Quality Assurance Project Plan (QAPP)

Hempstead Harbor Water-Quality Monitoring Program

COALITION TO SAVE HEMPSTEAD HARBOR
EST. 1986

HHPC
Hempstead
Harbor
Protection
Committee

Approval Date: June 2, 2020

Prior Associated Approved QAPPs in 2019, 2014, 2011, 2006

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U.S. Environmental Protection Agency
Region 2

Monitoring Organization:
Coalition to Save Hempstead Harbor

2020 QAPP Approval Page

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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 Quality Assurance (QA) Officer and Field Sampling Leader 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 Sampling Leader, and QA Officer positions are considered management personnel for the water-quality monitoring program and QAPP. Note that this QAPP replaces the related 2014 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 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 QA Manager, or the Project Manager/Field Sampling Leader, or both.

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

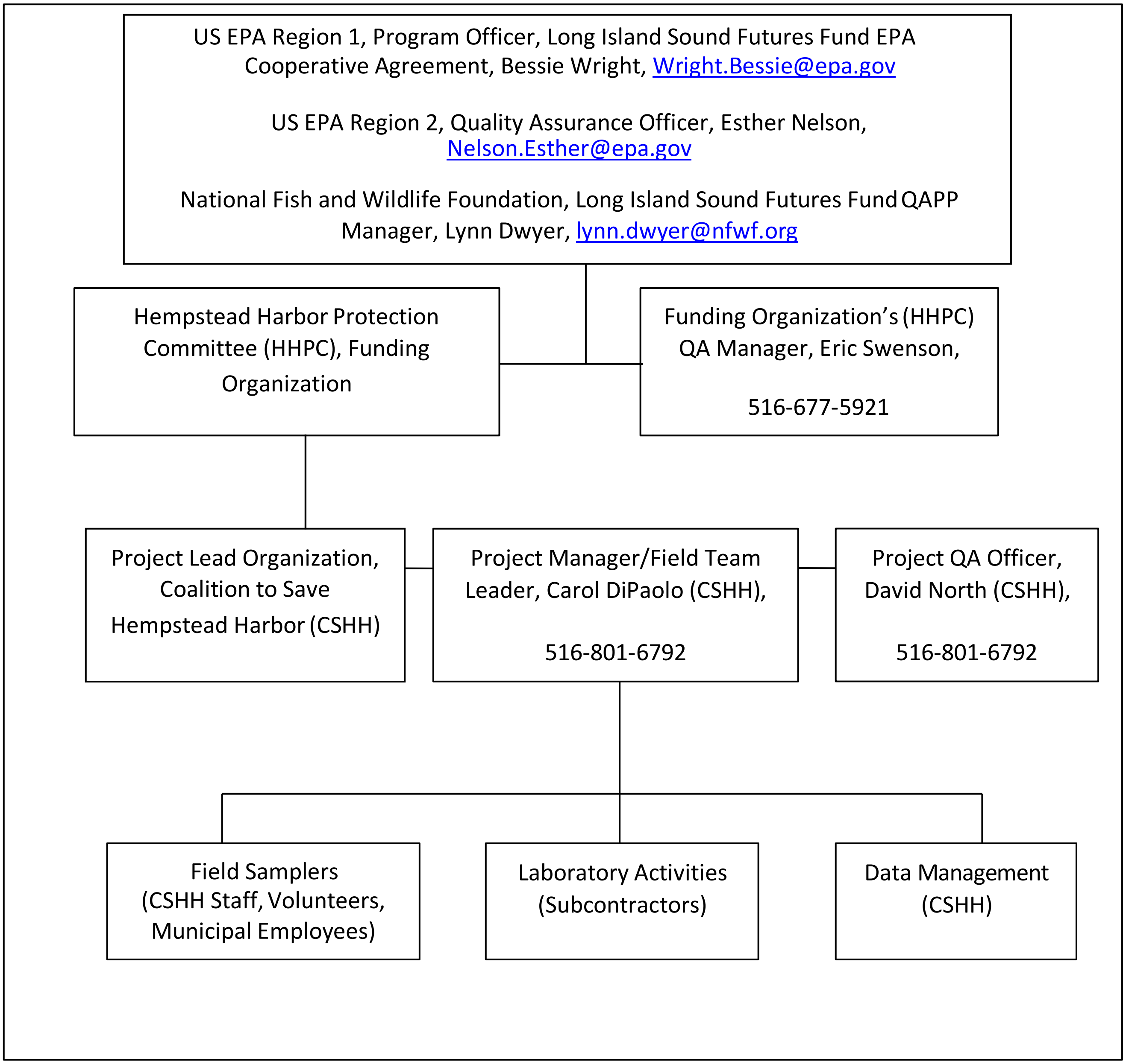

Table 1: Program Personnel Responsibilities

Title	Name	Affiliation	Responsibility
US EPA Program Officer	Bessie Wright	US EPA, Region 1	US EPA Cooperative Agreement, National Fish and Wildlife Foundation
LISFF QAPP Manager	Lynn Dwyer	National Fish and Wildlife Foundation	QAPP Management for Long Island Sound Futures Fund
US EPA QA Officer	Esther Nelson	US EPA, Region 2	1. Reviews proposed changes to the QAPP 2. Coordinates approval process for the QAPP
Advisory Board	Municipal Officials	Hempstead Harbor Protection Committee	1. Discusses and approves proposed changes in monitoring program 2. Reviews and approves budgets
QA Manager	Eric Swenson	Hempstead Harbor Protection Committee	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	1. Organizes daily operation of monitoring program 2. Schedules activities related to monitoring program 3. Ensures that equipment is properly maintained and that consumables are available 4. Trains volunteers and field samplers in the procedures described in this QAPP 5. Procures analytical services 6. Supervises sample handling 7. Tracks samples to verify that they reach the laboratory 8. Recommends changes to water-quality monitoring program 9. Determines whether QAPP changes are necessary
Project Quality Assurance Officer	David North	Coalition to Save Hempstead Harbor	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 and Municipal Employees	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 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 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 and bacteria levels within the harbor and (2) an outfall-monitoring program to identify other critical areas of pathogen loading to the harbor. Sampling begins in May and continues until November.

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 causes for negative events (e.g., algal blooms and fish kills)
- Investigate long-term trends in water-quality parameter levels
- Guide municipal and county-level 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 pathogen sources for targeting pathogen-load reduction efforts

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 reports of continued degradation of the harbor on a number of fronts. The impetus for creation of what was originally referred to as the citizens water-monitoring program for Hempstead Harbor were the severe county budget cuts that decimated Nassau County Department of Health's (NCDH) environmental program and 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.

In 1995, the Hempstead Harbor Protection Committee was created. HHPC is an intermunicipal organization comprising the nine municipalities that are situated in the Hempstead Harbor watershed and has been 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.

To identify additional sources of pathogen loadings, an outfall pathogen-monitoring program was developed in 2009. This component of the monitoring program was considered necessary to develop strategies to further reduce levels of pathogen 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.

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 continues to participate in the UWS and its equipment loan program, which lends electronic multiparameter meters and other equipment to each UWS group. To align both monitoring programs for Hempstead Harbor as much as possible, CSHH is using the same multiparameter meter (Eureka Manta+ 35) as the primary equipment for vertical profiles conducted as part of the Hempstead Harbor core monitoring program and the Hempstead Harbor UWS program.

Whereas CSHH monitors up to 21 locations for the core Hempstead Harbor water-monitoring program, 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.)

Previously used electronic equipment for the Hempstead Harbor core water-monitoring program (the YSI ProPlus for vertical profiles and the LaMotte 2020e for turbidity measurements) will be maintained for use as secondary equipment in the event that the primary equipment fails. **Note:** The calibration, operation, and maintenance procedures for the secondary, backup equipment are included in *Appendix D* following the standard operation procedures for the primary electronic meter.

4 Project and Task Description

CSHH monitors up to 21 CSHH locations weekly, generally from May to November. The principal CSHH stations that are sampled weekly during the monitoring 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 weekly on Wednesdays or Thursdays, approximately 8 am to 10 am, from November to May; 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 averages of certain parameters for comparison of previous years’ conditions. 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.

Table 2 includes the latitude/longitude points of the monitoring stations, and a map showing the monitoring locations is presented as *Appendix C*.

The monitoring program has two main elements—in-harbor monitoring and outfall pathogen monitoring—as described in *Sections 4.1* and *4.2*.

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 (1 meter intervals) 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 sampling program. The Nassau County Department of Health performs the bacterial analysis on CSHH station samples. Nitrogen is 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 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	40.85849	073.64204
CSHH #9, 10 ft west of #8	40.85850	073.64195
CSHH #10, 20 ft west of #8	40.85846	073.64198
CSHH #11, 50 ft east of #8	40.85852	073.64141
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: Elements of In-Harbor Water-Quality Monitoring

Parameter	Location	Analyzer or Method	Location of Analysis
Dissolved Oxygen	Vertical profile at 1-meter intervals at CSHH #1-7 and #16-17	Eureka Manta+ 35*	Field
Dissolved Oxygen	One location for electronic meter validation	LaMotte 5860-01 (Winkler titration)	Field
Water Temperature	Vertical profile at 1-meter intervals at CSHH #1-7 and #16-17	Eureka Manta+ 35*	Field
Water Temperature	One station for electronic meter validation	Calibrated Thermometer	Field
Air Temperature	One measurement at each station during monitoring	Calibrated Digital Thermometer	Field
Salinity	Vertical profile at 1-meter intervals at CSHH #1-7 and #16-17	Eureka Manta+ 35*	Field
pH	Vertical profile at 1-meter intervals at CSHH #1-7 and #16-17	Eureka Manta+ 35*	Field
pH	One station for electronic meter validation	LaMotte 5858-01 Test Kit	Field
Turbidity	Vertical profile at 1-meter intervals at CSHH #1-7 and #16-17	Eureka Manta+ 35**	Field
Water Clarity	CSHH #1-7 and #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	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 #1, #3, #6-7, #16	EPA 353.2 Rev.2.0	Pace Analytical Services, LLC
Nitrite	Grab sample at half-meter depth at #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, and #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, and #17A	Membrane Filter, EPA 1600	Nassau County Department of Health
Precipitation	Village of Sea Cliff	Stratus Precision Rain Gauge (visually read)	Field

** YSI ProPlus multiparameter meter will be used in the event that the Eureka Manta+ 35 is out of service.*

*** LaMotte 2020e (USEPA 180.1) meter will be used in the event that the Eureka Manta+ 35 is out of service.*

4.2 Outfall Pathogen Monitoring

The CSHH outfall pathogen-monitoring component of the water-monitoring program was developed to help assess pollutant loads and potential pathogen 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 inside the 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 from 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 from 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.)

Table 4: Elements of Outfall Pathogen Monitoring

Parameter	Location	Analyzer or Method	Location of Analysis
Dissolved Oxygen	CSHH #8, #13, #14, and #15	Eureka Manta+ 35*	Field
Water Temperature	CSHH #8-13, #14, and #15	Eureka Manta+ 35*	Field
Water Temperature	CSHH #14A, #15A, #15B	Calibrated Digital Thermometer	Field
Air Temperature	One measurement at all outfall locations during monitoring	Calibrated Digital Thermometer	Field
Salinity	CSHH #8, #13, #14, and #15	Eureka Manta+ 35*	Field
pH	CSHH #8, #13, #14, and #15	Eureka Manta+ 35*	Field
Turbidity	CSHH #8, #13, #14, and #15	Eureka Manta+ 35**	Field
Water Clarity	CSHH #8, #13, #14, and #15	LaMotte Secchi Disk	Field

Parameter	Location	Analyzer or Method	Location of Analysis
Total Kjeldahl Nitrogen	Grab sample at half-meter depth at CSHH #8, #12-13, #14A, #15A	EPA 351.2	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 #8-13, #14, #14A, #15, #15A, and #15B	Membrane Filter, SM 9222 D-2006	Nassau County Department of Health
Enterococci	Grab sample at CSHH #8-13, #14, #14A, #15, #15A, and #15B	Membrane Filter, EPA 1600	Nassau County Department of Health
Precipitation	Village of Sea Cliff	Stratus Precision Rain Gauge (visually read)	Field

** YSI ProPlus multiparameter meter will be used in the event that the Eureka Manta+ 35 is out of service.*
*** LaMotte 2020e (USEPA 180.1) meter will be used in the event that the Eureka Manta+ 35 is out of service.*

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 for the first in-harbor station for each sampling event (representing 8-13% of in-harbor samples, depending on tidal cycles and access to stations).
- 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 and analyzed by the Winkler-titration method using a LaMotte field kit.
- pH results from the multiparameter meter will be validated with a sample from one location per monitoring date and analyzed by a LaMotte reagent kit.
- Duplicate grab samples will be taken once in approximately every 20 samples for bacteria and nitrogen.

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 presented in *Appendix D*.

See also Tables 5 and 6.

Calibration acceptance criteria, where applicable, are defined in *Table 5.*

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, the three stations in the midsection of the harbor (CSHH #1, #2, #3) are representative of estuarine water conditions within that portion of the harbor; CSHH #16 and #17 may be considered representative of estuarine conditions in the outer section of the harbor.
- Outfall pathogen 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, tidal, 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 pathogen 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 pathogen 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 limits are determined by the analytical method or the instrument. Sensitivity is the lowest detection limit of the method or instrument 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 detection limits for water-quality parameters measured in this monitoring program.

Table 5: Accuracy, Precision, and Sensitivity of 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 (Eureka Manta+ 35)	meters (m)	0 to 10 m ±0.02 (±0.2% of FS) 0 to 25 m ±0.05 (±0.2% of FS) *FS=Full Scale*	20%	0 - 12 m	0.01 m
GPS coordinates (Garmin Montana 680t)	decimal degrees (dec. deg.)	± 7.8 m http://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 (Eureka Manta+ 35)	degrees Celsius (°C)	± 0.1 °C	10%	4 - 26 °C	0.01 °C
salinity (Eureka Manta+ 35)	pss/ppt	±1% of reading ±0.1 ppt	10%	5 - 30 ppt	4 digits
dissolved oxygen (LaMotte 5860-01, Winkler titration method)	milligrams per liter (mg/L) = parts per million (ppm)	±0.2 ppm	10%	0 -14 ppm	0 ppm

Parameter	Units	Accuracy	Precision (allowable RPD)	Approx. Expected Range	Sensitivity
dissolved oxygen (Eureka Manta+ 35)	milligrams per liter (mg/L) = parts per million (ppm); percent saturation (% sat.)	0 to 20 mg/L ± 0.2 mg/L 20 to 50 mg/L ± 10% reading 0 to 200% sat. ±1% of reading or ±0.1 % sat. 200 to 500% sat. ±10% of reading	20%	0 - 14 mg/L 0 - 120 % sat.	0.1 mg/L 0.1 % sat.
turbidity (Eureka Manta+ 35)	NTU	0 to 400 NTU ± 1% of reading ± 1 count	20%	0 - 30 NTU	4 digits
water clarity (Secchi disk)	m	±0.1 m	10%	0 - 4 m	0.1 m
pH (LaMotte 5858-01wide-range indicator)	N/A	5.0, 5.5, 6.0, 6.5, 7.0, 7.5, 8.0, 8.5, 9.0, 9.5, 10.0, 10.5	(color metric)	6.5 - 8.5	0.5
pH (Eureka Manta+ 35)	N/A	± 0.2	5%	6.5 - 8.5	0.01

Table 6: Accuracy and Precision for Laboratory Parameters

Parameter	Method	Reporting Limit	Accuracy	Precision
Fecal Coliform	Membrane Filter, SM 9222 D-2006	< 1 CFU/100mL	± 20	20%
Enterococci	Membrane Filter, EPA 1600	< 1 CFU/100mL	± 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%

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 is identified, its 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 rational for the selection of those locations, is presented in *Section 4.* A map showing the monitoring locations is 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 to November 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 outer 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 8*.

