

Hempstead Harbor Water-Quality Monitoring Program (NY)

National Fish and Wildlife Foundation (NFWF) Project No. 73349

Project Type: Participatory Science-Water Quality Monitoring

Quality Assurance Project Plan (QAPP)

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Prepared by:

Coalition to Save Hempstead Harbor

PO Box 159

Sea Cliff, NY 11579

(516) 801-6792, info@thecshh.org

Prepared for:

U.S. Environmental Protection Agency, Region 2

NYS Department of Environmental Conservation

Monitoring Organization:

Coalition to Save Hempstead Harbor



2023 QAPP Approval Page

QAPP will be approved prior to the start of work.

Approved by:

Carol DiPaolo, Water-Monitoring Coordinator
Project Manager/Field Team Leader, Coalition to Save Hempstead Harbor (Monitoring Organization)

X *Carol DiPaolo* Date: 2-8-2023

Eric Swenson, Esq., Executive Director
QA Manager, Hempstead Harbor Protection Committee (Funding Organization)

X *Eric Swenson* Date: 2/8/2023

Emily Nering, U.S. EPA Quality Assurance Officer
U.S. EPA Region 2

X *Emily Nering* Date: 1/30/2023

Elizabeth Wright, U.S. EPA Region 1
Project Officer, National Fish and Wildlife Foundation, Long Island Futures Fund

X _____ Date: _____

Lynn Dwyer, Program Director
National Fish & Wildlife Foundation

X *Lynn Dwyer* Date: 2-9-2023

Zachary M. Smith, Assistant QA Officer
NYS Department of Environmental Conservation

X *Zachary M. Smith* Date: 2/9/2023

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U.S. EPA REGION 2 - QUALITY ASSURANCE PROJECT PLAN APPROVAL FORM

PROJECT INFORMATION

Quality Assurance Officer: Emily Nering
Project Officer: Elizabeth Wright
Title of Quality Assurance Project Plan: Hempstead Harbor Water-Quality Monitoring Program (NY)
Assistance Agreement or Contract #: L100A01069-0
QA File Number: 2023-04

REGIONAL QA MANAGER OR DELEGATED APPROVER

Approved Conditionally Approved*

* Conditional Approval may be provided when there are unresolved comments that do not impact the data collection or the quality of the data and where the project has a small window of opportunity to collect such data. Conditional Approval expires 30 days from the signature date. If updated quality documentation (QD) is not provided by the expiration date or another due date is not agreed upon by EPA, then the QD will be considered delinquent.

Comments: Just need final signatures on the QAPP.

Signature EPA QA Officer **EMILY NERING** Digitally signed by EMILY NERING
Date: 2023.01.30 11:13:30 -05'00'

Signature EPA PO or Project lead **ELIZABETH WRIGHT** Digitally signed by ELIZABETH WRIGHT
Date: 2023.01.31 12:47:24 -05'00'

REVIEW SUMMARY:

A review was conducted on the above referenced Quality Assurance Project Plan. The subject QAPP was reviewed for conformance with the [EPA Requirements for Quality Assurance Project Plans](#) (EPA QA/R-5), EPA/240/B-01/003, March 2001; USEPA Region 2 Guidance for the Development of QAPPs for Environmental Monitoring Projects, April 2004 and other EPA QAPP guidance documents as appropriate.

This approval form documents EPA's decision of approval or conditional approval* for the aforementioned QAPP. After the QAPP is approved by EPA via this approval form, obtain the required signatures from your organization on the QAPP Title/Signature page. Send the signed QAPP to the EPA Project Officer and others on the QAPP distribution list within the timeframe stipulated in the AA terms and conditions.



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- D Meter Operation Manuals (Link)
- E LaMotte Kit Manuals
- F Field Data, Calibration, and Chain of Custody Sheets



1 Project and Task Organization

1.1 Project/Task Organization and Personnel Responsibilities

The organizational chart prepared for the Water-Monitoring Program for Hempstead Harbor is presented in *Figure 1*. The Project Manager/Field Team Leader and Project Quality Assurance (QA) Officer are responsible for the implementation of the QAPP. Note that the Hempstead Harbor Protection Committee (HHPC) is an intermunicipal organization consisting of representatives from the nine municipalities that have jurisdiction around Hempstead Harbor; HHPC has financial responsibility for the Hempstead Harbor water-monitoring program. The Coalition to Save Hempstead Harbor (CSHH) is a nonprofit, grassroots environmental organization that initiated the water program in 1992 and continues to conduct the sampling for the Hempstead Harbor water-monitoring program. *Table 1* presents the responsibilities of the personnel that are involved with the program. Individuals listed in *Table 1* will receive a copy of the QAPP. For purposes of this document, the Project Manager/Field Team Leader and Project QA Officer positions are considered management personnel for the water-quality monitoring program and QAPP. Note that this QAPP replaces the related 2020 QAPP version.

1.2 Communication Pathways

Tasks to be accomplished during the monitoring events will be communicated between field personnel and managers following the standard operating procedures presented in *Appendix A*. The QAPP will be reviewed by the QA Manager, Project Manager/Field Team Leader, and Project QA Officer at the beginning of each monitoring season. If issues arise during monitoring-program implementation, these personnel will discuss and institute any necessary changes. Issues pertaining to field activities or laboratory analyses will be addressed by the Project QA Officer, or the Project Manager/Field Team Leader, or both. The QAPP will be shared with those listed in *Figure 1* and will also be available on the CSHH and HHPC websites.

1.3 Modifications to QAPP

Modifications to this QAPP will be initiated by the Project Manager/Field Team Leader. When documenting amendments to the QAPP, the reasons for the changes will be outlined in a revision/modification log as will a description of how the changes are expected to affect the quality and usability of the data to be collected. Records of QAPP amendments will be maintained on-file at CSHH and HHPC offices. Proposed changes to the QAPP will be submitted to EPA for review and approval.



**Figure 1: Hempstead Harbor Water-Monitoring
Program Organizational Chart**

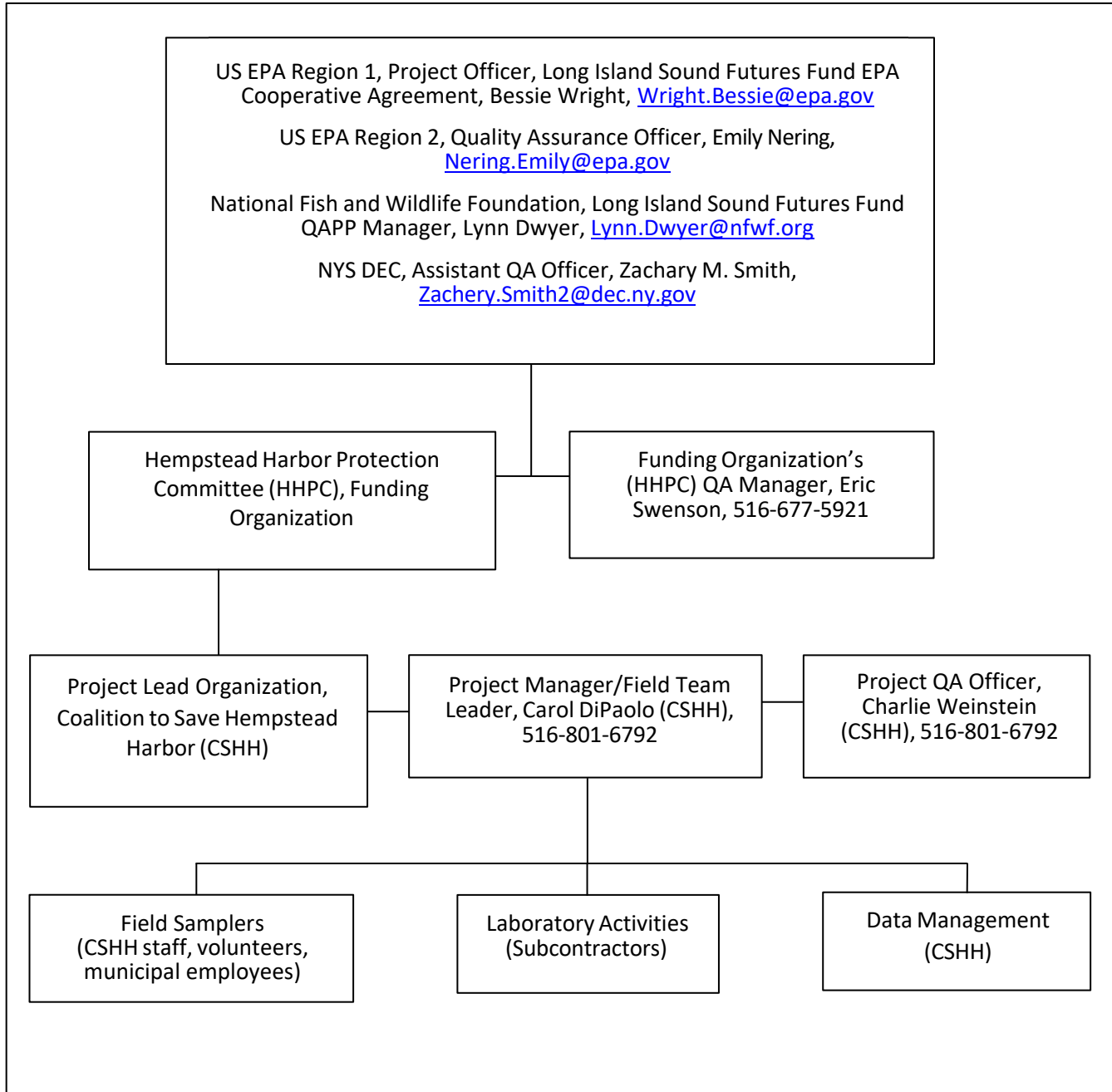




Table 1: Program Personnel Responsibilities

Title	Name	Affiliation	Responsibility
US EPA Program Officer	Bessie Wright	US EPA, Region 1	<ol style="list-style-type: none"> 1. Reviews proposed QAPP and future changes 2. Provides final approval for QAPP 3. Project Officer for LIS Futures Fund award #LI-00A01075
LISFF QAPP Manager	Lynn Dwyer	National Fish and Wildlife Foundation	QAPP Management for Long Island Sound Futures Fund
US EPA QA Officer	Emily Nering	US EPA, Region 2	<ol style="list-style-type: none"> 1. Reviews proposed changes to the QAPP 2. Coordinates approval process for the QAPP
NYS DEC Assistant QA Officer	Zachary M. Smith	NYS DEC	<ol style="list-style-type: none"> 1. Reviews proposed changes to the QAPP 2. Coordinates approval process for the QAPP
Advisory Board	Municipal officials	Hempstead Harbor Protection Committee	<ol style="list-style-type: none"> 1. Discusses and approves proposed changes in monitoring program 2. Reviews and approves budgets
QA Manager	Eric Swenson	Hempstead Harbor Protection Committee	<ol style="list-style-type: none"> 1. Reviews and approves proposed changes to the QAPP 2. Maintains correspondence with other groups
Project Manager/Field Team Leader	Carol DiPaolo	Coalition to Save Hempstead Harbor	<ol style="list-style-type: none"> 1. Organizes and schedules daily operations of monitoring program 2. Ensures that equipment is properly maintained and that consumables are available 3. Trains volunteers and field samplers in the procedures described in this QAPP 4. Procures analytical services 5. Supervises sample handling 6. Tracks samples to verify that they reach the laboratory 7. Recommends changes to water-quality monitoring program 8. Determines whether QAPP changes are necessary
Project QA Officer	Charlie Weinstein	Coalition to Save Hempstead Harbor	<ol style="list-style-type: none"> 1. Reviews the QAPP when necessary 2. Reports data-quality deficiencies to Project Manager/Field Team Leader 3. Oversees audits or data validation as mandated by this QAPP 4. Assesses whether laboratory elements outlined in the QAPP are followed 5. Oversees data verification activities
Field Samplers	Vary	CSHH staff and volunteers, municipal employees	<ol style="list-style-type: none"> 1. Assist the Project Manager/Field Team Leader as necessary 2. Collect samples and collect and record field data 3. Assist in maintaining field equipment



2 Special Training Needs and Certification

2.1 Training for Program Managers

Managers for the Hempstead Harbor water-quality monitoring program are required to be familiar with this QAPP and the standard operating procedures (SOPs) presented in *Appendix A*. Additionally, the Project QA Officer will be trained in the use of the data-verification procedures presented in *Section 12*. The Project Manager/Field Team Leader will be trained in the operation, calibration, and maintenance of field-data-collection equipment and will be familiar with appropriate field-sampling procedures. Training will be provided by an individual who is experienced with similar monitoring equipment and sampling techniques. Training provided by technicians from the sampling-equipment manufacturers, if available, is preferred. The Project QA Officer and Project Manager/Field Team Leader should have prior water-quality monitoring experience through this program, a similar program, or through work or education. The date and specifics of Project Manager/Field Team Leader training will be recorded and kept in the annual water-monitoring binder along with other training notes.

Program management will be evaluated during any cooperative monitoring events undertaken with similar water-quality monitoring groups or environmental-monitoring professionals. Deficiencies will be corrected with the procedures presented in *Section 2.3*.

2.2 Training for Field Samplers

Prospective Field Samplers (staff, volunteers, and/or municipal employees) will meet with program managers for information regarding the monitoring program. Interested individuals will be formally trained before participating in any water-quality monitoring. Training will include a discussion of this QAPP, the program's SOPs, and any other procedures that are necessary. Topics will typically include:

- Monitoring-program background and purpose
- The QAPP and SOPs
- Field-equipment care and maintenance, including:
 - Calibration
 - Checking the calibration
 - Checking items that may need replacement (e.g., DO probe)



- Appropriate sample-collection procedures
- Sample handling and labeling
- Potential safety hazards

Hands-on volunteer training will be provided during regularly scheduled sampling events. Field-sampler performance will be monitored informally by the Project Manager/Field Team Leader during sampling or during cooperative sampling events with members of other groups or environmental professionals. Deficiencies will be corrected with the procedures presented in *Section 2.3*.

The Project Manager/Field Team Leader will coordinate monitoring activities and will be assisted by field samplers. The Project Manager/Field Team Leader will select experienced field samplers who are familiar with this QAPP and the SOPs and have demonstrated proficiency with all required procedures to be able to sample without supervision in instances in which the Project Manager/Field Team Leader will not be present. In such instances, the Project Manager/Field Team Leader will review and approve documentation resulting from the monitoring activities (i.e., field data sheets and laboratory results).

2.3 Corrective Procedures

Individuals requiring additional instruction will receive instruction in the field at the time of sampling or will receive additional training prior to the next sampling event in which they participate. Systematic (group-wide) deficiencies may require revision of the monitoring protocols, QAPP, standard operating procedures, data quality objectives (see *Section 8*), and other program documents. Deficiencies will be noted and the training program revised to improve future group-wide performance. The training program will be revised, improved, and evaluated as appropriate.

2.4 Laboratory Accreditations

Copies of accreditations for the Nassau County Department of Health Laboratory and Pace Analytical Services, LLC are presented in *Appendix B*.



3 Problem Definition and Background

3.1 Problem Definition

The water-monitoring program for Hempstead Harbor (located on the north shore of Long Island) encompasses weekly (1) in-harbor water-quality monitoring that includes (a) measuring parameters related to the ecological health of the harbor and (b) sample collection to measure nitrogen (biweekly) and bacteria levels within the harbor and (2) an outfall monitoring program to identify other critical areas of pollutant loading to the harbor. Sampling for the regular season begins in May and continues through October.

The monitoring data will be used by the Coalition to Save Hempstead Harbor, Hempstead Harbor Protection Committee, Nassau County Department of Health, Nassau County Department of Public Works, the Interstate Environmental Commission, the New York State Department of Environmental Conservation, the Connecticut Department of Energy and Environmental Protection, Long Island Sound Study, other nongovernmental/environmental organizations, and the communities surrounding Hempstead Harbor. The data will be used to:

- Identify and study seasonal-scale trends in water quality
- Monitor aquatic habitats
- Identify potential causes for negative events (e.g., algal blooms and fish kills)
- Investigate long-term trends in water-quality parameter levels
- Guide local and regional environmental planning, policy, and compliance efforts (e.g., Phase II Stormwater Program, TMDL development, the Long Island Nitrogen Action Plan, and the Long Island Sound Nitrogen Reduction Strategy)
- Measure progress towards meeting water-quality goals in the watershed
- Help determine whether the opening of additional shellfish-harvesting areas within the harbor is feasible
- Identify pollutant sources for targeting reduction efforts

The objectives listed above are addressed in annual water-quality reports, as described in *Section 13*.



3.2 Background

Hempstead Harbor is a V-shaped harbor of approximately five miles from mouth to head, the harbor's average depth is 18 feet, and the maximum depth is about 40 feet. The harbor supports a number of uses including industry, primary and secondary contact recreation, and recreational fishing, and is classified by the New York State Department of State as a significant coastal fish and wildlife habitat. Previous industrial and commercial uses resulted in degraded water quality through oil spills, sewage spills, toxic contamination, air pollution, and industrial discharges. The greatest impacts of these discharges were noted in the mid-1980s. Restoration efforts in the harbor and its watershed resulted in the closure of a landfill, two incinerators, and a sewage treatment plant. Remediation has been completed for most of the hazardous waste sites around the harbor but is ongoing for others.

