed.

Position	Training Needed	Provided By	Duration
LISC Sampling Staff / Volunteers	Use and storage of equipment	Cailin Kaller	5 Hours
LISC Sampling Staff / Volunteers	Water sampling techniques	Judy Rentas	3-hour field session
LISC Sampling Staff	Storage and transport of materials to SOMAS Lab	Cailin Kaller	1-hour session
LISC Sampling Staff / Volunteers	Field data recording	Judy Rentas	45-minute session
LISC Sampling Staff	Data transfer and review	Cailin Kaller	1-hour session
All Staff and Volunteers	Field safety protocol	Cailin Kaller	1-hour session

Documents and Records

All data from the field will be recorded/documented on pre-printed datasheets. At the end of each monitoring schedule, either based on our own procedure or the SOP that is required with the equipment, the datasheets will be collected and entered into excel type datasheets. This data will be compiled for later use in the Long Island Science Center database. The data will be checked regularly for accuracy. The field datasheets and other required paperwork are necessary for accurate data collection and analysis.

Analytical Laboratory Results: Laboratories results will be electronically delivered to Cailin Kaller, Project Manager via a shared Google spreadsheet. Once received the results will be given to the Project Assistant to be added to the datasheets for use in the final report.

Data Generation and Acquisition

Rationale of Monitoring Design

The water bodies will be selected in accordance with the overarching goal of determining the health qualities of water bodies that directly impact or are of use to local communities. Tested waterbodies may be selected from an array of sources, local parks, and water sources approved and available for fishing and the like. Sampling locations are identified in Table X. These sites were chosen for several reasons but the most important is access. Each of the waterbodies either has a public access spot or we have been able to establish with the property owner a path for access. The other factor was to include a variety of types of waterbodies. We have included the Peconic River, a major estuary; Merritts Pond, a private closed waterbody; Riverwoods Mobile Home Complex unnamed water bodies which according to residents are deeply affected by runoff water from the nearby road; and Cranberry Bog (in Swezey Pond) which is an open waterbody connecting an unnamed waterbody upstream and downstream to our other sampling site, Wildwood Lake (all three are connected via Little River, the connection is pictured below). We had also selected a public space in the David Sarnoff Preserve but the unnamed waterbody with public access dried up last summer which would make consistent sampling difficult. Public access was important for us to be able to invite students and volunteers to come and participate. This goal will be achieved with three approaches to sampling: frequent sampling, weekly sampling, and one-time or monthly sampling of waterbodies selected by the LISC and citizen volunteers. The sampling will begin in Mid-May 2023 and continue regarding the three sampling strategies. The exact schedule may change based on if an algal bloom is detected.