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 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 indicates 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 (i.e., whether any 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 (CO_2) via photosynthesis affects aquatic pH on small time scales (hours to days), whereas increases in atmospheric CO_2 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.

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 (POTWs), or from illicit stormwater discharges. Thus, ammonia was previously monitored weekly using a LaMotte test kit at CSHH #1, which is distant from the harbor's inflows, and at CSHH #8, which is at the outfall of the Glen Cove sewage treatment plant. If ammonia was detectable during a monitoring event at CSHH #1, the assumption was that it may be the result of an unusual inflow event or the large presence of fish, so ammonia levels were then measured at the other monitoring stations on that day. However, over the last few years, detectable amounts of ammonia have been found increasingly at multiple CSHH stations, at the same time that a large presence of fish (notably, Atlantic menhaden) have been observed throughout Hempstead Harbor. It was decided that water samples would be collected for laboratory analysis to check those results against the results produced by the LaMotte kit. The laboratory results were within the range of the LaMotte kit results. Ultimately a decision was made to eliminate the use of the ammonia LaMotte kit and to rely solely on the laboratory analyses for ammonia samples.

Having examined previous nitrogen data, and given the information currently available regarding nitrogen testing under the Long Island Nitrogen Action Plan and the Long Island Sound Nitrogen Reduction Strategy, we will begin a new nitrogen testing plan. We will collect samples for total Kjeldahl nitrogen, nitrate, nitrite, and ammonia on a biweekly basis using laboratory analysis at 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 enrichment problems and can also be used to anticipate algal blooms and hypoxia. Thus, samples are collected at the CSHH locations described above for nitrate and nitrite and are subsequently analyzed at a certified laboratory.

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 (*Table 7* presents applicable New York State surface water-quality standards for bathing beaches and shellfish beds). CSHH collects water samples at 21 stations throughout Hempstead Harbor to augment the data collected by these agencies and to help identify and diminish pathogen loading to the harbor.

Quality-assurance controls for field-sampling systems, including field-measurement checks and duplicate sampling, are presented in *Tables 8* and *9.*

Table 7: New York State Water Quality Standards (6 NYCRR Part 703)

Parameter	Standard*
Fecal Coliform	NYS beach closure standards: 1,000 CFU/100 mL for fecal coliform; 200 Log AvgFC/100 mL
	NYS shellfish standards: geometric mean of 14 FC/100mL or 90th percentile values of 49 FC/100mL
Enterococci	NYS beach closure standards: 104 CFU/100 mL for enterococci; and 35 Log AvgEnt/100 mg/L
Ammonia plus Ammonium	Standard is pH and temperature dependent. Range from 0.0007 to 0.050 mg/L
Nitrate plus Nitrite	10 mg/L (Class SA)
Dissolved Oxygen	4.8 ppm (mg/L)
pH	Normal range shall not be exceeded by more than 0.1 S.U.

**For SB Classified Water Body unless otherwise noted.*

Table 8: Sampling Approaches for Vertical Profiles at Water-Quality Stations

Parameters	Number of Sample Locations*	Frequency	Field Survey Quality Control
GPS: latitude & longitude in decimal degrees; NAD 83 coordinate system or record system used	every station (7-13 stations depending on tide)	every sample date	Reference land site, once per sampling event. Verbally repeat readings every time a station is sampled. Coordinates indicating a 10 m or greater discrepancy will be assessed and documented in final report.
Water Clarity–Secchi disk			Two readings at every station.
Station depth			Take a replicate reading at one station once per field day. Post-monitoring check and calibration per SOPs.
Sample depth			
Temperature	every station (7-13 stations) starting at half a meter below the surface, thereafter in meter increments to approximately one-quarter meter above bottom		
Salinity			
Dissolved Oxygen			
Turbidity			
pH			

**Note: Number of locations may vary based on tidal and weather conditions*

Table 9: Sampling Approaches for Grab Samples at Water-Quality Stations

Parameters	Number of Sample Locations*	Frequency	Field Survey Quality Control
Fecal Coliform	21	1 day/week	• trip blank to control for temperature and contamination; sterile sample jars provided by laboratory • duplicate sample taken 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 direct sampling.) • pre-labeling sample bottles
Enterococci			
Total Kjeldahl Nitrogen	10	biweekly	• duplicate sample taken once in every 20 samples • rinse sample-collection bottle with sample water twice before collecting sample • pre-labeling sample bottles
Ammonia			
Nitrate			
Nitrite			

**Note: Number of locations may vary based on tidal and weather conditions.*

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 10 presents a summary of field quality-control requirements. (See also *Table 8* in *Section 7.2*.)

Table 10: 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 Eureka sonde reading	1/field day
Eureka Manta+ 35 multiparameter sonde	depth, temperature, salinity, pH, dissolved oxygen, turbidity	pre-survey checks and calibration and post-survey checks	duplicate profiles at one station and readings recorded only when values are stable	1/field day

8.2 Field Requirements for Grab Samples

Table 11 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. Dissolved oxygen (using the Winkler titration method) is analyzed in the field. (See also *Table 9* in *Section 7.2*.)

Table 11: 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 collected in laboratory-provided sample jars; samples stored on ice in cooler until delivery to the lab	the lab checks and records temperature when samples are delivered	trip blank to control for temperature and contamination; sample jars and preprinted data sheets provided by laboratory
Laboratory analysis	total Kjeldahl nitrogen, ammonia, nitrate, and nitrite	all samples collected in laboratory-provided sample jars; samples stored on ice in cooler until delivery to the lab	the lab checks and records temperature when samples are delivered	sample jars provided by laboratory; preprinted jar labels and chain of custody sheets provided by lab; sample duplicates 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 Winker titration collected at same depth that will be read from multiparameter meter	two or more members of the field team read color comparators to assess levels; sample for Winkler titration taken at same bottom depth and results compared with bottom reading of multiparameter meter	for Winkler titration, “fixed” sample water 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. Bacterial 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 12* presents preservation and holding-time requirements for the analyses performed by laboratories (samples are delivered immediately after monitoring; maximum hold time in *Table 12* is from the time of sample collection). All other parameters are field measured and are not held or preserved.

Table 12: 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 (H_2SO_4)	Grab	48 hours
Ammonia	250 ml/ Plastic	Iced/preserved (H_2SO_4)	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 H_2SO_4.

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 13* summarizes inspection procedures.

Table 13: Instrument/Equipment Inspection Procedures

Equipment Type	Inspection Frequency	Type 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 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, 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 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, replace as needed

9.1 Instrument/Equipment Calibration and Frequency

Calibration is conducted within a day prior to a 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 14.*

Table 14: Instrument/Equipment Calibration Procedures*

Instrument	Inspection and Calibration Frequency	Standard of Calibration for Instrument Used	Corrective Action
calibrated lines (for depth)	annually	LaMotte pre-marked line and tape measure	recalibrate or replace with calibrated line
multiparameter sonde	before each sampling run	standard solutions	manufacturer’s instructions and tech support recommendations

**Detailed calibration procedures are described in SOPs contained in Appendix A.*

9.2 Inspection/Acceptance of Supplies and Consumables

Supplies needed for this monitoring program include sampling bottles, calibration solutions, 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 solutions and replacement parts will be obtained from the original manufacturer of the equipment and/or the laboratory that has supplied the sample bottles. *Table 15* outlines the supplies inspection and acceptance procedures.

Table 15: 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	storage according to manufacturer's recommendations, annual replacement at beginning of sampling season
sonde sensors	before each sampling date	visual inspection of quantity, integrity	backup meter, new parts ordered as needed	storage 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	annually or as needed

10 Data Management

Field data is collected on a field data sheet during each sampling event (see *Appendix F*). Field data will be compiled electronically after each event. A sample of the electronic data repository is presented in *Appendix G*. 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.

The 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 EPA pertinent 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, post check, 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 datasheet.

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 QA Officer will then examine and validate the reviewed data. Data that meets the data-quality objectives and that is collected following the procedures presented in this QAPP practice are considered valid. Data that is inconsistent with these standards (data that was flagged) will be examined by the Project Manager/Field Team Leader, 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 DQOs, the 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.

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.

12.2 Data Usability

The purpose of this QAPP is to provide data that is acceptable to current users, including those 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 currently presents the data collected by this monitoring program in HHPC/CSHH Annual Water Quality Reports, periodically at CSHH and HHPC member meetings, Long Island Sound Citizen Advisory Committee meetings, and on the CSHH's and HHPC's websites.

Reporting, documentation, and record-keeping requirements are presented in *Section 10.*

Appendix A

Standard Operating Procedures

Standard Operating Procedures – Sampling Plan

Table of Contents

1 POINT OF CONTACT

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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 April for bacteria and nitrogen analysis only.

The sampling plan calls for 24 weeks of sampling during the regular season and 24 weeks of sampling during the winter season with a minimum of 22 weeks for each season. 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 occur on a biweekly basis during the regular season (May through October). During the regular season, nitrogen samples will be collected at up to 10 stations (CSHH #1, #3, #6-8, #12, #13, #14A, #15A, #16). During the winter season (November through April), nitrogen samples will be collected at up to 3 stations biweekly or monthly, with frequency of testing dependent on funding (for CSHH #14A, #15A, and #15B) (in 2020, this will occur biweekly).

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 bee stings

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 water 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:
        - o water temperature
        - o salinity
        - o dissolved oxygen
        - o chlorophyll a (note that sonde chlorophyll a readings are used only as a frame of reference against previous day's Unified Water Study chlorophyll a readings)
        - o 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—
        - o label sample jar with a permanent marker indicating the site identification (e.g., CSHH #1) and date and time of sample collection
        - o label the sample jar lid with the site identification
        - o rinse large sample collection jar twice with sample water before collecting sample where applicable
        - o 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
        - o for samples collected near outfalls, collect sample as close to outfall discharge as possible using large sampling jar attached to sample grab pole
        - o data sheets should indicate time sample is collected, air temperature, water temperature, wind direction and speed, weather conditions (using NCDH codes), and wave height
        - o 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—
        - o 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 sample as close to outfall discharge as possible using large sampling jar attached to sample grab pole
- 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 May through October for the regular season and November through 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, and chlorophyll a 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 a 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 below or in the near vicinity of outfalls for 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) 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 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 lab, 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 lab, 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 pre-sampling event portions of the datasheets.

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. Record postcheck against known standards of 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/production/files/2015-09/documents/2007_04_09_estuaries_monitoruments_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, 2021
Issued April 01, 2020

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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

MR. THOMAS EDWARDS
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 (2003) for the category
ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Bacteriology

Coliform, Fecal	SM 9221C E-2006 SM 9222D-2006
Coliform, Total	SM 9221B-2006
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

Aluminum, Total	EPA 200.8, Rev. 5.4 (1994)
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)
Mercury, Total	EPA 7470A
Selenium, Total	EPA 200.8, Rev. 5.4 (1994)

Metals II

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

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	EPA 200.7, Rev. 4.4 (1994)
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.: 61058

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2021
Issued April 01, 2020
Revised April 23, 2020

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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

NY Lab Id No: 10478

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

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2003) for the category ENVIRONMENTAL ANALYSES POTABLE WATER
All approved analytes are listed below:

Miscellaneous

Turbidity	EPA 180.1 Rev. 2.0
UV 254	SM 21-23 5910B (-00,-11)

Non-Metals

Alkalinity	SM 21-23 2320B (-97)
Calcium Hardness	EPA 200.7 Rev. 4.4 SM 18-22 2340B (-97)
Chloride	EPA 300.0 Rev. 2.1 SM 21-22 4500-Cl- E (-97)
Color	SM 21-23 2120B (-01)
Corrosivity	SM 18-22 2330
Cyanide	SM 20, 21-23 4500-CN E
Fluoride, Total	EPA 300.0 Rev. 2.1
Nitrate (as N)	EPA 353.2 Rev. 2.0
Nitrite (as N)	EPA 353.2 Rev. 2.0
Orthophosphate (as P)	SM 19, 21-23 4500-P E (-99)
Silica, Dissolved	EPA 200.7 Rev. 4.4
Solids, Total Dissolved	SM 21-23 2540C (-97)
Specific Conductance	EPA 120.1 Rev. 1982 SM 21-23 2510B (-97)
Sulfate (as SO4)	EPA 300.0 Rev. 2.1

Organohalide Pesticides

Alachlor	EPA 505
Aldrin	EPA 505
Atrazine	EPA 525.3
Butachlor	EPA 525.3

Organohalide Pesticides

Chlordane Total	EPA 505
Dieldrin	EPA 505
Endrin	EPA 505
Heptachlor	EPA 505
Heptachlor epoxide	EPA 505
Lindane	EPA 505
Methoxychlor	EPA 505
Metolachlor	EPA 525.3
Metribuzin	EPA 525.3
Propachlor	EPA 525.3
Simazine	EPA 525.3
Toxaphene	EPA 505

Polychlorinated Biphenyls

PCB Screen	EPA 505

Trihalomethanes

Bromodichloromethane	EPA 524.2
Bromoform	EPA 524.2
Chloroform	EPA 524.2
Dibromochloromethane	EPA 524.2
Total Trihalomethanes	EPA 524.2

Volatile Aromatics

1,2,3-Trichlorobenzene	EPA 524.2
1,2,4-Trichlorobenzene	EPA 524.2
1,2,4-Trimethylbenzene	EPA 524.2

Serial No.: 61969

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, 2021
Issued April 01, 2020
Revised April 07, 2020

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 - LONG ISLAND 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 (2003) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER All approved analytes are listed below:

Nitroaromatics and Isophorone

1,4-Naphthoquinone	EPA 8270D
2,4-Dinitrotoluene	EPA 625.1
	EPA 8270D
2,6-Dinitrotoluene	EPA 625.1
	EPA 8270D
Isophorone	EPA 625.1
	EPA 8270D
Nitrobenzene	EPA 625.1
	EPA 8270D

Nitrosoamines

N-Nitrosodiethylamine	EPA 8270D
N-Nitrosodimethylamine	EPA 625.1
	EPA 8270D
N-Nitrosodi-n-butylamine	EPA 8270D
N-Nitrosodi-n-propylamine	EPA 625.1
	EPA 8270D
N-Nitrosodiphenylamine	EPA 625.1
	EPA 8270D
N-nitrosomethylethylamine	EPA 8270D
N-nitrosopiperidine	EPA 8270D
N-Nitrosopyrrolidine	EPA 8270D

Nutrient

Ammonia (as N)	SM 4500-NH3 H-2011
	EPA 350.1, Rev. 2.0 (1993)
Kjeldahl Nitrogen, Total	EPA 351.2, Rev. 2.0 (1993)