Hempstead Harbor is a dynamic hydrologic and ecologic system that is affected by both runoff from its watershed and tidal water from Long Island Sound. In the 1980s, beaches were frequently closed due to high bacteria levels. Low oxygen levels have also resulted in periodic fish kills.

Although Hempstead Harbor was once the most productive oystering harbor in New York, high bacteria levels kept its shellfish beds closed to harvesting for decades—as was the case for most bays around Long Island Sound. However, in 2011, as a result of dramatic water-quality improvements, 2,500 acres in the outer area of Hempstead Harbor were reclassified as certified for shellfish harvesting.

Although water-quality monitoring has been conducted in Hempstead Harbor since the 1980s by various governmental and private organizations, the water-monitoring program initiated by the Coalition to Save Hempstead Harbor in 1992 is one of the most extensive and oldest programs of its kind around Long Island Sound. CSHH was founded in 1986 in response to reports of continued degradation of the harbor on a number of fronts. CSHH created the “citizens water-monitoring program” for Hempstead Harbor following severe budget cuts that decimated Nassau County Department of Health's (NCDH) environmental program, which ended midharbor sampling in the early 1990s. CSHH developed the Hempstead Harbor water-monitoring program to focus attention on the harbor, continue collecting midharbor samples (to be analyzed by NCDH) to monitor bacteria levels, and engage community residents in efforts to improve water quality.

To identify additional sources of pollutants, an outfall monitoring program was developed in 2009. This component of the monitoring program was considered necessary to develop strategies to further reduce levels of bacteria contamination that prevent the opening of additional shellfish harvesting areas within the harbor, result in occasional beach closures, and limit other recreational uses of the harbor.

In addition, because nitrogen loading can accelerate conditions for hypoxia, CSHH began to include nitrogen sampling in its monitoring program. From 2004 to 2016, CSHH collected water samples for levels of inorganic nitrogen. Beginning in 2018, nitrogen sampling was expanded to include both organic and inorganic forms of nitrogen.



The Hempstead Harbor Protection Committee, an intermunicipal organization formed in 1995, comprises the nine municipalities that are situated in the Hempstead Harbor watershed and is focused on reducing stormwater runoff into the harbor. Beginning in 2006, HHPC assumed financial responsibility for the water-quality monitoring program. CSHH continues to do field sampling, data collection, and reporting for the program. The monitoring program is necessary to continue assessing the impact on the harbor of watershed-management improvements, to supplement data from beach and shellfish monitoring conducted by county and state agencies, and to track the impact of environmental policy in the surrounding communities.

3.3 Participation in the Long Island Sound Unified Water Study for Embayments

In 2016, CSHH was invited to be one of two organizations to participate in a pilot project for a wider program that was planned to measure the ecological health of bays around Long Island Sound. In 2017, the details of the Unified Water Study (UWS) were fleshed out, and CSHH was again invited to participate in the program, which is intended to have various groups around Long Island Sound measure water quality in embayments, using the same sampling equipment, standard operating procedures, and data handling and reporting.

CSHH monitors up to 21 locations for the core Hempstead Harbor water-monitoring program, whereas 6 stations are monitored for the UWS; 5 of the UWS stations are identical to sites included in the Hempstead Harbor core water-monitoring program. (See *Appendix C* for the CSHH sites for Hempstead Harbor monitoring programs.)

CSHH continues to participate in the UWS and its equipment loan program, which lends electronic multiparameter meters and other equipment to each UWS group. Beginning in May 2023, CSHH will be using a YSI EXO2S for its core monitoring program, while the YSI EXO1 that is provided for the UWS will also serve as backup for the core program. The UWS YSI EXO1 does not have a port available for a pH sensor; in the event that backup equipment should be required for the core program, the LaMotte 5858-01 test kit will be used for surface and bottom pH. **Note:** The calibration, operation, and maintenance procedures for the primary as well as secondary (backup) equipment are included in *Appendix D*.

4 Project and Task Description

During the regular monitoring season, CSHH monitors up to 21 locations weekly, generally from May through October. The principal CSHH stations that are sampled weekly during the regular season for all program parameters are located in the central and northern portion of the harbor, between the former Bar Beach sand spit (now part of the 36.2-acre North Hempstead Beach Park) and Long Island Sound, as well as stations in Glen Cove Creek. The four stations that are located



south of the Bar Beach sand spit and two that are off of the eastern shore of the harbor are also tested for all program parameters but less frequently because access to these stations is dependent on tidal cycles.

Regular-season monitoring occurs weekly on Wednesdays, approximately 7 am to 12 noon, barring inclement weather conditions or problems with boat availability. Immediately following sampling, water samples are delivered to the appropriate laboratories for analysis. Winter-program sampling, which focuses on the Powerhouse Drain Subwatershed, occurs biweekly on Wednesdays or Thursdays, approximately 8 am to 10 am, from November through mid-April; water samples are delivered immediately following sampling to the appropriate laboratories for analysis.

CSHH produces a publicly available Water-Quality Monitoring Report annually, summarizing findings and any changes to the program. The annual reports contain data collected during the preceding monitoring season as well as comparisons with previous years' data. Preparation of the annual report begins following termination of the regular-season monitoring and is completed in July following the end of the winter monitoring season.

The monitoring program has two main elements—in-harbor monitoring and outfall monitoring—as described in *Sections 4.1* and *4.2*. *Table 2* includes the latitude/longitude points of all monitoring stations, and maps showing the monitoring locations are presented in *Appendix C*.

4.1 In-Harbor Monitoring Program

CSHH monitors estuarine water quality by measuring a series of field parameters and collecting samples to be analyzed by a laboratory. Dissolved oxygen, temperature, pH, salinity, and turbidity vertical profiles (starting at 0.5 meter below surface and then in 1-meter increments) are measured at most CSHH monitoring locations. A Secchi-disk depth is recorded at each CSHH location where a vertical profile is performed. Samples are collected and analyzed for total Kjeldahl nitrogen, nitrate, nitrite, ammonia, fecal coliform, and enterococci. *Table 3* summarizes the program parameters. The Nassau County Department of Health performs the bacterial analysis on CSHH station samples. Nitrogen samples are analyzed by Pace Analytical Services, LLC.

In 2015, three in-harbor monitoring stations (CSHH #16, #17, #17A) were added within the area of the harbor that was recertified for shellfish harvesting. CSHH #17 and #17A were specifically added to check conditions outside of Crescent Beach, which has been closed since 2009 because there is a known source of bacterial contamination (from a stream that runs adjacent to the beach and out to the harbor). CSHH #17 is just outside the restricted line for shellfish harvesting, and a full survey is conducted at this site. CSHH #17A is close to shore; a full survey is not conducted here, but bacteria samples are collected at this site.



**Table 2: Latitude/Longitude Points for All Monitoring Stations
(Garmin Montana 680t, NAD 83 Datum)**

Station ID	Latitude N	Longitude W
Upper-Harbor Stations		
CSHH #1, Beacon 11	40.83189	073.65353
CSHH #2, Bell 6	40.86099	073.67362
CSHH #3, red channel marker	40.85373	073.65202
CSHH #8, adjacent to STP outfall pipe	40.85851	073.64191
CSHH #9, 10 ft west of #8	40.85850	073.64195
CSHH #10, 20 ft west of #8	40.85846	073.64203
CSHH #11, 50 ft east of #8	40.85881	073.64154
CSHH #12, 100 ft east of #8	40.85947	073.64054
CSHH #13, 60 ft from Mill Pond weir	40.86165	073.63583
CSHH #15, about 50 yds from Scudder’s Pond outfall, north of Tappen Beach pool area	40.83820	073.65355
CSHH #15A, at outfall north of Tappen Pool	40.83837	073.65263
CSHH #15B, at Scudder’s Pond weir	40.83709	073.65144
CSHH #16, north of Bell 6	40.87349	073.67493
CSHH #17, just outside the Crescent Beach restricted shellfish area	40.88365	073.65016
CSHH #17A, inside Crescent Beach restricted shellfish area, just off shoreline	40.88343	073.64819
Lower-Harbor Stations		
CSHH #4, east of North Hempstead Beach Park (formerly Bar Beach) sand spit	40.82815	073.65015
CSHH #5, Mott’s Cove	40.82197	073.64619
CSHH #6, east of Port Washington transfer station	40.81114	073.65008
CSHH #7, west of Bryant Landing (formerly site of oil dock)	40.80596	073.65065
CSHH #14, about 50 yds from powerhouse drain outfall	40.82848	073.64840
CSHH #14A, at powerhouse drain outfall	40.82872	073.64776



Table 3: Parameters Measured for In-Harbor Water-Quality Monitoring (CSHH #1-7, #16-17, and #17A)

Parameter	Location	Analyzer or Method	Location of Analysis
Dissolved oxygen	Vertical profile* at CSHH #1-7, #16-17	YSI EXO2S**	Field
Dissolved oxygen	One location for electronic meter validation	LaMotte 5860-01 (Winkler titration)	Field
Water temperature	Vertical profile at CSHH #1-7, #16-17; CSHH #17A (sample collection only)	YSI EXO2S	Field
Water temperature	One station for electronic meter validation	Calibrated digital thermometer	Field
Air temperature	CSHH #1-7, #16-17, #17A	Calibrated digital thermometer	Field
Salinity	Vertical profile at CSHH #1-7, #16-17	YSI EXO 2S	Field
pH	Vertical profile at CSHH #1-7, #16-17	YSI EXO2S	Field
pH	One station for electronic meter validation	LaMotte 5858-01 Test Kit	Field
Turbidity	Vertical profile at CSHH #1-7, #16-17	YSI EXO2S	Field
Water clarity	CSHH #1-7, #16-17	LaMotte Secchi disk	Field
Total Kjeldahl nitrogen	Grab sample at half-meter depth at CSHH #1, #3, #6-7, #16	EPA 351.2, Rev. 2.0	Pace Analytical Services, LLC
Ammonia	Grab sample at half-meter depth at CSHH #1, #3, #6-7, #16	EPA 350.1, Rev. 2.0	Pace Analytical Services, LLC
Nitrate	Grab sample at half-meter depth at CSHH #1, #3, #6-7, #16	EPA 353.2 Rev. 2.0	Pace Analytical Services, LLC
Nitrite	Grab sample at half-meter depth at CSHH #1, #3, #6-7, #16	EPA 353.2 Rev. 2.0	Pace Analytical Services, LLC



Parameter	Location	Analyzer or Method	Location of Analysis
Fecal coliform	Grab sample at half-meter depth at CSHH #1-7, #16-17, #17A	Membrane filter, SM 9222 D-2006	Nassau County Department of Health
Enterococci	Grab sample at half-meter depth at CSHH #1-7, #16-17, #17A	Membrane filter, EPA 1600	Nassau County Department of Health
Precipitation	Village of Sea Cliff	Stratus Precision Rain Gauge (visually read)	Field

* Vertical profiles start at 0.5 meter below surface followed by 1-meter increments and are conducted for stations CSHH #1-7, and #16-17.

** In the event that the YSI EXO2S is out of service, the YSI EXO1 will be used for all parameters except pH.

4.2 Outfall Monitoring Program

The CSHH outfall monitoring component of the water-monitoring program was developed to help assess pollutant loads and sources.

The study area for the program is defined by the Hempstead Harbor shoreline (and the associated upland drainage areas) south of an east-west line starting at the mouth of Glen Cove Creek (also as reference, south of three DEC SGA #50 stations – DEC #10 [private dock], #11 [navigational marker C-A], and #12 [beyond mouth of Glen Cove Creek]). The stations monitored include Glen Cove Creek outfalls: CSHH #8 (the area below the Glen Cove sewage treatment plant outfall); CSHH #9 and #10 (west of the STP outfall); CSHH #11 and #12 (in-creek, not directly adjacent to outfalls but used to assess the overall impact of stormwater on Glen Cove Creek); and CSHH #13 (at the head of Glen Cove Creek, about 60 feet from the Mill Pond weir and the 4-foot outfall at the corner of the south bulkhead).

Farther south in Hempstead Harbor, along the eastern shoreline, is CSHH #15A (a large outfall at the bulkhead below Shore Road just north of the Tappen Pool). This outfall drains water from Scudder’s Pond and Littleworth Lane in Sea Cliff. CSHH #15B is within Scudder’s Pond at the weir, before the water drains to the harbor. These stations were established in 2009 to monitor discharges prior to implementation/construction of stormwater strategies/structures at Scudder’s Pond. In 2013, the major restoration work that was undertaken at Scudder’s Pond was completed, but CSHH continues to monitor pond-related stations to assess the efficacy of the restoration efforts in diminishing bacteria loading to Hempstead Harbor. CSHH #15 is about 50 yards west of the outfall at #15A and can be accessed only in high tide; bacteria samples are collected at this station to monitor the impact of water discharged from CSHH #15A.



Also in 2009, CSHH #14 and #14A were added to the monitoring program. CSHH #14A (the powerhouse drain outfall) is the large outfall below Shore Road at the bottom of Glenwood Road in Glenwood Landing and drains the subwatershed above. Samples collected from CSHH #14 (about 50 yards west of the powerhouse drain outfall, CSHH #14A) are intended to monitor the impact of water discharged from CSHH #14A. Similar to the strategy that was developed for Scudder’s Pond, the powerhouse drain outfall is being sampled during the summer season as well as during the fall and winter months. This sampling is being conducted in anticipation of the work that will be undertaken to diminish stormwater runoff and bacteria loading to Hempstead Harbor, from what was determined to be the second largest contributor of bacteria to the harbor (Scudder’s Pond was the largest, prior to the pond’s restoration.)

Grab samples for nitrogen and bacteria analysis are collected either at half-meter depth or directly from the outfall flow when possible (noted on bacteria chain-of-custody sheets).

**Table 4: Parameters Measured for Outfall Monitoring Program
(CSHH #8-14, #14A, #15A, and #15B)**

Parameter	Location	Analyzer or Method	Location of Analysis
Dissolved oxygen	Vertical profile* at CSHH #8, #13-14, #15	YSI EXO2S**	Field
Water temperature	Vertical profile at CSHH #8, #13-14, #15; CSHH #9-12 (sample collection only)	YSI EXO2S	Field
Water temperature	CSHH #14A, #15A, #15B	Calibrated digital thermometer	Field
Air temperature	CSHH #8-14, #14A, #15, #15A, #15B	Calibrated digital thermometer	Field
Salinity	Vertical profile at CSHH #8, #13, #14, #15	YSI EXO2S	Field
pH	Vertical profile at CSHH #8, #13, #14, #15	YSI EXO2S	Field
Turbidity	Vertical profile at CSHH #8, #13, #14, #15	YSI EXO2S	Field
Water clarity	CSHH #8, #13, #14, #15	LaMotte Secchi disk	Field



Parameter	Location	Analyzer or Method	Location of Analysis
Total Kjeldahl nitrogen	Grab sample at CSHH #8, #12-13, #14A, #15A	EPA 351.2, Rev. 2.0	Pace Analytical Services, LLC
Ammonia	Grab sample at CSHH #8, #12-13, #14A, #15A	EPA 350.1, Rev. 2.0	Pace Analytical Services, LLC
Nitrate	Grab sample at CSHH #8, #12-13, #14A, #15A	EPA 353.2, Rev.2.0	Pace Analytical Services, LLC
Nitrite	Grab sample at CSHH #8, #12-13, #14A, #15A	EPA 353.2, Rev.2.0	Pace Analytical Services, LLC
Fecal coliform	Grab sample at CSHH #8-14, #14A, #15, #15A, #15B	Membrane filter, SM 9222D-2006	Nassau County Department of Health
Enterococci	Grab sample at CSHH #8-14, #14A, #15, #15A, #15B	Membrane filter, EPA 1600	Nassau County Department of Health
Precipitation	Village of Sea Cliff	Stratus Precision Rain Gauge (visually read)	Field

* Vertical profiles start at 0.5 meter below surface followed by 1-meter increments and are conducted for stations CSHH #8, #13-14, and #15.

** In the event that the YSI EXO2S is out of service, the YSI EXO1 will be used for all parameters except pH.

5 Data Quality Objectives and Criteria

5.1 Data Quality Objectives

Data quality objectives specify the quality of environmental data required to support decision-making processes for the Hempstead Harbor monitoring program.



5.2 Data Quality Indicators

Below is a description of the data quality indicators: precision, bias, accuracy, representativeness, comparability, completeness, and sensitivity. *Table 5* summarizes the accuracy, precision, and sensitivity of the specific monitoring parameters.

5.2.1 Precision

Precision of sampling will be estimated by the following:

- Taking duplicate field measurements (for vertical profiles) for one station at the first in-harbor station for each sampling event (representing approximately 10% of all samples).
- For the multiparameter meter, standards will be read within 24 hours of the start and at the end of each field day, to verify the instrument has not drifted.
- Dissolved oxygen results from the multiparameter meter will be validated with a sample from one location per monitoring date using a LaMotte field kit that employs the Winkler-titration method.
- pH results from the multiparameter meter will be validated with a sample from one location per monitoring date and analyzed using a LaMotte reagent kit.
- Duplicate grab samples will be taken once in approximately every 20 samples for bacteria and nitrogen.
- Relative percent difference (RPD) is used as the precision acceptance criteria. RPD is calculated as follows:

$$RPD = \frac{|Conc(p) - Conc(d)|}{\left(\frac{1}{2}\right)(Conc(p) + Conc(d))} * 100$$

where:

Conc(p) = Primary Sample Concentration, the first sample collected at that location

Conc(d) = Duplicate Sample Concentration, the second sample collected at that location

See also *Tables 5* and *6*.

