TUTHILLS CREEK
WATERSHED MANAGEMENT PLAN

PREPARED FOR:

TOWN OF BROOKHAVEN
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Farmingville, NY 11738

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May 2016

TUTHILLS CREEK WATERSHED MANAGEMENT PLAN

FINAL

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Executive Summary

EXECUTIVE SUMMARY

Watershed planning is a means to protect and restore water resources, as well as the local economies that rely on these essential coastal resources. The purpose of a Watershed Management Plan is to provide a comprehensive approach to educate, plan for and implement incremental improvements with a goal of protecting and restoring watershed health. While Tuthills Creek itself is not currently impaired, long term planning is necessary to protect the health of the creek and ultimately to improve water quality to Patchogue Bay. To facilitate the preparation of a Watershed Management Plan for Tuthills Creek, the Town applied for and received a grant from New York State Department of State (funds provided under Title 11 of the Environmental Protection Fund).

The WMP provides a characterization of the existing natural, cultural and human resources within the watershed, identifies key factors impacting the Tuthills Creek watershed, provides general and site specific recommendations for watershed improvement, and provides implementation strategies for each of the recommendations provided.

Current Watershed Characteristics

The Watershed

A total of 13 subwatershed areas were defined within the overall Tuthills Creek watershed, ranging from approximately 33.75 acres in size to over 430 acres in size. In total, the subwatersheds represent the individual drainage areas that are present within the ±1,750 acre watershed.

Topography

The topography of the Tuthills Creek watershed area generally trends from higher elevations along the northeastern and northwestern boundary of the watershed to lower elevations nearing the confluence of Tuthills Creek and Patchogue Bay to the south. The highest elevations occur in hilly recreational and wooded areas north of the residential developments in the northwestern portion of the watershed in the vicinity of Skylark Drive and Greenbelt Parkway (97 feet above sea level). Topographically low areas exist along the shoreline of the Tuthills Creek confluence with Patchogue Bay and along the banks of West Lake in the central portion of the watershed. Elevations within these areas range from 1 to 15 feet above sea level (asl).

Soils and Erosion

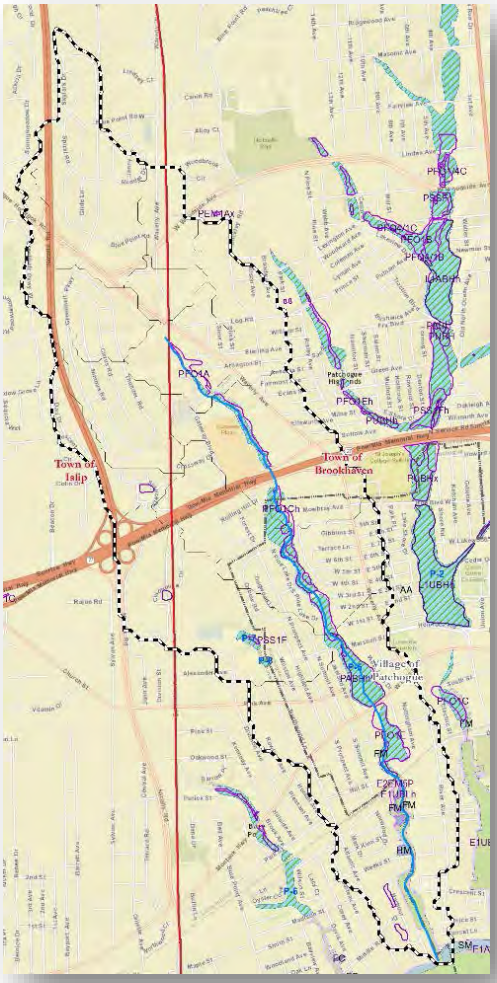
The soil survey characterizes the Tuthills watershed soils by the Riverhead-Plymouth-Carver association. This association contains the minor soil groups of Haven, Montauk, Raynham, and Wareham soils. Soils of this association are characterized as deep, rolling, excessively drained and well-drained, course textured and moderately course textured soils on moraines. In general, the sandy texture and steep slopes make the soils in much of this association poorly suited to farming. In some areas the soils are underlain by fine sand, silt, or compact glacial till.

Erosion is caused by unconsolidated soils becoming subject to overland transport as a result of land disturbances and weathering conditions such as wind and rain. Since Tuthills Creek watershed soils are comprised primarily of glacial sand deposits, destabilized surfaces are subject to erosion. However, as the watershed is relatively flat and no areas of significant bluffs and/or

barren soils with steep slopes are present, erosion is primarily caused by land disturbances and an increase in impervious surfaces.

Geology

The Tuthills Creek watershed lies within an area of glacial outwash deposits that were left behind by the series of glacial advances and retreats which created Long Island. The geology underlying the Tuthills Creek watershed is comprised of six geologic units. The deepest is comprised of crystalline bedrock. Above this bedrock lie the sedimentary deposits which form the three major water-bearing units that underlie the area. The uppermost geologic unit underlying the Tuthills Creek watershed area consists of the surficial deposits that comprise the Upper Glacial formation. This layer is encountered throughout Long Island at the land surface. These deposits consist primarily of stratified and unstratified sand and gravel interspersed with clay and isolated beds of clay.



