QUALITY ASSURANCE PROJECT PLAN
MANHASSET BAY PROTECTION COMMITTEE
TOWN OF NORTH HEMPSTEAD, NEW YORK

Prepared for:

THE MANHASSET BAY PROTECTION COMMITTEE
15 VANDERVENTER AVENUE
PORT WASHINGTON, NEW YORK

Prepared by:

D&B ENGINEERS AND ARCHITECTS
WOODBURY, NEW YORK

APRIL 2022
Effective April 2022
Expires April 2023

This document has been prepared according to the United States Environmental Protection Agency publication EPA Requirements for Quality Assurance Project Plans dated March 2001 (QA/R-5). the American National Standard for quality assurance systems (ANSI/ASQC E4- 1994), with which the QAPPs for all EPA grantees must conform, and USEPA's Guidance for Quality Assurance Project Plans (2002)

Funding for this project was provided from the New York State Environmental Protection Fund as administered by the New York State Department of Environmental Conservation. The opinions, results, findings and/or interpretation of data contained therein are the responsibility of the Contractor and do not necessarily represent the opinions, interpretations, or policies of New York State or the Department of Environmental Conservation.

MANHASSET BAY PROTECTION COMMITTEE

QUALITY ASSURANCE PROJECT PLAN

APPROVAL SHEET

This QAPP must be approved before work begins

Sarah Deonarine – Project Manager Executive Director Manhasset Bay Protection Committee	Date
Kevin Braun Project - Quality Assurance Officer Town of North Hempstead	Date
Zachary M. Smith Zachary M. Smith – DOW Quality Assurance Officer NYS Department of Environmental Conservation Bureau of Water Assessment and Management	2022-04-12 Date
David Tamayev – Microbiology Technical Director Nassau County Department of Health	Date
Mal Nathan– Principal Investigator Town of North Hempstead Bay Constable	Date

MANHASSET BAY PROTECTION COMMITTEE

QUALITY ASSURANCE PROJECT PLAN

UPDATE LOG

Prepared/Revised By:	Date:	Revision No.:	Summary of Changes:
Robbin Petrella, D&B Engineers and Architects	April 2022	V22-1	Initialization

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

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TOWN OF NORTH HEMPSTEAD, NEW YORK

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1.0 PROJECT MANAGEMENT

1.1 Distribution List

The following individuals must receive a copy of the approved QAPP in order to complete their role in this project.

Table 1-1: Project Implementation Personnel

Name	Title	Organization	Document Type
Sarah Deonarine	Program Manager	MBPC	Electronic
Kevin Braun	Project Quality Assurance Officer	Town of North Hempstead	Electronic
Zachary Smith	QA Officer	NYSDEC	Electronic
Andrew Wendolovske	Laboratory Director	NCDOH	Electronic
David Tamayev	Microbiology Technical Director	NCDOH	Electronic
Mal Nathan	Principal Investigator	Town North Hempstead Bay Constable	Electronic

1.2 Project/Task Organization

The following people and parties will actively participate in this project and its oversight.

Sarah Deonarine, Manhasset Bay Protection Committee Director – Project Manager
(516) 869-7983 mbpcExec@gmail.com

Responsibilities

1. Oversee project administration, including budget management, and coordination of interactions with NYSDEC
2. Draft, maintain, and modify (when necessary) the official approved copy of the QAPP
3. Determine project strategy and overall design, including site location, parameter selection, sampling frequency, etc.

Kevin Braun, Town of North Hempstead – Project Quality Assurance Officer.

Oversees the Quality Assurance activities of this project and is independent of individuals conducting the technical activities of the project. braunk@northhempsteadny.gov, 516-869-7754. Responsibilities include:

1. Ensure field procedures, analytical methods, and quality assurance/quality control requirements are consistent with project objectives and are clearly documented in the QAPP.
2. Maintain the official approved QAPP and any subsequent revisions.
3. Review all project documentation; field data sheets, calibration records, laboratory reports to see if quality control criteria specified in the QAPP were achieved.
4. Ensure corrective actions are taken to address inconsistencies, issues or problems identified from reviews.

NYSDEC Division of Water Standards and Analytical Support Section

Zachary Smith, Quality Assurance (QA) Officer, NYSDEC, Albany, NY, oversees Division of Water Quality Assurance activities and is not subject to the authority of any persons in the Manhasset Bay Protection Committee. (518) 402-8234. zachary.smith2@dec.ny.gov.

Responsibilities:

1. Provide expertise regarding analytical and QA/QC issues.
2. Review the QAPP to verify that those elements outlined in the *EPA Requirements for QA Project Plans (QA/R-5)* are successfully discussed.

Town of North Hempstead Bay Constable

Mal Nathan is the Town of North Hempstead Chief Bay Constable. The Town of North Hempstead Chief Bay Constable is responsible for the supervision of the bay constables who perform the collection of the weekly water samples. Department of Public Safety, Division of Harbor Patrol & Marine 311 or (516) 869-6311

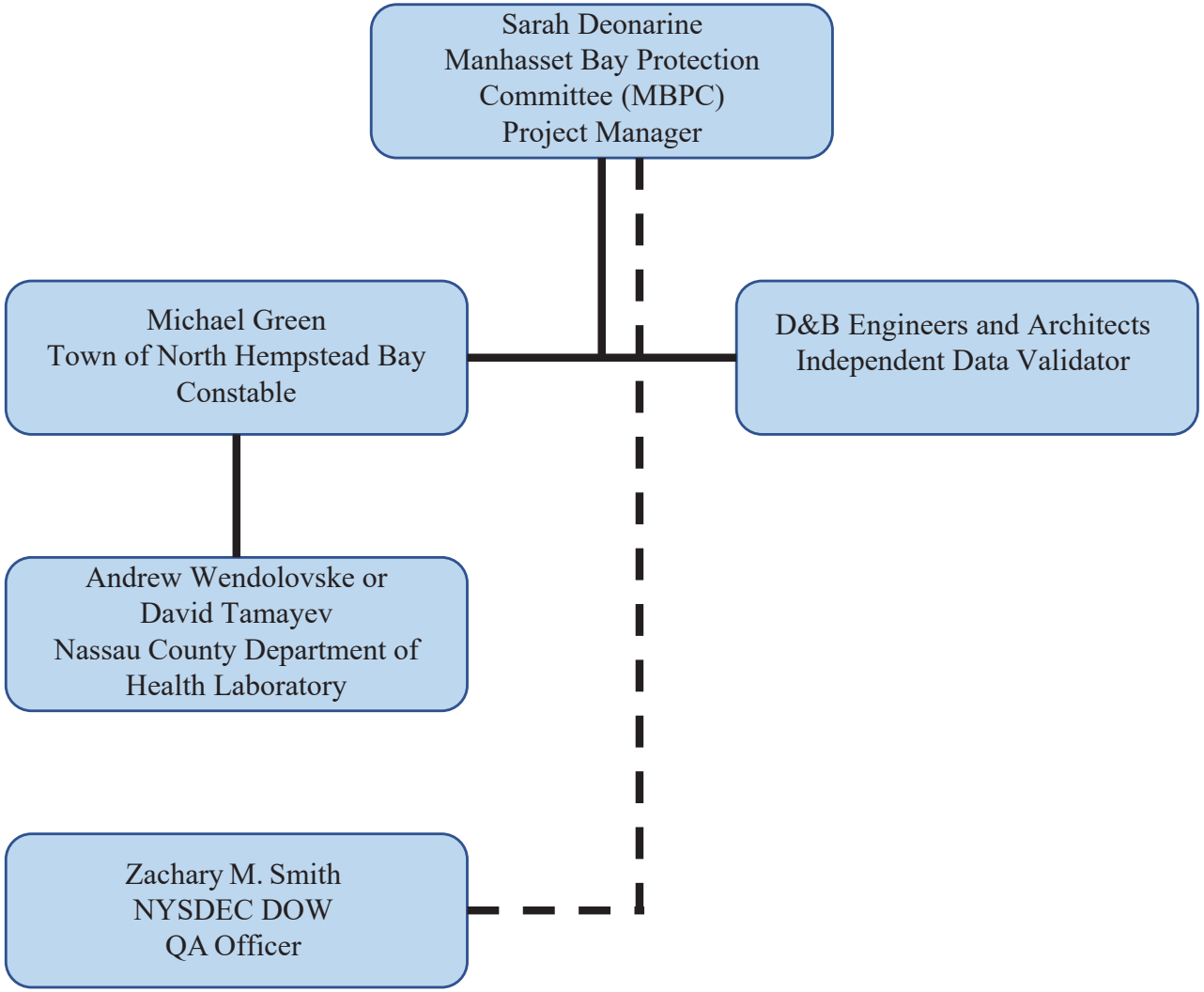
Nassau County Department of Health (NCDOH) Laboratory

The NCDOH is responsible for the pick-up, transport and analysis of the weekly samples. Contacts at the NCDOH are Andrew Wendolovske, Laboratory Director AWendolovske@nassaucountyny.gov (516) 227-9634 and David Tamayev, Microbiology Technical Director, DTamayey@nassaucountyny.gov, (516) 572-1202

Lines of responsibility and communication for personnel involved in project implementation are illustrated in the project organization chart in **Figure 1-1**.

