

Hog Island Channel at Island Park, NY  
Monitoring Report  
Per Agreements: AM07147 & AM08775

*A submittal to*  
**New York State Department of State**  
Office of Planning and Development

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*From*  
**New York State Department of Environmental Conservation**  
Division of Water, Bureau of Water Resource Management



Figure 1: Photograph of enclosure for station on Hog Island Channel at Island Park, looking north from Masone Beach Pier.

(<http://ny.water.usgs.gov/rt/pub/01311143.html>)

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## 1.0 Introduction

The Federal Clean Water Act requires states to periodically assess and report on the quality of waters in their state. Section 303(d) of the Act also requires states to identify Impaired Waters, where specific designated uses are not fully supported. For these Impaired Waters, states must consider the development of a Total Maximum Daily Load (TMDL) or other strategy to reduce the input of the specific pollutant(s) that restrict waterbody uses, in order to restore and protect such uses. In 2006 the New York State Department of Environmental Conservation (DEC) placed Hempstead Bay, a major, class SA, waterbody within the Western Bays, on the 303(d) list. Hempstead Bay, and the adjoining waters that make up the Western Bays are impaired due to excessive macro algal growth (*Ulva Lactuca*) and are not meeting the water quality standard for nitrogen as specified in 6 NYCRR Part 703.2 which states “none in amounts that will result in growths of algae, weeds and slimes that will impair the waters for their best use”.

A key element in being able to develop a TMDL is to have data that define the ambient water quality concentrations of the pollutant of concern (POC), and the relationship of that POC to the use impairment (eg. Excessive algal growth). To this end, the DEC, in cooperation with the New York State Department of State (DOS) provided funding to the United States Geological Survey (USGS) to install and operate a monitoring station (USGS Station 0131143 Hog Island) that collects continuous tidal and water quality data at a mid-bay location of the Western Bays. The data provided by this monitoring station, as well as data collected from the USGS monitoring station in Reynolds Channel at Point Lookout (installed in October 2004) will: (1) document the diurnal and tidal variability of water quality across a gradient of eutrophication in the Western Bays; (2) supply direct or indirect measurements of the aquifer-system; (3) compliment the water-quality grab sampling efforts of SUNY, the NYSDEC, and local stakeholders; and (4) provide information critical to the preparation and application of Total Daily Maximum Loads (TMDLs) for this system.

## 2.0 Scope of Work

### 2.1 Applicable Memorandums of Understanding

Table 1 below provides a brief overview of the applicable memorandums of understanding (MOU). The total cost for the project was \$456,300. Please note that the original MOUs are attached in appendix b.

Table 1: Applicable MOUs

Agreement No.	Dates	Amount	Scope of Work
AMO7147	9/1/08-12/31/11	\$223,380	Estuary-monitoring station installation, operation and maintenance. Parameters include tidal water elevations temperature, specific conductance, dissolved oxygen, turbidity, nitrogen, and chlorophyll.
AMO8775	8/8/12-8/8/14	\$232,920	Continuation of agreement number AM07147. Additions included monitoring pH at the Hog Island Channel Station, and stream and groundwater level monitoring program.

## *2.2 Bay Monitoring*

The NYSDEC has an existing Cooperative Agreement with the USGS, and has overseen USGS work operating a monitoring station that collects data on tidal water elevations at Hog Island Channel at Island Park, NY. These data have been, and will continue to be, recorded at 6-minute intervals, relayed hourly via satellite telemetry to USGS offices in real time, and made publicly available via the Internet within a few minutes of their arrival. In addition, the station is equipped with add-on water-quality monitors. The station has collected, and will continue to collect, ancillary data from about 0.5 m over the seabed. Monitored parameters include; water temperature, specific conductance (which will be used to compute salinity), dissolved oxygen, turbidity, nitrogen, chlorophyll, and pH. Collection of data for water elevation, temperature, specific conductance (used to compute salinity), dissolved oxygen, turbidity, and chlorophyll began in October 2010; collection of data for nitrate and pH began in March 2011 and October 2012, respectively.

These Data will also be disseminated with the water-elevation data in real time. Tidal statistics (e.g. mean high and low waters) will continue to be published annually for daily water-elevation records from the embayment in the USGS Water-Data Report for Long Island. In addition, daily statistics (e.g. maximum, minimum and mean values) will be published annually in this report for records of water temperature, salinity, dissolved oxygen, turbidity, nitrogen, chlorophyll, and pH from this station. All data from this monitoring station are publicly available from USGS webpages ([http://waterdata.usgs.gov/nwis/uv/?site\\_no=01311143](http://waterdata.usgs.gov/nwis/uv/?site_no=01311143)).

A project webpage ([http://ny.water.usgs.gov/projects/tidal/live\\_coast.html](http://ny.water.usgs.gov/projects/tidal/live_coast.html)) and one-page handout (<http://ny.cf.er.usgs.gov/nyprojectsearch/projects/images/SouthShoreEstuaryReserveMonitoring.pdf>) on USGS have been developed. The one page handout summarizes 2011 monitoring results from two stations: the Hog Island Channel at Island Park station and the Reynolds Channel at Point Lookout station. Examples are given that show; (1) how continuous monitoring reveals conditions and processes undetected by grab sampling, (2) the short-term response of the western bay system, and (3) the short-term variability of nitrate and salinity. Additional discussions present daily statistics that show good to fair water quality and ecological condition near the estuary mouth (Point Lookout), and fair to poor water quality and ecological condition at the mid-bay location (Hog Island Channel).

## *2.3 Streamflow and Groundwater-Level Monitoring*

In addition to the Hog Island Channel monitoring program, the NYSDEC extended the original contract with the USGS, to operate a streamflow and groundwater-leveling monitoring program to aid in TMDL development. In this second project element, groundwater-elevation data will be collected from two water-table observation wells equipped with continuous water-level recorders. Streamflow data gages will be monitored at four continuous-recording stations equipped with water-stage gages, one of which (a real-time station) has been equipped with a satellite telemeter. Partial-record streamflow measurements have also be collected at nine streams not equipped with water-stage gages, for which historic data exist.

### *2.3.1 Streamflow*

All four continuous-record stream gaging stations continue to operate and collect streamflow data. All scheduled field measurements have been collected, and data for all stations have been processed and displayed on NWISWeb. The second round of partial-record streamflow measurements at non-recording stations was completed in May 2013.

### 2.3.1.1 *Continuous-record stream gaging stations*

Massapequa Creek at Massapequa

USGS station ID: 01309500

[http://waterdata.usgs.gov/nwis/inventory?agency\\_code=USGS&site\\_no=01309500](http://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=01309500)

Bellmore Creek Tributary at Bellmore

USGS station ID: 01309990

[http://waterdata.usgs.gov/nwis/inventory?agency\\_code=USGS&site\\_no=01309990](http://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=01309990)

Bellmore Creek at Bellmore

USGS station ID: 01310000

[http://waterdata.usgs.gov/nwis/inventory?agency\\_code=USGS&site\\_no=01310000](http://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=01310000)

East Meadow Brook at Freeport

USGS station ID: 01310500

[http://waterdata.usgs.gov/nwis/inventory?agency\\_code=USGS&site\\_no=01310500](http://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=01310500)

### 2.3.1.2 *Partial-record streamflow measurements*

Carman Creek at Amityville

USGS station ID: 01309400

[http://waterdata.usgs.gov/nwis/inventory?agency\\_code=USGS&site\\_no=01309400](http://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=01309400)

Seaford Creek at Seaford

USGS station ID: 01309700

[http://waterdata.usgs.gov/nwis/inventory?agency\\_code=USGS&site\\_no=01309700](http://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=01309700)

Seamans Creek at Seaford

USGS station ID: 01309800

[http://waterdata.usgs.gov/nwis/inventory?agency\\_code=USGS&site\\_no=01309800](http://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=01309800)

Newbridge Creek at Merrick

USGS station ID: 01310100

[http://waterdata.usgs.gov/nwis/inventory?agency\\_code=USGS&site\\_no=01310100](http://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=01310100)

Cedar Swamp Creek at Merrick

USGS station ID: 01310200

[http://waterdata.usgs.gov/nwis/inventory?agency\\_code=USGS&site\\_no=01310200](http://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=01310200)

West Branch Freeport Creek at Freeport

USGS station ID: 01310515

[http://waterdata.usgs.gov/nwis/inventory?agency\\_code=USGS&site\\_no=01310515](http://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=01310515)

Milburn Creek at Baldwin

USGS station ID: 01310600

[http://waterdata.usgs.gov/nwis/inventory?agency\\_code=USGS&site\\_no=01310600](http://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=01310600)

South Pond Outlet at Rockville Centre

USGS station ID: 01310800

[http://waterdata.usgs.gov/nwis/inventory?agency\\_code=USGS&site\\_no=01310800](http://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=01310800)

Pines Brook at Malverne  
USGS station ID: 01311000

[http://waterdata.usgs.gov/nwis/inventory?agency\\_code=USGS&site\\_no=01311000](http://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=01311000)

### 2.3.2 Groundwater

Data from the Southern Nassau County groundwater network have been compiled from two observation wells from October 1, 2012, to September 30, 2013. The statistics from the continuous monitoring (data collected hourly, downloaded monthly) for these wells are summarized on the USGS Groundwater watch website.