Surface Water Resources

The New York State Department of Environmental Conservation (NYSDEC) has identified three freshwater wetlands within the Tuthills Creek Watershed; these areas comprise approximately 76.1 acres of wetland systems. It is noted that the largest freshwater wetland, P-5, is a 71.4 acre wetland complex associated with the floodplain of Tuthills Creek and includes West Lake. The other two wetlands (P-7 and P-8) are located adjacent to one another in the west-central portion of the watershed.

The tidal wetlands within the watershed are located where Tuthills Creek intersects and interfaces with tidal waters from Patchogue Bay. These wetlands

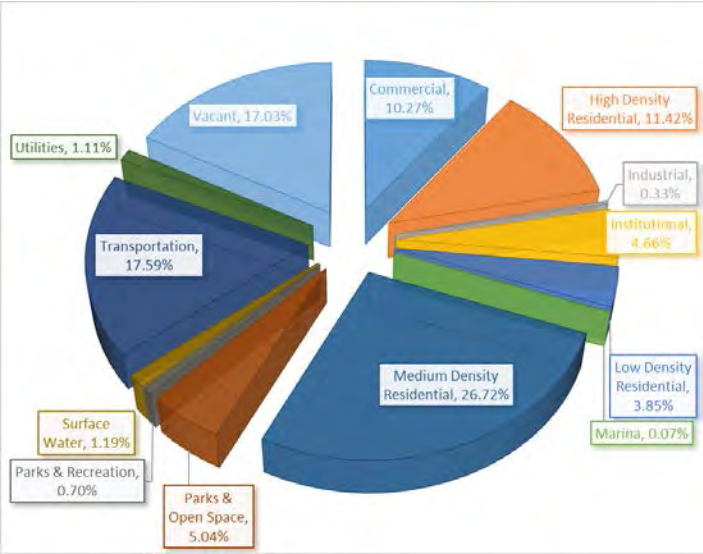
contain saline waters, which originate from the ocean-fed surface waters associated with the bay. These features are formed by coastal processes and, with the exception of formerly connected tidal wetlands, are subject to tidal influence. These areas are not only vital to the ecological systems to which they serve, but also function to control storm surges during flood and major storm events which may impact sensitive watershed areas.

Groundwater Resources

Groundwater in the Tuthills Creek watershed is derived from precipitation. Rainfall and meltwater entering the ground ("recharge") passes downward through the unsaturated zone to a level below which all porous layers are saturated. The upper surface of this level is referred to as the "water table". Groundwater is generally a mild expression of topography, therefore the water table coincides with surface water levels along the shorelines of the Tuthills Creek watershed, and rises in elevation towards the northern, western and eastern edges of the watershed boundaries.

The elevation of groundwater underlying the Tuthills Creek watershed ranges from approximately 48 feet above mean sea level (msl) in the northernmost part of the watershed, to zero (0) at the above ground surface in areas of wetlands and surface water. In general, groundwater underlying the Tuthills Creek watershed area flows from higher elevations on the west and east sides of the Creek towards surface water perpendicular to the contours of equal groundwater elevation. As groundwater migrates away from areas of higher elevation toward the creek network, it eventually discharges to surface water along coastal areas. Near the shore, water entering the system tends to flow horizontally along a shallow flow system and is discharged from the subsurface into streams. Water that enters the system farther inland generally flows vertically downward deeper into the Upper Glacial aquifer before flowing toward the shores of surface water where it is discharged as subsurface outflow.

Land Use



The Tuthills Creek surface watershed is 1,761.23 acres in size and is primarily occupied by medium density residential uses (26.72%), roadways (17.59%), vacant land (17.03%), high density residential uses (11.42%) and commercial uses (10.27%). Commercial uses are notably concentrated around Sunrise Highway, Montauk Highway, and Waverly Avenue, while the medium density residential uses and vacant land are interspersed throughout the watershed. Parks and open space, institutional uses, and low density residential uses occupy a combined total of 13.55% of the watershed. The largest block of public open space is located in the north central portion of the watershed, and the largest institutional use is associated with the IRS facility located in the northeast portion of the watershed. The remainder of the watershed is occupied by surface waters, utilities, parks and recreation, industrial uses and marinas, which occupy less than 4% of the watershed.

Land Cover

The majority of the watershed is occupied by Developed, Medium Intensity areas (589.74 acres) and Developed, Low Intensity areas (527.47 acres), which is a reflection of the primarily residential nature of the watershed. 291.49 acres of the watershed are occupied by Developed, Open Space areas, which represent lower density developments and older neighborhoods that have significant tree cover due to the age of the neighborhoods. Developed, High Intensity uses are representative of the large commercial centers and major roadways within the watershed. The remaining categories (Deciduous Forest, Emergent Herbaceous Wetlands, Evergreen Forest, Mixed Forest, Open Waters, Shrub/Scrub and Woody Wetlands) represent the types of vacant vegetated land and open space within the watershed.