1.3 Problem Definition/Background

The Manhasset Bay Protection Committee (MBPC) is an inter-municipal organization formed in 1998, focused on addressing water quality and coastal issues in Manhasset Bay with a coordinated, watershed-level approach. The 15 member municipalities are: Nassau County, the Town of North Hempstead, and the villages of Baxter Estates, Flower Hill, Great Neck,



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MANHASSET BAY PROTECTION
COMMITTEE TOWN OF NORTH HEMPSTEAD

PROJECT ORGANIZATIONAL CHART

FIGURE 1-1

Kensington, Kings Point, Manorhaven, Munsey Park, Plandome, Plandome Heights, Plandome Manor, Port Washington North, Sands Point, and Thomaston. More information on the Committee is available at manhassetbayprotectioncommittee.org. The Committee's goals are to protect, restore, and enhance Manhasset Bay so as to insure a healthy and diverse marine ecosystem while balancing and maintaining recreational and commercial uses. Tasks that help toward these goals include the annual water quality monitoring and regular assessment of Manhasset Bay. This QAPP covers the 2022 summer water quality monitoring sampling season. The cost of this project is approximately $25,000, which includes the preparation and approval of the QAPP. Funding for this project was provided from the New York State Environmental Protection Fund (C00493GG) as administered by the New York State Department of Environmental Conservation. It should be noted that the Town of North Hempstead donates Bay Constable time and the boat, gas, etc. and that Nassau County DOH donates the cost of bacteria analysis, sample bottles, etc for this sampling program. A break-down of the costs and approximate timeline is included in Table 1-2.

The goal of this project is to collect 2022 Manhasset Bay summer swimming season bacteriological and water quality data and to correlate that data with any weather or environmental variables present and assess the water quality relative to applicable standards. The Manhasset Bay water quality monitoring program encompasses weekly in-bay sampling that includes (a) measuring parameters related to the ecological health of the bay and (b) sample collection to measure bacteria levels within the bay. Sampling begins June 6th and continues until August 29th (excluding July 4, 12 sampling dates).

Table 1-2: Project Expenditures and Approximate Timeline

	Total Amount	Timeline	Notes
Contractual work			
QAPP development	$8,400.00	12/1/2020 -- 3/31/2022	Underway
Executive Director time spent on the water quality sampling program and associated activities (2022)	$1,000.00	4/1/2022 - 12/31/2022	
Part-time intern to assist with monitoring, data entry, and analysis (14 weeks per summer)	$500.00	4/1/2022 - 12/31/2022	
Equipment			
YSI (includes: handheld monitor, probe, field cable, carrying case, and other related items)	$7,167.00	Mar-22	Already spent, Requires an approved 2022 QAPP
Laptop (for data entry and analysis)	$2,895.00	April 2022	
External hard-drive for data back-up	$250.00	April 2022	
Cooler(s) for sample transport	$120.00	April 2022	
Swing sampler for surface water catches	$185.00	April 2022	
Handheld Anemometer (wind speed)	$250.00	April 2022	
Secchi disk	$175.00	April 2022	
Handheld Depth Sounder	$250.00	April 2022	
Other			
Summer monitoring calibration solutions & supplies	$1,000.00	April 2022	
Equipment maintenance & shipping	$1,573.00	Mar-22	Already spent, Requires an approved 2022 QAPP
TOTAL:	**$23,765**		

The monitoring data will be used by the Manhasset Bay Protection Committee, the Nassau County Department of Health, the New York State Department of Environmental Conservation, and the communities surrounding Manhasset Bay. The data will be used to address the following:

1. Determine if in-bay bacteria levels are safe for swimming
2. What is the relationship between counts of the two indicator bacteria species and rainfall?
3. How do factors such as precipitation affect other water quality parameters, and should these factors be targeted for study?
4. Is there a spatial difference in bacteria concentrations within the bay?

Ultimately, answering these questions will help determine where and what type of water quality improvement project needs to be done. In an effort to answer these questions, graphical and statistical analysis of Manhasset Bay data will be performed, along with tide data obtained from the National Oceanic and Atmospheric Administration (NOAA) at Kings Point and rainfall data obtained from LaGuardia Airport, and used for correlation analysis. Water quality reports are important, as they set a baseline to compare future progress against and identify sources of water pollution, as well as setting a course of next steps to continue the progress already made.

The United States Environmental Protection Agency (EPA) is charged with monitoring swimming beaches for public health and safety. To do that, the EPA recognized enterococci as the indicator of the presence of fecal material in water, which could also indicate the presence of disease-causing bacteria, viruses, and protozoa; cumulatively, pathogens. Enterococci are not themselves harmful to humans.

The New York State Department of Health (NYSDOH) recognizes both enterococci and fecal coliform as indicators of the presence of disease-causing organisms and has set the following standards ambient water quality standards as identified in NYCRR 6 Part 703.4:

1. Based on a summary statistics (geomeans with no more than 10 percent exceedance), the upper value for the density of bacteria for ambient water quality (NYCRR 6 Part 703.4) shall be:

    - The monthly geometric mean, from a minimum of five examinations for fecal coliforms, shall not exceed 200 CFU/100 mL for Class SB and SC waters.

    - For Enterococci the geometric mean of samples collected over any consecutive 30-day period shall not exceed 35 CFU/100 mL and no more than 10 percent of the samples collected in the same 30-day period shall exceed 130 CFU/100 mL for Class SA and SB waters.

The evaluation of the date will be based on the sampling dates. schedule listed below

Table 1-3: 2022 Sampling Dates/Statistics

Sampling Date[1]	Five Sample Dates	30-day mark
June 6	6/6, 6/13, 6/20, 6/27, 7/6	July 6
June 13	6/13, 6/20, 6/27, 7/6, 7/11	Jul 13
June 20	6/20, 6/27, 7/6, 7/11, 7/18	July 20
June 27	6/27, 7/6, 7/11, 7/18, 7/25	July 27
July 6[2]	7/6, 7/11, 7/18, 7/25, 8/1	Aug 5
July 11	7/11, 7/18, 7/25, 8/1, 8/8	Aug 10
July 18	7/18, 7/25, 8/1, 8/8, 8/15	Aug 17
July 25	7/25, 8/1, 8/8, 8/15, 8/22	Aug 24
Aug 1	8/1, 8/8, 8/15, 8/22, 8/29	Aug 31
Aug 8	7/25, 8/1, 8/8, 8/15, 8/22	Jul 24 – Aug 23
Aug 15	8/1, 8/8, 8/15, 8/22, 8/29	Jul 31 – Aug 30
Aug 22	7/25, 8/1, 8/8, 8/15, 8/22	July 23
Aug 29	8/1, 8/8, 8/15, 8/22, 8/29	July 16

[1] All Mondays, except July 6th

[2] Wednesday

1.4 Project/Task Description

Manhasset Bay is one of the westernmost estuarine embayments of the north shore of Long Island, NY. The Bay is, therefore, influenced by activities in and around New York City and the Long Island Sound, but this project aims only to investigate what is happening within Manhasset Bay. According to the New York State Department of Environmental Conservation's (NYSDEC) Priority Waterbodies List, Manhasset Bay is impaired by pathogens (as indicated by the bacteria fecal coliform and enterococcus) from stormwater runoff, which is the focus of this analysis and report.