#### 2.3.2.1 Groundwater measurement stations

N 1615. 4

USGS station ID: 404210073340801

<http://groundwaterwatch.usgs.gov/AWLSites.asp?S=404210073340801>

N 1129. 3

USGS station ID: 404124073394901

<http://groundwaterwatch.usgs.gov/AWLSites.asp?S=404124073394901>

## 3.0 Operation and Maintenance

### 3.1 Hog Island Station Operation and Maintenance

Typical operation and maintenance for this station requires 14 routine and 1 emergency servicing visits per year. Generally routine visits were made twice a month during the summer, monthly during the fall and spring, and about every six weeks during the winter. During each visit, measurement probes were cleaned and checked for biofouling and electronic drift, and recalibrated as necessary, according to USGS *Guidelines and Standard Procedures for Continuous Water-Quality Monitors: Station Operation, Record Computation, and Data Reporting* (Wagner and others, 2006). These guidelines and standard procedures also would be followed (as applicable) in pre- and post-trip preparation, data processing, record computation, data management and review, and supervision of the water-quality monitoring project.

Based on the period of record for each parameter (Appendix A), Table 2 provides an overview of the estimated uptime for each of the monitors associated with this station. This analysis was completed on a daily basis, i.e., if data was reported on a specific day in the record it was assumed that the gage was up for the entire day.

Table 2: Uptime at Hog Island Station

Parameter	Uptime	Parameter	Uptime
Sampling depth	93%	Chlorophyll	93%
Temperature	93%	Estuary surface elevation	96%
Specific conductance	89%	Turbidity	92%
Dissolved oxygen	93%	Salinity	91%
pH	86%	Nitrate	73%

The operating times for these monitors are excellent. It must be noted that the period of record for all monitoring equipment includes the occurrence of Superstorm Sandy.

### 3.2 Stream Gage Operation and Maintenance

In the summer of 2013, the roof, floor, walls, and recorder shelf for one of the Bellmore Creek stations were replaced. In addition, all new streamflow measurement equipment has been installed and the station retrofitted with satellite telemetry.

Online data was reviewed to determine the uptime for the four continuous-record stream gaging stations. Appendix A, provides an overview of the period of record for each station. According Agreement NO. AMO8775 the stream gage groundwater monitor began in August 2012 and ended on August 8, 2014. Within this period only one of the gauges, USGS 01309500 Massapequa Creek at Massapequa NY, has data covering the whole period and was operational about 98% of the time. For the period of 1/19/2013-08/15/2013 USGS gage 01309990 Bellmore Creek Tributary at Bellmore NY was operational 100% of the time, similarly for the period of 11/10/2012 to 08/08/14 USGS gage 01310500 East Meadow Brook at Freeport NY was operational 100% of the time. USGS gage 01310000 Bellmore Creek at Bellmore NY did not have any data available online for the funded study period at this time.

## 4.0 Review of Selected Data

Continuous monitoring reveals conditions and processes undetected by grab sampling, and documents the short-term variability of water-quality parameters. These data fluctuate in response to semi-diurnal and longer-period tides, reflecting differences in estuarine water quality due to oceanic, upland, and atmospheric influences.

Though only a few parameters are discussed in the following sections (4.1-4.4) all the resulting information will be used by NYSDEC to develop TMDLs and will be disseminated by USGS in a variety of formats, including digital web-based products, an online published data report, and water level maps. All station information and available data is listed in Appendix a.

### 4.1 Nitrate

Nitrogen can be found in two different states in the environment, unoxidized and oxidized. An overview of the forms of nitrogen found in the environment are below on Table 3.

Table 3: Forms of Nitrogen in the Environment

<b><u>Unoxidized forms of nitrogen</u></b>	<b><u>Oxidized forms of nitrogen</u></b>
Nitrogen Gas (N <sub>2</sub> )	Nitrite (NO <sub>2</sub> <sup>-</sup> )
Ammonia (NH <sub>4</sub> <sup>+</sup> , NH <sub>3</sub> )	Nitrate (NO <sub>3</sub> <sup>-</sup> )
Organic Nitrogen (urea, amino acids, peptides, proteins, etc ...)	Nitrous Oxide (N <sub>2</sub> O)
	Nitric Oxide (NO)
	Nitrogen Dioxide (NO <sub>2</sub> )

Additionally, forms of nitrogen can be characterized as soluble in water, insoluble in water, in a gaseous form or as either organic or inorganic. Dissolved Inorganic Nitrogen (DIN) is considered to be the form(s) of nitrogen that are most important in affecting eutrophication in estuarine waters (see EPA's National Estuary Program Coastal Condition Report (EPA 842-F-06-001) for basis of criterion). DIN is a measure of nitrate, nitrite, and ammonia (DIN = NO<sub>2</sub> + NO<sub>3</sub> + NH<sub>3</sub>) thus indicating that there is a relationship between nitrate and DIN. Also important is the fact that ammonia in the environment converts rapidly and easily to nitrate, so monitoring for nitrate gives a

good indication of DIN in the environment (nitrite is also readily converted to nitrate and therefore is not normally found in the environment). The “nitrogen” analyzer at the Hog Island station measures nitrate.

Figure 2 below shows the forms of nitrogen that are typically found in sanitary wastewater treated to secondary standards.

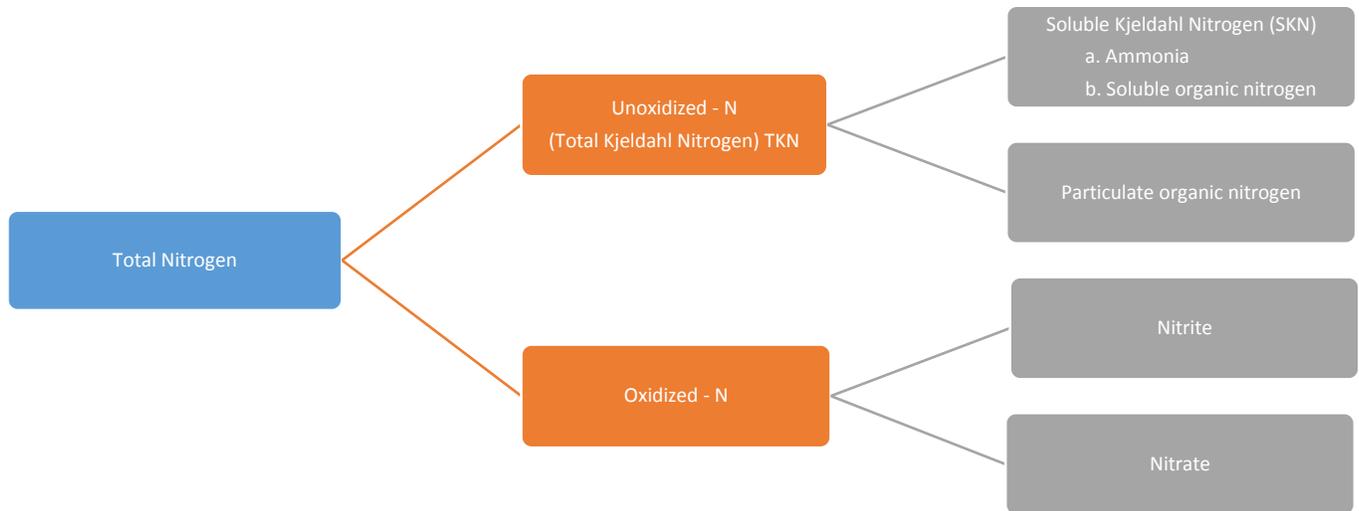


Figure 2: Nitrogen in Wastewater

The DEC will be developing a Total Maximum Daily Load (TMDL) for the Western Bays to address eutrophication impairments caused by excess nitrogen in the system. The DEC has not established a numeric water quality criteria for nitrogen in estuarine waters. The DEC does have a numeric water quality standard for ammonia in estuarine waters due to the toxicity of ammonia to fish. This standard is not applicable for addressing eutrophication impairments, and, as indicated previously, ammonia readily converts to nitrate in the environment, leaving the nitrogen available as “DIN”. In general, the nitrate concentrations reported at the Hog Island station fluctuate between the EPA poor and fair ecological condition criterion for DIN, 0.5 mg/L and 0.1 mg/L, respectively. USGS has discussed the relationship between nitrate and salinity over individual tidal cycles. Inferences made by the USGS include an inverse relationship can suggest that nitrate is predominantly supplied by freshwater inputs to the estuary (such as the discharge from a wastewater treatment plant or aquifer discharge) or a direct relationship may indicate the input (or loss) of nitrate is due to other factors. These findings highlight the need for more detailed information on freshwater inputs and nitrogen (nitrate) loads from wastewater treatment plant effluent and aquifer discharge to the estuary, e.g., one of the reasons for the streamflow and groundwater-level monitoring program.