Water Quality

Very limited surface water quality data is available from the United States Geological Survey (USGS), NYSDEC and Suffolk County Department of Health Services (SCDHS) for Tuthills Creek. Water quality data examined was collected by the NYSDEC, SCDHS, and Cornell Cooperative Extension (CCE) which demonstrated an impairment from pathogens resulting in closure of shellfish areas at the mouth of the creek. No additional impairments were identified.

What Can be Done to Protect Water Quality?

The characterization of water resources within the Tuthills Creek Watershed, input from the CAC and the public, and regulatory considerations were all considered and factor into the development of recommendations for the watershed. The overall intent of this document is to identify those measures that can be implemented to reduce existing water quality impacts, make meaningful strides toward water quality improvement, and prevent or mitigate potential future impacts to water quality.

Recommendations are divided into seven categories: Waterbody Recommendations, Stormwater Runoff and Water Quality Recommendations, Municipal Facility Recommendations, Wastewater Recommendations, Regulatory Recommendations, Natural Resource and Invasive Species Management and Public Education and Stewardship.

Primary Recommendations – Waterbody

- Establish a program for regular water quality monitoring of the creek at key locations.
- Establish a blueway trail within the navigable portion of the creek.
- Investigate dredging existing sediment accumulation within the Creek south of Weeks

Street Culvert and north of the LIRR bridge.

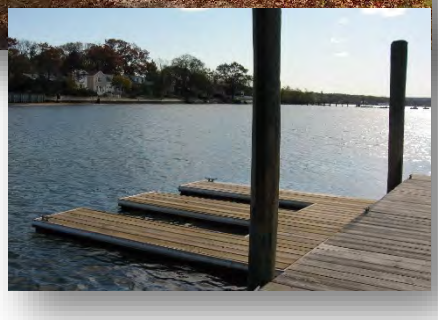
- Reestablish habitat for wildlife within and along the shorelines of the creek.

Primary Recommendations – Watershed Protection Area & Open Space Acquisition

- Identify parcels with significant wetland area for consideration by the Town's Open Space Committee.
- Adopt clearing restrictions to limit disturbances to existing natural areas and limit fertilizer dependent vegetation to no more than 15% of lot areas within parcels located within the 0-five year groundwater contributing area.

Primary Recommendations – Public Access & Recreation

- Improve public access opportunities to the Tuthills Creek waterfront by prioritizing acquisition of key parcels suitable for establishment of creekside public parks and landings for the proposed blueways trail with upland links to the community.
- Enhance the publicly owned parkland to encourage public access.
- Create a bike trail with interest markers that connects the blueway trail to community areas of interest.



Primary Recommendations - Stormwater Improvements

- Provide pretreatment to direct outfalls and at road ends, where feasible. Pretreatment options could include separator chambers, or in-line biological treatment (raingardens, tree boxes, constructed wetlands, etc.).
- Explore publicly owned parcels within the watershed for opportunities to redirect stormwater.
- Consider pavement reduction and stormwater catchment in road ends with excess unutilized paved area and within wide residential roadways through the installation of planted medians.

- Investigate use of infiltration practices, water quality structures and biological treatment options at the ends of Waterworks Road and Nottingham Avenue, and within Park Avenue to reduce overland flow of stormwater towards the Creek.
- Conduct a study to determine the source of persistent flooding and a potential buried culvert beneath Wilstan Avenue to determine potential remedial actions.
- Modify the medians on Waverly Avenue to allow for the treatment of stormwater through the use of infiltration practices and/or biological treatment practices.
- Encourage the use of green infrastructure/ practices on public lands and at public facilities such as recreational facilities, fire departments and public schools.

Primary Recommendations – Groundwater and Wastewater

- Encourage the use of green infrastructure/ practices on public lands and at public facilities such as recreational facilities, fire departments and public schools.
- Work with the SCDHS to encourage and incentivize the use of alternative sanitary treatment methods.

- Establish septic system replacement cost-share program for aged and poorly functioning on-site wastewater treatment systems.

Primary Recommendations – Natural Resource and Invasive Species Management

- Restore the Town owned parkland located at the south end of River Avenue, at the mouth of the creek to enhance habitat.
- Conduct restoration on currently impacted publicly owned land to improve natural treatment of stormwater runoff.

Primary Recommendations – Regulatory

- Adopt a local law requiring that new or replacement sanitary systems in areas with shallow depth to groundwater or within 500 feet of surface water utilize best available technology.
- Adopt a regulation to require inspection and certification once every five years for sanitary systems.
- Explore the establishment of a cost share program to aid in septic system inspection and certification.

Primary Recommendations – Stewardship and Public Education

- Work with local commercial landowners and businesses to encourage the use of Green Infrastructure practices in locations where excessive pavement, lack of drainage, direct discharge and/or close proximity to the creek exist.
- Develop educational materials regarding landscape management, natural buffers, green infrastructure, septic system maintenance, and invasive species.
- Work with existing organizations to utilize volunteers to assist with water quality monitoring activities.