Manhasset Bay is broken into three portions according to the NYSDEC Waterbody Inventory/Priority Waterbodies List, as shown in **Figure 1-2**. Portion 1(1702-0021) is comprised of Bay waters southwest of a line from Hewlett Point to Barker Point, southwest of a line from Plum Point to Port Washington Yacht Club dock, and north of a line running east of Harbor Way dock and is classified as an SA water. The known major pollutants in Portion 1 include dissolved oxygen/oxygen demand, nutrients, and pathogens sourcing from STPs and urban/stormwater runoff. Portion 2 (1702-0141) is Bay waters northeast of a line from Plum Point to Port Washington Yacht Club dock, with pathogens from urban/stormwater runoff as the known major pollutant and is classified as an SB water. Portion 3 (1702-0142) is made of Bay waters south of a line running east from Harbor Way dock, which also has pathogens as the known major pollutant from urban/stormwater runoff is classified as an SC water. Portions 1 and 2 of Manhasset Bay are also on the NYS Section 303(d) List of Impaired Waters Requiring a total maximum daily load (TMDL) or Other Strategy. Portion 1 is listed as a shellfishing restricted impairment for pathogens from urban/stormwater runoff requiring TMDL development. Portion 2 is listed as an individual waterbody segment with pathogen impairment from urban/stormwater runoff requiring TMDL development.

This project will collect Manhasset Bay bacteriological and water quality data available during the summer of 2022, correlate that data using a Pearson correlation, t-test and spatial trends, and assess the water quality relative to applicable standards.

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MANHASSET BAY PROTECTION COMMITTEE

TOWN OF NORTH HEMPSTEAD

MANHASSET BAY OVERVIEW MAP

FIGURE 1-2

5515 - Figure 1-2 - Manhassat Bay Overview Map.indd (12/01/20 - 9:43 AM)

The **Pearson Correlation** calculates an *r*-value between -1 and +1 in order to determine if and how strong a relationship is between two variables (an *r*-value of zero means that there is no relationship). If the coefficient is positive, then the two variables tend to increase together. If the coefficient is negative, one variable tends to decrease as the other variable increases. As positive *r*-values approach "+1," the two variables are more closely related (a value of +1 indicates a perfect correlation), therefore *r-values* equal to and higher than 0.70 are significant. This test was chosen as it was the same test performed for the last water quality analysis report completed in 2018.

A **t-test** calculates a p-value in order to determine if there is a significant difference between two sets of data which cannot be explained by chance. A p-value equal to or less than 0.05 is used as the threshold at which there is a significant difference. In order to run a t-test, bacteria data will be separated by species and station. A Two-sample Assuming Equal Variances t-Test is then run. This analysis was chosen based on conversations with Dr. Julie Rose of the NOAA Milford Laboratory. Additionally, it is a well recognized test for determining significance.

The previously completed water quality reports found **spatial differences** in how rainfall affects bacteria counts:

- Sampling stations near densely populated areas generally experienced higher bacteria counts on the same day as rain.
- Sampling stations near less densely populated areas and the central Bay generally experienced higher bacteria counts on the day after a rainfall (i.e., rain 1-day prior).

There are a total of seven (7) water quality monitoring sites throughout Manhasset Bay to represent full coverage of the Bay in areas experiencing various stressors. Weekly sampling will be conducted on Mondays from June 6th through August 29th, 2022 (excluding July 4), collecting indicator bacteria (enterococcus and fecal coliform) samples using a simple dip method at the water surface. Additional data will be collected from external sources, including precipitation from LaGuardia Airport, the closest weather station.

Table 1-4 below outlines tasks and timeline for completion.

Table 1-4: Schedule of Project Tasks

Task Name	Task Description	Start Date	End Date
Funding	Grants, Contracts awarded	April 1, 2017	TBD
QAPP Finalized Approved	Finalize project objectives and acceptance criteria with all participants.	January 2022	
Project Milestones	Purchase monitoring equipment and sampling supplies	April 1, 2022	May 15, 2022
	Sampling events – Weekly beginning the Monday after Memorial Day (not including July 4)	June 6, 2022	August 29, 2022
Deliverables	Generation dates and submission dates		
Analysis of Information	Results of the measures, identification, statistical methodology, and data management tasks	On-going	December 31, 2022
Quarterly Reports	Reports/status updates reported to the NYSDEC	60-days after the end of the quarter	60-days after the end of the quarter
Reports	Final documents and/or reports submitted to reporting agencies.	As required	

1.5 Quality Objectives and Criteria

Data quality objectives are based on precision, bias, accuracy, representativeness, comparability, completeness, and sensitivity.

- Precision of sampling is based on taking duplicate field measurements at one random station chosen per sampling event by random number generator before departing Town Dock and calibration of the YSI multiparameter probe prior to every sampling at the Town Dock.

- Accuracy and Bias is based on field blanks, trip blanks, laboratory blanks (e.g., for bacteria) and calibrations results. A field blank will be collected during each sampling event.

- Data Representativeness is determined by the sampling sites representative of conditions for a specific area of the water body (or a specific pollution source), any abnormal or episodic conditions that may affect the representativeness of sample data

are noted and maintained as metadata, and 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, and rising/ebb tide).

- Comparability is determined based on sites data result using established field protocols, standard laboratory methodologies and 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 the laboratory to produce comparable data by following established procedures.

- Data completeness is determined by at least 90% of the anticipated number of samples on a particular sampling date being collected, analyzed, and used, data is tracked by keeping detailed and complete sample and survey records, data was summarized via a report detailing number of anticipated samples, number of valid results, and percent completion for each parameter and the anticipated number of samples will vary according to tidal cycles and access to monitoring Stations.

1.6 Special Training/Certification

The Project Manager will ensure that all individuals involved with the project receive and are familiar with this QAPP and the Standard Operation Procedure (SOP) prepared for this project to ensure proper adherence to the procedures outlined within. 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. The Project QA Officer and Project manager/Field Team Leader should have prior water-quality monitoring experience through this program, a similar program, or through work or education. The date and specifics of Project Manager/Field Team Leader training will be recorded and kept in the annual water-monitoring binder along with other training notes.

Field Samplers (staff, and/or municipal employees) will meet with program managers for information regarding the monitoring program. 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;
- Sample collection procedures;
- Sample Handling and labeling; and
- Potential safety hazards as listed in the Sampling Plan SOP and safety plan.

1.7 Documents and Records

Data measurements, site conditions, and other information will be recorded on data sheets and labeled with the Station ID (MB-1, -2, etc). Project data accumulated throughout sampling as well as associated analyses will be stored in a digital spreadsheet. All data, including sample results and field measurements, from these efforts will be provided in electronic format (digital spreadsheet) to the MBPC Executive director.

1.7.1 Report Format/Information

Data reporting packages need to be consistent with the requirements and procedures used for data validation and data assessment described in this QAPP. The data packages at a minimum will consist of the following:

- Chain of Custody
- Certification of results by the laboratory
- Documentation of sample analysis/results

1.7.2 Document/Record Control

Documentation of this project will be completed electronically, including all data and analysis being organized and tabulated via Microsoft Excel. Any hand-recorded data records will be taken with indelible ink, and changes to such data records will be made by drawing a single line

through the error and initialed by the responsible person. The Project Manager will have ultimate responsibility for any and all changes to records and documents. Similar controls will be put in place for electronic records. Original field data sheets from sampling events will be stored by the Town Bay Constables.

1.7.3 Storage of Project Information

All data storage, including the YSI field parameter readings, for these project efforts will be saved in Microsoft Excel. Original field data sheets from sampling events are stored by the Town of North Hempstead Bay Constables.

The Project Manager shall retain copies of all management reports, memoranda, and all correspondence between NYSDEC and project personnel identified in Section 1.2.