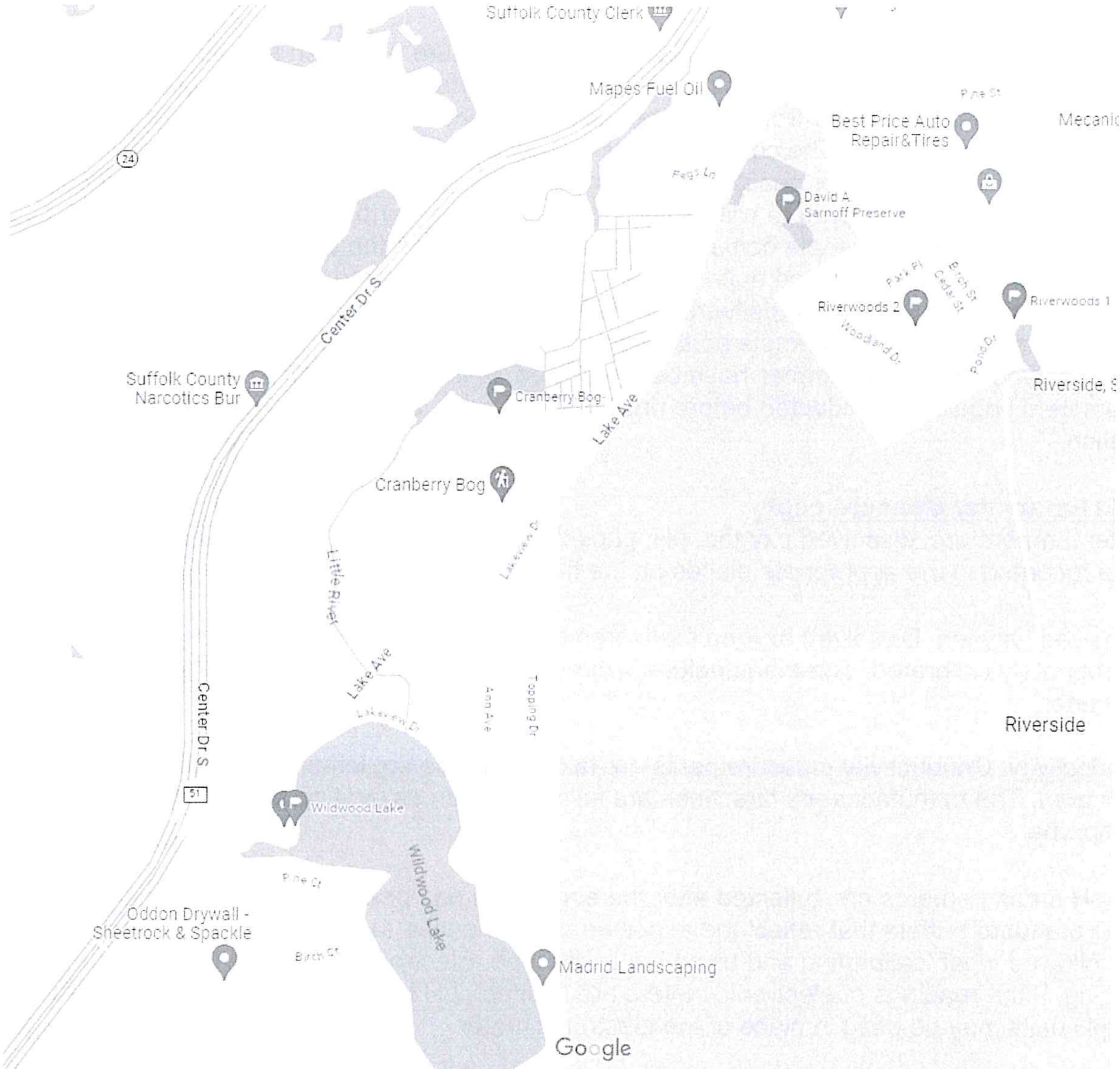
Sample Locations
Sample locations coordinates are available in Table X.

Sampling Frequency
Samples will be collected on a weekly basis in coordination with the SOMAS Lab schedule. Usually, the lab will accept samples starting in mid-May and will continue to accept them until approximately mid-September.

Sampling Frequency by Location Table

Type	Location	Testing for	Frequency	Testing for	Frequency
River	Grangebel Park	HAB	15-19	Field Parameters*	23
Lake	Wildwood Lake	HAB	15-19	Field Parameters*	23
Pond	Riverwoods 1	HAB	15-19	Field Parameters*	23
Pond	Riverwoods 2	HAB	15-19	Field Parameters*	23
Pond	Cranberry Bog	HAB	15-19	Field Parameters*	23
Pond	Merritts Pond North	HAB	15-19	Field Parameters*	23

**Field parameters are temperature, dissolved oxygen, pH, phosphate, nitrate, TDS, and salinity*



Sampling Methods

Sampling methods utilized in this Monitoring Program have been previously outlined in NYSDEC Division of Water Lake Sampling, SOP# 203. We have based our methodology on these standard operating procedures and will primarily be using grab sampling.
https://www.dec.ny.gov/docs/water_pdf/soplakesampling721.pdf

Field Data

The team will set up the testing procedures at the desired location for sample collection and record their position. This can be accomplished using several methods. If you have a GPS unit, you can simply record your latitude and longitude in a field notebook. Or alternatively and less susceptible to transcription error, you can save a waypoint on your GPS unit. It is also possible to record your GPS location in the metadata of a photograph taken from your location with your smartphone. We will be using the grab method of collection.