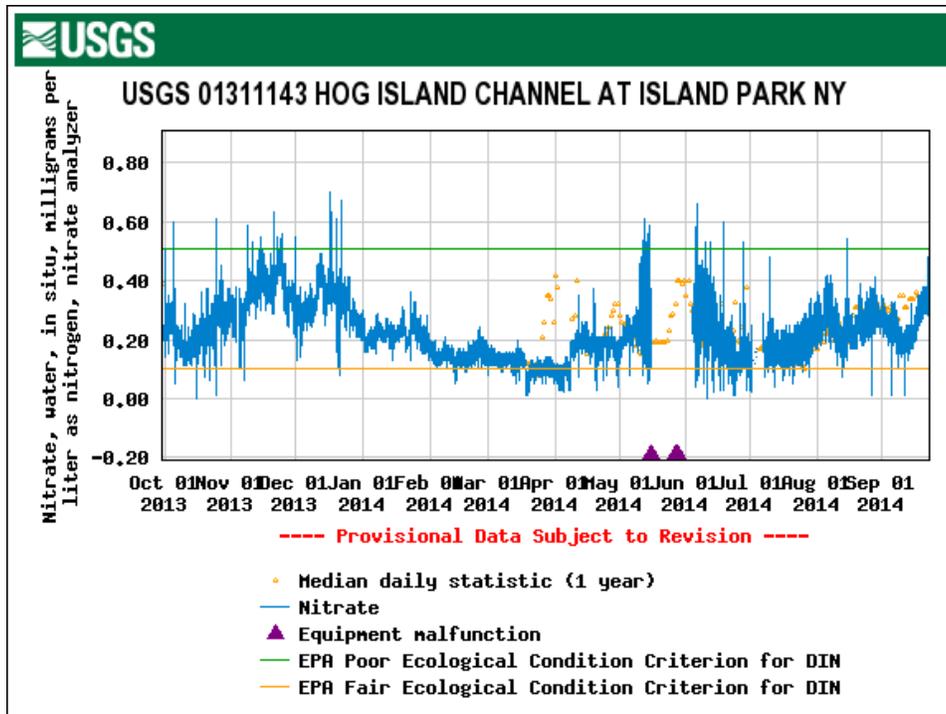


Figure 3: Nitrate concentration for water year 2014

## 4.2 Chlorophyll

Excess nitrogen in an estuarine system can fuel macro algal growth as well as phytoplankton, or micro algal growth. Measuring for chlorophyll provides for a general indication as to the level of phytoplankton growth, and thus give some indication as to the eutrophic state of the waters being monitored. Generally, in this system, the trend for chlorophyll is that there is lower concentrations in the fall and winter. Daily mean chlorophyll concentrations often remained below EPA's Fair Ecological Condition Criterion ( $5 \mu\text{g/L}$ ) during the fall and winter, and largely, with a few instances, exceed EPA's poor ecological condition criterion ( $20 \mu\text{g/L}$ ) during the spring and summer. Generally, (seen in water years; 2012, 2013, and 2014) there is an increase in Chlorophyll concentrations in early spring. These high concentrations are not maintained throughout the spring and decrease shortly thereafter. Comparison of Figure 2 and Figure 3 indicate that there appears to be an inverse relationship between nitrate concentrations and chlorophyll concentrations. This is important, however there is another confounding factor: the excessive growth of macro algae in this system. This data will be very valuable in trying to understand the relationship between the various types of eutrophication seen in the Western Bays and the levels of nitrogen in the ambient water for determining the applicable numeric water quality standard for nitrogen in this system.

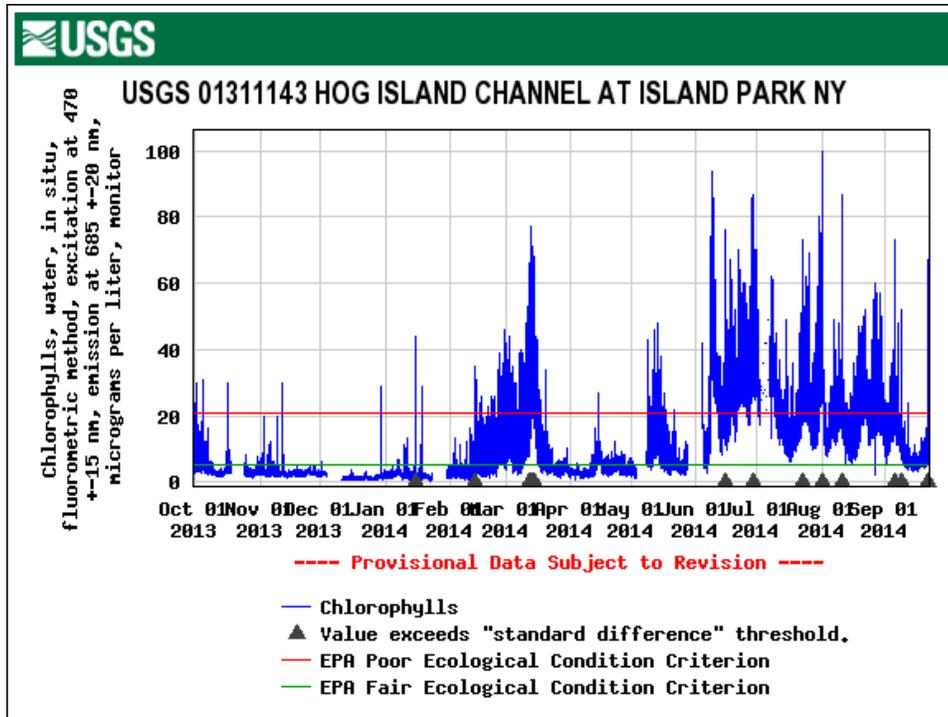


Figure 4: Chlorophyll concentration for water year 2014

#### 4.3 Dissolved Oxygen

The ambient water quality standards for dissolved oxygen (DO) for saline waters (Class SA, SB, and SC) is 4.8 mg/l, with allowable excursions to not less than 3.0 mg/L for certain periods of time. Collection of daily data allows for the evaluation of the DO standard. To illustrate evaluation of the standard Table 1 is provided.

Date	DO value	DO interval	No. of days within range	No. of days allowed	Fraction of days allowed
9/6	4.8	$< 4.8 \geq 4.6$	0	43	0.00
9/7	4.1	$< 4.6 \geq 4.5$	0	30	0.00
9/8	3.9	$< 4.5 \geq 4.4$	1	25	0.04
9/9	3.9	$< 4.4 \geq 4.3$	1	21	0.05
9/10	4.0	$< 4.3 \geq 4.2$	0	18	0.00
9/11	4.3	$< 4.2 \geq 4.1$	1	16	0.06
9/12	4.4	$< 4.1 \geq 4.0$	1	14	0.07
9/13	4.9	$< 4.0 \geq 3.9$	2	12	0.16
<b>Cumulative fraction of allowable days:</b>					<b>0.38</b>

Table 4: Dissolved oxygen Values below Chronic Standard

Since the cumulative fraction of allowable days did not exceed 1.0, therefore, this event does not constitute a violation of the chronic standard. For more guidance on the marine dissolved oxygen standard please see TOGS 1.1.6.

Daily statistics illustrate seasonal and longer-term changes in water-quality parameters. Figure 4 displays, minimum, average, and maximum values for dissolved oxygen (DO). Figure 4 shows that for water year 2014 the

daily average DO concentrations are above the NYS Chronic Water Quality Standard of 4.8 mg/L, and the DO concentration never fell below the acute standard of 3.0 mg/L.