2.0 DATA GENERATION AND ACQUISITION

2.1 Sampling Process Design (Experimental Design)

A key task in this project will be to develop a sound statistical methodology for collecting and analyzing data, in order to draw inferences related to the selected performance measures. An SOP establishing consistent sampling techniques so that the data is comparable from sampling event to sampling event is provided as **Appendix A**. The major quality objective will be to collect representative data that accurately reflect the environmental conditions of the project area.

The water quality monitoring encompasses seven (7) sites spread throughout Manhasset Bay. These sampling locations were selected based on the need to get full coverage of the Bay in areas experiencing different stressors. These sampling locations are detailed below in **Table 2-1** and **Figure 2-1**. Once per week, each Monday, between Memorial Day and Labor Day of each year, the Town of North Hempstead bay constables will collect data at these seven (7) disparate sites around Manhasset Bay including: site conditions (air and water temperature, wind speed and direction, weather, wave height), water quality parameters (YSI meter), secchi (visibility) measurements and water depth as well as surface water samples for bacteria counts. The Nassau County Department of Health will analyze the water samples for fecal coliform and enterococci (CFU/100mL) according to this and the standard operating procedures of the Nassau County Department of Health. The data from these efforts will be provided to the MBPC Executive Director (henceforth Director) in digital spreadsheet format.

Table 2-1: Manhasset Bay Water Quality Monitoring Sample Locations

Station ID	Site Name	Location Description	Latitude (N)	Longitude (W)
MB-1	Leeds Pond	Eastern shore of the Bay near the outlet of one of the major freshwater sources	40.81592	-73.70592

Station ID	Site Name	Location Description	Latitude (N)	Longitude (W)
MB-2	Kennelworth	Northwestern shore near the mouth; this station experiences a lot of flushing with Long Island Sound	40.82646	-73.72844
MB-3	Manorhaven	Northern shore near Sheets Creek	40.83022	-73.71578
MB-4	NUN 4	Aide to navigation buoy in the central channel of the Bay. Likely experiences a lot of flushing.	40.82946	-73.71794
MB-5	Baxter Beach	Northeastern shore near a lot of development and the outfall for the Port Washington STP	40.83412	-73.70142
MB-6	Manorhaven Beach	Northern shore near a Town recreational facility	40.83763	-73.71495
MB-7	Great Neck (2017-2018)	Southern shore where the Bay gets extremely shallow and more exposed to freshwater inputs. Site is near the outfall for the Great Neck STP, as tidal stage allows.	40.80224	-73.71337

Table 2-2: Elements of Manhasset Bay Water Quality Monitoring

Parameter	Location	Analyzer or Method	Location of Analysis
Dissolved Oxygen	MB-1 through MB-7	YSI Meter	Field
Conductivity	MB-1 through MB-7	YSI Meter	Field
pH	MB-1 through MB-7	YSI Meter	Field
Water Temperature	One station for electronic meter validation	YSI Meter	Field
Air Temperature	One measurement at each station during monitoring	Calibrated Digital Thermometer	Field
Water Clarity	MB-1 through MB-7	LaMotte Secchi Disk	Field
Fecal Coliform	MB-1 through MB-7	Membrane Filter, SM 9222 D-2006	Nassau County Department of Health
Enterococci	MB-1 through MB-7	Membrane Filter, EPA 1600	Nassau County Department of Health
Precipitation	LaGuardia Airport	NOAA National Centers for Environmental Information (NCEI)	Field

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SAMPLE LOCATIONS MAP

FIGURE 2-1

2.2 Sampling Methods

Sampling will be performed once per week on Monday mornings from June through August (except July 4) at seven (7) locations around the Bay by Town of North Hempstead Bay Constables utilizing a Town-owned boat; according to the following procedure:

- Sample Locations will be accessed via boat, with samples collected from the boat.
- Field measurements: temperature, dissolved oxygen, pH, and salinity readings will be taken at the surface (approximately one-foot depth to top of probe) using the YSI multiparameter probe, and turbidity measurements taken via secchi disk with half-meter markings on the line.
- Data measurements, site conditions, and other information will be recorded on data sheets and labeled with the Station ID.
- Bacteria samples will be collected using a simple dip method at the surface.
- Water depth will be determined using a depth sounder on the boat, when available.
- Site conditions and other information will be recorded on a data sheet and labeled with the Station ID.
- Samples will be refrigerated and collected by Nassau County Department of Health personnel for transport to the NCDOH laboratory for analysis.

2.2.1 Environmental Information Collection Methodology

The YSI multiparameter probe will be calibrated, as per the YSI ProDSS Set-up & Calibration SOP and Manhasset Bay YSI Sampling Guide provided in **Appendix A**, prior to every sampling at the Town Dock. The sampling locations will be identified by GPS Coordinates collected and recorded on the handheld YSI to verify sample locations. The sampling trip's YSI data log will be downloaded once back at Town Dock.

2.3 Sample Handling and Custody

Samples will be labeled in accordance with Section 7.1 of the SOP-Sampling Plan provided in **Appendix A** will include the following:

- Site Location: MB-1
- Date of Collection: 06/10/22
- Time of Collection: 13:00
- Name of Sampler:

An example ID would be MB-1_6/10/22_13:00

Samples will be placed on ice in a cooler upon collection. The samples will be picked up by NCDOH personnel, transported directly the laboratory and remain refrigerated until they perform the analysis at their laboratory. Samples will be transferred under typical chain of custody procedures as provided in **Appendix B**. All sample shipments collected from Manhasset Bay have a trip blank included in the cooler that is analyzed along with the water samples. Samples are checked for proper receiving temperature (less than 6C) and time received, any exceedances would cause the lab to question the results. If the temperature/time/trip blank noted with bacteria/etc. the lab stamps the log sheet as "results questionable." Every week that NCDOH picks up samples, a batch duplicate is run.

2.4 Analytical Methods

This project will follow well-recognized statistical analytical methods for survey samples. For physical tests or chemical analyses all laboratories must be certified by NYS Department of Health Environmental Laboratory Approval Program (ELAP) per NYS Public Health Law 502 and follow analytical methods as required in 40 CFR Part 136. Analyses will be performed by the ELAP-certified Nassau County Department of Health laboratory for bacteria samples utilizing Standard Methods (SM) 9222D and USEPA Method 1600. The holding times to begin processing

the bacterial samples analysis is 6 hours from sample collection. If holding time is exceeded the results will be rejected. See Tables 2-3 and 2-4 for detection limits for water-quality parameters measured in this monitoring program. The turnaround for receiving the data from the laboratory is 21-days.

Table 2-3: 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
GPS coordinates (YSI)	decimal degrees (dec. deg.)	± 7.8 m	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
dissolved oxygen (YSI Meter)	milligrams per liter (mg/L) = parts per million (ppm)	±0.2 ppm	10%	0 -14 ppm	0 ppm
Conductivity (YSI Meter))	NTU	0 to 400 NTU ± 1% of reading ± 1 count	20%	0 – 30 NTU	4 digits
pH (YSI Meter)	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
water clarity (Secchi disk)	m	±0.1 m	10%	0 - 4 m	0.1 m

Relative Percent Difference will be calculated using the formula listed below:

RPD = (Final result - Initial result) / ((Initial result + Final result) / 2)

Table 2-4: 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%

2.5 Quality Control

For quality control purposes, duplicate field measurements are taken at one station chosen at random per sampling event. Two bay constables will perform the sampling; the MBPC Director may participate in sampling at least once per month for quality assurance purposes. A duplicate sample will be collected at one location for lab analysis.

2.6 Instrument/Equipment Testing, Inspection, and Maintenance

For instruments operated by/in the contract laboratory, testing, inspection, and maintenance will be performed in accordance with guidelines detailed by the analytical methods and NYSDOH ELAP. Contract laboratories should maintain appropriate service contracts for laboratory instruments and perform routine instrument maintenance at intervals suggested by the manufacturer or by internal laboratory SOP.

The following information regarding equipment will be maintained at the project site if monitoring is deemed necessary:

1. Equipment calibration and operating procedures which will include provisions for documentation of frequency, conditions, standards, and records reflecting the calibration procedures, methods of usage and repair history of the measurement system. Calibration of field equipment will be completed daily at the sampling site and the instrument calibrated accordingly SOP provided in **Appendix A**.