5.2.2 Bias and Accuracy

Bias and **Accuracy** of results will be estimated or confirmed by the following:

- Analysis of lab blanks (e.g., for bacteria).
- When a multiparameter sonde is used, standards will be read within 24 hours of the start and end of each field day, to verify the instrument is accurate.



- Calibration of the multiparameter meter within 24 hours prior to each monitoring event. The instruments are calibrated using the procedures outlined in the manufacturer user manuals as referenced in *Appendix D*.
- Comparison of calibration and postcalibration results with acceptable calibration ranges; see *Table 7*.

See also *Tables 5 and 6*.

5.2.3 Representativeness

Data **representativeness** will be met by the following:

- Sampling sites are selected to be representative of conditions for a specific area of the water body (or a specific pollution source). For example, CSHH #2, #16, and #17 may be considered representative of estuarine conditions in the outer section of the harbor.
- Outfall monitoring stations are not representative of estuarine water quality, but may be considered representative of conditions in areas within close proximity to fresh water inflows and/or similar pollutant loadings. For example, CSHH #9 and #10 are representative of other areas within Glen Cove Creek that are near fresh water inflows.
- Any abnormal or episodic conditions that may affect the representativeness of sample data are noted and maintained as metadata.
- Sample-collection timing and frequency of in-harbor stations are selected to capture data that are representative of a range of conditions (e.g., wet/dry weather, rising/ebb tide, and seasonal variability).

5.2.4 Comparability

Comparability of project data among sites and with that of other programs will be enhanced by the following:

- Using established field protocols.
- Using standard laboratory methodologies.
- Sampling consistently on the same day of the week and at similar times of day.
- Documenting methods, analysis, sampling sites, times and dates, sample storage and transfer, as well as laboratories and identification of specialists used so that future surveys can produce comparable data by following similar procedures.



5.2.5 Completeness

Data **completeness** goals shall be:

- At least 80% of the anticipated number of samples on a particular sampling date will be collected, analyzed, and used.
- The anticipated number of samples on a particular sampling date will vary according to tidal cycles and access to monitoring stations.
- Data will be tracked by keeping detailed and complete sample and survey records.
- Data will be summarized via a report detailing number of anticipated samples, number of valid results, and percent completion for each parameter.

In-Harbor Monitoring Data

There are 10 in-harbor monitoring stations (including CSHH #17A—see *Section 4.1*). These encompass 4 lower-harbor stations and 6 upper-harbor stations. The completeness goal for each in-harbor monitoring event will vary according to tidal cycles. It is not possible to access lower-harbor stations during low tide. It is anticipated that access will be possible at least every three weeks to lower-harbor stations (sampling locations south of the sand spit of the Town of North Hempstead Beach Park). Therefore, failure to collect samples at these locations does not interfere with the usability of the data. Otherwise, CSHH will complete all sampling and field monitoring unless weather, tide, safety issues, or other conditions interfere.

Outfall Monitoring Data

There are 11 outfall-related monitoring stations. These include 3 stations that have limited access because of tidal cycles (CSHH #13, CSHH #14, and CSHH #15). However, uncollected/unanalyzed samples will still allow meeting the goal of identifying potential pollutant sources (i.e., a high bacteria or nitrogen value at a particular outfall could still be useful as identifying a pollutant source or event).

Because the selected monitoring locations will represent suspected bacteria and nitrogen contributors to the harbor, a complete sampling event (samples from all outfall locations, up to 11) is intended to characterize the discharges to the harbor. Because the intended use of the data is to identify, quantify, and interpret pollutant inputs to the harbor, there is no specific representativeness requirement; e.g., if a sample is not collected during an event, the validity of the dataset will not be compromised.

5.2.6 Sensitivity

Sensitivity/detection limits are determined by the instrument or the analytical method. Sensitivity is the lowest limit of the instrument or method for each of the measurement parameters of



interest. Laboratory analyses have preset limits of detection for the nitrogen analyses as well as the fecal coliform and enterococci bacteria. Field sampling equipment has published specifications that include detection limits.

See Tables 5 and 6 for sensitivity and detection limits for water-quality parameters measured in this monitoring program.

Table 5: Accuracy, Precision, and Sensitivity for Specific Monitoring Parameters

Parameter	Units	Accuracy	Precision (allowable RPD)	Approx. Expected Range	Sensitivity
Depth (calibrated line)	Meters (m)	± 0.1 m	20%	0 – 12 m	0.1 m
Depth (YSI EXO2S)	Meters (m)	0 to 10 m ± 0.004 m (± 0.04% of FS) 0 to 100 m ± 0.04 m (± 0.04% of FS) FS = Full Scale	20%	0 – 12 m	0.001 m
GPS coordinates (Garmin Montana 680t)	Decimal degrees (dec. deg.)	± 7.8 m https://www.gps.gov/systems/gps/performance/accuracy/	For reference point on land, within 10 m (e.g., =0.0001 dec. deg.)	N/A	1.02 m
Air/water temperature (digital thermometer)	Degrees celsius (°C)	± 1 °C	10%	-15 – 36 °C	0.1 °C
Water temperature (YSI EXO2S)	Degrees celsius (°C)	-5 to 35°C: ± 0.01°C	10%	4 – 26 °C	0.001°C
Conductivity* (YSI EXO2S)	MicroSiemens/centimeter (µS/cm)	0 to 100 µS/cm: ± 0.5% of reading or 0.001 µS/cm, whichever is greater	10%	9,000 – 46,000 µS/cm	0.0001 µS/cm
Dissolved oxygen (LaMotte 5860-01, Winkler titration method)	Milligrams per liter (mg/l) = parts per million (ppm)	± 0.2 ppm	20%	0 – 14 ppm	0.2 ppm



Parameter	Units	Accuracy	Precision (allowable RPD)	Approx. Expected Range	Sensitivity
Dissolved oxygen (YSI EXO2S)	Milligrams per liter (mg/l) = parts per million (ppm) percent saturation (% sat.)	0 – 20 mg/l: ± 1% of reading or 0.1 mg/l 0 – 200%: ± 1% reading or 1% air sat., whichever is greater	20%	0 – 14 mg/l 0 – 120% sat.	0.01 mg/l 0.1% air sat.
Turbidity (YSI EXO2S)	Formazine nephelometric units (FNU)	0 – 999 FNU: 0.3 FNU or ± 2% of reading, whichever is greater	20%	0 – 30 FNU	0.01 FNU
Water clarity (Secchi disk)	Meters (m)	± 0.1 m	10%	0 – 4 m	0.25 m
pH (LaMotte 5858-01 wide-range indicator)	N/A	5.0 – 10.5	(Color metric)	6.5 – 8.5	0.5
pH (YSI EXO2S)	N/A	± 0.1 pH units within ± 10°C of calibration temperature; ± 0.2 pH units for the entire temp range	5%	6.8 – 8.5	0.01 units

* Conductivity is the calibrated parameter to arrive at salinity (measured in parts per thousand), for which the approximate expected range is 5 – 30 ppt.



Table 6: Accuracy and Precision for Laboratory Parameters

Parameter	Method	Detection Limit	Accuracy	Precision
Fecal coliform	Membrane filter, SM 9222D-2006	< 1 CFU/100 ml	± 20	20%
Enterococci	Membrane filter, EPA 1600	< 1 CFU/100 ml	± 20	20%
Total Kjeldahl nitrogen	EPA 351.2, Rev. 2.0	< 0.10 mg/l	± 20	20%
Ammonia	EPA 350.1, Rev. 2.0	< 0.10 mg/l	± 20	20%
Nitrate	EPA 353.2, Rev. 2.0	< 0.050 mg/l	± 20	20%
Nitrite	EPA 353.2, Rev. 2.0	< 0.050 mg/l	± 20	20%

Table 7: Acceptable Calibration Ranges

Calibration Standard	Acceptable Range
HDO% (100%)	97-103
Chl <i>a</i> (0 µg/L)	-0.30 – 0.30
Turbidity (0 NTU)	-3.00 – 3.00
Turbidity (124 NTU)	121.0 – 127.0
SpCond (50,000 µS/cm)	48,500 – 51,500
pH (7.00)	6.80 – 7.20
pH (10.00)	9.80 – 10.20
Depth (0 m)	-0.1 – 0.1



6 Nondirect Measurements

To provide high-quality data to enhance the interpretation of data collected as part of this monitoring program, data may be acquired from qualified sources approved by the monitoring Project Manager/Field Team Leader. Tide information is obtained from the *Eldridge Tide and Pilot Book*, which is issued annually. No additional data sources have been identified that could be used in the monitoring program reports and data analysis. If other data are identified, their usability and comparability will be assessed.

7 Project Design Elements

7.1 Monitoring-Process Design

The monitoring program follows a judgment-based design intended to compare collected data with historical data and to provide a baseline for comparison with future sampling activities. A description of the monitoring locations and the rationale for the selection of those locations are presented in *Section 4*. Maps showing the monitoring locations are presented in *Appendix C*.

The Hempstead Harbor aquatic system is affected by many factors including tidal, seasonal, and meteorological conditions, treated sanitary wastewater, nonpoint-source runoff, and recreational uses. Therefore, the monitoring of CSHH stations is conducted once per week from May through October to document changes in ambient water-quality conditions and gain information on potential pollution sources.

The monitoring Project Manager/Field Team Leader consulted with environmental agency staff, e.g., Nassau County Department of Health and NYS Department of Environmental Conservation, to determine the stations that should be selected for both the in-harbor and outfall-monitoring components of the program. Factors considered for selecting stations as part of the in-harbor or outfall-monitoring components of the monitoring program include the following:

- In-harbor sites that were sampled previously by the above-mentioned agencies were incorporated into the current program to supplement historical data.
- In-harbor sites were selected as a result of changing water-quality conditions, as in the case of stations selected following recertification of shellfish beds in the upper harbor.
- Some outfall monitoring sites were selected because they were near inflows that were determined to be known sources of bacteria loading to Hempstead Harbor.
- Some outfall monitoring sites were selected as a result of repeated observations of unusual discharges.



The water-quality testing stations were assigned unique numeric codes that run chronologically as new stations are added. For example, CSHH #1, #2, and #3 were the first sites selected when the program was initiated in 1992. CSHH #16, #17, and #17A are the newest stations—added in 2015.

There are 21 water-quality stations monitored in Hempstead Harbor that encompass in-harbor monitoring stations and outfall monitoring stations. Sonde profiles for water-quality parameters at water-quality stations will be sampled in 1-meter increments starting at 0.5 m below the surface and ending within a quarter of a meter from the bottom.

A summary of general design approaches to the number of stations, depth of sampling, and frequency of sampling is included at *Table 10*.

7.1.1 Addition of Monitoring Locations

If other locations of interest are identified (e.g., if an outfall reconnaissance survey identifies the potential for significant pollutant sources or changing water-quality conditions require expanded investigation), they will be considered for future inclusion in the in-harbor or outfall-monitoring components of the program as appropriate. The QAPP will be amended as appropriate to reflect any changes via a letter listing station changes.

7.1.2 Removal of Monitoring Locations

Program managers may consider removing in-harbor monitoring locations based on the changing needs of data users and the availability of funding. If a monitoring location is removed from the monitoring program, it must be noted in that year's annual report.

7.2 Rationale for Selection of Sampling Parameters

Field parameters measured include dissolved oxygen, temperature, salinity, pH, water clarity, and turbidity. **Samples collected for laboratory analysis** include those for total Kjeldahl nitrogen, ammonia, nitrate, nitrite, fecal coliform, and enterococci. See *Tables 3 and 4*.

Dissolved oxygen (DO) is monitored because hypoxia is a common water-quality problem in Long Island Sound and Hempstead Harbor. DO is a significant indicator of estuarine health as it is required by marine fauna, and it is indirectly affected by nutrient enrichment. DO is an important indicator of the health of the fishery.

Monitoring water temperature is important in measuring percent saturation of DO within the harbor. In addition to nutrient enrichment, increased temperatures reduce water's capacity for DO. Thus, monitoring temperature can help indicate whether low DO levels result from temperature or nutrient enrichment. Additionally, monitoring temperature helps to determine



whether the water column is stratified. Density currents, caused by temperature differentials, can prevent mixing within the water column and can lead to hypoxia.

Monitoring salinity assists in determining whether the harbor is being influenced by tidal water or by freshwater from the watershed (and that can help determine whether water-quality problems result from stormwater, wastewater, other discharges, or from tidal backwater). Salinity measurements are also used to determine the percent saturation of DO.

pH is monitored to follow trends in aquatic life and water chemistry. Release of carbon dioxide (CO₂) via respiration affects aquatic pH on small time scales (hours to days), whereas increases in atmospheric CO₂ may affect aquatic pH on the decadal time scale.

Water clarity is monitored through the use of a Secchi disk, and turbidity levels are monitored through the use of a multiparameter meter. The Secchi disk is used to determine the depth to which ambient light can penetrate the water column. In most productive waters, Secchi-disk depth is limited by algal productivity; thus this monitoring tool can be used to track the spatial and temporal occurrence of algal blooms. Turbidity is the measure of particles in the water; the higher the turbidity is, the lower the water clarity will be.

We collect samples for total Kjeldahl nitrogen, nitrate, nitrite, and ammonia on a biweekly basis using laboratory analysis of the samples from the following monitoring stations: CSHH #1, #3, #6-8, #12-13, #14A, #15A, and #16. Any changes to the stations sampled due to unforeseen circumstances will be documented in field notes.

Nitrate and nitrite occur in later stages of the nitrogen cycle and are expected to be present in the estuary. However, high concentrations indicate nutrient enrichment and can be used to anticipate algal blooms and hypoxia. Ammonia is expected to be present in significant quantities only if there is a malfunction of wastewater treatment systems (including septic tanks, cesspools, and publicly owned treatment works) or from illicit stormwater discharges. Thresholds for total nitrogen in surface water are presented in *Table 8*.

The Nassau County Department of Health uses enterococci as the indicator of pathogen contamination for purposes of monitoring water quality at public swimming beaches. New York State Department of Environmental Conservation uses fecal coliform bacteria levels to determine whether to open or close shellfish beds. Hempstead Harbor is divided into three classifications: Class SA north of the sand spit (not including Glen Cove Creek), SB south of the sand spit, and SC for Glen Cove Creek. *Table 9* presents applicable New York State surface water-quality standards for Class SA, SB, and SC waterbodies. CSHH collects water samples at 21 stations throughout Hempstead Harbor to augment the data collected by these agencies and to help identify and diminish bacteria loading to the harbor.

Quality-assurance controls for field-sampling systems, including field-measurement checks and duplicate sampling, are presented in *Tables 10* and *11*.



Table 8: Total Nitrogen Thresholds*

Total Nitrogen in mg/l	Rating
< 0.4	Pass
0.4 - 0.5	Good
0.5 - 0.6	Fair
0.6 - 0.8	Marginal
0.8 - 1.2	Poor
> 1.2	Fail

*Water quality gradients and trends in New York Harbor, Dylan M. Taillie, Judith M. O’Neil, William C. Dennison, University of Maryland Center for Environmental Science, Integration and Application Network and Horn Point Environmental Lab, Cambridge, MD 21613.

Table 9: New York State Water Quality Standards (6 NYCRR Part 703)

Parameter*	Standard
pH	The normal range shall not be extended by more than one-tenth (0.1) of a pH unit.
Dissolved oxygen	Chronic: Shall not be less than a daily average of 4.8 mg/l
Fecal coliform**	The monthly geometric mean, from a minimum of five examinations, shall not exceed 200 per 100 ml.
Enterococci***	The geometric mean of samples collected over any consecutive 30-day period shall not exceed 35 per 100 ml, and no more than 10 percent of the samples collected in the same 30-day period shall exceed 130 per 100 ml.
Ammonia	35 µg/l for aquatic, chronic 230 µg/l for aquatic, acute

*For all SA, SB, SC Classified Waterbodies (unless otherwise specified); 6 CRR-NY 703.3 effective April 30, 2021 ([https://govt.westlaw.com/nycrr/Browse/Home/NewYork/NewYorkCodesRulesandRegulations?guid=I070d30d0b5a111dda0a4e17826ebc834&originationContext=documenttoc&transitionType=Default&contextData=\(sc.Default\)\)](https://govt.westlaw.com/nycrr/Browse/Home/NewYork/NewYorkCodesRulesandRegulations?guid=I070d30d0b5a111dda0a4e17826ebc834&originationContext=documenttoc&transitionType=Default&contextData=(sc.Default)))).