A collection bucket will be rinsed with distilled water to ensure it is clean and no outside contaminants are present to contaminate the collected waterbody sample. The collection bucket will then be rinsed with water from the waterbody to ensure no distilled water skews the authenticity of the sample. The collection bucket will be used to collect water from the waterbody and measured for qualities shown in Appendix C and placed in smaller, clean brown sample bottles. The temperature will be recorded immediately and then transfer from the collection bucket to the sample bottles will be quick to preserve the sample quality. The smaller sample bottles once sealed and appropriately labelled and recorded will be placed into a cooler. From there the samples will be delivered to SOMAS lab for further HAB evaluation. SOMAS will dispose of and sanitize the sample bottles for pick-up when we arrive with the next set of samples. Once the HAB samples have been secured, tests on the water for the reaming field parameters should be conducted before rinsing all materials and proceeding to the next location.

Field Parameter Measurements

Water temperature, dissolved oxygen, pH, phosphates, conductivity, turbidity, and nitrates are to be recorded in the appropriate places on the field sheets.

Dissolved Oxygen: Dissolved oxygen measurements are taken after the equipment has been appropriately calibrated. The manufacturer's directions are followed when calibrating and using the meter.

Conductivity: Conductivity measurements are taken after the equipment has been appropriately calibrated. The manufacturer's directions are followed when calibrating and using the multiprobe.

pH: pH measurements are collected after the equipment has been appropriately calibrated using standard buffers that reflect the expected pH of the lake(s). The manufacturer's directions are followed when calibrating and using the multiprobe. Electrodes are rinsed well after each reading. If the readings of electronic meters are suspect, pH indicator strips with an accuracy of 0.3 pH units may be used in place of the electronic meter.

Turbidity: If the turbidity sensor is present on the multiprobe, measurements are taken after the equipment has been appropriately calibrated. The manufacturer's directions are followed when calibrating and using the multiprobe. Alternatively, we have a secchi disk that can be used.

Water Temperature: Water temperature measurements are collected with a probe. The temperature is factory calibrated on all multiprobes used for monitoring.

Sample Information: Water depth (depth range for integrated sample) and text descriptions of color, odor, and comments specific to the sample/the collection of the sample are recorded on the Field Sheet. Ambient temperature and general weather conditions are recorded as well.

Notes and Remarks:

Any conditions/observations, that the sampling team deems pertinent to making an informed assessment of the water quality status and/or designated uses, are noted on the electronic data collection form and field sheet.

Sampling Equipment Cleaning, Rinsing, and Calibration
Cleaning and rinsing of sampling equipment will be handled as per the manufacturers' Best Practices. Probes should be rinsed between locations and stored at the end of sampling according to the manufacturers' recommendations.

Cleaning: Equipment should be washed every two weeks using a phosphate free detergent and water scrub followed by a distilled water rinse as needed. Whenever equipment is cleaned with a phosphate free detergent a notation is made in the equipment's log notebook.

Calibration: When calibrating a multiprobe fresh reference buffers are used and the origins of each buffer are noted in a log notebook for the multiprobe. Multiprobe calibration and calibration drift checks are conducted before and after each sampling trip. Specific instructions regarding the calibration of multiprobes are provided in the Operation Manuals for each instrument.

Sampling Handling and Custody

Samples will be collected in amber glass sample bottles that have been approved by the SOMAS Lab. The lab will clean them with acid washed in 10% HCl and labeled with respective sample names prior to use.