2. A schedule of preventive maintenance tasks, consistent with the instrument manufacturer's specific operation manuals, that will be carried out to minimize down time of the equipment.

3. Critical spare parts, necessary tools and manuals will be on hand to facilitate equipment maintenance and repair.

2.7 Inspection/Acceptance for Supplies and Consumables

Supplies needed for this monitoring program include sampling bottles, calibration solutions, and equipment replacement parts. The inspection and acceptance for supplies and consumables is the responsibility of the Program Manager and/or Bay Constable. 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 are purchased from USA Bluebook and replacement parts for the YSI unit are purchased directly from Xylem, Inc.

2.8 Non-Direct Measurements (i.e., Secondary Data)

Local weather, specifically precipitation levels, and tide data over the time periods specified will be collected. Precipitation data from LaGuardia Airport, the closest weather station, will be gathered from the NOAA National Centers for Environmental Information (NCEI) data request website. Tidal data from NOAA's Kings Point Station (ID #8516945) will be accessed from NOAA's Center for Operational Oceanographic Products and Services website. These non-direct measurements are detailed in **Table 2-2** below.

Table 2-5: Non-Direct Measurements (i.e., Secondary Data)

Data Sources	Intended Use	Rationale for Use	Acceptance Criteria
NOAA National Centers for Environmental Information (NCEI) – LaGuardia Airport	Identifying precipitation data and patterns for the general project area.	Commonly accepted source of precipitation data	Data will be collected on the day of sample collection, as well as rainfall 1- and 2-days prior. Based on the precipitation data the sample results may be qualified as rejected or unacceptable and those results will be excluded from the statistical analysis
NOAA's Center for Operational Oceanographic Products and Services – Kings Point Station	Identifying tidal data and patterns for the general project area.	Commonly accepted source of tide data	All data will be collected on the day of sample collection. Based on the tidal data the sample results may be qualified as rejected or unacceptable and those results will be excluded from the statistical analysis

2.8.1 Key Resources/Support Facilities Needed

The Manhasset Bay Protection Committee does not anticipate any obstacles to this approach. Both sources of secondary data are widely used and easily accessible via NOAA websites.

2.8.2 Determining Limits to Validity and Operating Conditions

Of the seven (7) sampling sites included in the water quality monitoring, several are located along the perimeter of the Bay, and therefore may miss some water quality dynamics of the central Bay. However, given the screening level nature of this monitoring, these sample locations have been deemed sufficient for these sampling efforts. In addition, it is anticipated that the largest

impacts on water quality will be closer to the shore and, therefore, these sample sites can serve as a proxy for what is happening in the central Bay.

An additional data limitation is that Manhasset Bay experiences a large tidal range and some portions of the Bay are getting shallower (through accretion). As such, some sites are not accessible during sampling, as sampling is set on a fixed schedule of Mondays. In these instances, samplers will attempt to get as close to the sampling location as possible and record their GPS coordinates on the YSI.

One final potential limitation of data is the use of secondary sources for both tidal and precipitation data. The nearest NOAA tidal gauge is located in King's Point, so this data will be used as representative of all of Manhasset Bay. Similarly, the precipitation data collected at LaGuardia Airport by NOAA will also be used as representative of the entire Bay for the purposes of this project.

2.9 Data Management

As part of this project, the Manhasset Bay Protection Committee (MBPC) and D&B Engineers and Architects (D&B) will develop/update a data management strategy and amend the QAPP based upon any changes in the strategy. The Project Manager is responsible for ensuring that if the strategy is updated then the QAPP is amended to reflect that strategy. The strategy will be consistent with the existing Manhasset Bay Protection Committee's Quality Management Plan.

Field data will be collected on a field data sheet during each sampling event. Field data, including the YSI calibration log, will be compiled electronically after each event and stored on the MBPC computer. The electronic file will be backed up quarterly and stored at the MBPC office. The original field data sheets will be maintained on file for at least five years in an annual logbook and maintained by the NCDOH.

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 MBPC office. 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 NYSDEC pertinent approvals shall be maintained with each version of the document.

3.0 ASSESSMENT/OVERSIGHT

3.1 Assessment and Response Actions

The Project Manager will thoroughly brief project implementation staff before and after beginning their respective implementation tasks, to identify emerging/unanticipated problems and take corrective action, if necessary. 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 there are unusual changes in detection limits, resampling and reanalysis may have to occur.
- For unusual occurrences in the field, a note will be made on the field data sheet.

The following is a list of conditions in the field that would lead to a suspension of work:

- Inclement weather that inhibits the boat to launch or shortens the field sampling, a note will be made in the field log and sampling rescheduled.

3.2 Reports to Management

Quarterly and annual progress reports, and a project final report will be prepared. Progress reports will note the status of project activities and identify whether any QA problems were encountered (and, if so, how they were handled). The project final report will analyze and interpret data, present observations, draw conclusions, identify data gaps, and describe any limitations in the way the data may be used.

Table 3-1: Project QA Status Reports

Type of Report	Frequency	Preparer	Recipients
QAPP	Once, before primary data collection begins	Manhasset Bay Protection Committee Project Manager	All recipients of original QAPP
Progress Report	Quarterly	Manhasset Bay Protection Committee	NYSDEC DOW
Progress Report	Annually	Manhasset Bay Protection Committee	NYSDEC DOW
Final Project Report	Once	Manhasset Bay Protection Committee	NYSDEC DOW

4.0 DATA REVIEW AND EVALUATION

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.

All data/report/presentation releases, publications, or distributions shall be approved by NYSDEC.

4.1 Data Review, Verification, and Validation

This QAPP shall govern the operation of the project at all times. Each responsible party listed in Section 1.4 shall adhere to the procedural requirements of the QAPP and ensure that all involved personnel do likewise.

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 (DQO) that are exceeded or 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 primarily conducted by Bay Constables, and the electronic copy of the data is immediately checked against the field data sheet and the NCDOH for laboratory data. The Director 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 are considered

valid. Data that is inconsistent with these standards (data that was flagged) will be examined by the Project Manager/Field Team Leader, MBPC 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.

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 SOP and/or the 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 have been deemed to be 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. NYSDEC will be notified of modifications to the QAPP in order to approve changes. MBPC 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.

The data qualifiers that may be used to assess the data are summarized below:

Qualifier	Definition	User
<1	Analyzed for but not detected	Laboratory
TNTC	Too numerous to count	Laboratory
*	Value estimated (for Enterococci	Laboratory
Results questionable – holding time exceeded	Holding time exceeded	Laboratory
Results questionable – trip blank >6C	Trip Blank received at a temperature greater than 6C	Laboratory
B	Constituent detected in the associated method blank	Validator (MBPC PM or QA Officer)

Qualifier	Definition	User
R	Result Rejected	Validator (MBPC PM or QA Officer)
A	Result Accepted	Validator (MBPC PM or QA Officer)

This QAPP shall be reviewed at least annually to ensure that the project will achieve all intended purposes. All the responsible persons listed in Section 1.2 shall participate in the review of the QAPP. The Project Manager and the Quality Assurance Officer are responsible for determining that data are of adequate quality to support this project. The project will be modified as directed by the Project Manager. The Project Manager shall be responsible for the implementation of changes to the project and shall document the effective date of all changes made.

The Project Manager shall authorize all changes or deviations in the operation of the project. Any significant changes will be noted in the next progress report and shall be considered an amendment to the QAPP. All verification and validation methods will be noted in the analysis provided in the final project report.

5.0 REFERENCES

Bathing Beach Water Quality Monitoring and Notification Program Quality Assurance Project Plan, New York State Department of Health, Revised October 15, 2018.

EPA Guidance for Quality Assurance Project Plans, EPA QA/G-5 May 2006.

General Monitoring Quality Assurance Project Plan (QAPP) Template, New York State Department of Environmental Conservation Water Assessment and Management, Division of Water.