Nutrient

Nitrate (as N)	EPA 353.2, Rev. 2.0 (1993)
Nitrate-Nitrite (as N)	EPA 353.2, Rev. 2.0 (1993)
Nitrite (as N)	EPA 353.2, Rev. 2.0 (1993)
Orthophosphate (as P)	SM 4500-P E-2011
Phosphorus, Total	SM 4500-P E-2011

Organophosphate Pesticides

Atrazine	EPA 8270D
Dimethoate	EPA 8270D
Disulfoton	EPA 8270D
Famphur	EPA 8270D
Parathion ethyl	EPA 8270D
Parathion methyl	EPA 8270D
Phorate	EPA 8270D
Sulfotepp	EPA 8270D
Thionazin	EPA 8270D

Petroleum Hydrocarbons

Diesel Range Organics	EPA 8015D
Gasoline Range Organics	EPA 8015D

Phthalate Esters

Benzyl butyl phthalate	EPA 625.1
	EPA 8270D
Bis(2-ethylhexyl) phthalate	EPA 625.1
	EPA 8270D
Diethyl phthalate	EPA 625.1

Serial No.: 61924

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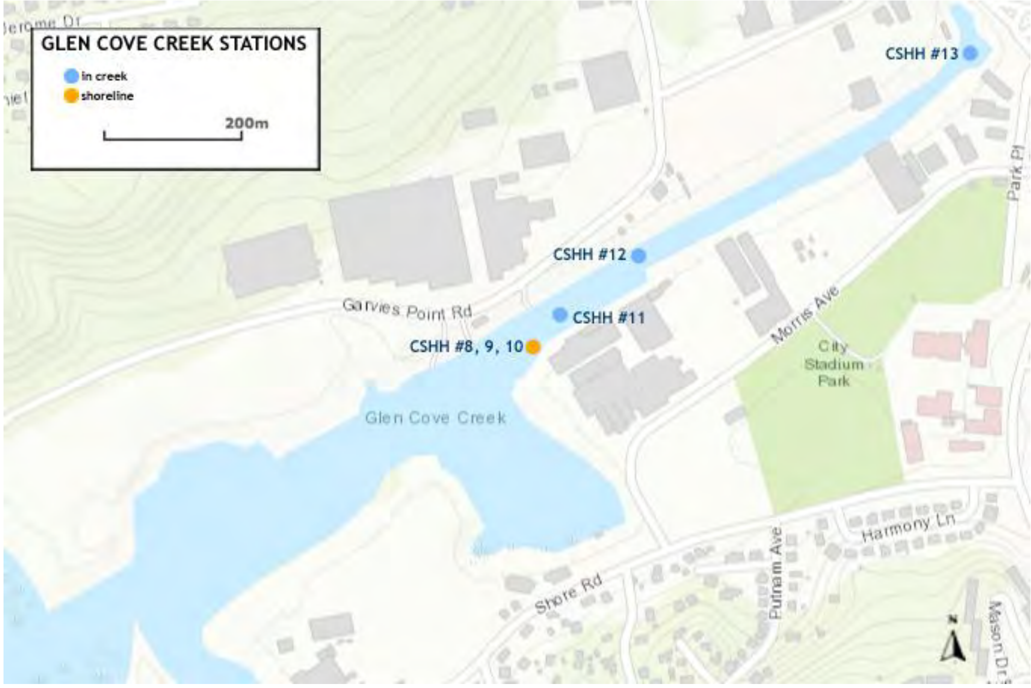
Appendix C

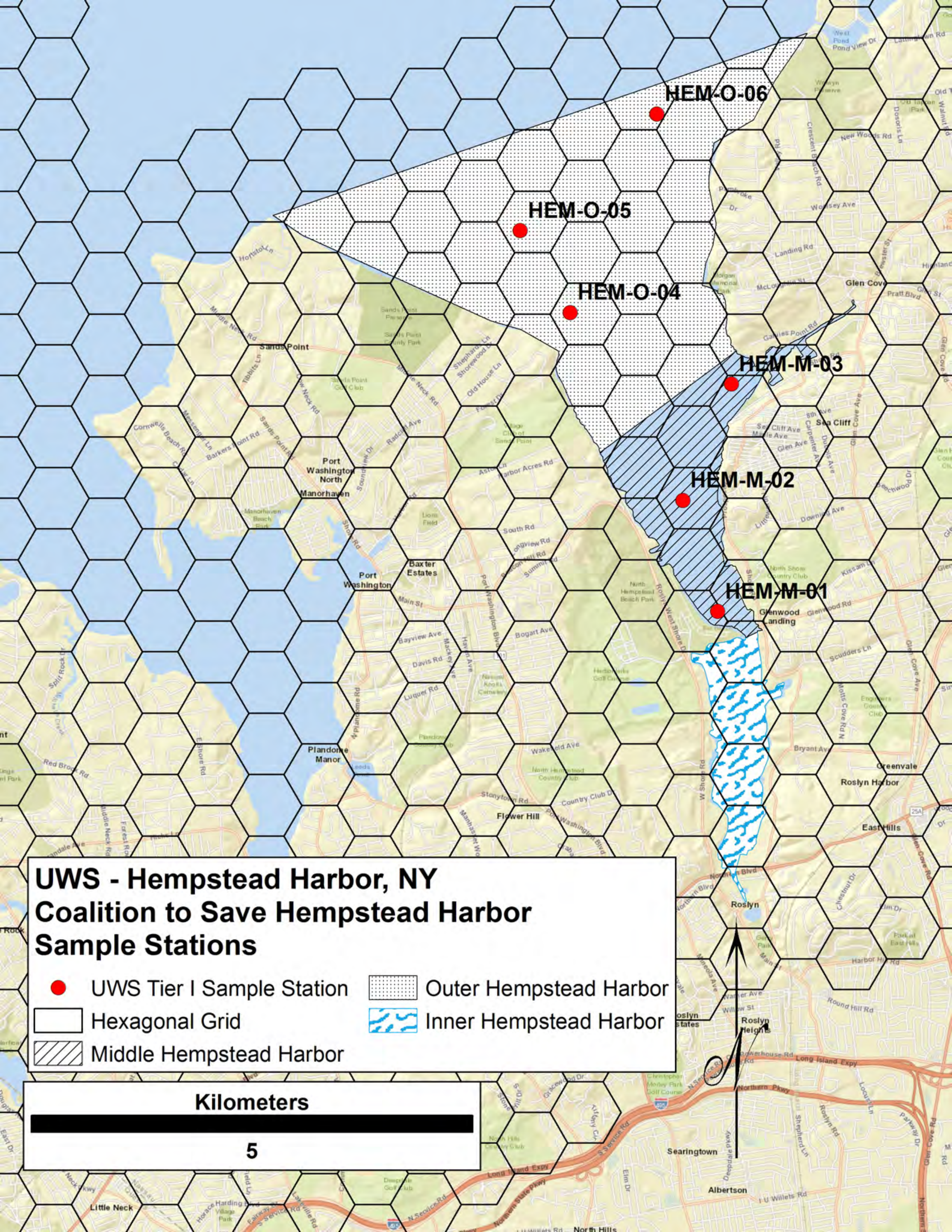
Monitoring Station Location Maps


CSHH MONITORING STATIONS
● HARBOR & MIDCREEK STATIONS
● SHORELINE STATIONS
Matinecock Point
Welwyn Preserve
CSHH #17
CSHH #17A
CSHH #16
CSHH #13
CSHH #12
CSHH #11
CSHH #8, 9, 10
Glen Cove
Sands Point Preserve
CSHH #2
Mott Point
CSHH #3
Sea Cliff
SET NECK
CSHH #15
CSHH #15A
CSHH #15B
Port Washington
CSHH #1
CSHH #14A
CSHH #4
CSHH #14
Harbor links Golf Course
CSHH #5
CSHH #6
CSHH #7
2 km
N


UPPER-HARBOR STATIONS
● in harbor
● shoreline
2km
CSHH #17
CSHH #17A
CSHH #16
CSHH #2
CSHH #3
Village Club of Sands Point
Harbor Acres Rd
Prospect Ave
Littleworth Ln
CSHH #15A
CSHH #15
CSHH #15B
North Hempstead Beach Park
CSHH #1
Port Washingt


West Shore Dr
Bar Beach
Glenwood Landing
CSHH #4
CSHH #14A
CSHH #14
CSHH #5
Bry
W Shore Rd
CSHH #6
CSHH #7
LOWER-HARBOR STATIONS
● in harbor
● shoreline
0.6 km
Roslyn


GLEN COVE CREEK STATIONS
● in creek
● shoreline
200m
Jerome Dr
CSHH #13
Park Pl
CSHH #12
Garvies Point Rd
CSHH #11
CSHH #8, 9, 10
Morris Ave
City Stadium Park
Glen Cove Creek
Harmony Ln
Putnam Ave
Shore Rd
Mason Dr



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

Appendix D

Meter Operation Manuals (Links)

Eureka Manta+ 35

Eureka Manual, online at:

https://docs.wixstatic.com/ugd/7f6545_f1fc5b1a1d3844c19103377c8714a54a.pdf

See Section C, C2-C5 at pages 27-30; C7-C10, pages 31-36; C12-C13, pages 37-41, C18, pages 46-47.

See Eureka video demonstrating calibration procedures For Manta +35 multiparameter meter:

https://www.youtube.com/watch?v=aooBZgg-hTk

YSI ProPlus

YSI ProPlus Manual, online at:

https://www.ysi.com/File%20Library/Documents/Manuals/605596-YSI-ProPlus-User-Manual-RevD.pdf

See pages 20-41, 51-52, 58-62, and 64-69.

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

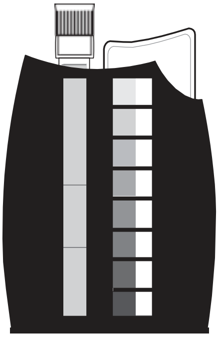
*WARNING: Reagents marked with an * are considered to be potential health hazards. To view or print a Safety Data Sheet (SDS) for these reagents go to www.lamotte.com. Search for the four digit reagent code number listed on the reagent label, in the contents list or in the test procedures. Omit any letter 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.

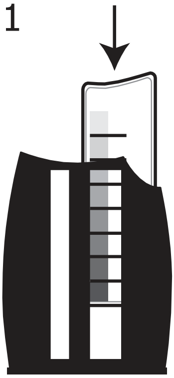
USE OF THE OCTA-SLIDE 2 VIEWER



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.

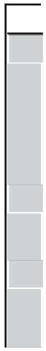
PROCEDURE

1



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

2

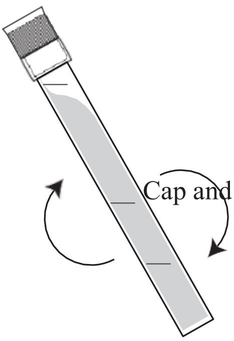


Fill a test tube
(0106) to the
10 mL line with
sample water.

3

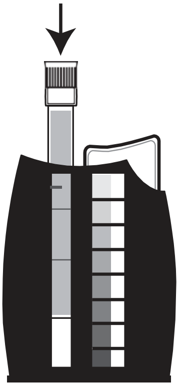
Add 10 drops of
*Wide Range pH
Indicator (2218).

4



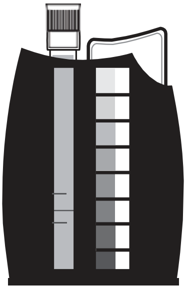
Cap and mix.

5



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

6



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

LaMOTTE COMPANY
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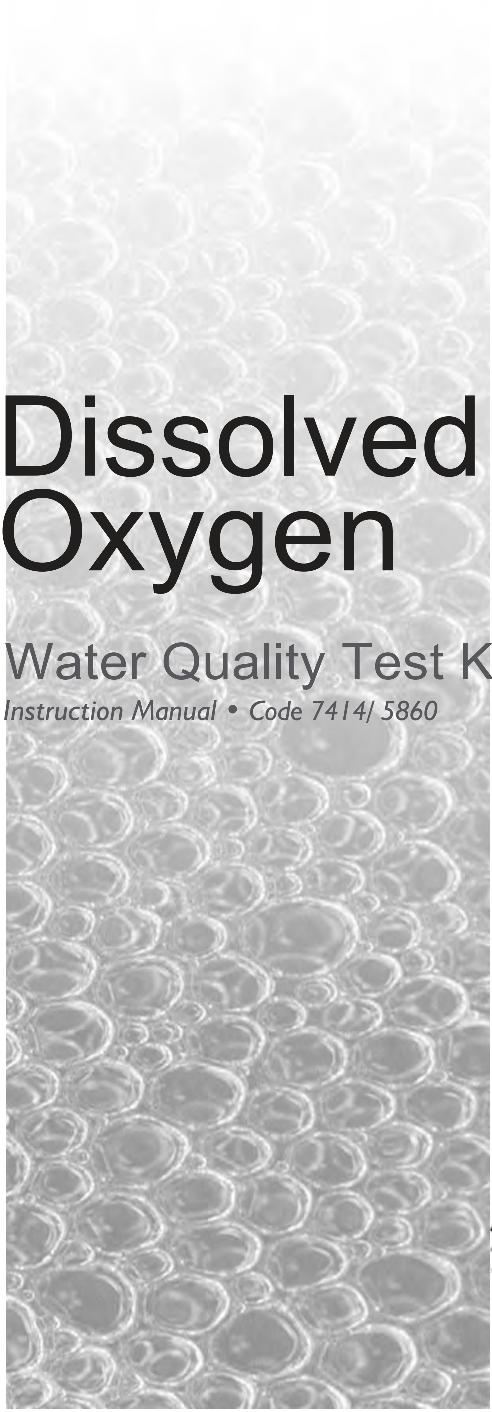
Fax: 410-778-6394
Visit us on the web at www.lamotte.com

65858-01 4/16



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.

Thistest kit uses theazidemodification of the Winkler methodfor determining dissolved oxygen.

TABLE OF CONTENTS

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

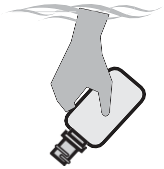
***WARNING:** Reagents marked with a * are considered hazardous substances. To view or print a Material Safety Data Sheet (MSDS) for these reagents see MSDS CD or our website. Toobtain a printed copy, contact us by e-mail, phone orfax..

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

TEST PROCEDURE

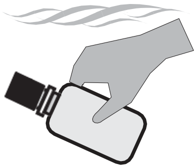
PART 1 - COLLECTING THE WATER SAMPLE

1.



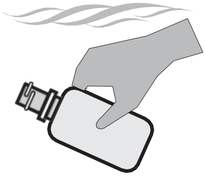
Rinse the Water Sampling Bottle (0688-DO) with the sample water.

2.



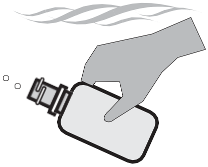
Tightly cap the bottle, and submerge it to the desired depth.

3.



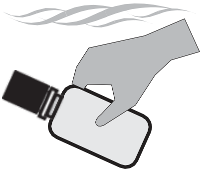
Remove the cap and allow the bottle to fill.

4.



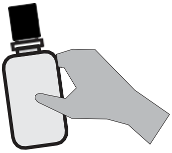
Tap the sides of the bottle to dislodge any airbubbles.