**For SB and SC Classified Waterbodies only.

***For coastal recreation waters of the following classes: SA and SB.



Table 10: Sampling Approaches for Vertical Profiles at Water-Quality Stations

Parameters	Field Survey Quality Control	Number of Sample Locations	Frequency
GPS: latitude & longitude in decimal degrees; NAD 83 coordinate system or record system used	Reference land site, once per sampling event. Verbally repeat readings every time a station is sampled. Assess coordinates indicating a 10 m or greater discrepancy and document in a final report.	7-13 stations depending on tide	Every sample date
Water clarity—Secchi disk	Take two readings at every station.	7-13 stations depending on tide, starting at half a meter below the surface, thereafter in meter increments to approximately one-quarter meter above bottom	
Station depth	Take a replicate reading at one station once per field day.		
Sample depth	Calibrate and conduct a postmonitoring check as per SOPs.		
Temperature			
Salinity			
Dissolved oxygen			
Turbidity			
pH			



Table 11: Sampling Approaches for Grab Samples at Water-Quality Stations

Parameters	Field Survey Quality Control	Number of Sample Locations	Frequency
Fecal coliform	Use trip blank to control for temperature and contamination (sterile sample jars provided by laboratory). Take duplicate sample once in every 20 samples. Rinse large sample jar with sample water twice before collecting sample (#14A, #15A, and #15B only, where a sampling collection jar is used; for all other samples, a sterile/new sample bottle is used for sampling). Prelabel sample bottles.	15-21 stations depending on tide	Weekly
Enterococci			
Total Kjeldahl nitrogen	Take duplicate sample once in every 20 samples.	8-10 stations depending on tide	Biweekly
Ammonia	Rinse sample-collection bottle with sample water twice before collecting sample.		
Nitrate	Prelabel sample bottles.		
Nitrite			

8 Quality Control

Parameters monitored in the field are recorded on a copy of the field data sheet presented in *Appendix F*. Field equipment is maintained as discussed in the SOPs presented in *Appendix A*.

Lab-quality control protocols are discussed with the external lab facility or contractor analyzing the enterococci and fecal coliform samples and the nitrogen samples prior to sampling to ensure acceptability.



8.1 Field Requirements for Vertical Profiles

Table 12 presents a summary of field quality-control requirements. (See also Table 10 in Section 7.2.)

Table 12: Field Quality-Control Requirements for Vertical Profiles

Instrument	Parameter	Accuracy Checks	Precision Checks	Field QC
Garmin Montana 680t	GPS coordinates	Set location of reference site and compare with Google Earth coordinates.	Check readings at a land-based reference point.	1/field day
Metered line	Station depth	Remeasure line.	Check against boat depth finder and YSI EXO2S sonde reading.	1/field day
YSI EXO2S multiparameter sonde	Depth, temperature, salinity, pH, dissolved oxygen, turbidity	Conduct presurvey checks, calibration, and postsurvey checks.	Repeat water-column profile at one station and record readings only when values are stable.	1/field day

8.2 Field Requirements for Grab Samples

Table 13 presents a summary of field quality-control requirements for grab samples taken for indicator bacteria tests and for nitrogen tests. For bacteria samples and nitrogen samples, selected laboratories are used for analyses. LaMotte test kits for dissolved oxygen (using the Winkler titration method) and pH are analyzed in the field.



Table 13: Field Quality-Control Requirements for Grab Samples

Lab/Test Kit	Parameter	Accuracy Checks	Precision Checks	Field QC
Laboratory analysis	Fecal coliform and enterococci	All samples are collected in laboratory-provided sample jars; samples are stored on ice in cooler until delivery to the lab.	The lab records temperature of samples when delivered.	A trip blank is used as a control for temperature and contamination; sample jars and data sheets are provided by lab.
Laboratory analysis	Total Kjeldahl nitrogen, ammonia, nitrate, and nitrite	All samples are collected in laboratory-provided sample jars; samples are stored on ice in cooler until delivery to the lab.	The lab records temperature of samples when delivered.	Sample jars, preprinted jar labels, and chain of custody sheets are provided by lab and sample duplicates are run by lab.
LaMotte test kits for field analysis	Dissolved oxygen (Winkler titration) and pH	Manufacturer directions are displayed for each sample analyzed; reagent bottles are held vertically while adding to sample to assure same amount of reagent used for each sample; sample for Winkler titration is collected at same depth that will be read from the multiparameter meter.	Two or more members of the field team read color comparators to assess levels; sample for Winkler titration is taken at the same bottom depth as multiparameter meter and results are compared.	For Winkler titration, “fixed” sample water is held in the event that the test must be repeated.



8.3 Field (Blind) Duplicate Samples

Duplicate samples will be collected to check the precision of the laboratory analysis and field-sampling procedures. Duplicate samples will be analyzed for the same parameters as the corresponding primary samples collected at the same time. The duplicate sample set will be assigned a different sample number than the original set so that the sample identity is blind to the laboratory. One duplicate sample will be collected per 20 samples per matrix and submitted to the laboratory.

8.4 Sample Handling and Custody Procedures

The majority of the measurements taken as part of the monitoring program are recorded in the field. Bacteria and nitrogen samples are labeled with a specific site identifier and the date and time the sample is taken. This information is also included on the lab-supplied data/chain-of-custody sheets. The samples are stored upright in a cooler with ice (for temperature control) during the monitoring event and are immediately transported to the laboratory once sampling is completed. A laboratory-provided trip blank is checked at the lab to assure the bacteria samples were maintained within the required temperature range (0°- 6°C). If the temperature-control sample is out of range, the results are flagged and qualified. *Table 14* presents preservation and holding-time requirements for the analyses performed by laboratories (samples are delivered immediately after monitoring; maximum hold time in *Table 14* is from the time of sample collection). All other parameters are field measured and are not held or preserved.

Table 14: Laboratory Requirements for Sample Handling

Parameter	Bottle Size/Type	Preservation	Type	Max Hold Time
Fecal coliform	250 ml/plastic	Iced	Grab	8 hours
Enterococci	250 ml/plastic	Iced	Grab	8 hours
Total Kjeldahl nitrogen	250 ml/plastic	Iced/preserved (H2SO4)	Grab	48 hours
Ammonia	250 ml/plastic	Iced/preserved (H2SO4)	Grab	48 hours
Nitrite/nitrate	250 ml/plastic	Iced/unpreserved*	Grab	48 hours
Nitrite	250 ml/plastic	Iced/unpreserved*	Grab	48 hours
Nitrate	(Calculated: Nitrite/Nitrate – Nitrite = Nitrate)			

*Nitrite/Nitrate can be run from preserved or unpreserved samples; the hold time can be extended to 28 days if preserved with H₂SO₄.



8.5 Fixed Laboratory QC

Quality-control samples that will be initiated by the laboratory will be analyzed in accordance with their quality assurance procedures and Laboratory Methods Manual.

9 Instrument/Equipment Inspection and Maintenance

Maintenance of instruments and equipment is conducted weekly during the field season. Records of equipment inspection, maintenance, and repair and replacement are kept in an annual logbook; logbooks are archived in the CSHH office. *Table 15* summarizes inspection procedures.

Table 15: Instrument/Equipment Inspection Procedures

Equipment Type	Inspection Frequency	Type of Inspection	Maintenance, Corrective Action
GPS unit	Before each sampling date	Battery life	Charge batteries.
Calibrated depth line	Annually, or when a potential problem is noted	Check the calibrated line against a meter tape	If the line has stretched or is damaged, replace immediately.
Secchi disk	Before each sampling date	Check line and metal bolt snap	Rinse after each sampling date and replace parts as needed.
Multiparameter sonde	Before each sampling date	Battery life, electrical connections, sensor condition	Charge batteries, as appropriate.
LaMotte test kits	Before each sampling date	Quantity and expiration of chemicals	Vials are rinsed in the field with surface water; following field sampling, vials are rinsed with a light solution of Dawn detergent and tap water; chemicals are replaced as needed.



Equipment Type	Inspection Frequency	Type of Inspection	Maintenance, Corrective Action
Calibrated electronic thermometer	Before each sampling date	Battery life	Change battery as needed.
Wind meter	Before each sampling date	Check float ball	Replace as needed.
Sample collection poles and jars	Before each sampling date	Check hinge and clamp	Lubricate and replace as needed.

9.1 Instrument/Equipment Calibration and Frequency

Calibration is conducted within a day prior to a sampling trip and a postcheck against standards occurs within six hours following the sampling trip.

Calibration records are kept in an annual logbook and archived in the CSHH office. Calibration records are maintained for a minimum of five years, ideally longer. A summary of calibration procedures for instruments and equipment is provided in *Table 16*.

Table 16: Instrument/Equipment Calibration Procedures

Instrument	Inspection and Calibration Frequency	Standard of Calibration for Instrument Used	Corrective Action
Calibrated lines (for Secchi-disk depth)	Annually	LaMotte pre-marked line and tape measure	Recalibrate or replace with calibrated line.
Multiparameter sonde	Before each sampling date	Standard solutions	Follow manufacturer's instructions and tech support recommendations.



9.2 Inspection/Acceptance of Supplies and Consumables

Supplies needed for this monitoring program include sampling bottles, calibration standards, and equipment replacement parts. Samples will be collected in bottles supplied by the laboratory scheduled to perform the analysis. Bottles will be inspected for signs of contamination (e.g., unexpected liquids and broken seals) and wear (e.g., cracks and scratched lid threads) before use. Calibration standards and replacement parts will be obtained from the original manufacturer of the equipment and/or the laboratory that has supplied the sample bottles. *Table 17* outlines the supplies inspection and acceptance procedures.

Table 17: Supplies Inspection and Acceptance Procedures

Supplies	Inspection Frequency	Type of Inspection	Available Parts	Maintenance
Calibration standards	Before each sampling date	Visual inspection of quantity and expiration date	Spare, fresh solutions	Store according to manufacturer's recommendations and replace annually at beginning of the sampling season.
Sonde sensors	Before each sampling date	Visual inspection of quality, integrity	Backup meter, new parts ordered as needed	Store according to manufacturer's recommendations.
Field and lab sample sheets	Before each sampling date	Visual	Additional copies	Update sheets seasonally.
Cooler	Before each sampling date	Cleanliness, visual inspection of integrity	New ice supply weekly	Inspect annually and replace as needed.



10 Data Management

Field data are collected on a field data sheet during each sampling event (see *Appendix F*). Field data will be compiled electronically after each event. The electronic file will be backed up periodically. The original field data sheets will be maintained on file for at least five years in an annual logbook and archived in the CSHH office. All water quality data will be uploaded to the Water Quality Exchange (WQX) as per EPA funding requirements.

The Project Quality Assurance Officer will frequently (once per month) compare a sample of the field data sheets to the electronic file and edit any incorrectly entered data.

Records of QAPP amendments will be maintained at CSHH offices. A summary of changes and revisions from the previous version of the QAPP, along with a brief justification for the changes, will be appended to the front of the superseded QAPP in the file. A record of the pertinent EPA approvals shall be maintained with each version of the document.

11 Assessment and Response Actions

Management review procedures are presented in *Section 2.1*. Volunteer training and review procedures are presented in *Section 2.2*.

Data review, verification, validation, and usability are described in *Section 12*. Data quality audits will be conducted at least once per season by the Project QA Officer or other program manager. Audits will consist of inspecting the field data sheets, laboratory QA/QC data, and field duplicate RPD calculation, if available. A field audit will be conducted at least once per season by the Project Manager/Field Team Leader and will consist of overseeing sampling procedures. An equipment maintenance audit will be conducted at least once per season by the Project Manager/Field Team Leader and will consist of overseeing precheck, postcheck, and calibration procedures. Any deficiencies will be reported to the QAPP Manager, who will oversee the resolution of deficiencies. Possible courses of action include revising the QAPP, seeking assistance from the laboratories and other groups, and marking previously accepted data as invalid or provisional.

The following is a list of possible occurrences in the field that may require corrective action and the corresponding action that would likely occur:

- If any sample bottles break during transit such that insufficient sample is available to complete the analysis, resampling may have to occur.
- If meters or other sampling equipment break or malfunction during sampling, efforts will be made to repair, recalibrate, or replace them with backup equipment.
- If there are unusual changes in detection limits, resampling and reanalysis may have to occur.
- For unusual occurrences in the field, a note will be made on the field data sheet.



12 Data Validation and Usability

The objectives of data validation are to:

- Assess and summarize the analytical quality and defensibility of data for the end user.
- Document factors contributing to analytical error that may affect data usability, such as data discrepancies, poor laboratory practices that impact data quality, site locations for which samples were difficult to analyze.
- Document any “sampling error” that may be identified by the data verification process, such as contaminated trip or equipment blanks, incorrect storage or preservation techniques, improper sampling containers, and improper sampling techniques.

12.1 Data Review, Verification, and Validation Methods

During or soon after a monitoring event, monitoring and quality-control results will be reviewed by the Project Manager/Field Team Leader. Any unusual values will be flagged. Unusual values may include quality-control limits or data quality objectives (DQOs) that are not met, any changes in reporting or detection limits that are noted, unexpectedly large or small values that were recorded, any noted deviation from this QAPP, or any missing values. Data entry is conducted by two CSHH members, and the electronic copy of the data is immediately checked against the field data sheet. The Project QA Officer will compare entered electronic data with the original data sheets at least once per season to ensure the data was entered correctly. Any errors found will be corrected.

The Project QA Officer will then examine and validate the reviewed data. Data that meet the DQOs and that is collected following the procedures presented in this QAPP are considered valid. Data that are inconsistent with these standards (data that were flagged) will be examined by the Project Manager/Field Team Leader or Project QA Officer, (or both) to determine the cause of the deficiency and evaluate the usability of the affected data. This data may be accepted, marked as conditional, or discarded.

Depending on the outcome of the review, other actions may be taken. If equipment failure is suspected to be the reason for the problem, calibration or maintenance techniques will be reviewed and improved. If human error is suspected, team members will receive additional training as necessary. If data consistently violates the DQOs, SOPs, and QAPP, they will be reviewed and revisions suggested to correct identified problems (e.g., due to more variability in the sampled system or site-specific issues). Additionally, the DQOs will be evaluated and adjusted if they are unreasonably stringent. Any data discrepancies, DQO violations, or other conditions that are not



anticipated by the QAPP will be resolved on a case-by-case basis. Pertinent program procedures and documents will be revised as necessary. EPA will be notified of modifications to the QAPP in order to approve changes.

12.2 Data Usability

The purpose of this QAPP is to provide data that are acceptable to current users, including those users identified in *Section 3.1*. Input from data users will be considered during any revisions and modifications that may be made to this QAPP. Possible input could include revising data quality objectives, changing calibration procedures, and adjusting data-verification techniques.

User requirements and data-quality problems will be considered on a case-by-case basis. For example, if the calculated relative percent difference (RPD) for a nitrate field duplicate and the corresponding sample is greater than 20%, the difference may result from variability in the sampled system, and the two results could be averaged. However, if the RPD for a laboratory matrix spike program is larger than 30%, equipment problems may be present and all results should be discarded. The lab, other monitoring groups, EPA guidance documents, and other information will be consulted to determine the usability of a conditional sample.

Collected data will be used for the intended purpose. For example, monitoring locations selected to monitor inflow concentrations of pollutants will not be included in evaluating ambient harbor water-quality conditions.

13 Reporting, Documentation, and Records

CSHH presents the data collected by this monitoring program in HHPC/CSHH annual water-quality reports. The annual water-quality reports are shared among stakeholder groups, on the CSHH's and HHPC's websites, and periodically at CSHH, HHPC, and Long Island Sound Study workgroup meetings.

The annual water-quality reports are the culmination of that year's data, analyses, and outcomes. To meet the objectives outlined in *Section 3.1*, data analysis is performed, tables and figures are created, and seasonal and long-term trends are examined.

Below is a list of data objectives, each followed by an example from annual water-quality reports.

- Identify and study seasonal-scale trends in water quality
 - Graphs are created showing the relationship between dissolved oxygen and temperature over the course of the season.



Coalition to Save Hempstead Harbor

- Monitor aquatic habitats
 - A narrative provides an overview of harbor conditions as well as conditions specific to certain areas (e.g., Scudder's Pond).
- Identify potential causes for negative events (e.g., algal blooms and fish kills)
 - Incidence of fish kills over time are retained in a table with corresponding attributable conditions.
- Investigate long-term trends in water-quality parameter levels
 - Long-term trends in DO levels are graphed in Appendix A of annual water-quality reports.
- Measure progress towards meeting water-quality goals in the watershed
 - Graphs of annual water quality results for key parameters enable year-to-year comparisons.
- Identify pollutant sources for targeting reduction efforts
 - Comparison of bacteria results and narrative describing what was done to investigate and identify the source of unusual bacteria levels are included in annual water-quality reports.

CSHH will attempt to track the sources of any unexpected conditions encountered during monitoring, such as unusually high monitoring results or exceedances of water-quality standards. If appropriate, further investigation will be undertaken, or the situation will be referred to an appropriate state or local agency.

Appendix A

Standard Operating Procedures

Standard Operating Procedures – Sampling Plan

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1 POINT OF CONTACT

NAME: Carol DiPaolo, Coalition to Save Hempstead Harbor (CSHH), Water-Monitoring
Coordinator
ADDRESS: PO Box 159, Sea Cliff, NY 11579
EMAIL: info@thecshh.org
PHONE: 516-801-6792

2 OBJECTIVE

The objective is to sample water quality within Hempstead Harbor. Frequency of sampling and daily order of events are specified.

3 OVERVIEW

Up to 21 water-quality stations are monitored for Hempstead Harbor weekly.