APPENDIX A

STANDARD OPERATING PROCEDURES

STANDARD OPERATING PROCEDURES – SAMPLING PLAN

TABLE OF CONTENTS

1.0 POINT OF CONTACT

NAME: Sarah Deonarine, Manhasset Bay Protection Committee (MBPC), Program Manager

EMAIL: mbpcexec@gmail.com

2.0 OBJECTIVE

The objective is to sample water quality within Manhasset Bay in an effort to quantify changes in water quality over time. Frequency of sampling and daily order of events are specified.

3.0 OVERVIEW

Seven water-quality stations are monitored within Manhasset Bay weekly.

Sampling for the "summer season" (Memorial Day to Labor Day) occurs June through August (for 2022, the dates are Mondays starting June 6th and ending August 29th, not including July 4th). 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.

The sampling plan calls for 13 weeks of sampling during the summer season barring unforeseen events or conditions (2022 will have 12 data points due to the July 4th holiday being on a Monday).

4.0 DEFINITIONS AND ABBREVIATIONS

Each monitoring station where samples are collected is identified by the acronym "MB" for Manhasset Bay and a number.

Table 4-1: Manhasset Bay Water Quality Monitoring Sample Locations

Station ID	Site Name	Location Description	Latitude (N)	Longitude (W)
MB-1	Leeds Pond	Eastern shore of the Bay near the outlet of one of the major freshwater sources	40.81592	-73.70592
MB-2	Kennelworth	Northwestern shore near the mouth; this station experiences a lot of flushing with Long Island Sound	40.82646	-73.72844
MB-3	Manorhaven	Northern shore near Sheets Creek	40.83022	-73.71578
MB-4	NUN 4	Aide to navigation buoy in the central channel of the Bay. Likely experiences a lot of flushing.	40.82946	-73.71794
MB-5	Baxter Beach	Northeastern shore near a lot of development and the outfall for the Port Washington STP	40.83412	-73.70142
MB-6	Manorhaven Beach	Northern shore near a Town recreational facility	40.83763	-73.71495
MB-7	Great Neck (2017-2018)	Southern shore where the Bay gets extremely shallow and more exposed to freshwater inputs. Site is near the outfall for the Great Neck STP, as tidal stage allows.	40.80224	-73.71337

5.0 SOURCES

The procedures used for the Manhasset Bay water-monitoring program are aligned to those of the Nassau County Department of Health. For testing parameters that are not within the scope of the UWS, laboratory and manufacturer instructions and protocols are followed.

6.0 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 bacteria samples
- laboratory provided sample jars and trip blank
- cooler
- ice
- electronic thermometer
- wind meter
- multiparameter meter and display unit with built-in GPS
- calibrated rope (0.5m markings) and secchi disk

- 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*

7.0 METHODS

7.1 Parameters to Sample

At first monitoring station

- Record:
  - Date, time, and GPS coordinates are automatically recorded by the YSI
  - names of team members present
  - weather conditions, as indicated on data sheet
  - water-surface conditions, as indicated on data sheet

For each monitoring station

- Record:
  - GPS coordinates
  - time
  - air temperature
  - wind direction and speed
  - Secchi depth
  - YSI surface readings of:
    - water temperature
    - salinity/conductivity
    - dissolved oxygen
    - pH
- Collect Water Samples (as indicated in monitoring/sampling plan) for:
  - bacteria analysis (fecal coliform and enterococci) by the Nassau County Department of Health (NCDOH) following NCDH protocols and using NCDOH sample jars, field blanks, and data sheet—

- label sample jar with a permanent marker indicating the site identification (e.g., MB -1) and date and time of sample collection
- label the sample jar lid with the site identification
- rinse large sample collection jar twice with sample water before collecting sample where applicable
- collect sample at 1 foot below surface using large sampling jar attached to sample grab pole
- data sheets should indicate time sample is collected, air temperature, water temperature, wind direction and speed, weather conditions (using NCDOH codes), and wave height
- collected samples and trip blank must be kept in a cooler with ice or refrigerated and delivered within six hours of collection time

7.2 Timing of Sampling

The sampling plan is for weekly sampling.

7.2.1 Timing during the Year

Sampling occurs during the "summer" swimming season which is considered to be between Memorial Day and Labor Day. Sampling is conducted June through August. The sampling plan calls for 13 weeks of sampling, 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 (Mondays) 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, and Turbidity

At all sampling stations (as allowed by tidal height) readings for GPS coordinates, water temperature, salinity, dissolved oxygen and pH, a are taken at one foot below the surface utilizing a multiparameter meter (YSI).

7.3.2 Bacteria

Bacteria samples are collected 1 foot below the surface using a simple grab method.

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 with multiparameter sonde (YSI)	1 reading at surface, wait for reading to stabilize before recording at 1 station per day (typically the first station), do two readings	verify depth by checking calibrated rope markings and boat depth finder read results in air-saturated water for dissolved oxygen, and turbidity and standards for salinity (conductivity), turbidity, and pH; this can be done the morning of (for pre-check) and at the end of the sample day (for post check)

Parameter & Technique	Field Replicates Required	Verification and/or Blank
bacteria, laboratory analysis	None	include NCDH provided trip 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 refrigerate upon return to Town Dock; NCDOH will pick-up samples and deliver to laboratory within six hours of sample collection 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 data using the multiparameter sonde.

D. At one station per day, repeat measurements where only one measurement 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 sample jars to be delivered to the laboratory.

C. Rinse equipment (sample grab poles, Secchi disk, platform, ropes, etc.) and store in preparation for next sampling date.

D. Record post check against known standards of multiparameter meter to ensure the equipment has not drifted.

8.0 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.

9.0 DATA PROCESSING AND STORAGE

The Bay Constables will enter data into an Excel spreadsheet, download field measurement data from the YSI 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.

10.0 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.

Manhasset Bay YSI Sampling Guide

YSI ProDSS Set-up & Calibration

Manhasset Bay YSI Sampling Guide

Battery

- Keep the battery 40% to 80% charged
- Charge the battery when below 50% charge

Checks

- Remove the calibration cup and screw the weight into the bottom of the sensor guard.
- Make sure you are on the main run screen and the GPS ( ) symbol appears in the top right of the screen to indicate the GPS is on.

At the first station

- Make sure the handheld is secure (wrap around metal cleat) and lower the probe into the water column to a depth of 0.5m/3ft
- Press the **Probe** () button,
- Under the probe menu, select **Auto Stable**
- Scroll down and select **Start Auto Stable** and leave the device while it records the measurements. The bottom of the screen should say "Sampling in Progress"
- When the message changes from "Sampling in Progress" to "Measurements Locked," select the option to **Log Measurement**
- Select **Station ID**, then **Select ID** and scroll down to the current station and press Enter
- Select **Log Now**
- Remove probe from the water and place it back in bucket of water

At remaining stations

- Lower probe into water 3 ft/0.5m below the surface
- Select **Start Logging**
- When the measurements are locked select **Log Measurement**
- Select **Station ID**, then **Select ID** and change the site to the current station
- Select **Log Now**
- Remove probe from the water and place it back in bucket of water

YSI ProDSS Set-up & Calibration

In order of tasks

YSI ProDSS Information

Model	S/N
ProDSS with GPS	18G103368
ProDSS 4 PORT CABLE ASSY, 4M, S-DEPTH	18E101266
ProDSS OPTICAL DO SENSOR	18G101957
ProDSS CONDUCTIVITY/TEMP SENSOR	18F100541
ProDSS pH SENSOR W/MODULE	18G103181

The ProDSS cable assembly can measure virtual vented depth (depth sensor is mounted in bulkhead). The virtual vented depth measurement allows for real time compensation for atmospheric pressure using the instrument's barometer (pp. 25 and 41).

YSI ProDSS Start-up and Calibration Instructions

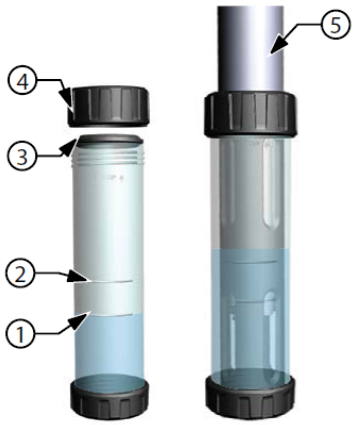
Calibration begins on page 33 of the manual.