5.



Replace the cap while the bottle is still submerged.

6.



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

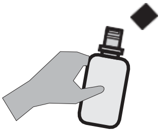
TEST PROCEDURE

PART 2 - ADDING THE REAGENTS

NOTE:

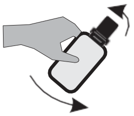
Be careful not to introduce air into the sample while adding the reagents.

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:

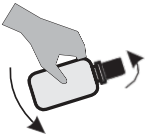
Immediately use the 1.0 g spoon (0697) to add one level measure of *Sulfamic Acid Powder (6286).

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

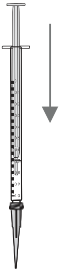
PART 3 - THE TITRATION

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).

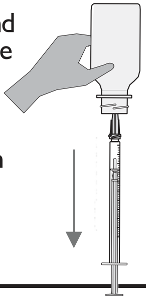


3.

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.

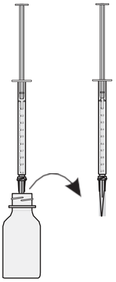


NOTE:

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:

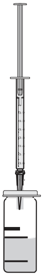
If the sample is a very pale yellow, go to Step 9.

continued . . .

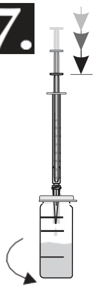
TEST PROCEDURE

6.

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



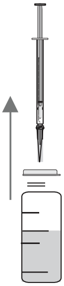
7.



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 tiration to mix the contents

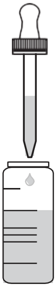
8.

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



9.

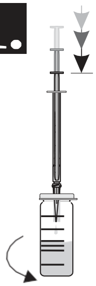
Add 8 drops of Starch Indicator Solution (4170WT). The sample should turn blue.



10.

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

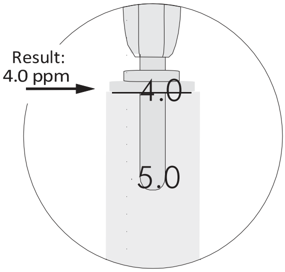
11.



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 0.2ppm.



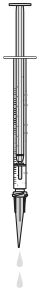
TEST PROCEDURE

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:

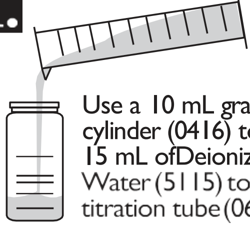
When testing is complete, discard titrating solution in Titrator. Rinse Titrator and titration tube thoroughly. DO NOT remove plunger or adapter tip.



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 ( ) arefor LaMotte products. These products arenot 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 ofDeionized Water (5115) to the titration tube (0608).

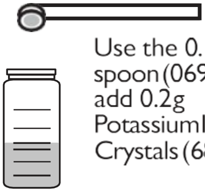
2.

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

3.

Add2 drops of Sulfuric Acid, 5N (8517WT).

4.



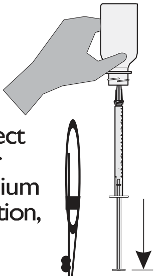
Use the 0.1 g spoon (0699) to add 0.2g PotassiumIodide Crystals (6809).

5.

Swirl to mix. Solution will turn yellowish brown.

6.

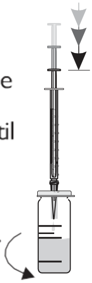
Fill another Direct Reading Titrator (0376) with Sodium Thiosulfate Solution, 0.025N (4169).



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.

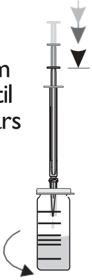


8.

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

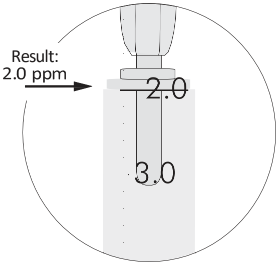
9.

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.

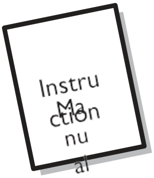


GENERAL SAFETY PRECAUTIONS

1.

Store the test kit in a cool, dry area.

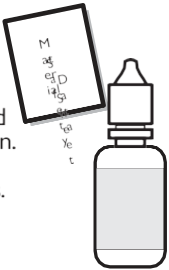
2.



Read all instructions and note precautions beforeperforming 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.

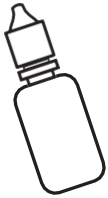
5.

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

6.

Wear safety glasses when performing test procedures.

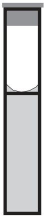
7.



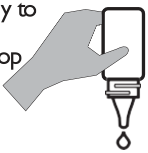
In the event of an accident or suspected poisoning, immediately call the Poison Center phone number in the front of your local telephone directory or call a physician. Additional information for all LaMotte reagents is available in the United States, Canada, Puerto Rico, and the US Virgin Islands from 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

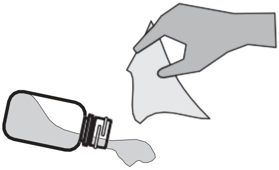
1. Use test tube caps or stoppers, not your fingers, to cover tubes during shaking or mixing.



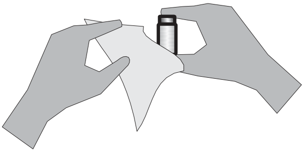
2. Hold dropper bottles vertically upside-down, and not at an angle, when dispensing a reagent. Squeeze the bottle gently to dispense the reagent one drop at a time.



3. Wipe up any reagent chemical spills immediately.

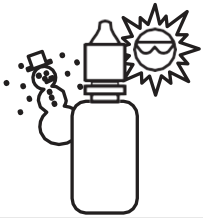


4. Thoroughly rinse test tubes before and after each test.



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

Coalition to Save
Hempstead Harbor

Water-Monitoring Data Sheet, Core Program

Collection Date: Wed. other _______________ ___ /___ /2020 **Time**: _______________

GPS Land Reference: ____ **BP:** _________ **Depth:** _______

Monitor Name: Carol DiPaolo, Mark Ring, Michelle L. McAllister, ____

Site Name: CSHH #1, Beacon 11 ______________________________ **Location**: Hempstead Harbor

Weather: fog/haze drizzle intermittent rain rain snow clear partly cloudy

% Cloud Cover: 0% 25% 50% 75% 100% other __________

Wind Direction: N NE NW S SE SW E W Velocity: _______kt (mph)

			Date	Amount
Rainfall:	Previous 24 hrs accumulation	_____.__mm	__________	__________
	Previous 48 hrs accumulation	_____.__mm	__________	__________
	Previous week’s accumulation	_____.__mm	__________	__________

Tidal Stage: ☐ incoming ☐ outgoing ☐ hours to high tide: _______ H:________ L:________

Water Surface: ☐ calm ☐ ripple ☐ waves ☐ whitecaps

Water Color: ☐ normal: ☐ brown ☐ green ☐ other ____________________________
☐ abnormal: ☐ brown ☐ green ☐ other ____________________________

Water Observations: ☐ jelly fish ☐ dead fish ☐ dead crabs ☐ algal bloom
☐ odors ☐ sea weed ☐ bubbles ☐ foam
☐ oil slick ☐ floatables ☐ ice ☐ turbidity (suspended particles)
☐ other____

Comments____

____

____

____

Plankton count ________ type ________ sample taken: ☐ surface ☐ ______ below surface

Human Activities

☐ Barges/tugs, Pt. W. gravel op. __________________ Gladsky __________________ Raison ____________________
DiNapoli __________________ Global/fuel _______________ other ___________________________

☐ 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 ______other______
☐ Styrofoam, cups _______pieces ______ ☐ Wood, boards ______ pieces ____________ other_________________
☐ Other ____

Coalition to Save Hempstead Harbor

Water-Monitoring Data Sheet

Date: ____________

Station: ________________ 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								
Air °C	3								
_____	4								
	5								
Repeat	0.5								
	1								
	2								
	3								
	4								
	5								

Station: ________________ 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								
	4								
Air °C	5								
	6								
_____	7								
	8								
	9								
	10								
	11								

Station: _______________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								
	4								
Air °C	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 Eureka 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	Lower Harbor
☐ Cormorants	____________	____________
☐ Ducks, mallards	________ ducklings ______	________ ducklings ______
☐ Egrets, great	____________	____________
snowy	____________	____________
☐ Geese, Canada	________ goslings ______	________ goslings ______
brandts	____________	____________
☐ Gulls, hooded	____________	____________
☐ Herons, blue	____________	____________
night, green	____________	____________
☐ Kingfisher, belted	____________	____________
☐ Ospreys	____________	________ chicks ______
☐ Plover-type, killdeer	____________	____________
☐ Swans, mute	________ cygnets ______	________ cygnets ______
☐ Other	____________	____________

JELLIES/JELLYFISH

☐ Comb, sea walnuts: CSHH stations ☐#1_____ ☐#2_____ ☐#3_____ ☐#4_____ ☐#5_____ ☐#6____ ☐#7_____

☐#8-10_____ ☐#11____ ☐#12___ ☐#13____________

sea gooseberries: CSHH stations ☐#1_____ ☐#2_____ ☐#3_____ ☐#4_____ ☐#5_____ ☐#6____ ☐#7_____

☐#8-10_____ ☐#11____ ☐#12____ ☐#13____________

☐ Lion's mane: CSHH stations ☐#1_____ ☐#2_____ ☐#3_____ ☐#4_____ ☐#5_____ ☐#6____ ☐#7__________

☐ Moon: CSHH stations ☐#1_____ ☐#2_____ ☐#3_____ ☐#4_____ ☐#5_____ ☐#6____ ☐#7__________

FISH

☐ Baitfish____________

☐ Blue____________

☐ Bunker____________

☐ Striped bass____________

☐ Small shrimp____________

CRABS

☐ Asian shore____________

☐ Blue-claw____________

☐ Horseshoe____________

OTHER____________

____

____

Hempstead Harbor Core Program
Calibration Datasheet Eureka Manta+ 35

• 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: 197407 **Sonde S/N:** MT04172710

◊ COMPLETE **BEFORE** SAMPLING ◊

① Fill cup with **AIR-SATURATED WATER** (Reagent Grade Water)

② Record **CHLOROPHYLL (µg/L)** reading in air-saturated water

Chl µg/L ••••

③ Calibrate **DISSOLVED OXYGEN (HDO%)**

Barometric Pressure (mmHg) •••••••

Pre-Calibration Reading

HDO% ••••

Post-Calibration Reading

SRF ••• HDO% •••

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

→**1st Cal Value: ZERO** (Reagent Grade Water)

Pre-Calibration Reading

Turbidity 0 NTU •••

→**2nd Cal Value: NON-ZERO** (Turbidity Standard)

Pre-Calibration Reading

Turbidity 100 NTU •••

Post-Calibration Reading

Turbidity **100 NTU** ••• SRF*•••

*SRF: Will need to look up in Cal Records

⑤ Calibrate **CONDUCTIVITY STANDARD (50,000 µS/cm)**

Pre-Calibration Reading

SpCond µS/cm •••

Post-Calibration Reading

SRF ••• SpCond µS/cm •••

*pH

⑥ Loosen cup to read **DEPTH (0 m)**

Pre-Calibration Reading

Depth m •••

Post-Calibration Reading

SRF ••• Depth m •••

◊ COMPLETE **AFTER** SAMPLING ◊

① Fill cup with **AIR-SATURATED WATER** (Reagent Grade Water)

Post-Readings

HDO %Sat ••• Chl µg/L •••

Turbidity 0 NTU •••

② Fill cup with **TURBIDITY STANDARD (100 NTU)**

Post-Reading

Turbidity 100 NTU •••

③ Fill cup with **CONDUCTIVITY STANDARD (50,000 µS/cm)**

Post-Reading

SpCond µS/cm ••••

*pH

④ Loosen cup to read **DEPTH (0 m)**

Post-Reading

Depth m •••

	Reagent Grade Water	**Turbidity Standard** 100 NTU	**Conductivity Standard** 50,000 µS/cm
Manufacturer			
Lot Number			
Expiration			

Accuracy Range Table	
HDO% (100%)	97 – 103
Chl *a* (0 µg/L)	-0.30 – 0.30
Turbidity (0 NTU)	-3.00 – 3.00
Turbidity (100 NTU)	97.0 – 103.0
SpCond (50,000 µS/cm)	48,500 – 51,500
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.:**

*See page 2 for pH calibration checks.

Sonde Calibration Datasheet

Eureka Manta+ 35

♦COMPLETE **BEFORE** SAMPLING♦

5a. Calibrate **pH STANDARD • 2-Point Calibration**

Pre-Calibration Reading

➔ **1st Cal Value: pH_____ •••** ☐

➔ **2nd Cal Value: pH_____ •••** ☐

Post-Calibration Reading

➔ **1st Cal Value: pH_____ •••** ☐

➔ **2nd Cal Vaue: pH_____ •••** ☐

SRF ••• ☐

♦COMPLETE **AFTER** SAMPLING♦

Post-Readings

3a. Fill cup with **pH STANDARD**

➔ **1st Cal Value: pH_____ •••** ☐

➔ **2nd Cal Value: pH_____ •••** ☐

	pH 7 Standard	**pH 10 Standard**
Manufacturer		
Lot Number		
Expiration		

Change pH reference standard monthly.