Sampling for the “regular season” occurs May through October. The regular-season sampling includes monitoring stations at which *both* a multiparameter meter is used to obtain a water-column profile *and* samples are collected for bacteria and/or nitrogen analysis (13 sampling stations: CSHH #1-8, #13, #14, #15, #16-17). The regular-season monitoring also includes monitoring stations at which *only* sample collection is conducted for bacteria and/or nitrogen analysis (8 sampling stations: CSHH #9-12, #14A, #15A, #15B, #17A).

Sampling for the “winter season” of up to three monitoring stations located at shoreline outfalls are related to specific watershed-management projects (e.g., the Scudder’s Pond restoration and the anticipated implementation of the Powerhouse Drain Subwatershed Plan); this sampling is conducted from November through mid-April for bacteria and nitrogen analysis only.

The sampling plan calls for 24 weeks of sampling during the regular season (May through October) with a minimum of 22 weeks. The plan calls for 12 weeks of sampling during the winter season (November through mid-April). Because some of the monitoring stations cannot be accessed during low tide, the plan calls for sampling a minimum of 15 stations during the regular season and a minimum of one station during the winter season, barring unforeseen events or conditions.

Beginning with the 2019 monitoring season, collection of nitrogen samples occurs on a biweekly basis during the regular season. During the regular season, nitrogen samples will be collected at up to 10 stations (CSHH #1, #3, #6-8, #12, #13, #14A, #15A, and #16). During the winter season, nitrogen samples will be collected at up to 3 stations biweekly or monthly (for CSHH #14A, #15A, and #15B). The frequency of testing is dependent on funding.

4 DEFINITIONS AND ABBREVIATIONS

Each monitoring station where samples are collected is identified by the acronym “CSHH” and a number. “CSHH” is the acronym for the Coalition to Save Hempstead Harbor, the nonprofit environmental group

that initiated the Hempstead Harbor water-monitoring program in 1992 and continues to coordinate the program. The numbers assigned to the stations indicate the chronological order in which the stations were established (e.g., CSHH #1 and CSHH #2 were the earliest stations established in 1992; CSHH #16, CSHH #17, and CSHH #17A are the most recent stations added to the program).

5 SOURCES

The procedures used for the Hempstead Harbor water-monitoring program are aligned to the extent possible with those used for the Unified Water Study (UWS) for Long Island Sound Embayments, which are based on the EPA Volunteer Estuary Monitoring Manual (EPA, 2007) and follow methods used in the EPA National Coastal Assessment (EPA, 2001). For testing parameters that are not within the scope of the UWS, laboratory and manufacturer instructions and protocols are followed.

6 MATERIALS AND EQUIPMENT

6.1 Safety

Each team member should have a copy of the safety plan, which includes general boat safety information and location of flairs, other emergency equipment, and first aid supplies.

- Each team member should have:
 - a cellular phone available with the contact number for emergency personnel
 - contact information for all field team members stored in each member's cell phone
 - contact list on the monitoring clipboard
- The monitoring clipboard should list each team member's:
 - full name
 - cell phone
 - home phone
 - emergency contact information
 - telephone numbers of emergency personnel (e.g., police, ambulance service)
- A first-aid kit should be prepared at the beginning of each season and include:
 - first-aid manual, which outlines diagnosis and treatment procedures
 - antibacterial or alcohol wipes
 - first-aid cream or ointment
 - several band-aids
 - several gauze pads
 - large compress bandage
 - doctor-prescribed antihistamine for any participant who is allergic to beestings

6.2 Sampling Gear – All Stations

- **REQUIRED**
 - site maps with station locations indicated
 - list of station IDs with GPS coordinates for the sites

- clip boards
- pens
- permanent markers
- field data sheets
- grab poles for nitrogen and bacteria samples
- laboratory provided sample jars and field blanks
- two coolers
- ice
- electronic thermometer
- covered thermometer for Winkler titration sampling jar
- wind meter
- multiparameter meter and display unit
- meter platform
- calibrated rope
- test kits and fresh reagents

➤ OPTIONAL BUT USEFUL

- extra batteries for any electronic sampling gear
- basic tools (pliers, wrench, screw drivers, etc.)
- plastic bags
- scissors, pocket knife
- cable ties
- electrical tape
- duct tape
- extra sampling jars
- current edition of the *Eldridge Tide and Pilot Book*

7 METHODS

7.1 Parameters to Sample

At first monitoring station—

- record:
- date and time
 - GPS land reference check
 - names of team members present
 - weather conditions, as indicated on data sheet
 - water-surface conditions, as indicated on data sheet
 - tidal stage and hours to next high tide
 - previous week's precipitation
- use LaMotte test kits for pH and DO (using Winkler titration method) as checks against meter and results for those parameters
- rinse vials, sample jars with sample water before conducting tests

- dispose of used reagents and titrated samples into a temporary dump jar until final proper disposal
- conduct replicate profile with multiparameter meter

For each monitoring station—

- record:
 - GPS coordinates
 - time
 - air temperature
 - wind direction and speed
 - Secchi depth
 - readings at 0.5 m below the surface and at 1-m increments to the bottom for parameters as indicated on data sheet, including:
 - water temperature
 - salinity
 - dissolved oxygen
 - chlorophyll a (note that sonde chlorophyll a readings are used only as a frame of reference against previous day's Unified Water Study chlorophylla readings)
 - turbidity
 - wildlife observations, as indicated on data sheet
- collect water samples (as indicated in monitoring/sampling plan) for:
 - bacteria analysis (fecal coliform and enterococci) by the Nassau County Department of Health (NCDH) following NCDH protocols and using NCDH sample jars, field blanks, and data sheet—
 - label sample jar with a permanent marker indicating the site identification (e.g., CSHH #1) and date and time of sample collection
 - label the sample jar lid with the site identification
 - rinse large sample collection jar twice with sample water before collecting sample where applicable
 - for in-harbor samples, collect sample at a half meter below surface using large sampling jar attached to sample grab pole with half-meter mark
 - for samples collected near outfalls, collect samples directly from outfall discharge when possible using large sampling jar attached to sample grab pole (direct vs. indirect samples are noted on bacteria chain-of-custody sheets)
 - data sheets should indicate time sample is collected, air temperature, water temperature, wind direction and speed, weather conditions (using NCDH codes), and wave height
 - collected samples and field blank must be kept in a cooler with ice and delivered within six hours of collection time
 - nitrogen analysis (nitrite, nitrate, ammonia, and TKN) using Pace Analytical Laboratory (PAL) and PAL protocols, sampling jars, jar labels, and chain of custody sheet—
 - fill out sheet labels with permanent pen or marker for sample jars and affix to appropriate jars (indicated as preserved and unpreserved by lab) prior to sampling

- place a loosely fitting rubber band around the preserved and unpreserved sample jars for each station prior to sampling
- rinse large sampling jar (attached to grab pole) twice with sample water
- for in-harbor samples, collect sample at a half meter below surface using large sampling jar attached to sample grab pole (a half-meter mark on pole)
- for samples near outfalls, collect samples directly from outfall discharge when possible using large sampling jar attached to sample grab pole (direct vs. indirect samples are noted on bacteria chain-of-custody sheets)
- pour sample into lab-provided sterile sample jars (preserved and unpreserved); each jar should have a label indicating the site name, date, and time of sample collection
- chain of custody sheets should reflect samples collected by site name and analysis requested
- collected samples should be kept in pairs (preserved and unpreserved) with a rubber band in a cooler with ice and delivered within the same day of collection

7.2 Timing of Sampling

The sampling plan is for weekly sampling. However, nitrogen samples will be collected biweekly.

7.2.1 Timing during the Year

Sampling occurs during a “regular” and “winter” season. Sampling is conducted weekly May through October for the regular season and biweekly November through mid-April for the winter season. The sampling plan calls for 24 weeks of sampling for each season, barring unforeseen events and conditions.

7.2.2 Timing during a Sample Day

Sampling is conducted once a week on the same day of the week (Wednesdays) and within the same time frame (7 am-12 pm), barring unforeseen events or conditions.

7.3 Sampling Depths

7.3.1 Water Temperature, Salinity, Dissolved Oxygen, pH, Chlorophyll a, and Turbidity

At sampling stations at which a profile of the water column is obtained using a multiparameter meter, readings for water temperature, salinity, dissolved oxygen, pH, chlorophyll a, and turbidity are taken at a half a meter below the surface and at increments of 1 meter to the bottom (which is within 0.2 m of the floor).

Always record the depth of the sample.

(Note that chlorophyll-a readings are taken only as a frame of reference and for comparison against readings taken for the Unified Water Study for which filtered chlorophyll samples are taken at half a meter below the surface.)

7.3.2 Bacteria and Nitrogen

Bacteria and nitrogen samples are collected 0.5 m below the surface for in-harbor stations and directly from or at 0.5 m below surface for outfalls at shoreline stations.

7.4 Required Replicates and Verification

During a field day, use the notation on the field data sheet as a reminder regarding the number of replicates required for each parameter.

Table 1: Required replicates, blanks, and verification readings.

Parameter & Technique	Field Replicates Required	Verification and/or Blank
GPS coordinates	1 reading per station	Read a land-based reference station twice within 2 days of the field sampling day.
Salinity, dissolved oxygen, pH, water temperature, chlorophyll a, turbidity with multiparameter sonde	1 reading at each depth, wait for reading to stabilize before recording at 1 station per day (typically the first station), do two replicate profiles – do one complete profile, then do a second	Verify depth by checking calibrated rope markings and boat depth finder. Read results in air-saturated water for dissolved oxygen, chlorophyll, and turbidity and standards for salinity (conductivity), turbidity, and pH; this can be done the day before (for precheck/calibration) and at the end of the sample day (for postcheck).
Bacteria, laboratory analysis	1 duplicate sample taken per every 20 samples	Include NCDH-provided field blank when first bacteria sample is collected and place in cooler. When sample is collected, check sample ID against the field data sheet. Keep field blank and samples in cooler with jars slightly embedded in ice and deliver within six hours of sample collection. At the lab, the technician will check and record temperature of sample on delivery.
Nitrogen (nitrate, nitrite, ammonia, TKN), laboratory analysis	1 duplicate sample taken per every 20 samples	Each nitrogen analysis requires two lab-provided sample jars (to be filled with the same water sample collected in the large sample jar attached to the grab pole). Keep samples in pairs (preserved and unpreserved); check sample ID against chain of custody sheet. At the lab, the technician will check and record temperature of sample on delivery.

7.5 Order of Events When Sampling at a Water-Quality Station

7.5.1 Prepare for Sampling Trip

- A. Calibrate all instruments.
- B. Make sure electronic instruments are fully charged.
- C. Record the GPS of a reference station on land to verify the accuracy and precision of the GPS coordinates.
- D. Gather all field supplies.
- E. Complete the presampling event portions of the data sheets.

7.5.2 Water-Quality Station Sampling

- A. Record station information on the data sheet. *Be sure to complete all sections of the data sheet completely, for every data entry.*
- B. Obtain total depth of the station.
- C. Collect profile data using the multiparameter sonde, sampling from top to bottom.
- D. At one station per day, repeat measurements where only one profile is typically collected. The first station of the day is recommended for time management.

7.5.3 End of Field Day

- A. Verify all sections of the data sheet have been completed.
- B. Enclose laboratory data sheet/chain of custody in a plastic sleeve and include with respective bacteria and nitrogen sample jars to be delivered to labs.
- C. Rinse equipment (sample grab poles, Secchi disk, platform, ropes, etc.) and store in preparation for next sampling date. Test-kit equipment should be rinsed in a very light solution of Dawn detergent and water (as per LaMotte Co. recommendations) and dried and stored for the next sampling date.
- D. Conduct postcheck within six hours of sampling using known standards for multiparameter meter to ensure the equipment has not drifted.

8 TROUBLESHOOTING / HINTS

- Gather field equipment the day prior to sampling. Check the field equipment in the morning, before heading out into the field. Use checklists included in field clipboard to prep for the field day.
- Always carry a copy of this SOP and the relevant parameter-specific SOPs.
- Print out the “quick sheets” for relevant SOPs to use as a reminder in the field. A plastic page-protector or laminating sheets can be used to keep paper sheets dry.

9 DATA PROCESSING AND STORAGE

Two individuals will work together to enter data into an Excel spreadsheet and check data against original data sheets. The data spreadsheet will be stored in a computer file with a backup copy. The Project Manager/Field Team Leader will be the custodian of the finalized data files.

10 REFERENCES

EPA, 2007, Volunteer Estuary Monitoring, A Methods Manual, Second Edition. Orhrel Jr., R.L., Register, K.M. (Eds.). The Ocean Conservancy & EPA. 396 p. https://www.epa.gov/sites/default/files/2015-09/documents/2007_04_09_estuaries_monitorings_manual.pdf

EPA, U.S. 2001. National Coastal Assessment: Field Operations Manual. U. S. Environmental Protection Agency, Office of Research and Development, National Health and Environmental Effects Research Laboratory, Gulf Ecology Division, Gulf Breeze, FL. EPA 620/R-01/003. 72 p.

Appendix B

Laboratory Accreditations

**NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER**



Expires 12:01 AM April 01, 2023
Issued April 01, 2022

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

**MS. MELISSA RODEFELD
NASSAU COUNTY DEPT OF HEALTH
209 MAIN STREET
HEMPSTEAD, NY 11550**

NY Lab Id No: 10339

*is hereby APPROVED as an Environmental Laboratory in conformance with the
National Environmental Laboratory Accreditation Conference Standards (2016) for the category
ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:*

Bacteriology

Coliform, Fecal	SM 9221 E-2014
	SM 9222D-2015
Coliform, Total	SM 9221B-2014
Coliform, Total (Enumeration) in Pools	SM 9221B-2014
Enterococci	EPA 1600

Metals I

Barium, Total	EPA 200.8, Rev. 5.4 (1994)
Cadmium, Total	EPA 200.8, Rev. 5.4 (1994)
Calcium, Total	EPA 200.7, Rev. 4.4 (1994)
Chromium, Total	EPA 200.8, Rev. 5.4 (1994)
Copper, Total	EPA 200.8, Rev. 5.4 (1994)
Iron, Total	EPA 200.7, Rev. 4.4 (1994)
Lead, Total	EPA 200.8, Rev. 5.4 (1994)
Magnesium, Total	EPA 200.7, Rev. 4.4 (1994)
Manganese, Total	EPA 200.8, Rev. 5.4 (1994)
Nickel, Total	EPA 200.8, Rev. 5.4 (1994)
Potassium, Total	EPA 200.7, Rev. 4.4 (1994)
Silver, Total	EPA 200.8, Rev. 5.4 (1994)
Sodium, Total	EPA 200.7, Rev. 4.4 (1994)

Metals II

Antimony, Total	EPA 200.8, Rev. 5.4 (1994)
Arsenic, Total	EPA 200.8, Rev. 5.4 (1994)
Beryllium, Total	EPA 200.8, Rev. 5.4 (1994)
Selenium, Total	EPA 200.8, Rev. 5.4 (1994)

Metals II

Zinc, Total	EPA 200.8, Rev. 5.4 (1994)
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Metals III

Cobalt, Total	EPA 200.8, Rev. 5.4 (1994)
Thallium, Total	EPA 200.8, Rev. 5.4 (1994)

Mineral

Alkalinity	SM 2320B-2011
Calcium Hardness	EPA 200.7, Rev. 4.4 (1994)
Chloride	EPA 300.0, Rev. 2.1 (1993)
Fluoride, Total	EPA 300.0, Rev. 2.1 (1993)
Hardness, Total	SM 2340B-2011
Sulfate (as SO4)	EPA 300.0, Rev. 2.1 (1993)

Miscellaneous

Color	SM 2120B-2011
Silica, Dissolved	EPA 200.7, Rev. 4.4 (1994)
Specific Conductance	EPA 120.1 (Rev. 1982)

Nutrient

Nitrate (as N)	EPA 300.0, Rev. 2.1 (1993)
Nitrite (as N)	EPA 300.0, Rev. 2.1 (1993)
Orthophosphate (as P)	EPA 300.0, Rev. 2.1 (1993)

Sample Preparation Methods

EPA 200.2

Serial No.: 64340

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**NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER**



Expires 12:01 AM April 01, 2023
Issued April 01, 2022
Revised April 04, 2022

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

DR. MICHAEL E. MILLER
PACE ANALYTICAL SERVICES, LLC - MELVILLE, NY
575 BROAD HOLLOW ROAD
MELVILLE, NY 11747

NY Lab Id No: 10478

*is hereby APPROVED as an Environmental Laboratory in conformance with the
National Environmental Laboratory Accreditation Conference Standards (2016) for the category
ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:*

Nitrosoamines		Nutrient	
N-Nitrosodiethylamine	EPA 8270E	Nitrate-Nitrite (as N)	EPA 353.2, Rev. 2.0 (1993)
N-Nitrosodimethylamine	EPA 625.1		EPA 300.0, Rev. 2.1 (1993)
	EPA 8270D	Nitrite (as N)	EPA 353.2, Rev. 2.0 (1993)
	EPA 8270E		EPA 300.0, Rev. 2.1 (1993)
N-Nitrosodi-n-butylamine	EPA 8270D	Orthophosphate (as P)	SM 4500-P E-2011
	EPA 8270E	Phosphorus, Total	EPA 200.7, Rev. 4.4 (1994)
N-Nitrosodi-n-propylamine	EPA 625.1		SM 4500-P E-2011
	EPA 8270D	Organophosphate Pesticides	
	EPA 8270E	Atrazine	EPA 8270D
N-Nitrosodiphenylamine	EPA 625.1		EPA 8270E
	EPA 8270D	Dimethoate	EPA 8270D
	EPA 8270E		EPA 8270E
N-nitrosomethylethylamine	EPA 8270D	Disulfoton	EPA 8270D
	EPA 8270E		EPA 8270E
N-nitrosopiperidine	EPA 8270D	Parathion ethyl	EPA 8270D
	EPA 8270E		EPA 8270E
N-Nitrosopyrrolidine	EPA 8270D	Parathion methyl	EPA 8270D
	EPA 8270E		EPA 8270E
Nutrient		Phorate	EPA 8270D
Ammonia (as N)	SM 4500-NH3 H-2011		EPA 8270E
	EPA 350.1, Rev. 2.0 (1993)	Sulfotepp	EPA 8270D
Kjeldahl Nitrogen, Total	EPA 351.2, Rev. 2.0 (1993)		EPA 8270E
Nitrate (as N)	EPA 353.2, Rev. 2.0 (1993)	Thionazin	EPA 8270D
	EPA 300.0, Rev. 2.1 (1993)		EPA 8270E

Serial No.: 65188

Property of the New York State Department of Health. Certificates are valid only at the address shown, must be conspicuously posted, and are printed on secure paper. Continued accreditation depends on successful ongoing participation in the Program. Consumers are urged to call (518) 485-5570 to verify the laboratory's accreditation status.



NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER



Expires 12:01 AM April 01, 2023
Issued April 01, 2022

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

DR. MICHAEL E. MILLER
PAGE ANALYTICAL SERVICES, LLC - MELVILLE, NY
575 BROAD HOLLOW ROAD
MELVILLE, NY 11747

NY Lab Id No: 10478

*is hereby APPROVED as an Environmental Laboratory in conformance with the
National Environmental Laboratory Accreditation Conference Standards (2016) for the category
ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:*

Nitrosoamines

N-Nitrosodiethylamine	EPA 8270D
	EPA 8270E
N-Nitrosodimethylamine	EPA 8270D
	EPA 8270E
N-Nitrosodi-n-butylamine	EPA 8270D
	EPA 8270E
N-Nitrosodi-n-propylamine	EPA 8270D
	EPA 8270E
N-Nitrosodiphenylamine	EPA 8270D
	EPA 8270E
N-nitrosomethylethylamine	EPA 8270D
	EPA 8270E
N-nitrosopiperidine	EPA 8270D
	EPA 8270E
N-Nitrosopyrrolidine	EPA 8270D
	EPA 8270E

Nutrients

Nitrate (as N)	EPA 9056A
Nitrite (as N)	EPA 9056A
Orthophosphate (as P)	EPA 9056A

Organophosphate Pesticides

Dimethoate	EPA 8270D
------------	-----------

Serial No.: 64388

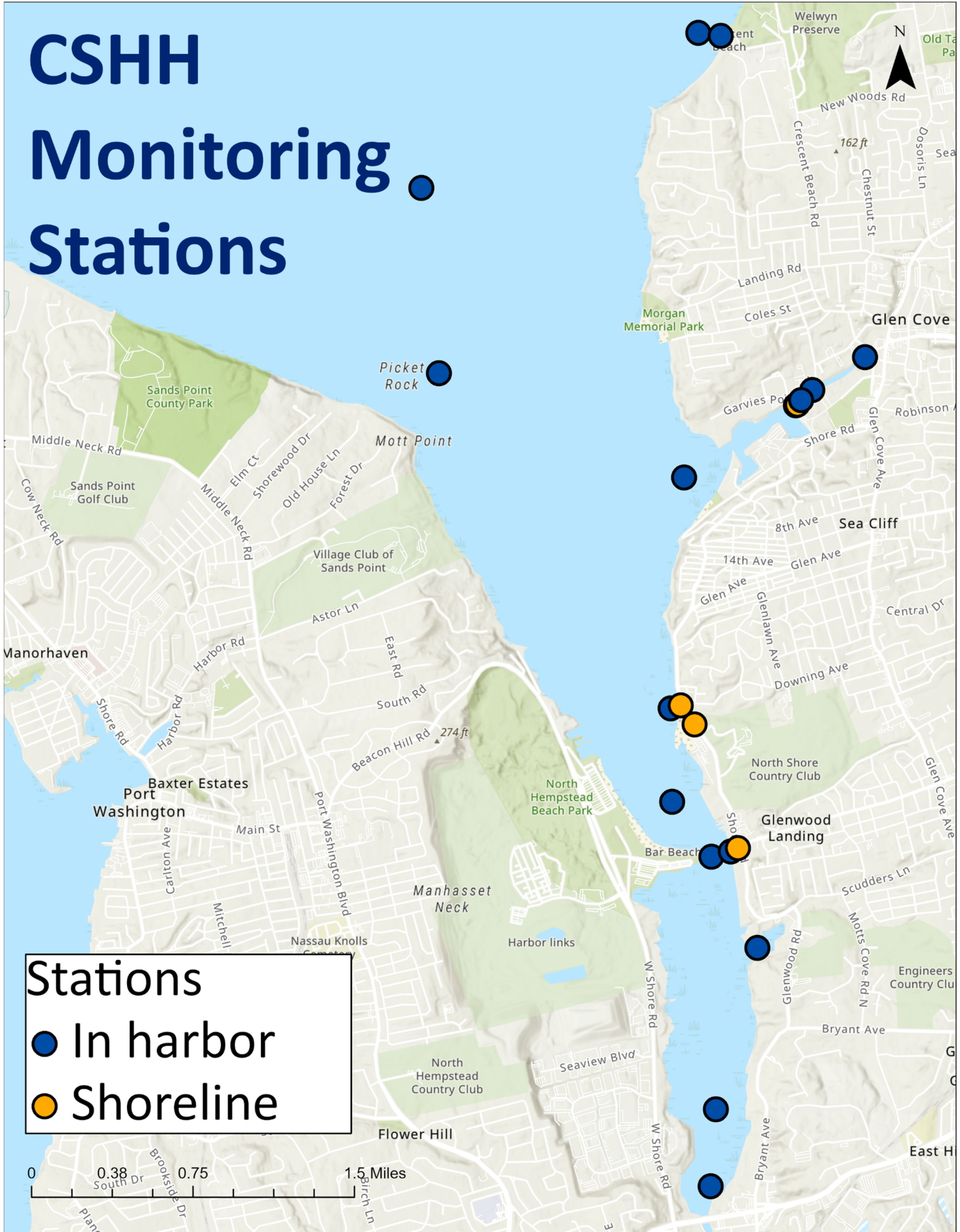
Property of the New York State Department of Health. Certificates are valid only at the address shown, must be conspicuously posted, and are printed on secure paper. Continued accreditation depends on successful ongoing participation in the Program. Consumers are urged to call (518) 485-5570 to verify the laboratory's accreditation status.

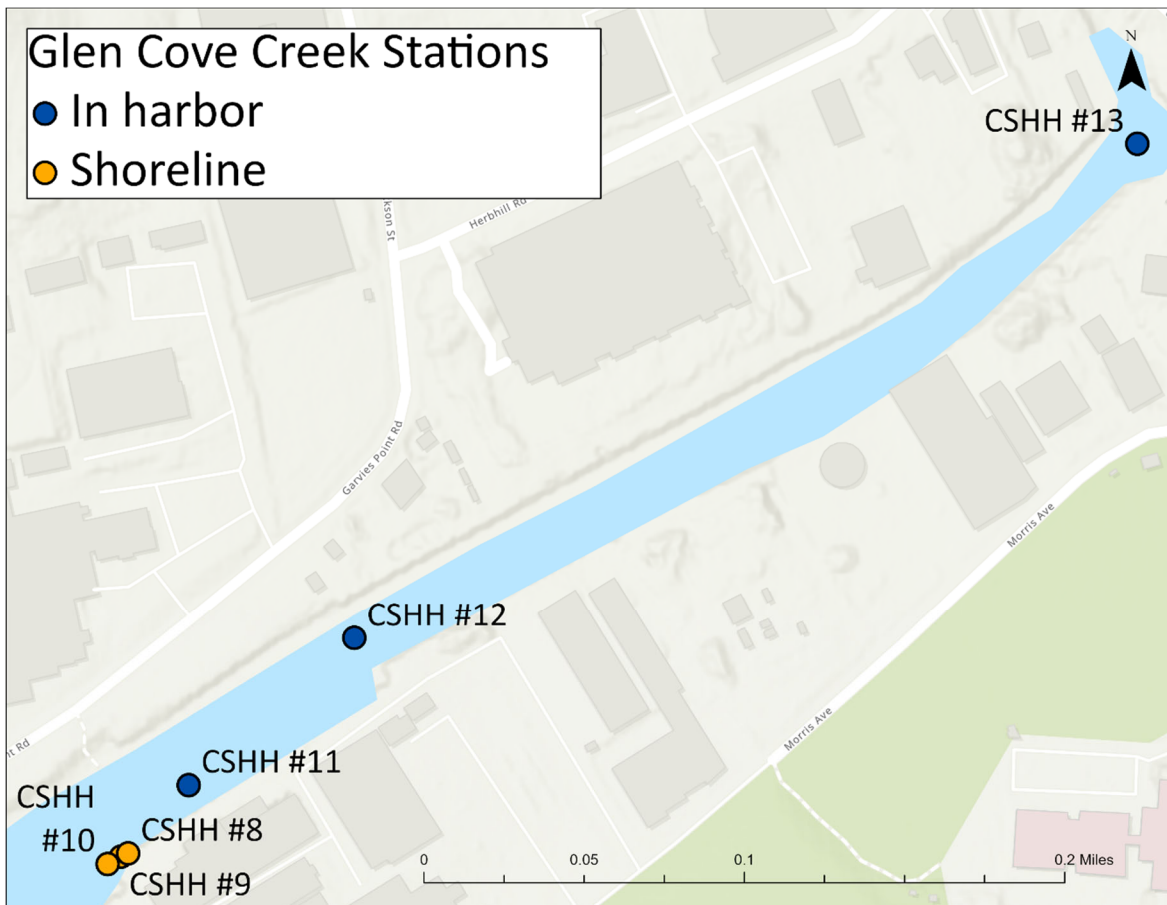
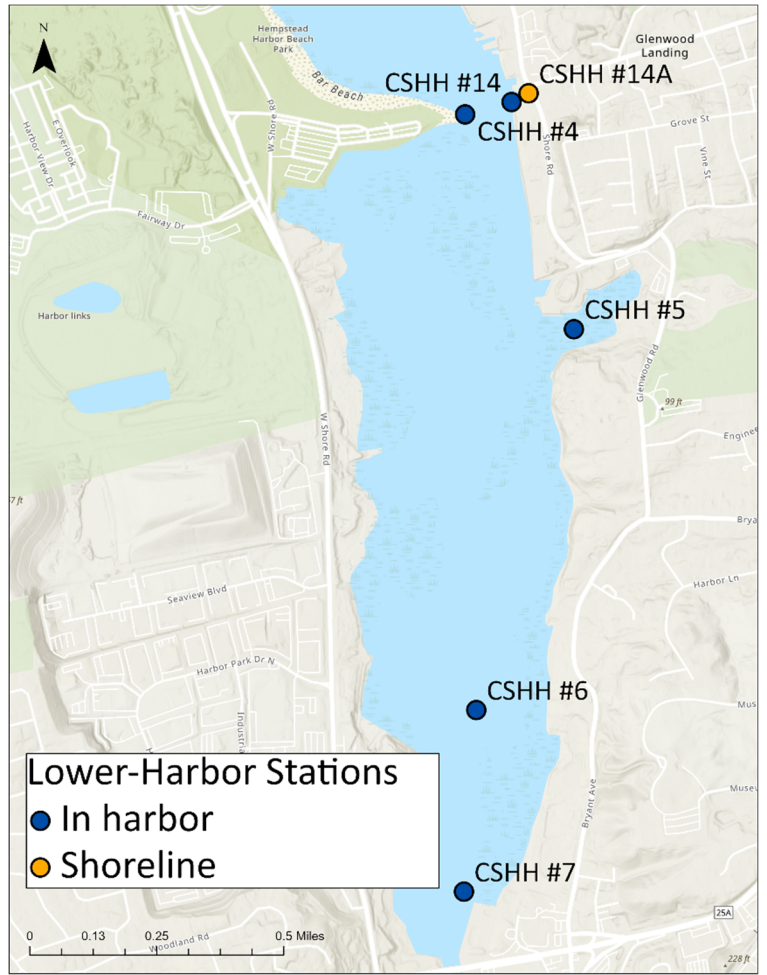
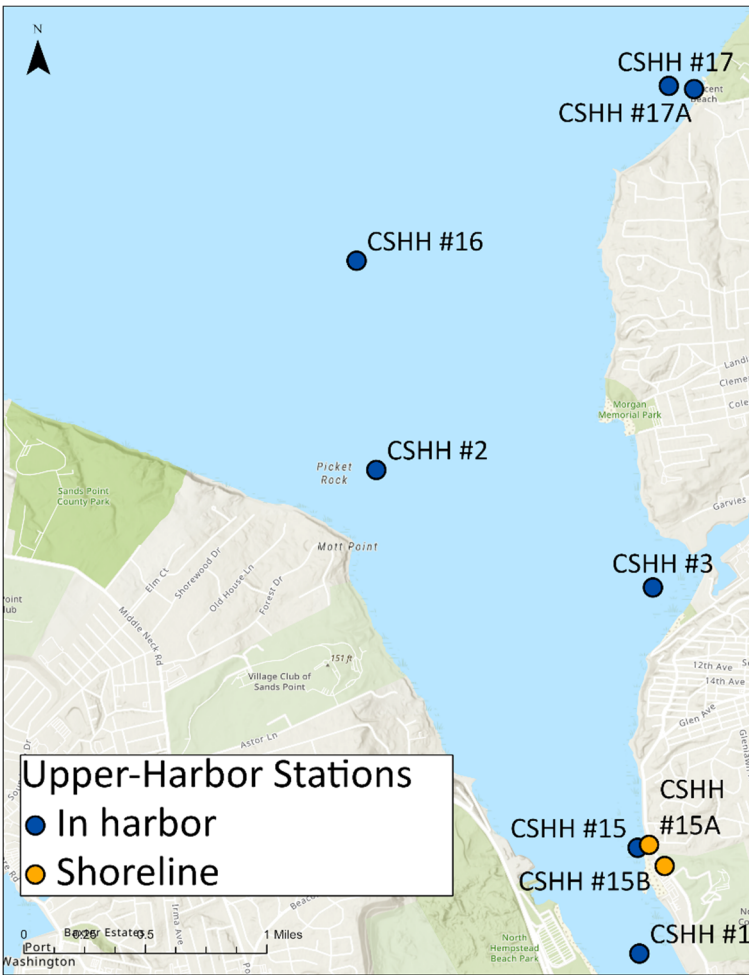


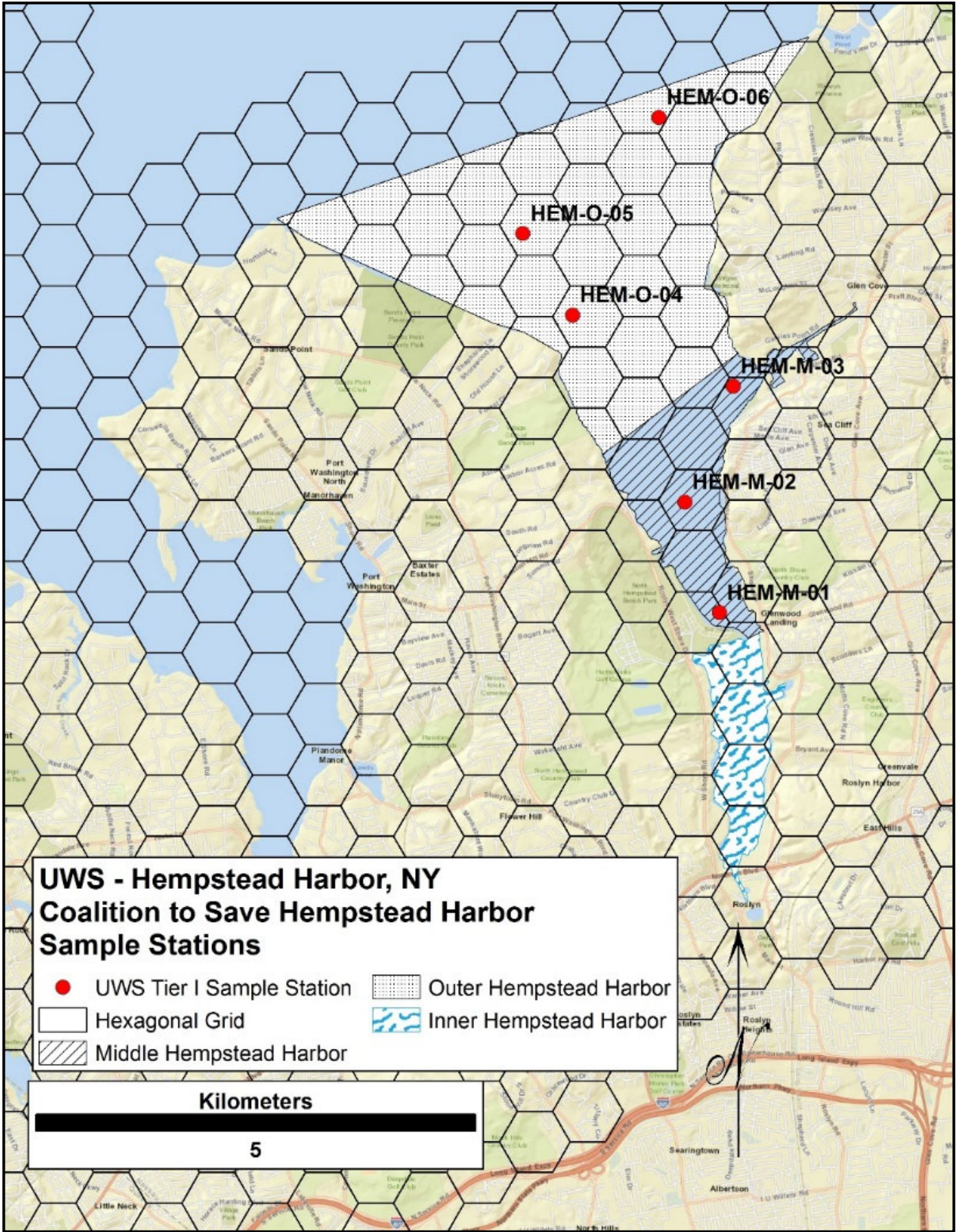
Appendix C

Monitoring Station Location Maps






CSHH Monitoring Stations







**UWS - Hempstead Harbor, NY
Coalition to Save Hempstead Harbor
Sample Stations**

 UWS Tier I Sample Station	 Outer Hempstead Harbor
 Hexagonal Grid	 Inner Hempstead Harbor
 Middle Hempstead Harbor	