How Do These Recommendations Get Funded?

Adoption of this Watershed Management Plan is a key component in securing funding, as it demonstrates the need for the various recommendations to improve water quality. A variety of funding sources have been identified as part of the plan, which include:

- New York State Environmental Facilities Corporation
- New York State Department of Environmental Conservation (NYSDEC)
- Suffolk County Department of Economic Development and Planning
- FHWA administered by NYS DOT thru Suffolk County DPW-Federal Funding administered by NYS DOT / New York Metropolitan Planning Council (NYMTCC)
- New York State Dept. of Transportation
- New York State Department of State (NYSDOS)
- New York State Office of Parks, Recreation & Historic Preservation
- Long Island Community Foundation
- Federal Emergency Management Agency (FEMA) thru NYS Division of Homeland Security & Emergency Services (DHSES) (formally NYS SEMO)
- U.S. Environmental Protection Agency
- National fish and Wildlife Foundation
- NYS Member Item Funding

Section 5.1 provides a prioritization of the recommendations, as well as implementation responsibilities, order of magnitude cost estimates for the various actions and potential funding sources to aid the Town in implementing the recommended actions.

Section 1.0
Introduction

1.0 INTRODUCTION

1.1 Background & Purpose

Tuthills Creek is the westernmost major river/creek that contributes to Patchogue Bay. The 3.2 mile stream has a ±1,750 acre surface water contributing area. A watershed is the total area of land draining to a body of water such as a stream, river, wetland, estuary, or aquifer. Activities occurring within the watershed contributing area of a waterbody impact the health of the waterbody. A Watershed Management Plan is a tool that identifies potential pollutant sources and activities, and provides a series of planning recommendations to help protect and restore water resources, as well as the local economies that rely on these essential coastal resources. The purpose of this Watershed Management Plan is to provide a comprehensive approach to educate, plan for and implement incremental improvements with a goal of protecting and restoring watershed health. To facilitate the preparation of a Watershed Management Plan for Tuthills Creek, the Town applied for and received a grant from New York State Department of State (funds provided under Title 11 of the Environmental Protection Fund) to prepare this Watershed Management Plan.

During precipitation events, stormwater flows overland and into stormwater conveyance systems eventually discharge to the Creek. During this process, stormwater collects and deposits pollutants in the Creek. This document assesses potential sources of pollutants within the watershed, and the smaller catchment areas within the overall watershed called subwatershed. A total of 13 subwatershed areas were defined within the overall Tuthills Creek watershed, ranging from approximately 33.75 acres in size to over 430 acres in size. The Watershed Management Plan evaluates the various potential pollutant sources, and provides measures and best management practices to protect existing resources and improve water quality. It is noted that specific water quality data is limited for Tuthills Creek; however the Creek discharges to Patchogue Bay, which is significantly impaired by both nitrogen and coliform pollution. As a result, protection of the resources associated with the Creek and prevention of impacts is critical to ensure the future health of the creek and ultimately Patchogue Bay. The Watershed Management Plan has been designed as a long term guidance and planning tool for the Town to utilize and implement over the upcoming decade and beyond.

1.2 Document Organization

The WMP provides a characterization of the existing natural, cultural and human resources within the watershed, identifies key factors impacting the Tuthills Creek watershed, provides general and site specific recommendations for watershed improvement, and provides implementation strategies for each of the recommendations provided. Existing watershed characteristics and environmental resources are described in **Section 2.0**. Resources detailed include: geology, topography, soils, wetlands, rare, threatened and endangered species, cultural and historic sites, land use and water quality. **Section 3.0** provides an overview of local laws, programs and practices, and identifies potential gaps that warrant consideration in an effort to provide watershed

protection and enhancement. Recommendations derived from analysis of resources and existing laws are provided in **Section 4.0**, and an implementation strategy providing details on how to complete each recommendation and funding sources available are provided in **Section 5.0**.

Section 2.0
Watershed Characterization

2.0 WATERSHED CHARACTERIZATION

A watershed is defined as "…the total area of land draining to a body of water such as a stream, river, wetland, estuary, or aquifer" **(NYSDOS, 2009)**. Watershed management is of vital importance for the protection of the resources that exist both within the watershed itself and within the water bodies that the watershed drains to. In order to identify the management needs of the watershed and the most efficient opportunities for addressing the identified needs, the physical and biological resources within the watershed must first be characterized. This section serves to define the overall watershed and sub-watershed areas of Tuthills Creek, and provides a characterization of the resources found within these watershed areas.

2.1 Watershed Study Area and Subwatershed Delineation

Tuthills Creek is a ±3.2 mile stream, located in the central southern portion of Long Island that drains to Patchogue Bay. The health of the Creek and its natural resources correlate with the intensity of surrounding land uses and the extent to which that intensity causes pollutants to be transported to the Creek via stormwater and groundwater. Therefore, identification of the boundaries within which stormwater and groundwater flow to the Creek is central to effective protection and restoration. Of the precipitation that falls on the land, that which is not subject to evapotranspiration becomes either runoff (overland flow) or recharge (water returned downward into the aquifer).