Date of pH reference standard replacement:

____

Accuracy Range Table	
pH 7	6.8 – 7.2
pH 10	9.8 – 10.2

Hempstead Harbor Core Program
Calibration Datasheet YSI ProPlus

• 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: 14B104664 **Sonde S/N:** 18M100228

◊ COMPLETE **BEFORE** SAMPLING ◊

① Calibrate **CONDUCTIVITY STANDARD (50,000 µS/cm)**

Pre-Calibration Reading

SpCond µS/cm • • •

Post-Calibration Reading

SpCond µS/cm • • •

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

Pre-Calibration Reading

→ 1st Cal Value: pH 7 • • •

→ 2nd Cal Value: pH 10 • • •

Post-Calibration Reading

pH 10 • • •

③ Calibrate **DISSOLVED OXYGEN (HDO%)** with **WATER-SATURATED AIR** (Reagent Grade Water)

- place a small amount of clean water (1/8 inch) in the storage cup
- make sure there are no water droplets on the DO membrane or temperature sensor
- screw the cap back on, disengage one or two threads to ensure atmospheric venting (make sure the DO and temperature sensors are not immersed in water)
- wait approximately 10 minutes for the storage container to become completely saturated

Barometric Pressure (mmHg) • • • • • • •

Pre-Calibration Reading

HDO% • • •

Post-Calibration Reading

HDO% • • •

☐ DO cap changed (once per month); follow instructions on pg. 21 of YSI Professional Plus User Manual

◊ COMPLETE **AFTER** SAMPLING ◊

① Fill cup with **CONDUCTIVITY STANDARD (50,000 µS/cm)**

Post-Reading

SpCond µS/cm • • •

② Fill cup with **pH 7.00 Standard**

Post-Reading

pH 7.00 • • •

③ Fill cup with **pH 10.00 Standard**

Post-Reading

pH 10.00 • • •

④ Follow WATER-SATURATED AIR procedure on left

Post-Reading

HDO% • • •

	Conductivity Standard 50,000 µS/cm	**pH 7 Buffer**	**pH 10 Buffer**	**Reagent Grade Water**
Manufacturer				
Lot Number				
Expiration				

Accuracy Range Table	
SpCond (50,000 µS/cm)	48,500 – 51,500
pH 7	6.8 – 7.2
pH 10	9.8 – 10.2
HDO% (100%)	97.0 – 103.0

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	FORM NAME: COALITION TO SAVE HEMPSTEAD HARBOR ☐ QC ☐ Equip Maint ☐ Training ☐ Comp Doc ☑ Other		
LABORATORY SECTION ☐ Chemistry ☑ Environmental Microbiology ☐ Clinical Microbiology	Form. No.: Beach Monitoring Daily Sampling Log - 1	Rev: 2	
	Date: 4/8/2011	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
THOMAS EDWARDS, LEAD TECHNICAL DIRECTOR; CONNIE IANNUCCI, MICROBIOLOGY TECHNICAL DIRECTOR TELEPHONE (516) 572-1202 FAX (516) 572-1206

COLLECTOR'S NAME **DATE**

ALL SAMPLES SUBMITTED IN STERILE POLYSTYRENE VESSELS CONTAINING SODIUM THIOSULFATE (UNLESS OTHERWISE SPECIFIED)

Field No.	Area No.	Point No.	Sample Type	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	10		5	BEACON ELEVEN										
CSHH-2	10		5	BELL BUOY 6										
CSHH-3	10		5	RED MARKER GLEN COVER CREEK										
CSHH-4	10		5	BAR BEACH SPIT										
CSHH-5	10		5	MOTT'S COVE										
CSHH-6	10		5	EAST OF FORMER TNH INCINERATOR										
CSHH-7	10		5	BRYANT LANDING										
CSHH-8	10		5	GLEN COVE STP										
CSHH-9	10		5	FIRST PIPE WEST OF STP OUTFALL										
CSHH-10	10		5	PIPE AT CORNER OF SEAWALL WEST OF STP OUTFALL										
CSHH-11	10		5	50 YARDS EAST OF STP OUTFALL										
CSHH-12	10		5	EAST OF STP OUTFALL BY BEND IN SEAWALL										
CSHH-13	10		5	60 FEET WEST OF MILL POND WEIR										

COMMENTS/REMARKS

*ESTIMATED COUNT

TNTC = "TOO NUMEROUS TO COUNT"

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

DATA ENTRY PROOFED

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

TEMP CONTROL:

TIME RECEIVED:

DATE ANALYZED:

DATE RECEIVED:

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 reproced except in full without the written approval of the laboratory. Current New York State laboratory certification status is maintained under ELAP ID #10339.

Page 1 of 2

VERIFICATION REVIEW

Name: **Title:** **Date:**

Comments:

Nassau Co. DOH PHL 209 Main Street Hempstead, NY 11550	FORM NAME: COALITION TO SAVE HEMPSTEAD HARBOR ☐ QC ☐ Equip Maint ☐ Training ☐ Comp Doc ☑ Other	
LABORATORY SECTION ☐ Chemistry ☑ Environmental Microbiology ☐ Clinical Microbiology	Form. No.: Beach Monitoring Daily Sampling Log - 1	Rev: 2
	Date: 4/8/2011	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
THOMAS EDWARDS, LEAD TECHNICAL DIRECTOR; CONNIE IANNUCCI, MICROBIOLOGY TECHNICAL DIRECTOR TELEPHONE (516) 572-1202 FAX (516) 572-1206

COLLECTOR'S NAME **DATE**

ALL SAMPLES SUBMITTED IN STERILE POLYSTYRENE VESSELS CONTAINING SODIUM THIOSULFATE (UNLESS OTHERWISE SPECIFIED)

Field No.	**Area No.**	**Point No.**	**Sample Type**	**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	10		5	NW CORNER OF POWER PLANT ~ 50 YARDS FROM CEMENT OUTFALL										
CSHH-14A	10		5	CEMENT OUTFALL ADJACENT TO POWER PLANT										
CSHH-15	10		5	NW CORNER OF TAPPEN POOL										
CSHH-15A	10		5	SCUDDER'S POND OUTFALL @ SEAWALL N. OF TAPPEN POOL										
CSHH-15B	10		5	SCUDDER'S POND WEIR										
CSHH-16	10		5	OUTER HARBOR MIDWAY BETWEEN EAST/WEST SHORE										
CSHH-17	10		5	OUTSIDE RESTRICTED AREA OF CRESCENT BCH ACROSS FROM WHITE BLDG										
CSHH-17A	10		5	INSIDE RESTRICTED AREA OF CRESCENT BCH ACROSS FROM WH BLDG & STREAM										
CSHH-18	10		5	TAPPEN MARINA, "S" Dock, NORTHERNMOST DOCK,										
CSHH-19	10		5	TAPPEN MARINA, END OF MAIN DOCK, OPPOSITE MARINA ENTRANCE										
CSHH-21	10		5	TAPPEN MARINA, "R" DOCK										
TRIP BLANK														

COMMENTS/REMARKS

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

Tide: High / Low **Time**: _______
Tide: High / Low **Time**: _______

14A: Mixed / Direct **15A**: Mixed / Direct

***ESTIMATED COUNT**

TNTC = "TOO NUMEROUS TO COUNT"

24hr rain: **48hr rain:**

DATA ENTRY PROOFED

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

TEMP CONTROL: TIME RECEIVED: DATE ANALYZED:

DATE RECEIVED:

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 rpeort shall not be reproced except in full without the written approval of the laboratory. Current New York State laboratory certification status is maintained under ELAP ID #10339. **Page 2 of 2**

VERIFICATION REVIEW
Name: **Title:** **Date:**
Comments:

C:\Users\CSHH\Documents\Water Monitoring\2019 Core Program\2019 Data Sheets\NCDH Data Sheet for HH Bacteria Samples p 2.exl

CHAIN-OF-CUSTODY / Analytical Request Document

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

Page : 1 Of 1

Section A
Required Client Information:
Company: Coalition to Save Hempstead Harbor
Address: PO Box 159
Sea Cliff, NY 11579
Email: cshh@optonline.net
Phone: (516) 801-6792
Fax
Requested Due Date:

Section B
Required Project Information:
Report To: Carol DiPaolo
Copy To: cshh@optonline.net
Purchase Order #:
Project Name: HEMPSTEAD HARBOR MONITORING
Project #:

Section C
Invoice Information:
Attention:
Company Name:
Address:
Pace Quote:
Pace Project betty.harrison@pacelabs.com
Pace Profile #: 7288

Regulatory Agency

State / Location
NY

MATRIX CODE
Drinking Water DW
Water WT
Waste Water WW
Product P
Soil/Solid SL
Oil OL
Wipe WP
Air AR
Other OT
Tissue TS

ITEM #	**SAMPLE ID** **One Character per box. (A-Z, 0-9 / , -)** **Sample Ids must be unique**	MATRIX CODE (see valid codes to	SAMPLE TYPE (G=GRAB C=CO	COLLECTED				SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives								**Y/N**	**Requested Analysis Filtered (Y/N)**												
				START		END																								
				DATE	TIME	DATE	TIME			Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	**Analyses Test**	No2/NO3,	NO2	NH3	TKN	Total Nitrogen	Total Organic Nitrogen							Residual Chlorine (Y/N
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	CSHH #18 (North, "S" dock)	WT	G						2	1	1								X	X	X	X	X	X							
12	CSHH #19 (Service dock)	WT	G						2	1	1								X	X	X	X	X	X							
13	CSHH #21 ("R" dock)	WT	G						2	1	1								X	X	X	X	X	X							
14																															

SAMPLE CONDITIONS

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME				

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER:

SIGNATURE of SAMPLER:

DATE Signed:

TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

Appendix G

Electronic Data Format Examples

Coalition to Save Hempstead Harbor

CSHH Water-Monitoring Program 2019

Date	Water Temp (°C)		Salinity (ppt)		DO (ppm)		pH		Air Temp	Secchi	Chlor a (ug/l)		Turbidity (NTU)		Depth(m)	Time
	Surface*	Bottom**	Surface	Bottom	Surface	Bottom	Surface	Bottom	(°C)	(m)	Surface	Bottom	Surface	Bottom	(Total)***	(AM)

Red numbers indicate that the readings were unusually low or high but reflect station conditions.

Green lines indicate replicate surveys.

Purple lines indicate survey using YSI Pro Plus.

Highlighted numbers indicate possible equipment malfunction.

*Sonde surface levels are taken at a half meter below the surface.

**Bottom levels are read by the sonde depth sensor, which is 0.3 m off the harbor floor.

***Total depth accounts for the 0.3 m distance between the Eureka sonde depth sensor and the harbor floor.

CSHH #1 - Beacon 11																
10/30/19	15.78	15.79	25.47	25.72	7.96	6.97	7.70	7.69	15.9	1.5	9.49	5.64	2.60	4.47	3.25	8:57
10/30/19	15.77	15.79	25.46	25.70	6.84	6.87	7.69	7.70	N/A	N/A	9.31	5.78	2.44	4.11	3.28	9:06
10/23/19	15.53	15.82	25.75	26.28	8.41	8.16	7.93	7.91	15.5	2.0	20.41	26.64	1.71	2.71	4.91	9:03
10/23/19	15.49	15.76	25.67	26.11	8.47	8.29	7.92	7.92	N/A	N/A	16.74	25.55	2.12	2.14	4.02	9:12
10/16/19	16.59	16.76	25.20	25.41	8.76	8.72	7.71	7.73	13.7	1.3	30.10	34.59	3.51	1.67	2.96	7:20
10/16/19	16.60	16.76	25.19	25.41	8.80	8.80	7.72	7.73	N/A	N/A	28.80	32.21	2.60	3.33	3.06	8:02
10/11/19	16.81	16.84	23.14	23.11	7.68	7.62	7.72	7.71	13.6	1.75	14.44	14.31	2.31	2.50	5.16	7:50
10/11/19	16.81	16.84	23.08	23.10	7.63	7.65	7.72	7.72	N/A	N/A	12.62	14.26	2.47	3.08	5.18	8:02
9/25/19	21.28	21.74	25.43	25.64	7.64	7.21	7.74	7.78	17.5	1.0	119.07	40.10	2.53	3.32	4.87	8:05
9/25/19	21.28	21.69	25.22	25.52	7.50	7.16	7.83	7.79	N/A	N/A	148.04	46.73	2.85	4.13	5.33	8:14
9/18/19	21.6	21.8	24.95	25.28	5.65	5.02	7.53	7.51	17.5	1.1	N/A	N/A	N/A	N/A	3.5	8:00
9/18/19	21.6	21.8	24.93	25.26	5.26	4.91	7.49	7.51	N/A	N/A	N/A	N/A	N/A	N/A	3.5	N/A
9/11/19	21.90	22.16	25.72	26.19	5.48	4.45	7.48	7.47	22.2	1.1	42.02	19.42	3.02	2.73	3.67	7:41
9/11/19	21.94	22.17	25.82	26.21	4.79	4.57	7.48	7.48	N/A	N/A	40.52	16.51	2.27	2.89	3.72	N/A
9/4/19	23.03	23.02	25.20	25.20	4.80	4.68	7.35	7.35	23.1	1.0	46.12	56.70	4.75	4.81	2.28	7:57
9/4/19	23.01	23.02	25.11	25.13	4.68	4.69	7.35	7.34	N/A	N/A	45.64	54.47	4.01	4.69	2.32	N/A
8/28/19	22.99	22.82	25.70	26.04	3.54	3.00	7.40	7.37	22.6	1.4	45.46	23.99	1.78	2.05	4.81	7:48
8/28/19	23.00	22.84	25.69	26.05	3.47	2.96	7.41	7.36	N/A	N/A	42.44	24.59	1.75	1.95	4.81	N/A

Date	Water Temp (°C)		Salinity (ppt)		DO (ppm)		pH		Air Temp	Secchi	Chlor a (ug/l)		Turbidity (NTU)		Depth(m)	Time
	Surface*	Bottom**	Surface	Bottom	Surface	Bottom	Surface	Bottom	(°C)	(m)	Surface	Bottom	Surface	Bottom	(Total)***	(AM)
8/22/19	24.14	23.97	25.54	25.77	3.49	2.12	7.23	7.21	25.2	1.0	35.51	34.21	2.97	3.66	3.67	7:50
8/22/19	24.13	24.09	25.39	25.60	2.32	2.18	7.21	7.21	N/A	N/A	37.83	32.53	2.99	2.94	3.58	N/A
8/14/19	22.73	22.18	25.21	25.80	1.92	0.27	7.19	7.12	23.1	1.5	64.89	16.14	2.03	4.27	3.63	7:50
8/14/19	22.74	22.17	25.17	25.83	1.17	0.38	7.16	7.13	N/A	N/A	52.93	16.46	2.11	4.78	3.43	N/A
8/7/19	22.56	22.53	25.12	25.30	2.34	1.96	7.18	7.17	24.2	1.25	29.06	27.80	2.32	2.24	4.07	7:56
8/7/19	22.51	22.46	25.32	25.36	1.96	1.83	7.17	7.17	N/A	N/A	29.47	29.09	2.41	2.17	3.96	N/A
7/31/19	22.67	20.66	24.84	25.52	4.70	0.32	7.38	7.20	27.1	1.25	63.86	16.02	3.59	2.24	4.00	8:10
7/31/19	22.69	20.62	24.85	25.62	2.55	0.58	7.34	7.20	N/A	N/A	68.32	16.76	2.86	2.35	4.07	N/A
7/24/19	22.85	21.60	23.85	25.00	3.32	1.67	7.31	7.22	21.9	1.25	14.46	9.21	1.90	1.29	4.16	8:00
7/24/19	23.20	21.69	22.72	24.96	2.35	1.86	7.29	7.23	N/A	N/A	26.70	9.68	2.13	1.14	4.12	N/A
7/17/19	21.82	20.82	25.03	25.34	3.54	2.14	7.26	7.18	26.5	1.0	69.18	32.78	2.96	2.20	2.97	7:48
7/17/19	21.70	20.69	25.04	25.46	3.11	2.34	7.24	7.19	N/A	N/A	62.42	38.41	2.74	2.84	3.00	N/A
7/10/19	21.15	19.73	24.76	25.21	6.44	4.76	7.55	7.37	22.5	1.25	56.10	43.20	3.15	2.39	4.90	8:10
7/10/19	21.02	19.83	24.78	25.19	5.19	5.17	7.44	7.41	N/A	N/A	51.08	48.48	3.43	4.12	4.88	8:17
7/3/19	20.88	17.79	24.17	25.11	7.25	3.72	7.76	7.37	24.3	1.1	61.07	84.73	3.37	3.60	3.61	8:02
7/3/19	21.13	17.91	24.10	25.07	6.86	4.74	7.77	7.42	N/A	N/A	62.91	84.11	3.95	5.90	3.60	N/A
6/26/19	20.25	19.06	23.06	23.63	7.04	5.22	7.75	7.58	20.7	1.3	19.82	18.15	1.40	5.56	5.37	8:00
6/26/19	20.27	19.06	23.08	23.65	5.98	5.21	7.72	7.58	N/A	N/A	19.13	17.64	1.30	7.82	5.34	N/A
6/19/19	18.86	18.63	23.11	23.45	6.10	5.03	7.09	7.12	20.7	1.2	17.90	16.65	4.44	9.44	3.39	7:48
6/19/19	18.93	18.65	23.09	23.49	5.40	5.01	7.09	7.11	N/A	N/A	20.89	17.92	4.48	7.92	3.27	8:00
6/12/19	18.03	17.57	23.28	23.87	9.08	8.03	7.99	7.89	19.5	1.25	19.26	28.23	3.15	7.93	4.68	9:10
6/12/19	17.92	17.57	23.29	23.89	8.63	7.98	7.97	7.88	N/A	N/A	24.42	27.92	2.71	4.33	4.64	N/A
6/5/19	17.53	17.49	22.43	22.54	10.02	10.25	8.24	8.26	19.7	1.0	40.80	56.44	3.65	3.28	2.24	7:51
6/5/19	17.57	17.51	22.32	22.51	10.20	10.12	8.22	8.24	N/A	N/A	51.21	50.84	3.31	2.92	2.19	N/A
5/29/19	15.85	13.31	23.20	24.07	10.35	9.56	8.04	7.68	13.8	1.5	45.05	25.50	1.40	3.32	6.37	8:00
5/29/19	15.84	13.64	23.19	23.92	10.15	10.11	8.07	7.74	N/A	N/A	53.04	37.43	1.37	2.37	6.32	8:17
5/22/19	16.13	15.99	22.10	22.41	9.49	9.87	8.07	8.12	16.0	1.1	10.31	35.68	4.09	3.80	3.45	8:01
5/22/19	16.15	15.99	22.07	22.41	9.10	9.25	8.04	8.12	N/A	N/A	14.24	37.03	3.54	3.82	3.39	N/A
5/15/19	12.36	12.26	22.67	23.05	9.36	8.72	pH probe malfur		10.7	2.0	6.71	18.37	2.28	1.45	5.67	9:18
5/15/19	12.38	12.26	22.66	23.09	9.28	8.85	pH probe malfunction			N/A	5.62	17.04	2.32	2.42	5.74	N/A
5/15/19	12.4	12.3	22.44	22.86	~~9.10~~	~~7.84~~	7.64	7.86	N/A	N/A	N/A	N/A	N/A	N/A	5.6	N/A