Chain of Custody
Individual sample containers are labeled with pre-printed waterproof labels to identify the special project study, sample ID number, collection date, GPS coordinates, and collection time. A LISC staff member will deliver and sign in the samples on the SOMAS Lab delivery sheet, reflecting the HAB analysis request, the project name, the date and time of drop off, and the location information regarding the collection. Transport and shipping procedures will be according to SBU protocols. Samples will be identified by a unique identification number assigned to each sample by SBU. Samples are to be deliver to:
SBU Southampton
239 Montauk Highway
Southampton, NY 11968
Telephone: 631-632-5043

Analytical Methods

Samples to SOMAS: Analytical methods used in this sampling program are provided in this QAPP. Samples will be analyzed as per the NYSDOH ELAP certification and the specifications of Memorandum of Understanding between SOMAS and NYSDEC.

Quality Control

Quality Control Sampling
The data quality objective of this study's quality control methodology is to establish and maintain standards that will ensure the validity of the data. An integral part of sample quality is the collection of representative samples. The usefulness of the data obtained from any monitoring program depends upon how accurately that data describes the characteristics of the waterbody being studied. The samples that are collected for analyses must accurately represent the studied waterbody and be unaffected by collection procedures, sample preservation and sample handling.

Equipment Blank Samples are collected after sampling equipment has been rinsed using standard operating procedures. The sample is then analyzed to help identify possible contamination from the sampling procedure (equipment, sample containers, preservatives, and handling) and to document the rinsing of sampling equipment. Equipment blank samples are analyzed for each of the collections. The reasoning is to verify method performance by indicating if interferences are introduced from the sample containers, sample processing equipment, or the reagents used in the assay. Equipment blank samples are collected at one site during each week of sampling.

Field Control Samples are used to help identify the accuracy of field collection methods. The samples are collected in duplicate at each weekly sampling event. The reasoning is to verify the precision of the sample collection methods.

Quality Control Evaluation

When QC samples fail to be within an acceptable range of results, the Project Manager will initiate an investigation of the field equipment. If these procedures prove inadequate to solve the problems, the Project Manager will contact the manufacturer of the equipment to determine what additional corrective actions are required to meet project quality assurance objectives.

Supplies and Consumables

Inspection of supplies and consumables must be made upon arrival of new materials and immediately before their use in the field or laboratory. For newly arrived supplies and consumables all materials must be in their original packaging and free of noticeable damage. For materials already obtained and about to be used no noticeable defects will be allowed. Field Samplers are responsible for assuring the quality of all supplies and consumables for each of their sampling trips.

Data Management

Sample collection information (location, collection date, time) and field parameter measurements (temperature, dissolved oxygen, pH, conductivity, water clarity, water depth) will be transferred from the electronic field data collection form (and/or paper field sheet) into an Excel data sheet maintained by LISC staff. This document will be transferred to the Project Manager at the completion of the project.

Analytic results from SOMAS laboratories will be reported to NYSDEC in a complete data document that includes summaries of data validation conducted by the analytic laboratory. Values are compared against assessment criteria, including established parameter-specific limits. If reported values exceed the established limit, the result is flagged for further investigation.

Reporting, Documents, and Records

Reporting

The Project Manager is responsible for submitting the semi-annual and final report to EPA as per their requirements. The QA Manager is responsible for submitting monthly reports to the Project Managers. If a cyanobacteria bloom is detected the SOMAS lab is responsible for reporting the bloom to the NYS DEC and Suffolk County. Our goal is to be able to provide the public with an overview of the health of our local water bodies. We will conduct a total of 20 educational sessions, and we will include a ranking scale (health report card) of our field parameters that will be easily interpreted by the public.