Kilometers

5

Appendix D

[Meter Operation Manuals \(Link\)](#)

YSI EXO2S and backup YSI EXO1

YSI EXO Manual, online at:

<https://www.yei.com/File%20Library/Documents/Manuals/EXO-User-Manual-Web.pdf>

Appendix E

LaMotte Kit Manuals



PRECISION pH KIT

OCTA-SLIDE 2, pH 3.0-10.5

CODE 5858-01

QUANTITY	CONTENTS	CODE
2 x 30 mL	*Wide Range pH Indicator	*2218-G
2	Test Tubes, 2.5-5-10 mL, plastic, w/caps	0106
1	Wide Range pH Octa-Slide 2 Bar, 3.0-6.5	2193-01
1	Wide Range pH Octa-Slide 2 Bar, 7.0-10.5	2196-01
1	Octa-Slide 2 Viewer	1101

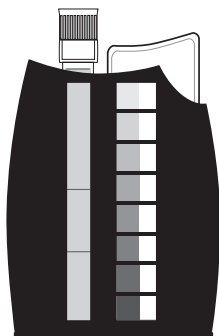
***WARNING:** Reagents marked with an * are considered to be potential health hazards. To view or print a Safety Data Sheet (SDS) for these reagents go to www.lamotte.com. Search for the four digit reagent code number listed on the reagent label, in the contents list or in the test procedures. Omit any letter that follows or precedes the four digit code number. For example, if the code is 4450WT-H, search 4450. To obtain a printed copy, contact LaMotte by email, phone or fax.

Emergency information for all LaMotte reagents is available from Chem-Tel (US, 1-800-255-3924) (International, call collect, 813-248-0585).

To order individual reagents or test kit components, use the specified code number.

Warning! This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

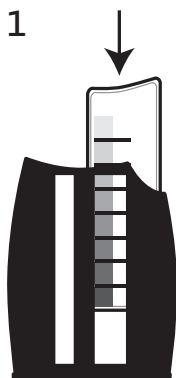
USE OF THE OCTA-SLIDE 2 VIEWER



The Octa-Slide 2 Viewer should be held so non-direct light enters through the back of the Viewer. Insert the Octa-Slide 2 Bar into the Viewer. Insert the reacted sample into the top of the Viewer. Match the color of the reaction to the color standards.

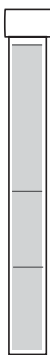
PROCEDURE

1



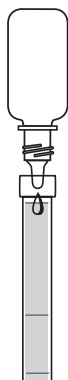
Insert Wide Range pH Octa-Slide 2 Bar (2193-01 or 2196-01) into the Octa-Slide 2 Viewer (1101).

2



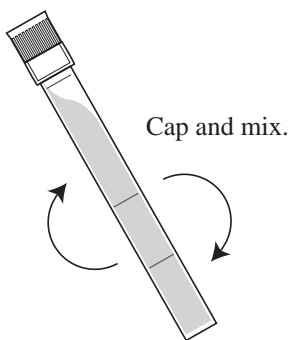
Fill a test tube (0106) to the 10 mL line with sample water.

3



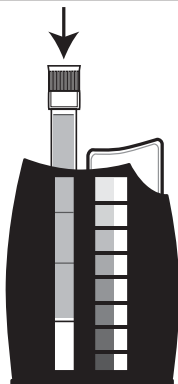
Add 10 drops of *Wide Range pH Indicator (2218).

4



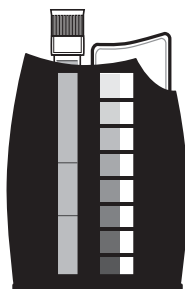
Cap and mix.

5



Insert test tube into Octa-Slide 2 Viewer (1101).

6



Match sample color to a color standard. Record as pH.

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Dissolved Oxygen

Water Quality Test Kit

Instruction Manual • Code 7414/5860

 **LaMotte**

INTRODUCTION

Aquatic animals need dissolved oxygen to live. Fish, invertebrates, plants, and aerobic bacteria all require oxygen for respiration. Oxygen dissolves readily into water from the atmosphere until the water is saturated. Once dissolved in the water, the oxygen diffuses very slowly and distribution depends on the movement of the aerated water. Oxygen is also produced by aquatic plants, algae, and phytoplankton as a by-product of photosynthesis.

The amount of oxygen required varies according to species and stage of life. Dissolved Oxygen levels below 3 ppm are stressful to most aquatic organisms. Dissolved Oxygen levels below 2 or 1 ppm will not support fish. Levels of 5 to 6 ppm are usually required for growth and activity.

This test kit uses the azide modification of the Winkler method for determining dissolved oxygen.

TABLE OF CONTENTS

	Page
Kit Contents	2
Test Procedure	
Part 1: Collecting a Water Sample.....	3
Part 2: Adding the Reagents	4
Part 3: Titration	5
EPA Compliance	8
Dissolved Oxygen Fact Sheet.....	10
General Safety Precautions.....	13
Use Proper Analytical Techniques.....	14
Material Safety Data Sheets.....	15
Kit Diagrams.....	21
Short Form Instructions	Back Cover

KIT CONTENTS

QUANTITY	CONTENTS	CODE
30 mL	*Manganous Sulfate Solution	*4167-G
30 mL	*Alkaline Potassium Iodide Azide	*7166-G
50 g	*Sulfamic Acid Powder (7414 Kit)	*6286-H
30 mL	*Sulfuric Acid, 1:1 (5860 Kit)	*6141WT-G
60 mL	*Sodium Thiosulfate, 0.025N	*4169-H
30 mL	Starch Indicator Solution	4170WT-G
1	Spoon, 1.0 g, plastic (7414 Kit)	0697
1	Direct Reading Titrator	0377
1	Test Tube, 5-10-12.9-15-20-25 mL, glass, w/cap	0608
1	Water Sampling Bottle, 60 mL, glass	0688-DO


***WARNING:** Reagents marked with a * are considered hazardous substances. To view or print a Material Safety Data Sheet (MSDS) for these reagents see MSDS CD or our website. To obtain a printed copy, contact us by e-mail, phone or fax..

To order individual reagents or test kit components, use the specified code numbers.

TEST PROCEDURE


PART 1 - COLLECTING THE WATER SAMPLE

1.



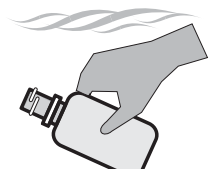
Rinse the Water Sampling Bottle (0688-DO) with the sample water.

2.



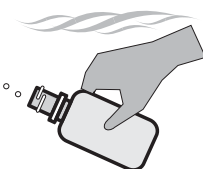
Tightly cap the bottle, and submerge it to the desired depth.

3.



Remove the cap and allow the bottle to fill.

4.



Tap the sides of the bottle to dislodge any air bubbles.

5.



Replace the cap while the bottle is still submerged.

6.



Retrieve the bottle and make sure that no air bubbles are trapped inside.

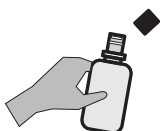
TEST PROCEDURE

PART 2 - ADDING THE REAGENTS

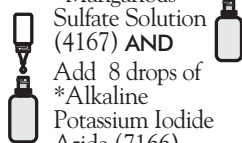
NOTE:

Be careful not to introduce air into the sample while adding the reagents.

1. Remove the cap from the bottle.



2. Immediately add 8 drops of *Manganous Sulfate Solution (4167) AND Add 8 drops of *Alkaline Potassium Iodide Azide (7166).



3.



Cap the bottle and mix by inverting several times. A precipitate will form.

4.



Allow the precipitate to settle below the shoulder of the bottle.

5.

For Kit Code 7414:

Immediately use the 1.0 g spoon (0697) to add one level measure of *Sulfamic Acid Powder (6286).



OR

For Kit Code 5860:

Add 8 drops of *Sulfuric Acid, 1:1 (6141WT).



6. Cap and gently invert the bottle to mix the contents until the precipitate and the reagent have totally dissolved. The solution will be clear yellow to orange if the sample contains dissolved oxygen.



NOTE: At this point the sample has been "fixed" and contact between the sample and the atmosphere will not affect the test result. Samples may be held at this point and titrated later.

TEST PROCEDURE

PART 3 - THE TITRATION

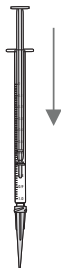
1.

Fill the titration tube (0608) to the 20 mL line with the fixed sample. Cap the tube.



2.

Depress plunger of the Titrator (0377).



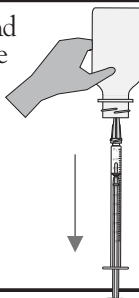
3.

Insert the Titrator into the plug in the top of the *Sodium Thiosulfate, 0.025N (4169) titrating solution.



4.

Invert the bottle and slowly withdraw the plunger until the large ring on the plunger is opposite the zero (0) line on the scale.

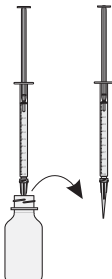


NOTE:

If small air bubbles appear in the Titrator barrel, expel them by partially filling the barrel and pumping the titration solution back into the reagent container. Repeat until bubble disappears.

5.

Turn the bottle upright and remove the Titrator.



NOTE:

If the sample is a very pale yellow, go to Step 9.

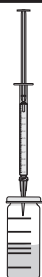


continued . . .

TEST PROCEDURE

6.

Insert the tip of the Titrator into the opening of the titration tube cap.



7.

Slowly depress the plunger to dispense the titrating solution until the yellow-brown color changes to a very pale yellow. Gently swirl the tube during the titration to mix the contents.



8.

Carefully remove the Titrator and cap. Do not to disturb the Titrator plunger.



9.

Add 8 drops of Starch Indicator Solution (4170WT). The sample should turn blue.



10.

Cap the titration tube. Insert the tip of the Titrator into the opening of the titration tube cap.



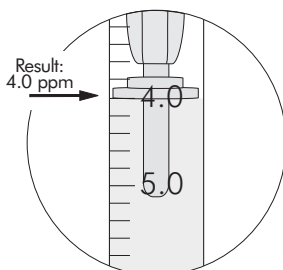
11.

Continue titrating until the blue color disappears and the solution becomes colorless.



12.

Read the test result directly from the scale where the large ring on the Titrator meets the Titrator barrel. Record as ppm Dissolved Oxygen. Each minor division on the Titrator scale equals 0.2 ppm.



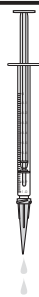
TEST PROCEDURE

NOTE:

If the plunger ring reaches the bottom line on the scale (10 ppm) before the endpoint color change occurs, refill the Titrator and continue the titration. Include the value of the original amount of reagent dispensed (10 ppm) when recording the test result.

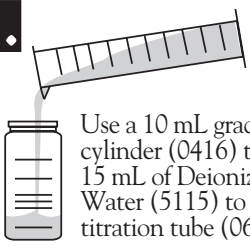
NOTE:


When testing is complete, discard titrating solution in Titrator. Rinse Titrator and titration tube thoroughly. DO NOT remove plunger or adapter tip.





EPA COMPLIANCE


To qualify as an EPA accepted test, and to achieve the greatest accuracy, the Sodium Thiosulfate Solution, 0.025N (4169) must be standardized daily. This procedure follows Standard Methods for the Examination of Water and Wastewater. Numbers in () are for LaMotte products. These products are not included in this kit but can be ordered from LaMotte Company by using the specified code number.

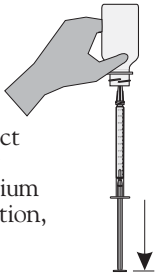
1.  Use a 10 mL graduated cylinder (0416) to add 15 mL of Deionized Water (5115) to the titration tube (0608).

2.  Use a Direct Reading Titrator, 0-1 Range (1.0 mL capacity) (0376) to add 2 mL of Potassium Bi-iodate (7346).

3.  Add 2 drops of Sulfuric Acid, 5N (8517WT).

4.  Use the 0.1 g spoon (0699) to add 0.2 g Potassium Iodide Crystals (6809).

5. Swirl to mix. Solution will turn yellowish brown. 

6.  Fill another Direct Reading Titrator (0376) with Sodium Thiosulfate Solution, 0.025N (4169).

EPA COMPLIANCE

7.

While gently swirling the tube, add Sodium Thiosulfate, 0.025N until the color fades to pale yellow. It will be necessary to refill the Direct Reading Titrator.



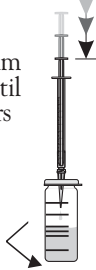
8.

Add 3 drops of Starch Indicator Solution (4170WT). The solution will turn blue.



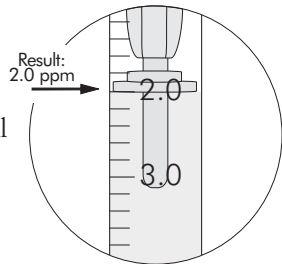
9.

Continue adding Sodium Thiosulfate, 0.025N until the blue color disappears and the solution is colorless.



10.

Read the test result directly from the scale where the large ring on the Titrator meets the Titrator barrel. Include the value of the original amount dispensed (1 mL). If the reading is 2.0 +/- 0.1 mL, the Sodium Thiosulfate, 0.025N (4169) is satisfactory. If not, discard and replace with new reagent.



GENERAL SAFETY PRECAUTIONS

1.



Store the test kit in a cool, dry area.

2.



Read all instructions and note precautions before performing the test procedure.

3.

Read the labels on all reagent bottles. Note warnings and first aid information. Read all Material Safety Data Sheets.



4.



Keep all equipment and reagent chemicals out of the reach of young children.

5.

Avoid contact between reagent chemicals and skin, eyes, nose, and mouth.



6.

Wear safety glasses when performing test procedures.



7.



In the event of an accident or suspected poisoning, immediately call the Poison Center phone number in the front of your local telephone directory or call a physician. Additional information for all LaMotte reagents is available in the United States, Canada, Puerto Rico, and the US Virgin Islands from Chem-Tel by calling 1-800-255-3924. For other areas, call 813-248-0585 collect to contact Chem-Tel's International access number. Each reagent can be identified by the four digit number listed on the upper left corner of the reagent label, in the contents list and in the test procedures.

USE PROPER ANALYTICAL TECHNIQUES

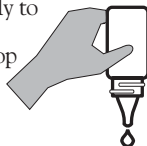
1.



Use test tube caps or stoppers, not your fingers, to cover tubes during shaking or mixing.

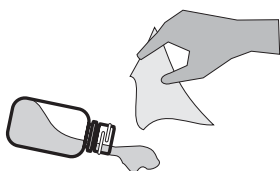
2.

Hold dropper bottles vertically upside-down, and not at an angle, when dispensing a reagent. Squeeze the bottle gently to dispense the reagent one drop at a time.



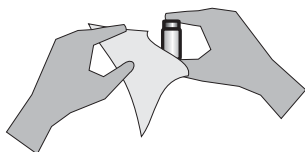
3.

Wipe up any reagent chemical spills immediately.



4.

Thoroughly rinse test tubes before and after each test.



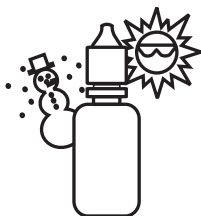
5.

Tightly close all containers immediately after use. Do not interchange caps from containers.



6.

Avoid prolonged exposure of equipment and reagents to direct sunlight. Protect reagents from extremes of temperature.



SHORT FORM INSTRUCTIONS

Read all instructions before performing test. Use this guide as a quick reference.