Date	Water Temp (°C)		Salinity (ppt)		DO (ppm)		pH		Air Temp	Secchi	Chlor a (ug/l)		Turbidity (NTU)		Depth(m)	Time
	Surface*	Bottom**	Surface	Bottom	Surface	Bottom	Surface	Bottom	(°C)	(m)	Surface	Bottom	Surface	Bottom	(Total)***	(AM)
CSHH #2 - Bell Marker 6																
10/30/19	15.77	15.88	26.04	26.59	8.44	7.58	7.86	7.82	16.4	2.25	12.58	4.65	1.19	1.58	6.67	9:22
10/23/19	15.87	15.99	26.37	26.62	8.81	8.28	8.00	7.87	16.0	2.6	18.62	12.97	1.02	1.42	8.84	9:36
10/16/19	17.33	17.24	26.13	26.13	10.40	10.58	8.01	7.96	15.3	1.76	51.26	45.14	1.21	1.24	6.75	8:21
10/11/19	No survey - high wind and waves.															
9/25/19	21.56	21.13	25.76	25.68	7.61	7.07	7.81	7.74	21.5	2.1	16.45	10.66	1.09	1.13	8.68	10:17
9/18/19	21.9	22.0	26.06	26.07	6.43	6.00	7.67	7.66	17.1	1.5	N/A	N/A	N/A	N/A	6.25	8:32
9/11/19	22.19	22.12	26.40	26.45	6.03	5.53	7.59	7.53	25.3	1.4	10.00	13.85	1.60	3.15	8.82	9:20
9/4/19	22.92	22.86	25.96	25.99	6.43	5.44	7.60	7.49	22.7	1.25	25.39	27.93	1.38	4.55	6.93	8:37
8/28/19	22.86	22.84	25.98	26.12	6.65	5.85	7.74	7.66	22.3	1.75	25.84	19.37	1.01	1.14	8.46	9:40
8/22/19	24.71	23.44	25.86	26.25	6.89	3.03	7.79	7.39	25.5	1.25	26.38	10.70	1.86	3.03	7.80	8:18
8/14/19	22.74	21.39	25.54	26.14	5.19	0.72	7.46	7.17	22.8	1.25	51.27	7.44	1.33	1.93	7.43	8:22
8/7/19	22.52	21.92	25.68	25.85	6.16	3.40	7.67	7.41	23.8	No secchi	18.63	10.33	1.06	2.43	7.78	8:40
7/31/19	23.28	20.73	25.03	25.60	6.74	1.84	7.87	7.33	27.4	1.25	37.13	12.22	1.38	0.87	8.90	10:15
7/24/19	23.03	20.30	23.44	25.36	7.30	1.64	7.77	7.20	22.3	1.2	49.27	5.71	2.27	1.28	7.40	8:32
7/17/19	22.19	18.61	25.17	25.89	6.53	1.14	7.68	7.16	27.2	1.25	31.57	11.66	1.96	1.87	7.50	8:39
7/10/19	21.41	18.99	24.93	25.45	8.28	5.02	7.87	7.46	23.5	1.8	9.21	25.24	0.97	2.92	8.41	9:00
7/3/19	20.30	16.36	24.62	25.54	9.51	3.29	8.08	7.39	25.1	1.25	42.27	20.58	1.81	3.64	8.01	8:50
6/26/19	22.76	16.09	23.41	24.37	8.49	4.05	8.06	7.50	22.6	1.5	9.51	5.08	0.92	10.82	9.83	8:49
6/19/19	19.10	16.44	23.49	24.35	7.86	5.52	7.56	7.24	20.3	1.5	25.49	10.12	1.98	4.56	7.09	8:18
6/12/19	17.77	17.35	23.98	24.24	8.40	8.36	7.97	8.04	18.3	2.3	4.90	22.48	1.26	2.71	8.41	9:40
6/5/19	16.95	14.05	23.11	24.11	10.51	6.44	8.38	7.70	19.1	1.5	36.02	43.89	8.38	4.55	7.63	8:17
5/29/19	15.85	13.35	23.32	24.16	11.50	9.60	8.29	7.81	15.5	1.75	26.94	27.87	1.31	1.13	7.77	9:45
5/22/19	14.83	14.61	22.80	22.91	9.88	10.56	8.37	8.24	16.4	2.3	12.51	27.34	1.25	2.05	5.88	8:40
5/15/19	12.16	12.05	23.24	23.37	9.78	9.38	pH probe malfun		12.4	2.25	7.94	14.50	1.09	2.42	8.08	10:10
5/15/19	N/A	12.1	N/A	23.14	N/A	~~8.86~~	N/A	8.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Date	Water Temp (°C)		Salinity (ppt)		DO (ppm)		pH		Air Temp	Secchi	Chlor a (ug/l)		Turbidity (NTU)		Depth(m)	Time
	Surface*	Bottom**	Surface	Bottom	Surface	Bottom	Surface	Bottom	(°C)	(m)	Surface	Bottom	Surface	Bottom	(Total)***	(AM)
CSHH #16 - Outer Harbor, Midway E/W Shore and N/S Boundary of Shellfish Harvesting Area																
10/30/19	15.78	15.92	26.30	26.58	8.50	7.89	7.90	7.85	16.4	2.75	8.81	5.18	0.85	4.55	9.21	9:40
10/23/19	16.04	16.25	26.49	26.73	8.48	7.62	7.95	7.88	16.2	3.5	9.04	12.48	0.69	2.66	10.35	9:56
10/16/19	17.48	17.49	26.15	26.11	9.21	9.42	7.89	7.87	16.4	2.0	28.82	29.18	5.66	2.80	9.21	8:45
10/11/19	No survey - high wind and waves.															
9/25/19	21.53	21.54	25.74	25.78	7.41	6.79	7.76	7.70	21.2	1.75	16.31	19.85	1.38	6.97	10.77	10:32
9/18/19	21.7	21.7	26.11	26.12	6.61	6.20	7.69	7.66	17.6	1.75	N/A	N/A	N/A	N/A	8.5	8:52
9/11/19	22.14	22.07	26.29	26.51	6.76	5.48	7.63	7.53	25.8	1.75	11.42	11.58	1.74	4.39	10.70	9:36
9/4/19	23.11	22.95	25.98	26.07	7.21	5.57	7.72	7.54	23.2	1.25	33.01	21.42	1.30	3.43	8.96	9:00
8/28/19	22.73	22.70	26.13	26.14	6.69	5.41	7.72	7.63	22.1	1.8	20.42	17.95	2.13	4.65	11.02	9:55
8/22/19	24.56	23.32	25.87	26.26	6.97	3.56	7.78	7.41	27.0	1.4	24.00	10.53	1.58	3.45	9.30	8:40
8/14/19	22.87	20.90	25.75	26.46	5.62	1.01	7.62	7.20	23.4	1.25	44.03	6.65	1.28	1.34	9.89	8:42
8/7/19	22.75	21.84	25.61	25.88	6.82	3.52	7.80	7.44	25.0	1.6	13.41	7.87	1.08	5.37	9.47	9:05
7/31/19	23.68	19.58	25.09	25.94	6.75	0.86	7.90	7.25	28.0	1.4	33.28	6.30	1.52	1.26	11.02	10:31
7/24/19	22.96	19.99	24.11	25.50	7.09	1.39	7.86	7.21	22.3	1.75	20.41	5.62	1.64	1.01	9.51	8:50
7/17/19	22.97	18.37	25.18	26.98	6.96	2.60	7.92	7.27	27.4	1.25	29.84	16.35	1.77	3.48	9.28	9:00
7/10/19	21.71	18.19	25.11	25.62	11.01	3.44	8.12	7.34	25.7	1.75	19.19	35.36	1.03	5.48	9.98	9:20
7/3/19	20.92	16.23	24.71	25.63	10.63	3.90	8.27	7.46	26.4	1.4	24.09	23.66	1.21	7.04	9.49	9:08
6/26/19	20.91	15.56	23.41	24.51	9.12	3.90	8.14	7.53	23.8	1.75	18.94	4.97	0.76	18.71	10.09	9:26
6/19/19	18.83	16.04	23.76	24.54	7.96	5.86	7.57	7.30	20.2	1.6	22.92	9.75	1.62	5.43	8.75	8:40
6/12/19	17.62	17.22	24.09	24.22	8.66	8.47	8.04	8.06	18.2	2.25	4.51	22.81	0.81	5.52	10.27	10:00
6/5/19	17.38	13.21	23.10	24.44	10.06	6.67	8.42	7.65	19.1	1.5	27.96	34.86	1.32	3.80	8.51	8:41
5/29/19	15.80	12.31	23.40	24.44	12.31	7.16	8.29	7.61	16.5	No secchi	19.35	19.99	1.02	1.83	10.60	10:03
5/22/19	14.94	13.01	22.93	23.40	10.84	9.19	8.32	8.02	16.3	2.1	10.71	28.69	0.55	6.02	8.48	9:17
5/15/19	bacteria and nitrogen sample pick up only															

Date	Water Temp (°C)		Salinity (ppt)		DO (ppm)		pH		Air Temp	Secchi	Chlor a (ug/l)		Turbidity (NTU)		Depth(m)	Time
	Surface*	Bottom**	Surface	Bottom	Surface	Bottom	Surface	Bottom	(°C)	(m)	Surface	Bottom	Surface	Bottom	(Total)***	(AM)
CSHH #17 - Outer Harbor, Just Outside Restricted Crescent Beach Boundary																
10/30/19	15.87	15.89	26.36	26.58	8.40	7.71	7.90	7.84	16.4	2.5	10.64	4.46	0.99	1.42	7.33	9:55
10/23/19	16.05	16.12	26.49	26.64	9.17	8.42	8.04	7.94	16.5	3.0	16.91	17.31	0.98	3.20	7.26	10:17
10/16/19	17.52	17.51	26.15	26.10	9.24	9.35	7.87	7.86	16.8	2.0	23.49	27.07	1.52	2.46	7.26	9:10
10/11/19	No survey - high wind and waves.															
9/25/19	21.98	21.51	25.76	25.73	8.12	7.70	7.96	7.88	22.6	1.7	7.20	14.36	1.59	2.01	8.21	10:47
9/18/19	21.6	21.7	26.21	26.25	6.00	5.24	7.60	7.55	18.4	1.7	N/A	N/A	N/A	N/A	6.25	9:12
9/11/19	22.21	22.13	26.16	26.34	7.02	6.29	7.69	7.63	24.0	1.5	11.57	18.80	2.33	4.97	8.50	9:58
9/4/19	22.98	22.89	26.07	26.09	5.94	5.19	7.57	7.49	23.1	1.25	22.15	19.34	2.23	4.52	6.47	9:24
8/28/19	22.66	22.57	26.06	26.14	6.26	5.22	7.70	7.60	21.8	1.9	19.76	13.78	1.17	8.44	8.82	10:12
8/22/19	24.79	22.83	25.80	26.36	7.12	3.04	7.83	7.37	26.7	1.25	22.99	9.30	1.74	4.46	6.62	9:00
8/14/19	23.02	21.56	25.67	26.18	5.45	1.96	7.59	7.26	25.2	1.4	18.62	11.07	1.27	1.24	8.16	9:08
8/7/19	22.41	21.75	25.77	25.92	5.29	3.06	7.57	7.43	27.2	1.75	6.24	6.58	1.49	3.00	7.00	9:44
7/31/19	23.94	19.72	25.22	25.94	6.78	0.94	7.86	7.27	27.9	1.6	18.74	8.85	1.40	0.56	8.67	10:52
7/24/19	22.73	19.55	24.35	25.60	7.00	2.17	7.78	7.24	22.0	1.75	14.79	5.29	1.31	1.20	7.05	9:20
7/17/19	23.02	18.71	25.49	25.93	9.67	2.18	8.12	7.25	26.5	1.4	18.58	12.60	1.54	3.10	7.81	9:23
7/10/19	21.93	18.08	25.20	25.70	10.07	4.03	8.15	7.41	25.7	2.0	12.52	19.45	0.73	4.05	7.60	9:45
7/3/19	20.10	17.19	25.02	25.42	10.28	5.21	8.14	7.59	24.7	1.4	13.40	32.28	1.27	1.89	7.89	9:43
6/26/19	19.85	15.44	23.60	24.68	8.19	3.68	7.96	7.49	24.5	1.5	11.78	4.15	1.14	10.97	7.05	9:48
6/26/19	19.8	15.5	23.97	24.96	7.81	3.18	7.91	7.42	N/A	N/A	N/A	N/A	N/A	N/A	7.10	9:48
6/19/19	18.40	16.34	23.90	24.42	7.94	5.44	7.53	7.23	22.4	1.75	17.45	8.74	1.33	4.43	6.47	9:00
6/12/19	17.45	16.82	24.01	24.38	8.53	7.84	8.00	7.95	18.2	2.0	4.96	24.45	1.42	6.83	7.90	10:21
6/5/19	16.95	14.66	23.28	24.02	11.31	8.47	8.40	7.96	20.0	1.5	15.46	34.63	1.21	8.78	6.78	9:05
5/29/19	15.67	13.91	23.61	23.98	11.33	9.88	8.17	7.90	16.8	No secchi	16.46	33.36	1.07	2.82	7.78	10:31
5/22/19	15.26	15.11	22.95	22.94	10.32	10.26	8.27	8.25	18.0	1.7	8.57	26.45	1.88	2.21	6.27	9:52
5/15/19	bacteria sample pick up only															