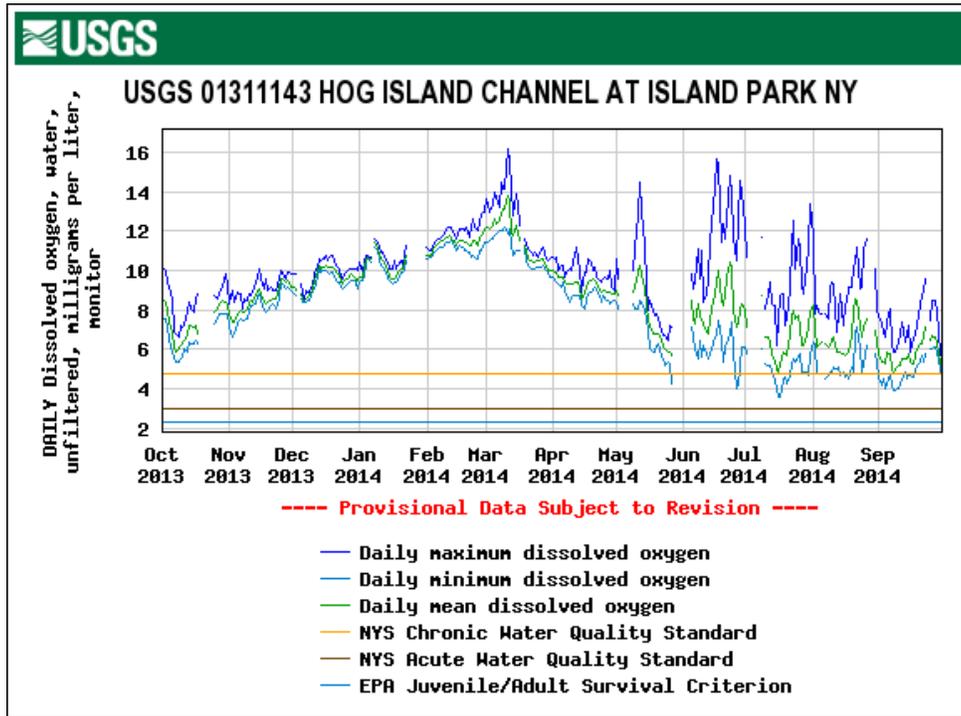


Figure 5: Dissolved oxygen concentration for water year 2014

#### 4.4 Streamflow / Groundwater

Data on the aquifer system provides the ability to quantify the role of the groundwater discharge, and help identify sources of nitrogen to the Western Bays; essential to the analysis of ambient concentrations. Groundwater elevation, and streamflow data are pertinent to accurately assess seasonal fluctuations and trends in the aquifer-system including; recharge, storage, and discharge. Figure 5 displays the streamflow at East Meadow Brook (Site No. 01310500), and the daily groundwater elevation at a well about 0.4 miles east (Site No. 404210073340801). The increased flow during high groundwater levels may indicate that East Meadow Brook is a gaining stream, i.e., the baseflow of East Meadow Brook may be attributed to groundwater.

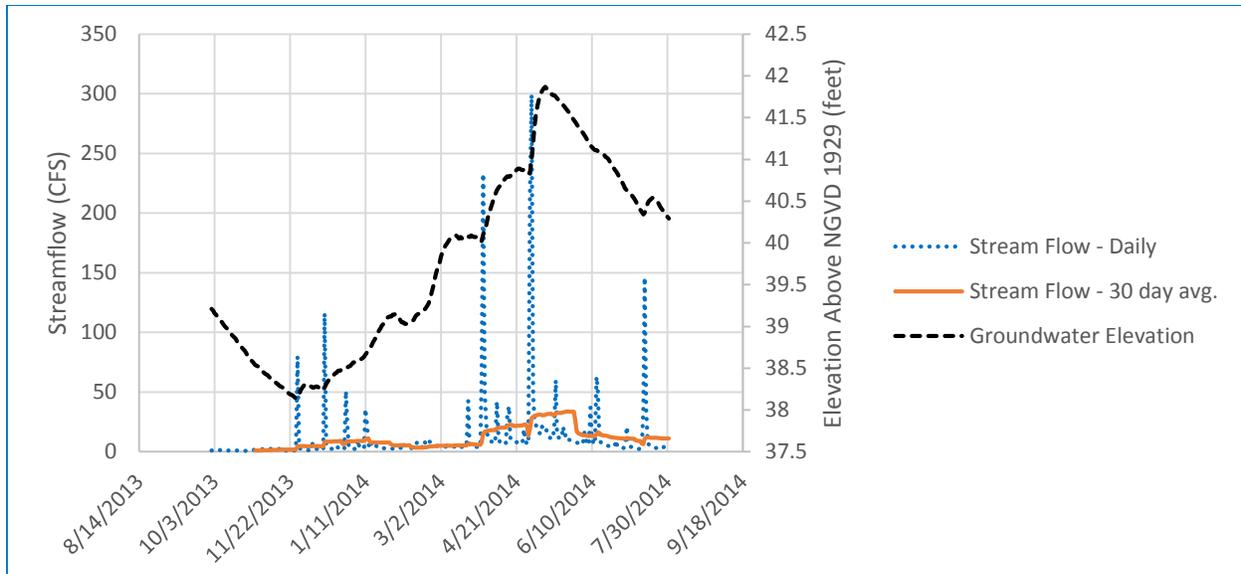


Figure 6: Streamflow & groundwater values for October 2013 – July 2014.

#### 4.5 pH

Monitoring pH at Hog Island Channel began in October of 2012 using a YSI 6600 multi-parameter sonde. In the summer of 2013 this instrument was replaced with a YSI EXO2. Currently Hog is the only station with this new instrumentation. In general, pH probes on the YSI 6600 require recalibration 1-2 times per year and are quite reliable with a life of about 2 years. The pH probe on the EXO at Hog has required calibration at least 4 times since deployment. Erroneous values were recorded in the early summer of 2014 and this data was excluded from the record. The probe could not be recalibrated and was replaced at the next site visit. The new probe is performing well.

The pH standard, 6 NYCRR part 703.3, for saline waters is the normal range shall not be extended by more than one-tenth (0.1) of a pH unit. Figure 7 presents the pH data from this station and is currently indicating a range of 7.3 – 8.4 SU. The existing record is relatively short, with a significant gap in the summertime data, however if this represents the normal pH range for this waterbody, the allowable range that would meet DEC standards would be 7.2 to 8.5 SU. Additionally, the data is indicating a possible lowering of the pH in late summer with what may be an increase in the pH as we move into the fall, however, at this time there is insufficient data to make any conclusions regarding pH in this waterbody.

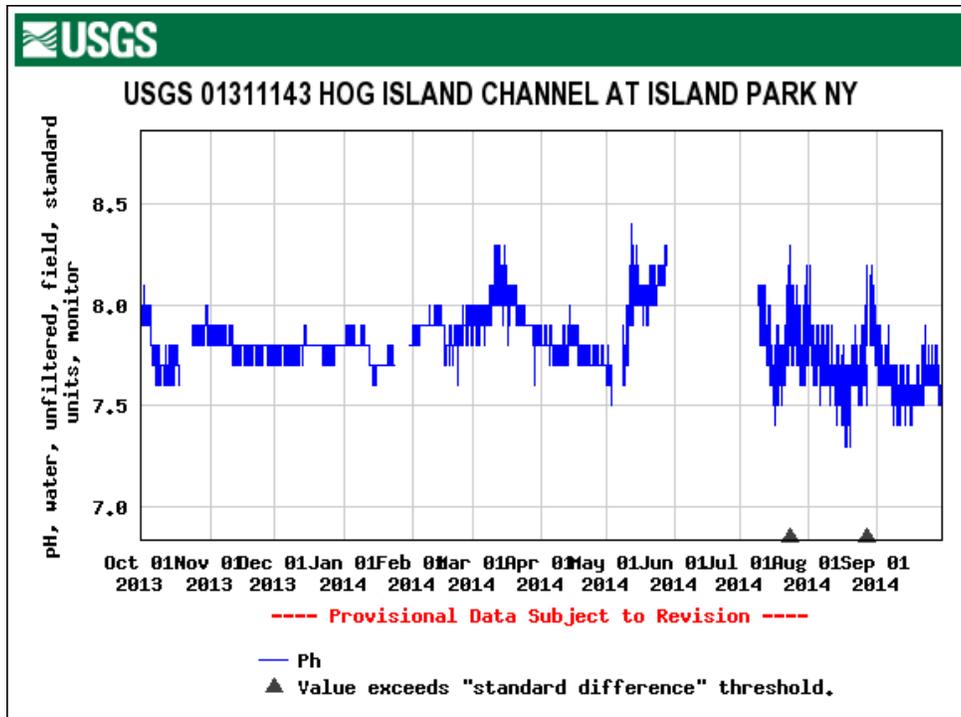


Figure 7: Daily maximum, minimum, and median pH for water year 2014

## 5.0 Conclusions

The USGS operated and maintained several monitoring stations on Long Island in and around the Western Bays. The Hog Island Channel station was equipped with add-on water quality monitors, including temperature, salinity, dissolved oxygen, turbidity, nitrogen, chlorophyll, and pH to document water quality within the bay. The USGS had monitored various streams and groundwater observation wells to contribute to an improved understanding of the aquifer-system discharge to the Western Bays. Both programs produced an immense amount of data in most cases each parameter has over 1,000 daily data points. The total cost for this project was \$456,300.

This expanded monitoring program helps; (1) document the variability of water quality across a gradient of eutrophication in the western bays; (2) compliment the water-quality grab sampling efforts of SUNY, the NYSDEC, and local stakeholders; and (3) provide information critical to the preparation and application of Total Daily Maximum Loads (TMDLs) for this system. The primary focus of this TMDL assessment for the western bays will be on nitrogen enrichment. This enrichment is believed to be derived from wastewater treatment plant (WWTP) effluent, stormwater runoff and aquifer-system discharge.

The result of these monitoring activities, characterization of the estuary’s water quality, detailed information on freshwater inputs, nitrogen (nitrate) loads from wastewater treatment plant effluent, and aquifer discharge to the estuary will aid in the development of a model of the system required for the development of a TMDL. The TMDL being the driving factor for limiting loads to the western bays, enabling water quality goals to be met.