The boundaries of the surface water contributing area have been used to define the Tuthills Creek watershed. Utilizing 2006 Suffolk County Light Detecting and Ranging (LiDAR) data, the Tuthills Creek watershed area and subwatersheds were delineated. A total of thirteen (13) subwatersheds totaling 1,761.23 acres, were identified, ranging in size from approximately 33.75 acres to 430.01 acres (**Figure 1**). The delineation of sub-watersheds assists in overall watershed analysis by allowing a comparison between the distinct areas that contribute drainage to the Creek and identification of the areas that contribute the greatest amount of pollutants to it.

2.2 Topography

The topography of the Tuthills Creek watershed area generally trends from higher elevations along the northeastern and northwestern boundary of the watershed to lower elevations nearing the confluence of Tuthills Creek and Patchogue Bay to the south. **Figure 2** illustrates Tuthills Creek drainage area topography using LiDAR (Light Detecting and Ranging) data collected by Suffolk County in 2006. The highest elevations occur in hilly recreational and wooded areas north of the residential developments in the northwestern portion of the watershed in the vicinity of Skylark Drive and Greenbelt Parkway (97 feet above sea level). Topographically low areas exist along the shoreline of the Tuthills Creek confluence with Patchogue Bay and along the banks of West Lake in the central portion of the watershed. Elevations within these areas range from 1 to 15 feet above sea level (asl).

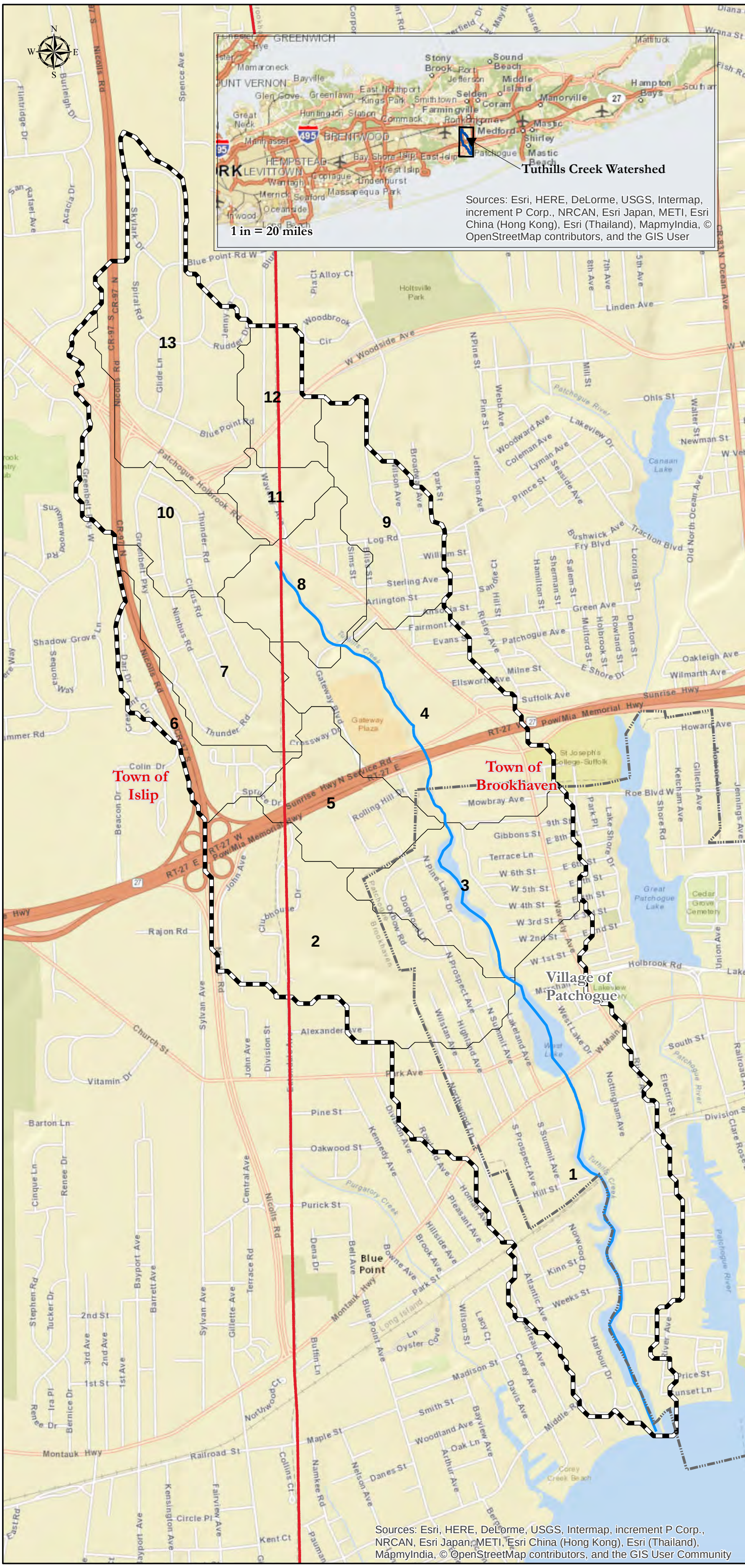
Town of Brookhaven
and
New York Department of State