Parameter	Unhealthy (low)	Healthy	Unhealthy (high)
pH	<6	6.5-9	>10
Dissolved Oxygen	<80%	80%-120%	
Phosphate		<0.025mg/IP-0.035mg/IP	>0.035 mg/IP
Nitrate		<10 ppm	>10 ppm
Turbidity		< 50 NTU Rivers, <25 NTU Lakes	> 100 NTU

Documents and Records

Field Data Collection Forms and Physical Field Data Sheets

Hard copies of the field data sheets are to be stored by LISC and entered by one of the LISC staff into a shared spreadsheet format as provided by the SOMAS Lab. The LISC QA Manager will check the spreadsheet data entry against the field data sheets to check that the data has been entered accurately. The Project Manager will copy the results to a local spread sheet to be preserved in week-by-week tabs.

Analytical Laboratory Results

SOMAS Lab will provide HAB results weekly via a shared spreadsheet. Other analytical data from any other labs will need to be manually entered.

Linking Field Data to Analytical Laboratory Data

Unique sample identification numbers have been assigned for this project as per SOMAS lab SOP. ID information is included in Table X.

Assessment and Oversight

Program assessments will be conducted to evaluate the validity of the field data collection and analytical activities conducted as part of this monitoring program. All field staff will be briefed on appropriate project objectives and methods for the special project by the Program and Project Manager in advance of any sampling. Random field audits of field staff may be conducted by the Project Manager to assess the performance of the sampling operations.

Corrective Actions

Revisions to the Quality Assurance Project Plan are to be approved by the Project Manager as well as the EPA Region 2 QA Manager. The Project Manager will notify those on the distribution list of the revision.

Major sources of errors may include analytical and equipment problems and those resulting from the deviation from intended plans and procedures. If these problems occur in the field, corrective actions should be taken, and the Program Manager should be informed.

Deviation from intended plans and procedures should be noted by the person observing the deviation and reported to project staff responsible for the operation or analysis in question. The appropriate project personnel shall (1) develop a corrective action plan to ensure that future sampling, analyses, etc. are conducted in accordance with the QA procedures presented in this QAPP; (2) rerun procedures in the appropriate manner; and (3) report all problems and deviations to the Project Manager, who will also be consulted during the development of any proposed corrective action plans. All deviations from intended plans and procedures are to be recorded in the appropriate field or laboratory notes.

Table X. Coordinates of sampling locations

Type	Location ID	Latitude	Longitude
River	GP-01 (Grangebel Park)	40.91577 N	72.66408 W
Lake	WP-01 (Wildwood Lake)	40.895969 N	72.67815 W
Pond	RIV-01 (Riverwoods 1)	40.90680 N	72.65705 W
Pond	RIV-02 (Riverwoods 2)	40.90682 N	72.66038 W
Pond	CB-01 (Cranberry Bog)	40.90487 N	72.67234 W
Pond	MP-01 (Merritts Pond North)	40.92822 N	72.66823 W

Table Y. Water Column Sampling Specifications

Parameter	Medium	Collection Method	Sample Container	Preservation Method	Holding Time
HAB	Lake	Bucket	500ml Amber Glass wide mouth bottle	Cooler	2 hours
All other parameters	Lake	Bucket	Test Tube	None	None

Table Z. Sampling Equipment List

Manufacturer/ Distributor	Quantity	Item
USA Camp Zone	1	GPS Navigation Receiver Portable Digital Altimeter Barometer Compass
Lowes	6	Buckets with rope
Kirkland	600	Multipurpose disposable nitrile gloves
Coleman	1	16 qt cooler
United States Plastic Corp	12	500ml Amber Glass Wide Mouth Packer Bottles with caps
		Portable garbage bin/bags
		Distilled Water
Hanna Instruments	1	HI98194 HI98194 pH/EC/DO multiparameter portable meter supplied with HI7698194 probe with 4-meter cable Multiparameter pH/ORP/EC/TDS/Salinity/DO/Pressure/