## Appendix a – Gage Information and Data Available

**Gage Information:** Hog Island Channel at Island Park, NY

**Location:** Lat 40°36'31.8", long 73°39'22.0" referenced to North American Datum of 1983, Nassau County, NY, Hydrologic Unit 02030202, at Village of Island Park Masone Beach Pier, in Island Park.

**Period of record:** October 2010 to current year.

**Gage:** Water-stage recorder. Datum of gage is NGVD of 1929.

**Remarks:** Satellite elevation telemeter at station.

**Extremes outside period of record:** Storm tide of Dec. 11, 1992, reached an elevation of 7.3 ft, from high-water mark at site 1.1 mi south-southwest.

**Period of record<sup>1</sup>:** October 2010 to current year. Sampling depth records for October 2010 to current year are unpublished and available in files of the Geological Survey.

**Instrumentation<sup>1</sup>:** Water-quality monitor provides 6-minute-interval readings collected from 1.6 ft above bottom. Nitrate analyzer provides 30-minute-interval readings collected from 1.6 ft above bottom. Salinity record computed from specific-conductance readings.

<sup>1</sup> Water-Quality Records

*Derived from NY Annual Water-Data Report 2010*

### Available data:

Data Type	Begin Date	End Date	Count
<b>Current / Historical Observations</b>	2010-10-01	2014-09-22	
<b>Daily Data</b>			
Sampling depth, feet -- monitor	2011-09-23	2014-09-21	3045
Temperature, water, degrees Celsius -- monitor	2010-10-21	2014-09-21	4050
Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees Celsius -- monitor	2010-10-21	2014-09-21	3882
Dissolved oxygen, water, unfiltered, milligrams per liter -- monitor	2010-10-21	2014-09-21	4032
pH, water, unfiltered, field, standard units -- monitor	2012-10-18	2014-09-21	1824
Chlorophylls, water, in situ, fluorometric method, excitation at 470 +-15 nm, emission at 685 +-20 nm, micrograms per liter -- monitor	2013-07-19	2014-09-21	1089
Chlorophyll, total, water, fluorometric, 650-700 nanometers, in situ sensor, micrograms per liter -- monitor	2010-10-21	2013-07-03	2919
Estuary or ocean water surface elevation above NGVD 1929, feet	2010-10-01	2014-09-21	6674
Turbidity, water, unfiltered, monochrome near infra-red LED light, 780-900 nm, detection angle 90 +-2.5 degrees, formazin nephelometric units (FNU) -- monitor	2010-11-23	2013-07-03	2810
Turbidity, water, unfiltered, monochrome near infra-red LED light, 780-900 nm, detection angle 90 +-2.5 degrees, formazin nephelometric units (FNU) -- monitor	2013-07-19	2014-09-21	1158
Salinity, water, unfiltered, practical salinity units at 25 degrees Celsius -- monitor	2010-10-21	2014-09-21	3942
Nitrate, water, in situ, milligrams per liter as nitrogen -- nitrate analyzer	2011-03-18	2014-09-21	2848
<b>Daily Statistics</b>			
Temperature, water, degrees Celsius -- monitor	2010-10-21	2011-09-30	345
Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees Celsius -- monitor	2010-10-21	2011-09-30	336
Dissolved oxygen, water, unfiltered, milligrams per liter -- monitor	2010-10-21	2011-09-30	329
Chlorophyll, total, water, fluorometric, 650-700 nanometers, in situ sensor, micrograms per liter -- monitor	2010-10-21	2011-09-30	345
Estuary or ocean water surface elevation above NGVD 1929, feet	2010-10-01	2011-09-30	365

Turbidity, water, unfiltered, monochrome near infra-red LED light, 780-900 nm, detection angle 90 +-2.5 degrees, formazin nephelometric units (FNU) -- monitor	2010-11-23	2011-09-30	312
Salinity, water, unfiltered, practical salinity units at 25 degrees Celsius -- monitor	2010-10-21	2011-09-30	345
Nitrate, water, in situ, milligrams per liter as nitrogen -- nitrate analyzer	2011-03-18	2011-09-30	181
<b><u>Monthly Statistics</u></b>			
Temperature, water, degrees Celsius -- monitor	2010-10	2011-09	
Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees Celsius -- monitor	2010-10	2011-09	
Dissolved oxygen, water, unfiltered, milligrams per liter -- monitor	2010-10	2011-09	
Chlorophyll, total, water, fluorometric, 650-700 nanometers, in situ sensor, micrograms per liter -- monitor	2010-10	2011-09	
Estuary or ocean water surface elevation above NGVD 1929, feet	2010-10	2011-09	
Turbidity, water, unfiltered, monochrome near infra-red LED light, 780-900 nm, detection angle 90 +-2.5 degrees, formazin nephelometric units (FNU) -- monitor	2010-11	2011-09	
Salinity, water, unfiltered, practical salinity units at 25 degrees Celsius -- monitor	2010-10	2011-09	
Nitrate, water, in situ, milligrams per liter as nitrogen -- nitrate analyzer	2011-03	2011-09	
<b><u>Annual Statistics</u></b>			
Temperature, water, degrees Celsius -- monitor	2011	2011	
Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees Celsius -- monitor	2011	2011	
Dissolved oxygen, water, unfiltered, milligrams per liter -- monitor	2011	2011	
Chlorophyll, total, water, fluorometric, 650-700 nanometers, in situ sensor, micrograms per liter -- monitor	2011	2011	
Estuary or ocean water surface elevation above NGVD 1929, feet	2011	2011	
Turbidity, water, unfiltered, monochrome near infra-red LED light, 780-900 nm, detection angle 90 +-2.5 degrees, formazin nephelometric units (FNU) -- monitor	2011	2011	
Salinity, water, unfiltered, practical salinity units at 25 degrees Celsius -- monitor	2011	2011	
Nitrate, water, in situ, milligrams per liter as nitrogen -- nitrate analyzer	2011	2011	

**Description:** USGS 01309500 Massapequa Creek at Massapequa NY

**Location:** Latitude 40°41'20", Longitude 73°27'17" NAD83

Nassau County, New York, Hydrologic Unit 02030202

**Drainage area:** 38.6 square miles

**Datum of gage:** 18.31 feet above NGVD29.

**Available data:**

<b>Data Type</b>	<b>Begin Date</b>	<b>End Date</b>	<b>Count</b>
<b><u>Current / Historical Observations</u></b>	2007-10-01	2014-10-03	
<b><u>Daily Data</u></b>			
Discharge, cubic feet per second	1936-12-12	2014-10-02	25355
<b><u>Daily Statistics</u></b>			
Discharge, cubic feet per second	1936-12-12	2010-09-30	24627
<b><u>Monthly Statistics</u></b>			
Discharge, cubic feet per second	1936-12	2010-09	
<b><u>Annual Statistics</u></b>			
Discharge, cubic feet per second	1937	2010	
<b><u>Peak streamflow</u></b>	1937-09-13	2010-03-30	69

<b><u>Field measurements</u></b>	1961-04-16	2014-08-18	234
<b><u>Field/Lab water-quality samples</u></b>	1966-05-11	2001-06-26	163
<b><u>Water-Year Summary</u></b>	2006	2010	5

**Description:** USGS 01309990 Bellmore Creek Tributary at Bellmore NY

**Location:** Latitude 40°40'47", Longitude 73°30'46" NAD27

Nassau County, New York, Hydrologic Unit 02030202

**Available data:**

<b>Data Type</b>	<b>Begin Date</b>	<b>End Date</b>	<b>Count</b>
<b><u>Daily Data</u></b>			
Discharge, cubic feet per second	1971-10-07	2013-08-15	12446
<b><u>Daily Statistics</u></b>			
Discharge, cubic feet per second	1971-10-07	2010-09-30	12237
<b><u>Monthly Statistics</u></b>			
Discharge, cubic feet per second	1971-10	2010-09	
<b><u>Annual Statistics</u></b>			
Discharge, cubic feet per second	1972	2010	
<b><u>Field measurements</u></b>	1938-09-21	2013-06-11	172
<b><u>Field/Lab water-quality samples</u></b>	1966-04-22	1976-09-29	36

**Description:** USGS 01310000 Bellmore Creek at Bellmore NY

**Location:** Latitude 40°40'43", Longitude 73°30'56" NAD83

Nassau County, New York, Hydrologic Unit 02030202

**Drainage area:** 14.2 square miles

**Available data:**

<b>Data Type</b>	<b>Begin Date</b>	<b>End Date</b>	<b>Count</b>
<b><u>Daily Data</u></b>			
Discharge, cubic feet per second	1937-09-23	2010-09-30	24662
<b><u>Daily Statistics</u></b>			
Discharge, cubic feet per second	1937-09-23	2010-09-30	24662
<b><u>Monthly Statistics</u></b>			
Discharge, cubic feet per second	1937-09	2010-09	
<b><u>Annual Statistics</u></b>			
Discharge, cubic feet per second	1937	2010	
<b><u>Peak streamflow</u></b>	1938-09-21	2010-03-30	66
<b><u>Field/Lab water-quality samples</u></b>	1996-08-26	1996-08-26	1
<b><u>Water-Year Summary</u></b>	2006	2010	5