TUTHILLS CREEK WATERSHED MANAGEMENT PLAN

FIGURE 1

WATERSHED LOCATION MAP

SOURCE: Suffolk County LiDAR;
ESRI Web Mapping Service
SOURCE DATE: 2006



Legend

- Tuthills Creek Watershed
- Tuthills Creek
- Tuthills Creek Subwatersheds
- Town Boundary
- Village Boundary

1 inch = 1,500 feet

0 750 1,500 3,000 Feet

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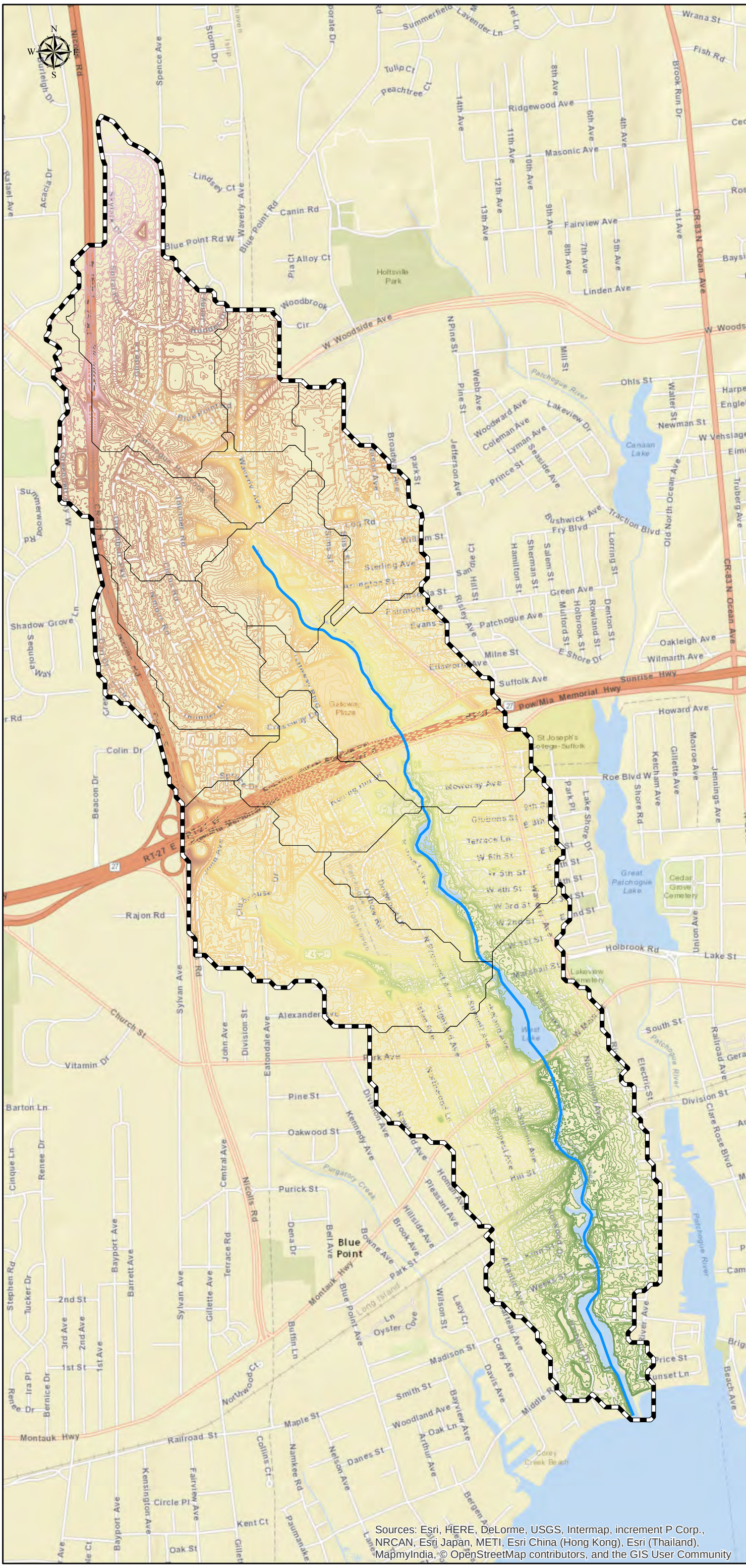
TUTHILLS CREEK WATERSHED MANAGEMENT PLAN

FIGURE 2

TOPOGRAPHY MAP

SOURCE: Suffolk County LiDAR;
ESRI Web Mapping Service
SOURCE DATE: 2006



Legend

- Tuthills Watershed
- Tuthills Creek Subwatersheds
- Tuthills Creek

Elevation (feet asl)

97

0

1 inch = 1,500 feet

0 750 1,500 3,000 Feet

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It should be noted that the Tuthills Creek watershed area generally exhibits moderate slopes in addition to slopes of less than 10%. The steepest slopes occur along the western banks of Tuthills Creek in the area around Gateway Boulevard and north of Gateway Plaza where slopes are up to approximately 25-30%. These areas are wooded and well vegetated so it is not believed that they are subject to accelerated erosion.