****Temperature calibration is not available or required for accurate temperature measurements.****
****The barometer is factory calibrated and should rarely need to be recalibrated.****
Barometer calibration is on page 36 of the manual.
****Make sure the sensor guard is installed before placing the sensors into the calibration cup.****

Calibration Cup Installation (p.34)

The calibration cup is designed to go over the sensor guard, so long as the weight is not installed.

1. Ensure the calibration cup gasket is correctly seated (Figure 43). Loosely install the retaining nut on the cup.
2. Slide the calibration cup over the sensors and sensor guard and tighten the retaining nut.



1	Fill line one (used for Turbidity, pH, ORP, PC, PE, and chlorophyll calibration solutions)
2	Fill line two (used for conductivity calibration solution)
3	Gasket
4	Retaining nut
5	Calibration cup installed

Figure 43 Calibration cup standard volume (4 port cable)

NOTE: *When the 4 port calibration cup is empty (i.e. no sensor guard or sensors), it takes ~170 mL of solution to fill the calibration cup to line 1 while it takes ~225 mL to fill the cup to line 2.*

Calibration Screen Layout

The calibration screen has the same basic layout for each parameter (Figure 44).

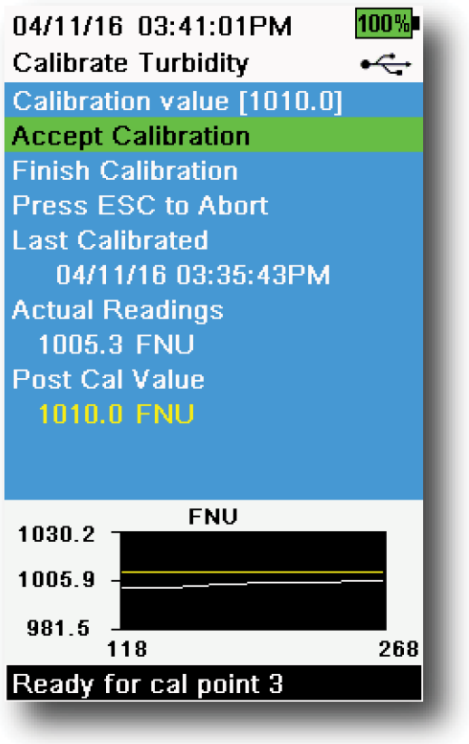


Figure 44 Layout of calibration screen

Calibration value: The value the sensor will be calibrated to. *The **Yellow Line** on the graph corresponds to this.*

Accept Calibration: Calibrates the sensor to the calibration value.

Finish Calibration: Only available with multi-point calibrations (i.e. pH). Finishes the calibration by applying previously accepted points.

Press ESC to Abort: The sensor will not be calibrated to any points. The last successful calibration will be used.

Last Calibrated: Date and time of the last successful sensor calibration.

Actual Readings: The current measurement value on the Run screen. *The **White Line** on the graph corresponds to this. Observe the White Line to ensure the measurement is stable before choosing **Accept Calibration**.*

Post Cal Value: The same as the calibration value. This will be the measurement value in the current solution after the calibration is finished.

GLP Menu (p.17)

Detailed sensor calibration information is stored in the Good Laboratory Practice (GLP) file for later review. One GLP file is used to store all calibration records. The instrument's internal memory can save up to 400 individual calibration records. After 400 records, the instrument will overwrite previously stored calibration records, starting with the oldest. To prevent the permanent loss of GLP records, periodically download the GLP file to a computer using the KorDSS software. There is no need to record calibrations on paper.

1.  ⟶ **GLP** ⟶ **Options**
2. Scroll down to User Field #1, hit enter
3. Select name of person calibrating, hit enter, hit enter for "Select[NAME]"
4. Press **ESC** to return to the Run screen

NOTE: *User Field #2 can be used to describe the condition of the probe. For example, new sensor or new ODO cap.*

DO Calibration in % Saturation (pg. 37)

Note: By calibrating in % saturation, you automatically calibrate in mg/L.

Note: YSI ProDSS DOES have a barometer. The barometer is factory calibrated and should rarely need to be recalibrated.

1. Fill the calibration cup with a moderate amount of plain water and tighten the calibration cup onto the bulkhead. Use the water to rinse the cup and the sensor to be calibrated. Discard the rinse.
2. Fill calibration cup with approximately 1/8 inch of plain **tap** water (not DI).
3. **Make sure there are no water droplets on the DO sensor cap or temperature sensor (KimWipe).**
4. Attach the sensor guard to the bulkhead and carefully place the guard/sensor into the calibration cup, making sure that the DO and Temperature sensors are not immersed in water.
5. **Partially** tighten the calibration cup to the bulkhead to ensure that the DO sensor is vented.
6. Press the **On/Off** key (lower right), which will bring you to the "Run" Screen.

NOTE: The YSI must be on for at least 5-15 minutes to polarize the DO sensor, allow for the air in the transport/calibration cup to become water saturated and for the temperature to equilibrate.

7. Press the 

, then select 3-ODO. Select DO%.
   Note: The DO probe is installed in the third port, hence the "3."
8. Observe the actual measurement readings for stability (white line on graph shows no significant change for 40 seconds), then select **Accept Calibration**. "Calibration successful!" will be displayed in the message area (bottom of screen).
   NOTE: *If you see a calibration error message, verify the barometer reading and inspect the sensor cap. Clean and/or replace the sensor cap as needed.*
9. Rinse the probe module and sensors in DI water and dry with Kim wipes.

Conductivity Calibration (p.35) – Specific Conductance

The conductivity/temperature sensor can measure and calculate conductivity, specific conductance (temperature compensated conductivity), salinity, etc. Calibration is only available for specific conductance, conductivity, and salinity. Calibrating one of these options automatically calibrates the other conductivity/temperature parameters listed above. For both ease of use and accuracy, **YSI recommends calibrating specific conductance**.

Note: shake calibration solutions before starting

Thoroughly rinse the calibration cup with a small amount of the calibration standard to be used. Discard.

1. Place a small amount of conductivity standard in the calibration cup to rinse the probe module/sensor before calibration and discard (use discarded calibration solution, if available).
2. Fill the calibration cup to the second (top) line with the 50,000 µS/cm standard into the calibration cup **(50,000 µS/cm or 50 mS/cm)**
3. Carefully immerse the sensor end of the probe module into the solution. Gently rotate and/or move the probe module up and down to remove any bubbles from the conductivity cell. Screw the transport/calibration cup on the threaded end of the probe module and securely tighten.

   Note: The sensor **must** be completely immersed past its vent hole.

****Allow at least one minute for temperature equilibration before proceeding.****

4. Press the Cal, then select **Conductivity**, then select **Specific Conductance**.
5. Select **Calibration value** then enter the calibration value of the standard used (mS/cm at 25°C). **50,000 µS/cm = 50 mS/cm** Make sure that the units are correct and match the units displayed on the handheld.
6. Observe the actual measurement readings for stability (white line on graph shows no significant change for 40 seconds), then select **Accept Calibration**. "Calibration successful!" will be displayed in the message area (bottom of screen).
   NOTE: *If the data is not stabilized after 40 seconds, gently rotate the sensor or remove/reinstall the calibration cup to make sure that no air bubbles are in the conductivity cell.*
   NOTE: *If the actual measurement data is about 1/2 of the expected calibration value, the conductivity sensor is not completely submerged. Add more calibration standard.*
   NOTE: *If you get calibration error messages, check for proper sensor immersion, verify the calibration solutions is fresh, the correct value has been entered into the ProDSS, and/or try cleaning the sensor*
7. Rinse the probe module, sensors, and cup in DI water and dry with Kim Wipes.

pH Calibration 2- or 3-point (pp.39-40)

NOTE: *If performing a 2- or 3-point calibration, one point should be in buffer 7; however, the calibration points can be in any order.*

Note: shake calibration solutions before starting

Thoroughly rinse the calibration cup with a small amount of the calibration standard to be used. Discard.

1. Fill the calibration cup to the first (bottom) line with pH buffer
2. Carefully immerse the probe end of the sensors into the buffer solution.