**Description:** USGS 01310500 East Meadow Brook at Freeport NY

**Location:** Latitude 40°39'56", Longitude 73°34'11" NAD83

Nassau County, New York, Hydrologic Unit 02030202

**Drainage area:** 28.7 square miles

**Datum of gage:** 10.45 feet above NGVD29.

**Available data:**

<b>Data Type</b>	<b>Begin Date</b>	<b>End Date</b>	<b>Count</b>
<b><u>Daily Data</u></b>			
Discharge, cubic feet per second	1937-01-01	2014-08-26	25318
<b><u>Daily Statistics</u></b>			
Discharge, cubic feet per second	1937-01-01	2010-09-30	24663
<b><u>Monthly Statistics</u></b>			
Discharge, cubic feet per second	1937-01	2010-09	
<b><u>Annual Statistics</u></b>			
Discharge, cubic feet per second	1937	2010	
<b><u>Peak streamflow</u></b>	1937-09-14	2010-03-30	69
<b><u>Field measurements</u></b>	1944-01-06	2014-08-27	208
<b><u>Field/Lab water-quality samples</u></b>	1966-04-22	2001-04-19	160
<b><u>Water-Year Summary</u></b>	2006	2010	5

**Description:** USGS 01309400 Carman Creek at Amityville NY

**Location:** Latitude 40°40'09", Longitude 73°26'02" NAD27

Nassau County, New York, Hydrologic Unit 02030202

**Available data:**

<b>Data Type</b>	<b>Begin Date</b>	<b>End Date</b>	<b>Count</b>
<b><u>Field measurements</u></b>	1991-03-26	2013-08-30	12
<b><u>Field/Lab water-quality samples</u></b>	1966-05-12	2001-04-18	7

**Description:** USGS 01309700 SEAFORD CREEK AT SEAFORD, N.Y.

**Location:** Latitude 40°40'00", Longitude 73°28'57" NAD27

Nassau County, New York, Hydrologic Unit 02030202

**Available data:**

<b>Data Type</b>	<b>Begin Date</b>	<b>End Date</b>	<b>Count</b>
<b><u>Field measurements</u></b>	1990-11-16	2013-08-30	7
<b><u>Field/Lab water-quality samples</u></b>	1966-05-11	1966-05-11	1

**Description:** USGS 01309800 SEAMANS CREEK AT SEAFORD, N.Y.

**Location:** Latitude 40°39'56", Longitude 73°29'37" NAD27

Nassau County, New York, Hydrologic Unit 02030202

**Available data:**

<b>Data Type</b>	<b>Begin Date</b>	<b>End Date</b>	<b>Count</b>
<b><u>Field measurements</u></b>	1990-11-16	2013-08-30	6
<b><u>Field/Lab water-quality samples</u></b>	1966-05-11	1966-05-11	1

**Description:** USGS 01310100 NEWBRIDGE CREEK AT MERRICK, N.Y.

**Location:** Latitude 40°39'42", Longitude 73°32'02" NAD27

Nassau County, New York, Hydrologic Unit 02030202

**Available data:**

<b>Data Type</b>	<b>Begin Date</b>	<b>End Date</b>	<b>Count</b>
<b><u>Field measurements</u></b>	1963-04-03	2013-08-21	87
<b><u>Field/Lab water-quality samples</u></b>	1966-05-11	1966-05-11	1

**Description:** USGS 01310200 CEDAR SWAMP CREEK AT MERRICK, N.Y.

**Location:** Latitude 40°39'39", Longitude 73°32'24" NAD27

Nassau County, New York, Hydrologic Unit 02030202

**Available data:**

Data Type	Begin Date	End Date	Count
<u>Field measurements</u>	1991-05-24	2013-08-29	7
<u>Field/Lab water-quality samples</u>	1966-05-11	1966-05-11	1

**Description:** USGS 01310515 West Branch Freeport Creek at Freeport, NY (MD-11)

**Location:** Latitude 40°39'32", Longitude 73°34'14" NAD27

Nassau County, New York, Hydrologic Unit 02030202

**Available data:**

Data Type	Begin Date	End Date	Count
<u>Field measurements</u>	1990-11-20	2013-08-21	7

**Description:** USGS 01310600 Millburn Creek at Baldwin NY

**Location:** Latitude 40°39'04", Longitude 73°36'13" NAD27

Nassau County, New York, Hydrologic Unit 02030202

**Available data:**

Data Type	Begin Date	End Date	Count
<u>Field measurements</u>	1953-01-16	2013-09-12	124
<u>Field/Lab water-quality samples</u>	1966-05-11	1986-07-28	3

**Description:** USGS 01310800 South Pond Outlet at Rockville Centre NY

**Location:** Latitude 40°40'00", Longitude 73°39'08" NAD27

Nassau County, New York, Hydrologic Unit 02030202

**Available data:**

Data Type	Begin Date	End Date	Count
<u>Field measurements</u>	1990-11-15	2013-08-20	7
<u>Field/Lab water-quality samples</u>	1966-05-05	1972-04-19	2

**Description:** USGS 01311000 Pines Brook at Malverne NY

**Location:** Latitude 40°39'59", Longitude 73°39'33" NAD83

Nassau County, New York, Hydrologic Unit 02030202

**Drainage area:** 10.1 square miles

**Datum of gage:** 7.11 feet above NGVD29.

**Available data:**

Data Type	Begin Date	End Date	Count
<u>Daily Data</u>			
Discharge, cubic feet per second	1937-01-01	1999-01-31	22470
<u>Daily Statistics</u>			
Discharge, cubic feet per second	1937-01-01	1999-01-31	22470
<u>Monthly Statistics</u>			
Discharge, cubic feet per second	1937-01	1999-01	
<u>Annual Statistics</u>			
Discharge, cubic feet per second	1937	1999	

<b><u>Peak streamflow</u></b>	1937-06-14	1999-01-03	63
<b><u>Field measurements</u></b>	1983-02-03	2013-09-12	156
<b><u>Field/Lab water-quality samples</u></b>	1966-05-05	2001-04-19	85

**Description:** Site Number: 404210073340801 - N 1615. 4

**Location:** Latitude 40°42'10", Longitude 73°34'08" NAD27

Nassau County, New York, Hydrologic Unit 02030202

**Well depth:** 33 feet

**Land surface altitude:** 61.0 feet above NGVD29.

Well completed in "Northern Atlantic Coastal Plain aquifer system" (S100NATLCP) national aquifer.

Well completed in "Glacial Aquifer, Upper" (112GLCLU) local aquifer

**Available data:**

<b>Data Type</b>	<b>Begin Date</b>	<b>End Date</b>	<b>Count</b>
<b><u>Daily Data</u></b>			
Elevation above NGVD 1929, feet	2002-10-26	2014-07-31	3604
<b><u>Daily Statistics</u></b>			
Elevation above NGVD 1929, feet	2002-10-26	2013-09-30	3300
<b><u>Monthly Statistics</u></b>			
Elevation above NGVD 1929, feet	2002-10	2013-09	
<b><u>Annual Statistics</u></b>			
Elevation above NGVD 1929, feet	2003	2013	
<b><u>Field groundwater-level measurements</u></b>	1989-10-23	2014-08-01	707
<b><u>Water-Year Summary</u></b>	2006	2008	3

**Description:** Site Number: 404124073394901 - N 1129. 3

**Location:** Latitude 40°41'24", Longitude 73°39'49" NAD27

Nassau County, New York, Hydrologic Unit 02030202

**Well depth:** 55.0 feet

**Hole depth:** 55.00 feet

**Land surface altitude:** 51.00feet above NGVD29.

Well completed in "Northern Atlantic Coastal Plain aquifer system" (S100NATLCP) national aquifer.

Well completed in "Glacial Aquifer, Upper" (112GLCLU) local aquifer

**Available data:**

<b>Data Type</b>	<b>Begin Date</b>	<b>End Date</b>	<b>Count</b>
<b><u>Daily Data</u></b>			
Elevation above NGVD 1929, feet	2002-10-26	2014-07-31	3682
<b><u>Daily Statistics</u></b>			
Elevation above NGVD 1929, feet	2002-10-26	2013-11-18	3427
<b><u>Monthly Statistics</u></b>			
Elevation above NGVD 1929, feet	2002-10	2013-11	
<b><u>Annual Statistics</u></b>			
Elevation above NGVD 1929, feet	2003	2014	
<b><u>Field groundwater-level measurements</u></b>	2002-10-25	2014-08-01	453

## Appendix b – MOUs

DOS-MOU-2008-03

AMO7147

**Memorandum of Understanding  
Between  
New York State Department of State  
And  
New York State Department of Environmental Conservation for  
Development of TMDL's for the western bays of the SSER**

WHEREAS the New York State Department of State (DOS) is interested in developing Total Maximum Daily Loads (TMDLs) for pollutants in the western bays of the South Shore Estuary Reserve (SSER) but lacks the expertise and experience to conduct the work required;

WHEREAS the SFY 08-09 NYS Budget S. 6805D A. 9805D provides Environmental Protection Funds (EPF) under Title 3 Open Space Account (OSA) for implementing projects and activities identified in the Long Island South Shore Estuary Reserve (SSER) Coastal Management Plan (CMP); and

WHEREAS, this project initiates activities identified in the SSER CMP and is supported by the SSER Council; and

WHEREAS the New York State Department of Environmental Conservation (DEC) has experience and interest in development of TMDLs in New York; and

WHEREAS the DEC has an existing Agreement with the US Geological Survey (USGS) to perform various water quality related work;

WHEREAS the USGS has necessary expertise and interest in assisting the DEC and DOS in conducting work necessary to begin TMDL development; and

WHEREAS the DEC is willing to amend its Agreement with USGS to include activities associated with developing TMDLs.