2.3 Soils and Erosion

The USDA Soil Survey of Suffolk County, New York provides a complete categorization, mapping and description of the soil types found in Suffolk County **(Warner et al, 1975)**. Soils are classified by similar characteristics and depositional history, into soil series, which are in turn grouped into associations. A soil association is a landscape that has a distinctive proportional pattern of soils; it normally consists of one or more major and at least one minor soil series.

According to the Soil Survey, Tuthills watershed soils are characterized entirely by the Riverhead-Plymouth-Carver association. This association contains the minor soil groups of Haven, Montauk, Raynham, and Wareham soils. Soils of this association are characterized as deep, rolling, excessively drained and well-drained, course textured and moderately course textured soils on moraines. In general, the sandy texture and steep slopes make the soils in much of this association poorly suited to farming. In some areas the soils are underlain by fine sand, silt, or compact glacial till.

The predominant Tuthills Creek watershed soil types (**Figure 3**) include PlA (Plymouth loamy sand, 0-2% slopes) which are generally excessively drained and CuB (Cut and fill land, generally sloping) in which the drainage properties of the soil can vary but are classified as poorly drained. **Table 2-1** below provides a quantification of each soil type within the watershed in addition to the drainage category the soil type falls within. Significant quantities of RdA (Riverhead sandy loam, 0-3% slopes), and CpC (Carver-Plymouth sands, 3 to 15% slopes), which are generally well drained to exceptionally well drained soils, are also present within the watershed. Small portions of the watershed consist of other well drained soils including CpA & CpE – Carver-Plymouth sands, De – Deerfield sand, PlB – Plymouth loamy sand, and RhB – Riverhead sandy loam. Another small portion of the watershed consists of poorly drained soils including At – Atsion sand, Bd – Berryland mucky sand, Fd – Filled land, Tm – Tidal marsh, Ur – Urban land, W – water, and We – Wareham loamy sand.

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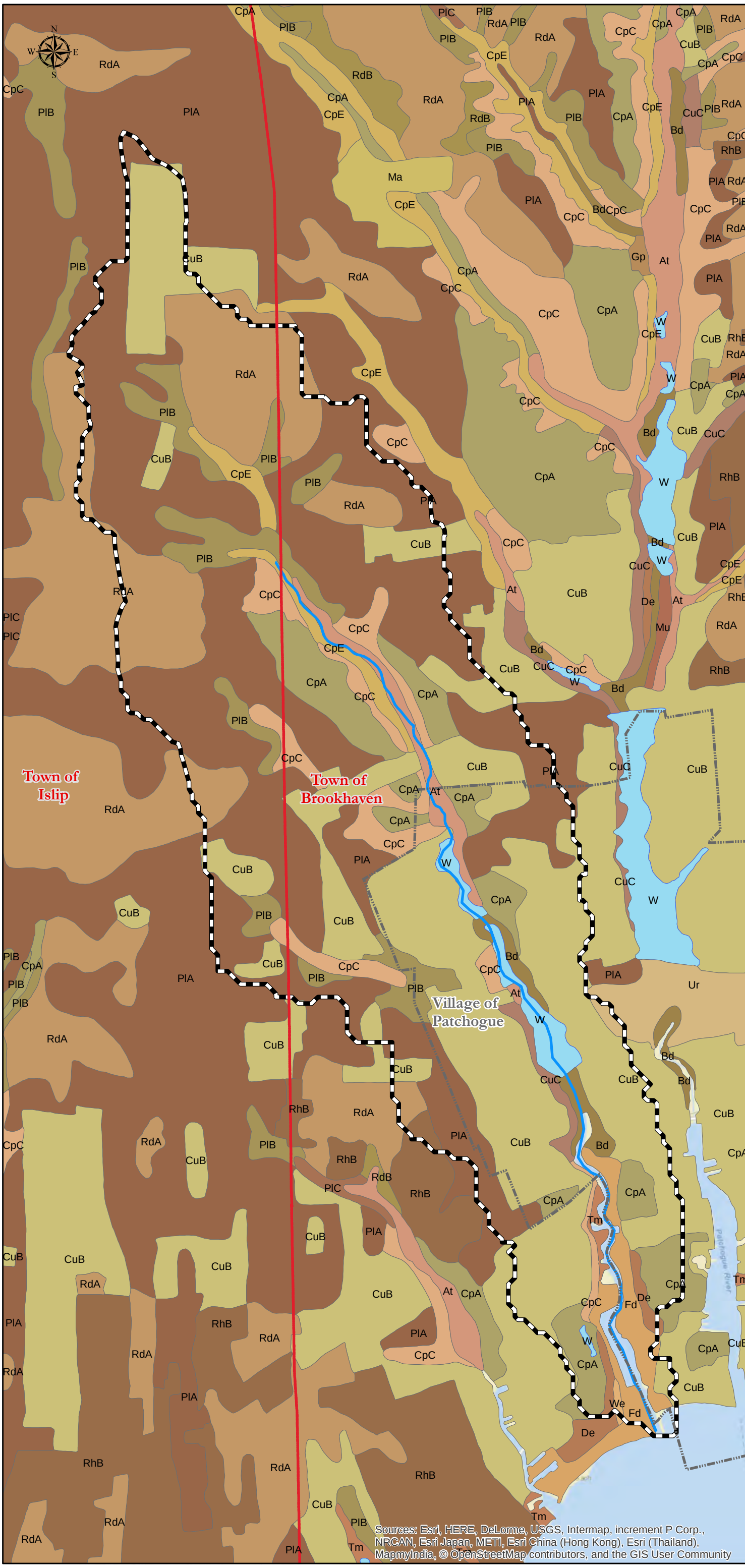
TUTHILLS CREEK WATERSHED MANAGEMENT PLAN