1. Push the Cal key, then select **pH** or **pH/ORP**.
   NOTE: *If using a pH/ORP sensor, select* **pH/ORP***, then* **pH***.*

2. Allow at least one minute for temperature stabilization. The **Calibration value** will automatically be adjusted based on the selected buffer set and temperature. Alternatively, the Calibration value can be manually entered.
3. Observe the actual measurement readings for stability (white line on graph shows no significant change for 40 seconds), then select **Accept Calibration**. "Calibration successful!" will be displayed in the message area (bottom of screen). "Ready for cal point 2" will be displayed in the message area.
4. Rinse the sensor 2-3 times with a small amount of the next buffer solution.
5. Fill the calibration cup to the first (bottom) line with this same pH buffer
6. Repeat steps **2 through 6**.
7. After calibrating to the second point, select **Finish Calibration** for a 2-point calibration or continue with an additional buffer to complete a 3-point calibration. The procedure will automatically finish after calibrating using a third buffer.
8. Rinse the probe module, sensors, and transport/calibration cup in DI water (or tap water) and prepare for transport.
   a. **Note: Do not store probes in DI water, use pH 4 buffer.**

   b. **Note: Transport probe module in attached sensor guard and place in a bucket of water.**
9. Remove the probe from the calibration cup and attach the weight onto the bottom of the sensor guard.
10. Leave the meter on for sampling (Auto Shutoff should be disabled).

Your meter is calibrated and you are now ready to measure DO, pH, conductivity, specific conductance, salinity, and temperature.

Calibration Checks

1. Back at Dock, do readings on the conductivity and pH 7 standards.
2. Rinse the probe module and sensors in DI water.
3. Place a small amount of conductivity standard in the calibration cup to rinse the probe module/sensor and discard.
4. Place approximately 55 mL of the 50,000 µS/cm standard into the calibration cup.
5. Keeping the device on the "Run" screen, wait for the reading for specific conductance to show no significant change for approximately 30 seconds. Record the Specific Conductance value on the YSI 556-01 MPS Daily Calibration/Verification Check Datasheet.
6. Rinse the probe module and sensors in DI water.
7. Place a small amount of pH 7.0 standard in the calibration cup to rinse the probe module/sensor and discard.
8. Place approximately 55 mL of the pH 7.0 standard into the calibration cup.
9. Keeping the device on the "Run" screen, wait for the reading for pH to show no significant change for approximately 30 seconds. Record the pH value on the YSI 556-01 MPS Daily Calibration/Verification Check Datasheet.

Power Down & Storage

1. Turn off the machine by holding down the **ON/OFF** button.
2. Rinse the probe sensors and guard in DI water and discard.
3. Remove the weight from the bottom of the guard.
4. Fill the sensor cup with **pH 4 calibration standard** and attach to the probe for storage. Make sure all the **sensors are fully immersed**.

Manhasset Bay Protection Committee

YSI 556-01 MPS Verification Check Datasheet

Prep: YSI m/n 556 s/n_S29907_____ Date / Time _____

Battery good (Y/N)				
Current Local Barometer: Time / in Hg: _____: _____	convert (25.397088 mmHg/inHg) = _____mmHg			
Conductivity Calibrator Soln.: 50,000 uS/cm	Accuracy: 1%	Lot: 17E100515	Exp. 11-18-2018	Certificate: YES

pH buffer Solutions:

pH Brand	NIST Traceable(Y/N)	pH Buffer @ 25°C	Lot No.	Exp. Date	Certificate (Y/N)
Aqua Phoenix	Yes	4.00 ± 0.01	7GD343	APR 2019	Yes
Aqua Phoenix	Yes	7.00 ± 0.01	7GD829	APR 2019	Yes
Aqua Phoenix	Yes	10.00 ± 0.01	7GC1135	APR 2019	Yes

Conductivity Calibrator Calibration Verification

TIP: 55mL solution mark on calibration cup; Enter 50 mS/cm (50mS/cm = 50,000uS/cm)

Pre-Sampling		Post-Sampling	
SC Reading (uS/cm)	Within Calibrator Accuracy (from prep above)	SC Reading (uS/cm)	Within Calibrator Accuracy If no, data should be qualified.
Print Name/Sign/Date/Time:		Print Name/Sign/Date/Time:	

Dissolved Oxygen (DO) Calibration (Pre-sampling)

TIP: Warm up instrument at least 10 minutes to allow sensor to polarize. Add 1/8" water to mark on calibration cup; Temp/DO sensors are NOT immersed in water. Allow 10 minutes for temperature equilibration.

Calibration Method: Percent (%) Saturation	Barometric Pressure:_____mmHg (from above)	DO cap: 2.0mil - blue
Print Name/Sign/Date/Time:		

pH 7.0 Verification

TIP: 30mL solution mark on calibration cup for each buffer;

Pre-Sampling			Post-Sampling	
Place pH probe in 7 pH and record result (SU)	Record pH/Temp on bottle	Is pH within ± 0.2SU of probe and pH on bottle @ Temp? If no, data should be qualified.	Place pH probe in 7 pH and record result (SU)	Is pH within ± 0.2SU of probe and pH on bottle @ Temp? If no, data should be qualified.
SU / C	SU / C	(Y/N):	SU / C	(Y/N):
Sign/Time:			Sign/Time:	

Comments: _____

APPENDIX B

CHAIN OF CUSTODY

Nassau Co. DOH PHL 209 Main Street Hempstead, NY 11550	FORM NAME: MANHASSET BAY PROTECTION COMMITTEE □ QC □ Equip Maint □ Training □ Comp Doc ☑ Other	
LABORATORY SECTION □ Chemistry ☑ Environmental Microbiology □ Clinical Microbiology	Form. No.: Beach Monitoring Daily Sampling Log - 9	Rev: 2
	Date: #######	Created By: CONNIE IANNUCCI

Beach Monitoring Daily Sampling Log

MANHASSET BAY PROTECTION COMMITTEE

Elap ID #10339

NASSAU COUNTY DEPARTMENT OF HEALTH
DIVISION OF PLBLIC HEALTH LABORATORIES
209 MAIN STREET, HEMPSTEAD, NY 11550

Mike Green — COLLECTOR'S NAME
8/29/16 — DATE

THOMAS EDWARDS, LEAD TECHNICAL DIRECTOR; CONNIE IANNUCCI, MICROBIOLOGY TECHNICAL DIRECTOR TELEPHONE (516) 572-1202 FAX (516) 572-1206

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

Field No.	Sample Type	Location	Time	Temperature Air	Temperature Water	Wind	Weather	Wave Height	Laboratory Use Only: Lab Number	Fecal Coliforms	Enterococci	Comments
MB-1	6	LEEDS POND	0800	82	81	N00	1	0.0	6353	18	3	
MB-2	6	KENNELWORTH	0810	82	81	N00	1	0.0	6354	8	<1	
MB-3	6	MANORHAVEN	0820	82	81	N00	1	0.0	6355	3	<1	
MB-4	6	NUN4	0830	82	81	N00	1	0.0	6356	<1	<1	
MB-5	5	BAXTER BEACH	0840	82	81	N00	1	0.0	6357	52	<1	
MB-6	5	MANORHAVEN BEACH	0850	82	81	N00	1	0.0	6358	12	1	
MB-7	6	Southern M B	0910	82	81	N00	1	0.0	6359	49	2	
									6360	<1	<1	

COMMENTS/REMARKS

TNTC = "TOO NUMEROUS TO COUNT"

DATA ENTRY PROOFED RAIN 24: RAIN 48: SOURCE:

TEST	METHOD	CODE
Fecal Coliform CFU/100 ml.	Membrane Filtration	SM-18-20 9222 D
Enterococci/100 ml	Membrane Filtration	EPA Method 1600

TEMP CONTROL: 3°C TIME RECEIVED: 1250 pm DATE ANALYZED: AUG 29 2016

DATE RECEIVED: AUG 29 2016

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.

VERIFICATION REVIEW

Name: CIANNUCCI Title: MED TECH III Date: AUG 30 2016

Comments:

(7) 9/2