NOW, THEREFORE, in cooperation of the mutual covenants and agreements contained herein, the parties hereto agree as follows:

- A. DEC shall use \$223,380 of funds allocated above to procure the services of USGS to undertake this project;
- B. DEC shall be responsible for overseeing the work of the USGS and executing any agreements and purchasing any equipment required to implement terms of this memorandum of understanding and ensure the work shall be conducted and products delivered as specified in Attachment A, the "Work Program" ;
- C. All administrative and other requirements and responsibilities are hereby transferred from DOS to DEC;
- D. Payment Schedule
  1. Payment to USGS for work outlined in this workplan will be invoiced in accordance with the existing Agreement with DEC.
  2. DEC project managers will certify to DOS project manager appropriate completion of tasks along with copies of invoices and required products/reports.

3. For each payment request submitted, DOS project manager will review information submitted in accordance with the terms and conditions of this MOU to determine total allowable project costs incurred and the number and percentage of allowable project tasks completed to date. For the purpose of determining the payment amount, costs may be reduced if the percentage of task completion is deemed insufficient.
  4. Amendment to the USGS contract shall make payment for work in the workplan to be contingent upon and subject to approval by the Department of State (DOS).
  5. DOS through its Division of Coastal Resources (DCR) will email DEC to authorize DEC to proceed with the payment. If payment is reduced from the amount requested, DOS will provide an explanation to DEC justifying reduction.
  6. DEC shall not make payment for any claimed costs until it has received the notification above.
  7. Payments for work completed after the current State Fiscal Year are contingent upon reappropriation of funds by the New York State Legislature for each fiscal year in which work occurs and payment is made.
- E. This MOU shall begin on September 1, 2008 and will remain in effect through December 31, 2011 with the option to add funds, amend the work program and/or extend the period of time covered;
- F. The budget for this MOU is \$223,380, and represents the maximum amount reimbursement by DEC;
- G. A waiver of enforcement of any provision of this MOU by Department shall not constitute a waiver by the Department of any provision of this MOU, nor shall it preclude the Department from subsequently enforcing such provision thereafter.
- H. Any provision of the MOU found to be prohibited by law shall be ineffective.
- I. The foregoing and attachments hereto contain the entire MOU of the Department and the DEC.
- J. Points of Contact:

Project Managers: Fred Anders of the DOS (473-2477) and Jeff Myers of the DEC, Division of Water (402-8179) shall be responsible for the technical administration of the MOU.

Administrative Managers: Jean Fuller of the DOS (473-2462) and Joanne Swint of the DEC (402-8222).

DOS Contracts Administration Unit: George Lupe (486-3905)

K. Termination:

This Memorandum of Understanding may be terminated by either party giving the other 30 days advanced written notice of such intent and the reasons thereof. Neither party shall enter into or otherwise create new obligations relative to this Memorandum of Understanding following receipt of such notice, without the written consent of the other party. Both parties agree to enter into good faith negotiations to resolve any differences and provide for an orderly closure of this Memorandum of Understanding if agreement cannot be reached. Termination will be effective only after agreement has been reached with respect to the amount of equitable reimbursement and payment for all outstanding commitments.

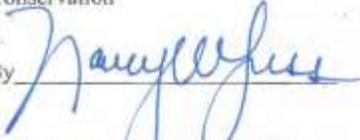
L. Executory Clause:

In accordance with Section 41 of the State Finance Law, both parties shall have no liability under this Memorandum of Understanding to one another or to anyone else beyond funds available for this Memorandum of Understanding.

The individuals below are authorized to sign and execute this MOU between their respective institutions.

New York State Department of Environmental  
Conservation

By



Title

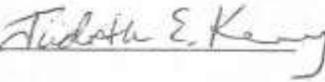
Director of MBS

Dated

February 10, 2010

New York State Department of State

By



Judith Kenny

Director of Administration and Management

Dated

4/3/09

## Attachment A

### WORK PROGRAM FOR ASSISTANCE IN DEVELOPMENT OF TMDLs IN THE WESTERN BAYS OF THE SOUTH SHORE ESTUARY RESERVE

The U.S. Geological Survey (USGS) has monitored chemical parameters since October 2004 at its estuary station on Reynolds Channel at Point Lookout, in cooperation with the New York State Department of Environmental Conservation (NYSDEC) and Town of Hempstead Department of Conservation & Waterways. Concerns about water-quality impairments in the inshore embayments of this estuary system have prompted the DEC together with USGS to propose expanded monitoring for these parameters. The expanded monitoring program will document the diel and tidal variability of water quality across a gradient of eutrophication in Hempstead Bay; compliment the water-quality grab sampling efforts of SUNY, the NYSDEC, and local stakeholders; and provide information critical to the preparation and application of Total Daily Maximum Loads (TMDLs) for this system.

The DEC will oversee the USGS to establish and operate a monitoring station that collects data on tidal water elevations in an inshore embayment of Hempstead Bay. These data will be recorded at 6 minute intervals, relayed hourly via satellite telemetry to USGS offices in real time, and made publicly available via the Internet within a few minutes of their arrival. In addition, the station will be equipped with an add-on water-quality monitor that collects ancillary data from about 0.5 m above the seabed on water temperature, specific conductance (which will be used to compute salinity), dissolved oxygen, turbidity, nitrogen, and chlorophyll; these data also will disseminated with the water-elevation data in real time. Tidal statistics (for example, mean high and low waters) will be published annually for daily water-elevation records from the embayment in the USGS Water-Data Report for Long Island. In addition, daily statistics (for example, maximum, minimum, and mean values) will be published annually in this report for records of water temperature, salinity, dissolved oxygen, turbidity, nitrogen, and chlorophyll from this station.

The operation and maintenance of this water-quality monitoring project is expected to entail 14 routine and 1 emergency servicing visits per year. Routine visits would be made twice a month during the summer, monthly during the fall and spring, and about every six weeks during the winter. During each visit, measurement probes will be cleaned and checked for biofouling and electronic drift, and recalibrated as necessary, according to USGS *Guidelines and Standard Procedures for Continuous Water-Quality Monitors: Station Operation, Record Computation, and Data Reporting* (Wagner and others, 2006). These guidelines and standard procedures also would followed (as applicable) in pre- and post-trip preparation, data processing, record computation, data management and review, and supervision of the water-quality monitoring project.

Estuary-monitoring station installation will begin after April 1, 2008, and will be completed within a period of about six months, as practicable. Station operation and maintenance will begin on or about October 1, 2008, and will continue for a minimum duration of two years.

Total proposed budget: \$223,380

#### References Cited

Wagner, R.J., Boulger, R.W., Jr., Oblinger, C.J., and Smith, B.A., 2006, Guidelines and Standard Procedures for Continuous Water-Quality Monitors: Station Operation, Record Computation, and Data Reporting: U.S. Geological Survey Techniques and Methods Report 1-D3

**Memorandum of Understanding  
Between  
New York State Department of State  
and  
New York State Department of Environmental Conservation  
for  
Continued Water Quality Monitoring  
in the  
Western Bays of the South Shore Estuary Reserve**

AM08775

**THIS Memorandum of Understanding (MOU)** (AM08775) by and between the new York State Department of Environmental Conservation, hereinafter referred to as the Department, having office at 625 Broadway, Albany, New York 12233 and the New York State Department of State, hereinafter referred to as DOS having offices at 99 Washington Ave. Albany, New York 12231.

WHEREAS the New York State Department of State (DOS), is interested in developing Total maximum Daily Loads (TMDLs) for pollutants in the western bays of the SSER but lacks the expertise and experience to conduct the work required;

WHEREAS the SFY 11-12 NYS Budget S.2804 A4004 provides Environmental Protection Funds (EPF) under Title 3 Open Space Account (OSA) for implementing projects and activities identified in the SSER Comprehensive Management Plan (CMP); and

WHEREAS, this project initiates and continues to implement activities identified in the SSER CMP and is supported by the SSERC; and

WHEREAS the New York State Department of Environmental Conservation (DEC) has experience and interest in the development of TMDLs in New York; and

WHEREAS the DEC has an existing contract (C007853) with the US Geological Survey (USGS) to perform various water quality related work;

WHEREAS the USGS has necessary expertise and interest in assisting the DEC and DOS in continuing work necessary to continue TMDL development; and

WHEREAS the DEC is willing to amend its contract with USGS to include additional activities associated with the development and continued water quality monitoring for TMDLs in the western bays of the SSER

NOW, THEREFORE, in cooperation of the mutual covenants and agreements contained herein, the parties hereto agree as follows:

- A. DEC is appropriated these funds in the EPF budget and sub-allocates to DOS but in this instance, DEC shall use **\$232,920** of funds already allocated above to procure the services of USGS to undertake two elements of this project identified as the following:
  - a. \$144,620 for the pH probe and continued monitoring at the Hog Island Channel station.
  - b. \$ 88,300 for the Stream and Groundwater-Level Monitoring Program.