Date	Water Temp (°C)		Salinity (ppt)		DO (ppm)		pH		Air Temp	Secchi	Chlor a (ug/l)		Turbidity (NTU)		Depth(m)	Time
	Surface*	Bottom**	Surface	Bottom	Surface	Bottom	Surface	Bottom	(°C)	(m)	Surface	Bottom	Surface	Bottom	(Total)***	(AM)
CSHH #3 - Glen Cove Creek, Red Marker																
10/30/19	15.85	15.88	25.71	26.27	7.89	7.78	7.83	7.84	17.3	2.25	12.69	5.97	1.62	1.25	4.61	10:24
10/23/19	15.84	15.96	25.19	26.82	9.84	8.28	8.10	7.88	16.9	2.0	15.43	24.13	1.51	1.47	4.33	10:41
10/16/19	17.20	17.56	25.85	26.12	10.75	10.78	8.06	7.99	17.1	1.7	63.81	39.32	1.48	3.58	4.42	9:42
10/11/19	17.26	17.49	23.59	23.77	8.03	7.83	7.81	7.79	14.3	2.0	13.94	13.88	1.45	6.07	5.85	8:40
9/25/19	22.16	21.66	25.08	25.69	8.54	8.28	8.01	7.93	22.3	1.5	7.09	17.65	1.59	2.69	4.96	11:02
9/18/19	21.8	22.0	25.53	25.97	6.05	5.16	7.64	7.56	18.3	1.75	N/A	N/A	N/A	N/A	3.75	9:45
9/11/19	22.15	22.12	25.96	26.01	5.98	5.75	7.60	7.57	25.5	1.1	25.84	22.50	2.03	2.34	5.34	10:22
9/4/19	23.46	23.25	25.50	26.00	7.26	6.47	7.70	7.61	23.8	1.0	36.22	32.48	2.51	3.73	3.36	10:05
8/28/19	23.12	22.70	25.57	26.20	5.93	3.90	7.66	7.47	22.6	1.8	18.30	15.79	1.14	1.45	5.78	10:34
8/22/19	24.97	23.85	25.37	26.00	5.92	3.30	7.70	7.35	27.3	1.25	26.55	17.02	2.58	1.95	3.51	9:31
8/14/19	23.21	22.10	25.45	25.90	6.20	1.27	7.65	7.21	25.2	1.25	45.02	11.30	1.49	1.23	5.44	9:45
8/7/19	23.18	22.07	24.98	25.77	5.79	2.50	7.49	7.29	28.1	1.5	23.81	16.30	2.04	1.40	3.66	10:23
7/31/19	23.11	20.78	24.98	25.51	6.82	1.82	7.81	7.29	27.5	1.25	42.67	12.74	1.63	0.81	5.55	11:20
7/24/19	23.72	22.00	23.59	24.95	5.22	3.57	7.53	7.37	23.6	1.5	11.61	11.76	1.90	2.76	3.79	9:51
7/17/19	22.66	20.94	25.17	25.51	7.24	3.89	7.88	7.39	27.9	1	44.63	39.18	1.84	2.01	4.54	9:51
7/10/19	21.35	19.55	24.92	25.34	8.36	7.39	7.86	7.61	27.1	1.5	21.89	19.56	1.73	3.61	3.97	10:30
7/3/19	21.58	17.61	24.42	25.24	10.00	5.49	8.25	7.57	25.3	1.25	40.05	29.01	1.89	1.81	4.80	10:20
6/26/19	21.08	19.65	22.91	23.50	8.77	7.80	8.02	7.83	24.8	No secchi	8.55	23.25	1.29	3.15	4.25	10:44
6/19/19	18.81	18.23	23.51	23.89	7.87	6.52	7.49	7.35	22.9	1.4	29.70	20.80	1.80	1.80	3.50	9:30
6/12/19	17.87	17.20	23.58	23.96	8.69	8.24	8.03	7.95	19.7	1.5	11.49	22.38	2.17	2.58	4.43	10:42
6/5/19	18.03	17.28	22.62	22.99	10.16	10.79	8.50	8.31	20.4	1.25	51.57	47.83	1.90	2.20	3.55	9:33
5/29/19	16.23	14.81	23.05	23.63	11.64	9.91	8.17	7.87	17.8	1.75	25.63	49.27	1.84	1.79	5.00	10:56
5/29/19	16.3	14.4	22.79	23.70	11.15	9.11	7.94	7.85	16.5	N/A	N/A	N/A	N/A	N/A	4.75	10:56
5/22/19	16.13	15.80	22.83	22.88	10.14	10.75	8.31	8.30	18.4	2.0	8.26	27.86	1.50	1.37	3.08	10:28
5/15/19	12.74	12.15	22.96	23.31	9.91	9.89	pH probe malfur		12.7	2.0	7.40	21.51	1.76	1.41	5.10	11:13
5/15/19	N/A	N/A	N/A	N/A	N/A	N/A	7.97	8.01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Date	Water Temp (°C)		Salinity (ppt)		DO (ppm)		pH		Air Temp	Secchi	Chlor a (ug/l)		Turbidity (NTU)		Depth(m)	Time
	Surface*	Bottom**	Surface	Bottom	Surface	Bottom	Surface	Bottom	(°C)	(m)	Surface	Bottom	Surface	Bottom	(Total)***	(AM)
CSHH #8 - Glen Cove Sewage Treatment Plant Outfall																
10/30/19	15.91	15.88	25.55	25.79	8.11	7.63	7.80	7.81	17.5	1.75	9.31	8.47	2.32	2.87	2.86	10:48
10/23/19	15.92	15.74	24.95	26.22	8.96	9.09	8.00	7.97	17.4	1.3	36.62	21.82	2.95	2.09	2.33	10:58
10/16/19	17.69	17.68	25.78	25.82	9.69	10.29	7.98	7.93	16.4	1.5	54.14	42.01	1.77	2.54	2.38	10:05
10/11/19	17.30	17.29	23.29	23.51	8.14	7.58	7.76	7.77	14.8	2.25	15.93	11.26	1.41	1.18	3.86	9:05
9/25/19	22.62	21.61	24.90	25.51	7.05	6.33	7.72	7.82	21.9	1.3	15.94	14.08	18.97	11.38	2.84	11:23
9/18/19	22.2	22.2	24.59	25.75	4.02	3.87	7.49	7.45	16.8	1.3	N/A	N/A	N/A	N/A	1.75	10:05
9/11/19	22.15	22.08	22.77	25.23	6.50	5.31	7.57	7.52	26.0	0.5	42.61	24.43	15.08	4.09	3.27	10:25
9/4/19	23.34	23.38	24.76	25.18	6.56	5.66	7.55	7.47	24.3	0.75	35.70	31.92	5.73	4.20	1.28	10:32
8/28/19	23.33	23.17	25.25	25.68	5.22	3.91	7.48	7.46	21.7	1.5	19.75	15.37	3.07	3.48	3.54	11:01
8/22/19	24.83	24.71	24.91	25.44	4.94	2.41	7.44	7.25	26.9	1.0	15.95	12.56	3.73	4.10	1.48	9:55
8/14/19	23.29	23.12	24.70	25.28	5.01	4.19	7.49	7.45	24.7	1.0	47.24	40.86	2.21	2.51	2.94	10:13
8/7/19	23.14	23.02	23.08	25.11	5.04	3.28	7.36	7.23	29.0	1.0	18.33	11.71	5.57	4.90	1.30	10:52
7/31/19	24.18	22.59	24.29	24.98	5.61	3.55	7.60	7.41	30.2	1.0	43.85	27.67	3.71	3.43	3.67	11:37
7/24/19	23.75	23.59	14.22	24.21	5.69	3.44	7.29	7.28	23.0	1.25	5.90	8.03	6.04	3.10	1.74	10:30
7/17/19	23.43	22.30	23.01	25.14	7.35	6.51	7.81	7.60	29.8	0.75	65.26	43.38	3.46	3.87	2.73	10:12
7/10/19	21.59	21.14	24.59	24.86	7.28	6.21	7.66	7.52	27.7	1.0	17.66	19.70	4.96	7.05	1.72	10:50
7/3/19	21.16	20.35	23.66	24.55	9.43	8.56	8.11	7.96	27.1	0.8	46.87	43.61	3.80	3.44	3.46	10:00
6/26/19	20.47	19.91	18.62	23.21	6.71	5.52	7.55	7.52	26.5	0.75	19.36	20.16	11.50	14.60	1.99	11:07
6/19/19	19.40	18.03	21.87	23.96	7.32	5.24	7.37	7.18	21.6	1.2	30.85	13.94	3.24	14.10	2.76	9:47
6/12/19	18.33	17.37	21.93	23.70	8.21	7.20	7.87	7.80	22.0	1.25	36.92	26.33	3.62	3.08	2.45	11:15
6/5/19	18.51	17.89	17.96	22.70	12.64	10.57	8.44	8.27	20.4	1.0	95.31	65.97	3.05	6.84	2.72	10:01
5/29/19	17.77	15.23	22.70	23.59	11.48	10.66	8.22	7.89	18.1	1.25	74.77	47.51	2.56	1.95	3.31	11:25
5/22/19	16.77	15.78	20.69	22.76	10.81	10.07	8.29	8.13	20.3	1.0	19.60	23.83	2.18	3.14	2.31	10:55
5/15/19	13.26	12.21	19.35	23.06	9.31	8.90	pH probe malfur		14.4	1.5	11.38	16.52	1.78	1.17	3.26	11:40
5/15/19	N/A	N/A	N/A	N/A	N/A	N/A	7.86	7.90	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Date	**Water Temp (°C)**		**Salinity (ppt)**		**DO (ppm)**		**pH**		**Air Temp**	**Secchi**	**Chlor a (ug/l)**		**Turbidity (NTU)**		**Depth(m)**	**Time**
	Surface*	Bottom**	Surface	Bottom	Surface	Bottom	Surface	Bottom	(°C)	(m)	Surface	Bottom	Surface	Bottom	(Total)***	(AM)
CSHH #13 - 60' West of the Mill Pond Weir																
10/30/19	15.89	15.85	24.77	25.74	7.01	6.15	7.57	7.65	17.8	1.5	7.98	5.74	3.13	3.85	2.66	11:17
10/23/19	15.82	15.84	21.85	26.12	8.01	7.35	7.69	7.70	17.8	0.75	25.47	31.47	4.88	3.98	1.79	11:21
10/16/19	17.83	17.76	25.21	25.75	9.42	9.02	7.83	7.75	17.8	1.45	70.72	39.79	2.30	3.33	2.14	10:25
10/11/19	18.22	18.19	26.56	26.56	5.81	6.27	7.56	7.65	15.8	1.9	15.95	10.01	2.34	3.17	3.45	9:26
9/25/19	22.45	22.17	24.53	25.51	6.06	6.00	7.61	7.74	24.6	1.5	8.15	15.19	3.37	3.62	2.46	11:43
9/18/19	22.3	22.5	24.44	25.45	3.05	2.75	7.28	7.26	18.5	1.3	N/A	N/A	N/A	N/A	1.6	10:30
9/11/19	21.07	22.35	18.54	25.02	6.02	4.04	7.38	7.34	25.5	0.75	19.17	24.45	12.56	4.78	2.93	11:00
9/4/19	N/A	21.23	N/A	16.42	N/A	6.29	N/A	7.46	25.7	0.75 Bottor	N/A	13.81	N/A	16.40	0.62	11:00
8/28/19	23.44	23.44	24.83	25.44	4.49	2.56	7.37	7.25	21.9	1.6	51.28	13.63	3.75	3.58	3.02	11:21
8/22/19	23.91	24.58	21.64	24.47	3.59	2.85	7.04	7.06	27.4	1.0	15.07	13.76	9.31	7.94	1.09	10:16
8/14/19	Access blocked by barge.															
8/7/19	22.36	22.71	22.23	24.06	5.89	3.55	7.36	7.14	28.1	1.25 Bottor	15.15	9.79	3.31	5.13	0.95	11:15
7/31/19	Ran out of time for survey															
7/24/19	23.32	23.10	16.10	24.93	4.16	1.73	7.31	7.11	25.0	1.1	9.21	8.11	3.30	7.70	2.06	11:10
7/17/19	23.41	23.05	19.50	24.81	9.09	6.26	8.14	7.49	30.8	No secch	9.76	32.36	6.01	6.76	2.75	10:34
7/10/19	21.67	21.52	23.22	24.38	7.12	6.77	7.57	7.47	29.8	1.0	10.58	20.56	4.74	6.20	1.27	11:24
7/3/19	21.72	20.25	23.33	24.55	10.87	7.82	8.21	7.72	29.2	0.8	107.10	35.92	5.12	9.92	3.83	11:10
6/26/19	20.29	19.91	13.27	22.91	7.17	4.79	7.64	7.34	27.1	1.0	7.89	8.22	2.54	5.11	1.78	11:28
6/19/19	19.03	18.78	21.26	23.37	6.11	4.64	7.16	7.04	22.0	1.0	27.60	12.38	4.98	4.17	2.30	10:09
6/12/19	17.90	17.39	22.44	23.59	8.01	6.14	7.73	7.55	24.4	1.25	6.08	20.92	2.94	2.94	2.88	11:33
6/5/19	18.60	18.20	18.04	22.35	11.79	11.04	8.45	8.12	21.7	1.0	131.53	80.40	3.48	3.80	1.63	10:22
5/29/19	16.87	15.82	22.92	23.28	8.46	8.69	7.67	7.78	19.5	1.25	54.51	52.52	5.31	2.45	1.98	11:50
5/22/19	16.76	15.83	21.44	22.58	10.19	9.57	8.12	8.02	20.0	0.8	22.90	25.65	3.32	2.60	1.68	11:23
5/15/19	Ran out of time for survey															