		Temperature Waterproof Meter
Hanna Instruments	1	H1717 High Range Phosphate Colorimeter - Checker® HC
Hanna Instruments	1	H1713 Low Range Phosphate Colorimeter - Checker® HC
Hanna Instruments	1	Checker®HC Reagents
Hanna Instruments	1	HI70300L Electrode storage solution, 500 mL bottle
Hanna Instruments	1	HI9828-25 Quick Calibration Solution (500mL Bottle)
Hanna Instruments	1	HI7698292 Probe maintenance kit consisting of HI7042S (electrolyte solution for DO sensor), O-rings for DO sensor (5), small brush, O-rings for probe (5), and syringe with grease to lubricate the O-rings.
Hanna Instruments	1	HI7040L Zero oxygen solution, 500 mL bottle for DO
Hanna Instruments	1	HI7042S Electrolyte solution for galvanic probes, 30 mL bottle for DO
Hanna Instruments	1	HI5004 4.01 pH Value @25°C, (1) 500 mL bottle
Hanna Instruments	1	HI5007 7.01 pH Value @25°C, (1) 500 mL bottle
Hanna Instruments	1	HI5010 10.01 pH Value @25°C, (1) 500 mL bottle
Hanna Instruments	1	HI7698194 Multiparameter (pH/EC/DO) Probe for HI98194 Spare probe
Hanna Instruments	1	HI70671L Cleaning and Disinfection Solution for Algae, Fungi and Bacteria (Industrial Processes), 500 mL bottle
Hanna Instruments	1	HI97728C Nitrate Portable Photometer with CAL Check- kit including carrying case and secondary standards
Hanna Instruments	1	HI93728-01 Nitrate, cadmium reduction method, Reagent kit for 100 tests (NO3--N)
Hanna Instruments	1	HI731331 Cuvette (glass) for HI95 and 96 series (4 pcs)
Hanna Instruments	1	HI731335N Caps for cuvette for HI837 series photometer and 987XX and 887XX turbidity meters (4 pcs)
Hanna Instruments	1	HI93703-50 Cleaning solution for cuvet , 230 mL
Hanna Instruments	1	HI97717C Phosphate HR photometer: Range 0.0 to 30.0 mg/L – kit including carrying case and CAL Check standards
Hanna Instruments	1	HI93717-01

		Phosphate HR, amino acid method, Reagent kit for 100 tests (PO43- HR)
Hanna Instruments	1	HI97717-11 CAL Check™ standards for Phosphate HR, 0.0 and 15.0 ppm
Hanna Instruments	1	HI713 Phosphate low range Checker HC® colorimeter: Range 0.00 to 2.50 ppm (mg/L)
Hanna Instruments	1	HI713-11 Phosphate Low Range Checker HC Calibration Check Set
Hanna Instruments	1	HI713-25 Phosphate, LR Checker HC, ascorbic acid method, reagents for 25 tests
Hanna Instruments	1	HI717 Phosphate HR Checker HC®, 0.0 to 30.0 ppm (mg/L)
Hanna Instruments	1	HI717-11 Phosphate High Range Checker HC Calibration Check Set (0.0 and 15.0 ppm phosphate)
Hanna Instruments	1	HI717-25 Phosphate HR Checker HC reagents for 40 tests (Phosphate HR)

Appendix A

List of Members who will receive a copy of this QAPP.
Cailin Kaller
Judy Rentas
Anna Lando
All Sampling Staff

Appendix B

Sample Bottle Labels Sheet
Waterbody Name ____________________________
Location ID _________________________
Project Name ___________________
Sampling Date __ __ __ __ - __ __ - __ __
Sampling Time ___ : __ __
Latitude __________________________
Longitude _________________________

Appendix C

Sample Field Data Sheet

Sampler Name: ______________________ Data Recorder Name: ______________________

Date: ________________ Time: _______________ Location ID: _______________

Waterbody Name: _______________________ Weather Conditions: ___________________

Latitude: ________________________ Longitude: _________________________

Parameter	Test 1	Test 2
Temperature (º C)		
pH		
Dissolved Oxygen		
Phosphate		
Nitrate		
Turbidity		
Salinity		
Total Dissolved Solids		