Development of TMDLs and Continued Water Quality Monitoring in the Western Bays of the SSER

- B. DEC shall be responsible for overseeing the work of the USGS and executing any agreements and purchasing any equipment required to implement terms of this Memorandum of Understanding (MOU) and ensure the work shall be conducted and products delivered as specified in Attachment A, and as outlined in the USGS approved workplan.
- C. DEC project managers will certify to DOS project manager appropriate completion of tasks along with copies of products/reports.
- D. This MOU shall begin on August 8, 2012, and will remain in effect through August 8, 2014, with the option to add funds, amend the work program and/or extend the period of time covered.
- E. The total budget for this MOU is **\$232,920** and represents the maximum amount reimburseable by DEC to USGS.
- F. A waiver of enforcement of any provision of this MOU by either party shall not constitute a waiver by the other party of any provision of this MOU, nor shall it preclude either party from subsequently enforcing such provision thereafter.
- G. Any provision of the MOU found to be prohibited by law shall be ineffective.
- H. The foregoing and attachments hereto contain the entire MOU of the DOS and the DEC.
- I. Points of Contact:

Project Managers: Fred Anders of the DOS, Communities and Waterfronts, 99 Washington Ave. Albany, New York 12231 (473-2477) [Fred.Anders@dos.ny.gov](mailto:Fred.Anders@dos.ny.gov) and Jeff Myers of the DEC, Division of Water, NYSDEC, 625 Broadway, Albany, NY 12233 (402-8179) [jmyers@gw.dec.state.ny.us](mailto:jmyers@gw.dec.state.ny.us) shall be responsible for the technical administration of the MOU.

Administrative Managers: Vincent Sculco of the DOS, 99 Washington Ave., Albany, NY 12231 (473-2462) [Vincent.Sculco@dos.ny.gov](mailto:Vincent.Sculco@dos.ny.gov) and Joanne Kosinski of the DEC, 625 Broadway, Albany, NY 12233 (402-8222) [jkosins@gw.dec.state.ny.us](mailto:jkosins@gw.dec.state.ny.us)

DOS Contracts Administration Unit: George Lupe, DOS, 99 Washington Ave., Albany, NY 12231 (474-2754) [George.Lupe@dos.ny.gov](mailto:George.Lupe@dos.ny.gov)

K. Termination:

This MOU may be terminated by either party giving the other 30 days advanced written notice of such intent and the reasons thereof. Neither party shall enter into or otherwise create new obligations relative to this MOU following receipt of such notice, without the written consent of the other party. Both parties agree to enter into good faith negotiations to resolve any differences and provide for an orderly closure of this MOU if agreement cannot be reached. Termination will be effective only after agreement has been reached with respect to the amount of equitable reimbursement and payment for all outstanding commitments; and,

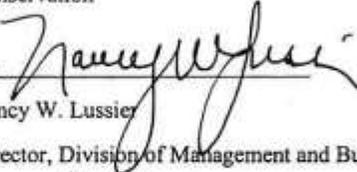
L. Executory Clause:

In accordance with Section 41 of the State Finance Law, both parties shall have no liability under this MOU to one another or to anyone else beyond funds available for this MOU.

The individuals below are authorized to sign and execute this MOU between their respective institutions.

New York State Department of Environmental  
Conservation

By



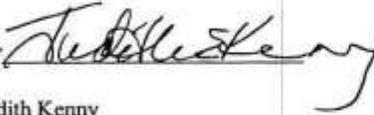
Nancy W. Lussier

Director, Division of Management and Budget

Dated NOVEMBER 18, 2012

New York State Department of State

By



Judith Kenny

Director of Administration and Management

Dated 11.17.13

**Attachment A**

**WORK PROGRAM FOR  
THE CONTINUED WATER QUALITY MONITORING  
IN THE WESTERN BAYS OF THE SOUTH SHORE ESTUARY RESERVE**

The U.S. Geological Survey (USGS) has monitored chemical parameters since October 2004 at its estuary station on Reynolds Channel at Point Lookout, in cooperation with the New York State Department of Environmental Conservation (NYSDEC) and Town of Hempstead Department of Conservation & Waterways. In 2008, concerns about water-quality impairments in the inshore embayments of this estuary system prompted the DEC together with USGS to propose to DOS and the SSER Council expanded monitoring for these parameters. The expanded monitoring program documented the diel and tidal variability of water quality across a gradient of eutrophication in Hempstead Bay; which complimented the water-quality grab sampling efforts of SUNY, the NYSDEC, and local stakeholders; and provided information critical to DEC's preparation and application of Total Daily Maximum Loads (TMDLs) for this system.

The DEC will extend an existing Cooperative Agreement (C007853) with the USGS and will oversee USGS work to continue operating a monitoring station that collects data on tidal water elevations at Hog Island Channel, an inshore embayment of Hempstead Bay. These data have been, and will continue to be, recorded at 6-minute intervals, relayed hourly via satellite telemetry to USGS offices in real time, and made publicly available via the Internet within a few minutes of their arrival. In addition, the station will be equipped with add-on water-quality monitors, including in this MOU the installation of a new pH monitor. The gauge has collected, and will continue to collect ancillary data from about 0.5 m above the seabed on water temperature, specific conductance (which will be used to compute salinity), dissolved oxygen, turbidity, nitrogen, chlorophyll, and now, pH. These data will also be disseminated with the water-elevation data in real time. Tidal statistics (for example, mean high and low waters) will continue to be published annually for daily water-elevation records from the embayment in the USGS Water-Data Report for Long Island. In addition, daily statistics (for example, maximum, minimum, and mean values) will be published annually in this report for records of water temperature, salinity, dissolved oxygen, turbidity, nitrogen, chlorophyll, and pH from this station.

The operation and maintenance of this water-quality monitoring project is expected to entail 14 routine and 1 emergency servicing visits per year. Routine visits would be made twice a month during the summer, monthly during the fall and spring, and about every six weeks during the winter. During each visit, measurement probes will be cleaned and checked for biofouling and electronic drift, and recalibrated as necessary, according to USGS *Guidelines and Standard Procedures for Continuous Water-Quality Monitors: Station Operation, Record Computation, and Data Reporting* (Wagner and others, 2006). These guidelines and standard procedures also would be followed (as applicable) in pre- and post-trip preparation, data processing, record computation, data management and review, and supervision of the water-quality monitoring project.

Station operation and maintenance began on or about October 1, 2008, and continued until August 8, 2012 under the previous USGS contract C005904 and current USGS contract C007853. Under the current USGS contract C007853, the first project element; operation and maintenance of the Hog Island Channel gauge, will begin on August 8, 2012 and continue until August 8, 2014, including the new pH probe installed in 2012. All data collected will be reported as described above.

In addition to the Hog Island Channel monitoring project described above, the DEC will extend the existing contract with the USGS, and will oversee USGS work, to operate a streamflow and groundwater-leveling monitoring program to aid in TMDL development. In this second project element, groundwater-elevation data will be collected from two water-table observation wells equipped with continuous water-level recorders. Streamflow data gages will be monitored at four continuous-recording stations equipped with water-stage gages, one of which (a real-time station) will be equipped with a satellite telemeter. Partial-record streamflow measurements will also be collected at nine streams not equipped with water-stage gages, for which historic data exist. The resulting information will be used by DEC to develop TMDLs and will be disseminated in a variety of formats, including digital web-based products, an online published data report, and water level maps.

A quality assurance project plan (QAPP) or equivalent quality system document will be required to describe and govern the monitoring activities described in this work program. USGS will draft this document and DEC will need to be included in its review and approval process.

The streamflow and groundwater-level monitoring program will begin in August 2012, and continue until August 8, 2014.

Total proposed budget:

- \$232,920 for additional monitoring from the SSER, EPF Title 3, 2011-12 budget not suballocated to DOS:
  - \$144,620 for the pH probe and continued monitoring at the Hog Island Channel station.
  - \$ 88,300 for the Stream and Groundwater-Level Monitoring Program.

References Cited

Wagner, R.J., Boulger, R.W., Jr., Oblinger, C.J., and Smith, B.A., 2006, Guidelines and Standard Procedures for Continuous Water-Quality Monitors: Station Operation, Record Computation, and Data Reporting: U.S. Geological Survey Techniques and Methods Report 1-D3