Date	Water Temp (°C)		Salinity (ppt)		DO (ppm)		pH		Air Temp	Secchi	Chlor a (ug/l)		Turbidity (NTU)		Depth(m)	Time
	Surface*	Bottom**	Surface	Bottom	Surface	Bottom	Surface	Bottom	(°C)	(m)	Surface	Bottom	Surface	Bottom	(Total)***	(AM)
CSHH #14 - 50 yds from Powerhouse Drain																
10/23/19	15.41	15.50	25.49	25.67	8.33	8.16	7.86	7.87	14.9	1.8	21.97	28.39	2.35	1.58	2.42	8:45
10/11/19	16.65	16.85	25.39	25.93	7.86	7.62	7.74	7.74	17.0	1.75	10.96	12.61	2.83	2.19	3.27	11:19
9/25/19	21.65	21.63	25.18	25.25	7.23	6.84	7.78	7.74	20.4	1.26	51.08	30.21	2.99	3.95	2.69	9:21
9/11/19	21.99	22.13	25.57	26.09	5.06	4.35	7.44	7.45	23.6	1.3	14.61	13.01	3.12	2.56	1.82	8:11
8/28/19	22.86	22.84	25.92	25.93	3.04	2.67	7.34	7.34	21.9	1.35	19.21	22.00	2.75	3.03	2.45	8:06
8/14/19	22.78	22.33	25.32	25.65	4.10	1.74	7.36	7.20	26.1	1.25	45.45	19.53	2.72	1.27	2.62	11:09
7/31/19	22.67	22.31	24.74	24.87	3.65	2.14	7.32	7.27	27.7	1.25	24.68	26.62	2.42	2.25	2.02	8:48
CSHH #15 - 50 yds from Scudder's Pond Outfall, North of Tappen Pool																
10/23/19	15.36	15.63	24.97	25.64	8.45	8.46	7.90	7.90	15.8	1.75	15.47	27.26	1.67	3.78	1.79	9:23
10/11/19	16.67	16.91	25.56	26.21	8.30	7.83	7.78	7.77	15.5	2.0	9.75	13.14	1.87	2.67	2.67	9:55
9/25/19	21.35	21.70	25.07	25.51	8.22	7.95	7.99	7.92	20.0	1.25	31.71	39.64	2.33	4.09	2.48	10:03
9/11/19	21.68	21.67	25.34	25.33	5.60	5.13	7.48	7.47	24.4	1.2	14.16	27.06	3.26	2.84	2.21	9:10
8/28/19	23.06	23.07	25.77	25.77	4.24	3.55	7.39	7.41	21.9	1.8	23.86	20.69	1.84	1.91	2.85	9:22
8/14/19	22.71	22.68	25.46	25.65	4.52	2.74	7.37	7.31	26.6	1.25	35.25	38.72	1.92	1.31	3.02	10:46
7/31/19	22.38	22.10	24.91	25.15	4.55	2.85	7.43	7.36	29.2	1.5	36.96	26.22	2.58	1.78	2.48	10:00
CSHH #4 - Bar Beach Spit																
10/23/19	15.42	15.59	25.68	25.87	8.22	8.17	7.89	7.89	15.2	2.0	19.06	22.48	2.19	2.23	2.63	8:53
10/11/19	16.52	16.53	25.49	25.55	7.42	7.43	7.68	7.68	17.1	1.5	6.23	8.97	3.02	2.48	2.32	11:31
9/25/19	21.58	21.57	25.19	25.24	7.30	7.16	7.78	7.78	21.8	1.24	38.51	29.48	3.51	3.33	1.44	9:37
9/11/19	22.10	22.10	26.03	26.05	5.98	4.86	7.51	7.48	22.1	1.25	22.32	28.78	2.42	2.55	3.20	7:59
8/28/19	22.84	22.84	25.76	25.82	3.98	3.39	7.39	7.38	22.3	1.45	25.11	23.75	2.70	2.65	2.17	8:19
8/14/19	22.71	22.73	25.59	25.59	4.12	2.53	7.34	7.26	24.9	1.4	16.51	21.67	1.51	1.51	1.67	10:59
7/31/19	21.61	21.15	25.29	25.48	1.58	0.76	7.24	7.21	26.5	strong curr	26.86	20.42	1.96	1.95	5.35	8:30

Date	Water Temp (°C)		Salinity (ppt)		DO (ppm)		pH		Air Temp	Secchi	Chlor a (ug/l)		Turbidity (NTU)		Depth(m)	Time
	Surface*	Bottom**	Surface	Bottom	Surface	Bottom	Surface	Bottom	(°C)	(m)	Surface	Bottom	Surface	Bottom	(Total)***	(AM)
CSHH #5 - Mott's Cove																
10/23/19	15.38	15.66	24.75	25.67	8.20	7.84	7.76	7.79	14.8	1.5	18.90	11.00	3.49	2.53	2.30	8:34
10/11/19	16.62	16.71	25.47	25.72	7.91	7.47	7.66	7.70	17.0	1.6	8.63	12.92	2.54	2.73	2.83	11:00
9/25/19	21.19	21.38	24.64	24.96	6.98	6.85	7.68	7.69	19.7	1.2	39.43	31.72	3.83	4.03	2.23	9:17
9/11/19	21.83	22.04	25.29	25.75	4.71	4.35	7.37	7.41	23.9	1.2	25.39	23.62	4.41	4.48	1.51	8:22
8/28/19	22.80	22.88	25.25	25.67	3.43	2.83	7.31	7.31	22.7	1.3	43.21	27.75	3.51	2.57	2.18	8:31
8/14/19	22.65	22.53	25.14	25.51	3.03	1.85	7.25	7.19	25.6	1.3	20.63	21.26	2.32	3.85	2.27	11:23
7/31/19	22.12	21.63	24.80	25.11	1.70	1.21	7.25	7.22	27.8	1.3	19.12	20.71	2.83	2.06	1.70	9:06
CSHH #6 - East of Former Incinerator Site																
10/23/19	15.21	15.61	24.27	25.71	7.94	7.53	7.76	7.81	15.0	1.5	11.98	17.84	4.32	8.82	2.58	8:20
10/11/19	15.60	15.63	24.84	24.90	7.65	7.14	7.61	7.58	16.6	1.0	7.17	5.90	6.85	7.08	2.99	10:38
9/25/19	21.16	21.55	24.39	25.10	6.11	5.74	7.52	7.56	19.5	1.0	48.10	16.37	9.01	23.17	2.49	8:54
9/11/19	21.80	21.91	25.04	25.44	5.69	4.19	7.43	7.36	23.6	0.8	67.57	39.58	5.06	3.91	2.12	8:42
8/28/19	22.97	22.96	25.34	25.42	3.41	2.70	7.29	7.28	22.4	1.25	46.78	33.91	3.10	2.14	2.52	8:54
8/14/19	23.44	22.73	24.91	25.25	3.44	2.33	7.30	7.22	27.3	1.25	15.39	19.41	2.48	1.95	2.84	11:31
7/31/19	22.70	22.28	24.87	24.98	3.18	2.01	7.33	7.26	29.0	1.25	51.24	23.37	2.84	2.18	5.27	9:22
CSHH #7 - West of Bryant Landing (formerly site of oil dock)																
10/23/19	15.49	15.51	24.05	24.32	7.62	7.38	7.71	7.68	14.2	1.23	11.91	8.16	3.95	9.25	1.85	8:03
10/11/19	14.13	14.47	22.41	23.24	7.46	7.37	7.57	7.57	16.3	0.5	7.58	5.77	13.03	16.22	2.33	10:26
9/25/19	21.16	21.41	23.87	24.51	5.37	4.58	7.43	7.39	19.5	0.8	62.54	24.45	7.60	7.03	1.83	8:44
9/11/19	21.80	21.79	25.01	25.02	4.19	3.36	7.27	7.23	23.8	0.6	60.19	75.86	6.99	8.20	1.30	8:52
8/28/19	23.03	23.12	24.83	25.19	2.55	1.65	7.20	7.16	22.4	0.65	43.39	35.27	4.62	6.38	1.92	9:05
8/14/19	23.29	23.22	23.18	24.78	4.06	3.06	7.24	7.20	27.0	0.75	44.75	18.37	7.05	8.43	1.87	11:39
7/31/19	23.51	23.38	24.44	24.53	3.86	2.70	7.30	7.26	28.8	1.25	19.32	19.35	4.49	3.68	1.73	9:40
7/17/19	23.51	22.70	24.81	24.83	5.77	4.48	7.48	7.34	32.9	0.75	31.71	18.89	3.97	7.20	1.65	11:32

Coalition to Save Hempstead Harbor

2019 Sea Cliff Precipitation Data

CSHH 2019 (JANUARY-DECEMBER) PRECIPITATION DATA FOR SEA CLIFF

MO/DAY	AMT(MM)	AMT(IN)	MO/DAY	AMT(MM)	AMT(IN)	MO/DAY	AMT(MM)	AMT(IN)	MO/DAY	AMT(MM)	AMT(IN)	MO/DAY	AMT(MM)	AMT(IN)	MO/DAY	AMT(MM)	AMT(IN)
JAN			MARCH			MAY			JULY			SEPT			NOV		
1	3.30	0.13	1*	3.30	0.13	1	0.25	0.01	6	0.51	0.02	2	5.33	0.21	7	2.79	0.11
5	17.27	0.68	2*	21.34	0.84	2	1.52	0.06	8	1.78	0.07	6	2.54	0.10	8	4.06	0.16
7T	0.00	0.00	3*	1.52	0.06	3T	0.00	0.00	11†	12.70	0.50	9T	0.00	0.00	12	1.78	0.07
8	4.06	0.16	4*	25.40	1.00	4	3.56	0.14	17	71.63	2.82	10T	0.00	0.00	17	13.97	0.55
9	3.56	0.14	10	14.99	0.59	5	33.78	1.33	18†	8.38	0.33	12	1.27	0.05	18	7.62	0.30
18**	1.27	0.05	13T	0.00	0.00	7	1.27	0.05	21	1.27	0.05	16T	0.00	0.00	22	2.79	0.11
19	9.14	0.36	15	6.35	0.25	10T	0.00	0.00	22	69.85	2.75				23	1.02	0.04
20	29.97	1.18	21	10.16	0.40	11	1.02	0.04	23†	16.76	0.66				24	19.30	0.76
24	50.80	2.00	22	22.86	0.90	12	34.29	1.35	29	0.25	0.01						
27	0.51	0.02	29	0.25	0.01	13	16.51	0.65	31†	28.96	1.14						
29	9.14	0.36	31	5.59	0.22	14	6.60	0.26									
30**	1.27	0.05				15	3.30	0.13									
						16	3.05	0.12									
						17	2.54	0.10									
						19	0.76	0.03									
						20	1.78	0.07									
						23	7.11	0.28									
						25T	0.00	0.00								.	
						26	2.79	0.11									
						28	2.03	0.08									
						29C	15.49	0.61									
						30†	40.39	1.59									
						31†	1.02	0.04									
TOTAL	**130.30**	**5.13**	**TOTAL**	**111.8**	**4.40**	**TOTAL**	**179.07**	**7.05**	**TOTAL**	**212.09**	**8.35**	**TOTAL**	**9.14**	**0.36**	**TOTAL**	**53.34**	**2.10**
MO/DAY	AMT(MM)	AMT(IN)	MO/DAY	AMT(MM)	AMT(IN)	MO/DAY	AMT(MM)	AMT(IN)	MO/DAY	AMT(MM)	AMT(IN)	MO/DAY	AMT(MM)	AMT(IN)	MO/DAY	AMT(MM)	AMT(IN)
FEB			APRIL			JUNE			AUGUST			OCT			DEC		
6	4.57	0.18	2	1.52	0.06	2†	10.16	0.40	4	5.59	0.22	2	9.40	0.37	1*	19.56	0.77
7	7.37	0.29	5	7.11	0.28	5	3.81	0.15	7C	20.07	0.79	3	8.64	0.34	2*	8.13	0.32
8	9.14	0.36	8	7.62	0.30	10,11A†	18.54	0.73	8†	0.51	0.02	4	0.76	0.03	5T	0.00	0.00
12,13*	22.86	0.90	9	3.30	0.13	13	11.43	0.45	13	3.30	0.13	6	1.27	0.05	9	49.02	1.93
18	4.06	0.16	12	7.62	0.30	16	1.78	0.07	14T	0.00	0.00	7T	0.00	0.00	10	8.38	0.33
20,21*	19.56	0.77	13	15.49	0.61	17	0.51	0.02	17	0.51	0.02	8	2.03	0.08	11*	7.37	0.29
24	23.62	0.93	14	0.25	0.01	18	11.68	0.46	18	4.32	0.17	9	15.24	0.60	13	22.86	0.90
28**	1.27	0.05	15	16.76	0.66	19	1.27	0.05	19A†	34.54	1.36	13	0.51	0.02	14	44.96	1.77
			17	1.27	0.05	20C	13.21	0.52	21	5.84	0.23	16	36.83	1.45	16*	1.02	0.04
			18T	0.00	0.00	21†	9.40	0.37	22B	27.18	1.07	20	8.64	0.34	17*	26.67	1.05
			21	0.76	0.03	25	8.38	0.33	23†	1.78	0.07	21,22	18.03	0.71	18**	0.51	0.02
			22	12.95	0.51	29	0.51	0.02	28C†	26.42	1.04	26T	0.00	0.00	29	8.38	0.33
			23	0.51	0.02	30	1.52	0.06				28	38.35	1.51	30	14.73	0.58
			25	6.10	0.24							29	3.81	0.15	31	1.27	0.05
			26	34.80	1.37							30	2.03	0.08			
			28	0.51	0.02							31	11.43	0.45			
			30	4.57	0.18												
TOTAL	**92.46**	**3.64**	**TOTAL**	**121.16**	**4.77**	**TOTAL**	**92.20**	**3.63**	**TOTAL**	**130.05**	**5.12**	**TOTAL**	**156.97**	**6.18**	**TOTAL**	**212.85**	**8.38**
													TOTAL RAIN 2019 (IN)=		59.11		

Note: Precipitation recorded from midnight to midnight; snow recorded in inches, converted to approximate liquid equivalent (see below). "A" designates that about 12.5 mm of rain fell between midnight and 8 AM; "B" designates that the first 12.5 mm of rain fell by 4 PM; "C" designates that the first 12.5 mm of rain fell later in the evening, by midnight (meaningful during beach season).

T=trace amount.

†Advisory/closure for 13 rain dates: Of the 7 Hempstead Harbor beaches that are tested for bacteria by the Nassau County Department of Health, 4 beaches were closed preemptively following half an inch or more of rain. North Hempstead Beach Park (S), Morgan Beach, Sea Cliff Beach, and Tappen Beach were closed on the following 5 dates: 6/21, 7/12, 7/18, 7/23, and 8/8. North Hempstead Beach Park (S), Morgan Beach, and Sea Cliff Beach were also closed on 8/20, 8/23, and 8/29. On 8/1, Town of North Hempstead Beach Park (S), Sea Cliff Beach, and Tappen Beach were closed. North Hempstead Beach Park (S) had 4 additional closures on 5/30, 5/31, 6/3, and 6/11. Village Club at Sands Point and North Hempstead Beach Park (N) were not operational during this season. Crescent Beach remained closed all season.

†† Elevated bacteria beach closures: Three Hempstead Harbor beaches also had closures due to elevated bacteria levels. Sea Cliff Beach was closed for 2 days (7/4-7/5). Morgan Beach was closed for 16 days (7/19, 7/31-8/6, and 8/9-8/16). North Hempstead Beach Park (S) was closed 1 day (8/16).

*Sleet/rain mix or wet snow converted to approximate liquid equivalent in mm (5 in of wet snow approx. equal to 1 in liquid precip.).

**Snow--powdery--converted to approximate liquid equivalent in mm (10 in of snow equal to approx. 1 in liquid precip.).

Note: CFU refers to the number of colony forming units, or the number of bacterial cells in the water sample. Log AvgFC (log average for fecal coliform) and Log AvgEnt (log average for enterococci) refer to the running seasonal average of bacteria results at each location. Boldfaced, italicized values exceed the NYS shellfish bed closure standards of 1,000 CFU/100 ml for fecal coliform and 200 Log AvgFC or NYS beach closure standards of 104 CFU/100 ml for enterococci and 35 Log AvgEnt.