1. Fill Water Sampling Bottle (0688-DO).
2. Add 8 drops of *Manganous Sulfate Solution (4167).
3. Add 8 drops of *Alkaline Potassium Iodide Azide (7166).
4. Cap and mix.
5. Allow precipitate to settle.
6. Use the 1.0 g spoon to add *Sulfamic Acid Powder (6286) or add 8 drops of Sulfuric Acid, 1:1 (6141WT).
7. Cap and mix until reagent and precipitate dissolve.
8. Fill test tube (0608) to the 20 mL line.
9. Fill Titrator with *Sodium Thiosulfate, 0.025N (4169).
10. Titrate until sample color is pale yellow. DO NOT DISTURB TITRATOR.
11. Add 8 drops of Starch Indicator (4170WT).
12. Continue titration until blue color just disappears and solution is colorless.
13. Read result in ppm Dissolved Oxygen.

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Appendix F

Field Data, Calibration, and
Chain of Custody Sheets



Water-Monitoring Data Sheet

Date: ___ / ___ /2023

Station: CSHH # _____ GPS: 40. _____ 073. _____ Time: _____ Grab Samples: N ___ B ___

	Sample Depth (m)	Temp (°C)	Salinity (ppt)	DO		pH	Secchi (m)	Chlorophyll (ug/L)	Turbidity (NTU)
				(%)	(ppm)				
Wind _____	Surface								
	0.5								
	1								
	2								
	3								
Air °C _____	4								
	5								
	Repeat 0.5								
	1								
	2								
	3								
	4								
	5								

Station: CSHH # _____ GPS: 40. _____ 073. _____ Time: _____ Grab Samples: N ___ B ___

	Sample Depth (m)	Temp (°C)	Salinity (ppt)	DO		pH	Secchi (m)	Chlorophyll (ug/L)	Turbidity (NTU)
				(%)	(ppm)				
Wind _____	Surface								
	0.5								
	1								
	2								
	3								
Air °C _____	4								
	5								
	6								
	7								
	8								
	9								
	10								
	11								

Station: CSHH # _____ GPS: 40. _____ 073. _____ Time: _____ Grab Samples: N ___ B ___

	Sample Depth (m)	Temp (°C)	Salinity (ppt)	DO		pH	Secchi (m)	Chlorophyll (ug/L)	Turbidity (NTU)
				(%)	(ppm)				
Wind _____	Surface								
	0.5								
	1								
	2								
	3								
Air °C _____	4								
	5								
	6								
	7								
	8								
	9								
	10								
	11								

Note: Bottom depth of sampling represented here is not the total depth. Total depth includes an addition of 0.3 m, which is the distance from the depth sensor on the YSI EXO2S to the bottom of the platform. Total depth is reflected in the data entry Excel spreadsheet.



Water-Monitoring Data Sheet–Wildlife Observations

Date _____

Birds

Upper Harbor

- Bald Eagles _____
- Cormorants _____
- Ducks, Mallards _____ ducklings _____
- Egrets, Great _____
 - Snowy _____
- Geese, Canada _____ goslings _____
 - Brandt _____
- Hooded Gulls _____
- Herons, Blue _____
 - Black-Crowned Night _____
 - Green _____
- Belted Kingfisher _____
- Ospreys _____ chicks _____
- Plover-type, Killdeer _____
- Swans, mute _____ cygnets _____
- Terns _____
- Other _____

Lower Harbor

- _____
- _____
- _____ ducklings _____
- _____
- _____ goslings _____
- _____
- _____
- _____
- _____ chicks _____
- _____
- _____ cygnets _____
- _____
- _____

Jellyfish

- Comb, Sea Walnuts _____
 - Sea Gooseberries _____
- Lion's Mane _____
- Moon _____

Fish

- Baitfish _____
- Blue _____
- Bunker _____
- Striped Bass _____
- Small Shrimp _____

Crabs

- Asian shore _____
- Blue-claw _____
- Horseshoe _____

Other Wildlife

Human Activities

- Barges/tugs, Pt. W gravel op. _____ Gladsky _____ Raison _____ DiNapoli _____
Global Fuel _____
- Boats, power _____ sailboats _____ kayaks _____ crew _____
shellfishing _____ near Matinecock Pt. _____ Webb Inst. _____ other _____
- Anglers, at beaches _____ at piers _____
- Other _____

Floatables Observations (type, approximate number)

- Bottles, glass _____ plastic _____ cans _____ paper _____ plastic bags/pieces _____
- Styrofoam, cups _____ pieces _____ wood, boards _____ pieces _____ other _____
- Other _____

Hempstead Harbor Core Program Calibration Data Sheet YSI EXO2S

- Calibrations to be completed **DAY BEFORE** or **MORNING OF** Field Sampling Date •
- Post-Readings to be completed the **AFTERNOON OF** or **DAY AFTER** Field Sampling Date •

Calibrations • Person: _____ Date: _____ Time: _____

Post-Readings • Person: _____ Date: _____ Time: _____

Handheld S/N: _____ Sonde S/N: _____

◇ COMPLETE **BEFORE** SAMPLING ◇

◇ COMPLETE **AFTER** SAMPLING ◇

① Calibrate **DISSOLVED OXYGEN (ODO % sat)**

Barometric Pressure (mmHg)

Temperature

Pre-Cal Value

Post-Cal Value

ODO Gain

② Calibrate **CHLOROPHYLL (µg/L) • 1-Point Calibration**

Pre-Cal Value

Post-Cal Value

③ Calibrate **CHLOROPHYLL (RFU) • 1-Point Calibration**

Pre-Cal Value

Post-Cal Value

④ Calibrate **TURBIDITY • 2-Point Calibration**

→ 1st Cal Value: 0 NTU (Reagent Grade Water)

Pre-Cal Value

Post-Cal Value

→ 2nd Cal Value: 124 NTU (Turbidity Standard)

Pre-Cal Value

Post-Cal Value

⑤ Calibrate **Specific Conductance (50,000 µS/cm)**

Pre-Cal Value

Post-Cal Value

Cell Constant

⑥ Calibrate **pH • 2-Point Calibration**

→ 1st Cal Value: pH 7.00 (Buffer Solution)

Pre-Cal Value

Post-Cal Value

→ 2nd Cal Value: pH 10.00 (Buffer Solution)

⑥ Calibrate **DEPTH (0 m)**

Pre-Cal Value

Post-Cal Value

① Post-reading for **DISSOLVED OXYGEN (% sat)**

② Post-reading for **CHLOROPHYLL (µg/L)**

③ Post-reading for **CHLOROPHYLL (RFU)**

④ Post-reading for **TURBIDITY (0 NTU)**

Post-reading for **TURBIDITY (124 NTU)**

⑤ Post-reading for **SP COND (50,000 µS/cm)**

⑥ Post-reading for **pH (7.00)**

Post-reading for **pH (10.00)**

⑦ Post-reading for **DEPTH (0 m)**

	Reagent Grade Water	Turbidity Standard 124 NTU	Conductivity Standard 50,000 µS/cm	pH 7 Standard	pH 10 Standard
Manufacturer					
Lot Number					
Expiration					

Accuracy Range Table

DO% (100%)	97 – 103
Chl a (0 µg/L)	-0.30 – 0.30
Turbidity (0 NTU)	-3.00 – 3.00
Turbidity (124 NTU)	121.0 – 127.0
SpCond (50,000 µS/cm)	48,500 – 51,500
pH (7.00)	6.80 – 7.20
pH (10.00)	9.80 – 10.20
Depth (0 m)	-0.1 – 0.1

GPS of reference station: (circle one) **NAD-83** **WGS-84**

- within 2 days of sampling day • in decimal degrees •

Lat.: _____ Long.: _____

Nassau Co. DOH PHL 209 Main Street Hempstead, NY 11550 LABORATORY SECTION <input type="checkbox"/> Chemistry <input checked="" type="checkbox"/> Environmental Microbiology <input type="checkbox"/> Clinical Microbiology	FORM NAME: COALITION TO SAVE HEMPSTEAD HARBOR <input type="checkbox"/> QC <input type="checkbox"/> Equip Maint <input type="checkbox"/> Training <input type="checkbox"/> Comp Doc <input checked="" type="checkbox"/> Other			
	Form. No.: Beach Monitoring Daily Sampling Log - 1 Date: 12/14/2021	Rev: 3 Created By: CONNIE IANNUCCI		

BEACH MONITORING DAILY SAMPLING LOG
COALITION TO SAVE HEMPSTEAD HARBOR

Elap ID #10339	NASSAU COUNTY DEPARTMENT OF HEALTH DIVISION OF PUBLIC HEALTH LABORATORIES 209 MAIN STREET, HEMPSTEAD, NY 11550 DAVID TAMAYEV, MD, MICROBIOLOGY TECHNICAL DIRECTOR TELEPHONE (516) 572-1202 FAX (516) 572-1206		Michelle Lapinel McAllister COLLECTOR'S NAME	DATE	ALL SAMPLES SUBMITTED IN STERILE POLYSTYRENE VESSELS CONTAINING SODIUM THIOSULFATE (UNLESS OTHERWISE SPECIFIED)
-------------------	---	--	--	-------------	--

Field Number	Location	Time	Temperature		Wind	Weather	Wave Height	Laboratory Use Only			
			Air	Water				Lab Number	Fecal Coliforms CFU/100 mL	Enterococci CFU/100 mL	Comments
CSHH-1	BEACON ELEVEN										
CSHH-1A											
CSHH-2	BELL BUOY 6										
CSHH-3	RED MARKER GLEN COVE CREEK										
CSHH-4	BAR BEACH SPIT										
CSHH-5	MOTT'S COVE										
CSHH-6	EAST OF FORMER TNH INCINERATOR										
CSHH-7	BRYANT LANDING										
CSHH-8	GLEN COVE STP										
CSHH-9	FIRST PIPE WEST OF STP OUTFALL										
CSHH-10	PIPE AT CORNER OF SEAWALL WEST OF STP OUTFALL										
CSHH-11	50 YARDS EAST OF STP OUTFALL										
CSHH-12	EAST OF STP OUTFALL BY BEND IN SEAWALL										
CSHH-13	60 FEET WEST OF MILL POND WEIR										

COMMENTS/REMARKS:

REPORT TO: RECREATIONAL FACILITIES
 200 COUNTY SEAT DRIVE
 MINEOLA, NY 11501

*ESTIMATED COUNT
 TNTC = "TOO NUMEROUS TO COUNT"

DATA ENTRY: PROOFED:

TEST	TECHNOLOGY	METHOD
Fecal Coliform CFU/100 ml.	MF-QN	SM 9222D-2006
Enterococci CFU/100 ml	MF-QN	EPA 1600

TEMP CONTROL: TIME RECEIVED: DATE RECEIVED:

DATE ANALYZED:

SAMPLE ACCEPTABLE: YES NO ANALYSIS SUCCESSFUL: YES NO

LABORATORY ACCREDITATION NOTICE: The results provided on this report have been produced in compliance with "NELAC" (National Environmental Laboratory Accreditation Conference) standards and relate only to the identified sample. Any deviations from the accepted "NELAC" collection requirements for non-potable samples are appropriately noted. This report shall not be reproduced except in full without the written approval of the laboratory. Current New York State laboratory certification status is maintained under ELAP ID #10339.	VERIFICATION REVIEW		
	Name:	Title:	Date:
Comments:			

Nassau Co. DOH PHL 209 Main Street Hempstead, NY 11550	FORM NAME: COALITION TO SAVE HEMPSTEAD HARBOR <input type="checkbox"/> QC <input type="checkbox"/> Equip Maint <input type="checkbox"/> Training <input type="checkbox"/> Comp Doc <input checked="" type="checkbox"/> Other				
LABORATORY SECTION <input type="checkbox"/> Chemistry <input checked="" type="checkbox"/> Environmental Microbiology <input type="checkbox"/> Clinical Microbiology	Form. No.: Beach Monitoring Daily Sampling Log - 1 Date: 12/14/2021	Rev: 3 Created By: CONNIE IANNUCCI			

BEACH MONITORING DAILY SAMPLING LOG
COALITION TO SAVE HEMPSTEAD HARBOR

Elap ID #10339	NASSAU COUNTY DEPARTMENT OF HEALTH DIVISION OF PUBLIC HEALTH LABORATORIES 209 MAIN STREET, HEMPSTEAD, NY 11550 DAVID TAMAYEV, MD, MICROBIOLOGY TECHNICAL DIRECTOR TELEPHONE (516) 572-1202 FAX (516) 572-1206	Michelle Lapinel McAllister COLLECTOR'S NAME	DATE	ALL SAMPLES SUBMITTED IN STERILE POLYSTYRENE VESSELS CONTAINING SODIUM THIOSULFATE (UNLESS OTHERWISE SPECIFIED)
-------------------	---	--	-------------	--

Field Number	Location	Time	Temperature		Wind	Weather	Wave Height	Laboratory Use Only			
			Air	Water				Lab Number	Fecal Coliforms CFU/100 mL	Enterococci CFU/100 mL	Comments
CSHH-14	NW CORNER OF POWER PLANT ~ 50 YARDS FROM CEMENT OUTFALL										
CSHH-14A	CEMENT OUTFALL ADJACENT TO POWER PLANT										
CSHH-15	NW CORNER OF TAPPEN POOL										
CSHH-15A	SCUDDER'S POND OUTFALL @ SEAWALL N. OF TAPPEN POOL										
CSHH-15B	SCUDDER'S POND WEIR										
CSHH-16	UPPER HARBOR MIDWAY BETWEEN EAST/WEST SHORE										
CSHH-17	OUTSIDE RESTRICTED AREA OF CRESCENT BCH ACROSS FROM WHITE BLDG										
CSHH-17A	INSIDE RESTRICTED AREA OF CRESCENT BCH ACROSS FROM WHITE BLDG & STREAM										
TRIP BLANK											

COMMENTS/REMARKS: **Tide:** High / Low **Time:** _____ **14A:** Mixed / Direct **15A:** Mixed / Direct *ESTIMATED COUNT
REPORT TO: RECREATIONAL FACILITIES **Tide:** High / Low **Time:** _____ TNTC = "TOO NUMEROUS TO COUNT"
 200 COUNTY SEAT DRIVE
 MINEOLA, NY 11501

DATA ENTRY: _____ PROOFED: _____ RAIN 24 : _____ RAIN 48: _____ SOURCE: _____

TEST	TECHNOLOGY	METHOD
Fecal Coliform CFU/100 ml.	MF-QN	SM 9222D-2006
Enterococci CFU/100 ml	MF-QN	EPA 1600

TEMP CONTROL: _____ TIME RECEIVED: _____ DATE RECEIVED: _____
 DATE ANALYZED: _____
 SAMPLE ACCEPTABLE: YES NO ANALYSIS SUCCESSFUL: YES NO

LABORATORY ACCREDITATION NOTICE:
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VERIFICATION REVIEW		
Name:	Title:	Date:
Comments:		

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:			Section B Required Project Information:			Section C Invoice Information:					
Company: Coalition to Save Hempstead Harbor			Report To: Carol DiPaolo			Attention:					
Address: PO Box 159			Copy To: cshh.org@gmail.com			Company Name:					
Sea Cliff, NY 11579						Address:			Regulatory Agency		
Email: cshh.org@gmail.com			Purchase Order #:			Pace Quote:					
Phone: (516) 801-6792 Fax			Project Name: HEMPSTEAD HARBOR MONITORING			Pace Project: betty.harrison@pacelabs.com			State / Location		
Requested Due Date:			Project #:			Pace Profile #: 7288			NY		

ITEM #	SAMPLE ID <small>One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique</small>	MATRIX		CODE DW		MATRIX CODE <small>(see valid codes to)</small>	SAMPLE TYPE <small>(G=GRAB C=CO)</small>	COLLECTED				SAMPLE TEMP AT COLLECTION	PRESERVATIVES									Y/N	Analyses Test	Requested Analysis Filtered (Y/N)												Residual Chlorine (Y/N)					
		Drinking Water	Water	WT	WW			SL	OL	WP	AR		OT	TS	# OF CONTAINERS	Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3			Methanol	Other	NO2/NO3	NO2	NH3	TKN	Total Nitrogen	Total Organic Nitrogen										
		Product Soil/Solid	Oil Wipe	Air	Other			Tissue	DATE	TIME	DATE		TIME																												
1	CSHH #1	WT	G									2	1	1							X	X	X	X	X	X															
2	CSHH #3	WT	G									2	1	1							X	X	X	X	X	X															
3	CSHH #6	WT	G									2	1	1							X	X	X	X	X	X															
4	CSHH #7	WT	G									2	1	1							X	X	X	X	X	X															
5	CSHH #8	WT	G									2	1	1							X	X	X	X	X	X															
6	CSHH #12	WT	G									2	1	1							X	X	X	X	X	X															
7	CSHH #13	WT	G									2	1	1							X	X	X	X	X	X															
8	CSHH #14A	WT	G									2	1	1							X	X	X	X	X	X															
9	CSHH #15A	WT	G									2	1	1							X	X	X	X	X	X															
10	CSHH #16	WT	G									2	1	1							X	X	X	X	X	X															
11																																									
12																																									
13																																									
14																																									
ADDITIONAL COMMENTS		RELINQUISHED BY / AFFILIATION				DATE	TIME	ACCEPTED BY / AFFILIATION				DATE	TIME																												

SAMPLER NAME AND SIGNATURE		TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
PRINT Name of SAMPLER: Michelle Lapinel McAllister					
SIGNATURE of SAMPLER:	DATE Signed:				