FIGURE 3

SOIL MAP

SOURCE: SSURGO Web Soil Survey
SOURCE DATE: 1975



Legend

- Town Boundary
- Village Boundary
- TuthillsWatershed
- Tuthills Creek

Soils

- At
- Bd
- CpA
- CpC
- CpE
- CuB
- CuC
- De
- Fd
- PlA
- PlB
- RdA
- RhB
- Tm
- Ur
- W
- We

1 inch = 1,500 feet

0 750 1,500 3,000 Feet

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Table 2-1
SOIL TYPES AND ABUNDANCE

WELL DRAINED SOILS		
Soil Type	**Area (Acres)**	**Percent**
CpA	130.16	7.46%
CpC	84.28	4.85%
CpE	26.64	1.53%
De	8.47	0.49%
PlA	562.57	32.35%
PlB	101.67	5.85%
RdA	192.62	11.1%
RhB	4.35	0.25%
Subtotal	*1110.76*	*63.89%*

Source: Suffolk County Soil Survey; Warner et al, 1975; NRCS SSURGO Database; see **Figure 3**

POORLY DRAINED SOILS		
Soil Type	**Area (Acres)**	**Percent**
At	25.48	1.46%
Bd	17.59	1.01%
CuB	506.93	29.15%
CuC	9.48	0.55%
Fd	34.9	2%
Tm	3.88	0.22%
Ur	3.09	0.18%
W	25.05	1.44%
We	1.36	0.08%
Subtotal Poorly Drained Soils	*627.76*	*36.11%*
Subtotal Well Drained Soils	*1110.76*	*63.89%*
TOTAL	**1,738.52**	**100.00%**

Erosion is caused by unconsolidated soils becoming subject to overland transport as a result of land disturbances and weathering conditions such as wind and rain. Since Tuthills Creek watershed soils are comprised primarily of glacial sand deposits, destabilized surfaces are subject to erosion. However, as the watershed is relatively flat and no areas of significant bluffs and/or barren soils with steep slopes are present, erosion is primarily caused by land disturbances and an increase in impervious surfaces. Increased imperviousness results in higher runoff rates and volumes that cause scouring, sediment transport, and removal of soil stabilizing vegetation.

2.4 Geology

The Tuthills Creek watershed lies within an area of glacial outwash deposits that were left behind by the series of glacial advances and retreats which created Long Island. The geology underlying the Tuthills Creek watershed is comprised of six geologic units. The deepest is comprised of crystalline bedrock, which is found at a depth of approximately 1,700 feet below sea level (bsl). Above this bedrock lie the sedimentary deposits which form the three major water-bearing units that underlie the area. The uppermost geologic unit underlying the Tuthills Creek watershed area consists of the surficial deposits that comprise the Upper Glacial formation. This layer is encountered throughout Long Island at the land surface, which ranges from 1 foot above sea level (asl) to approximately 97 feet bsl across the watershed. The thickness of the Upper Glacial formation ranges from

119 feet to 212 feet. These deposits consist primarily of stratified and unstratified sand and gravel interspersed with clay and isolated beds of clay.

2.5 Surface Water

2.5.1 Hydrology

Tuthills Creek is a groundwater fed stream whose headwaters are located on the south side of Waverly Avenue, south of the intersection of Waverly Avenue and Holbrook Road. The actual location of flowing and standing water at the headwaters varies from year to year as a function of precipitation, groundwater elevation and topography. The actual creek bed follows the topographic valley that leads to Patchogue Bay. West Lake, located on the north side of West Main Street, is one of two impoundments located along the creek. The second impoundment, Pine Lake, is located approximately 1,200 feet north of West Lake. The Creek, including both freshwater and tidal waters, is approximately 3.2 miles long.

No true streams feed into the Creek, however, one freshwater wetland complex (NYSDEC Freshwater Wetland #P-7 and P-8; located south and west of Oxbow Road, see **Figure 4**) is hydrologically connected to the Creek.

2.5.2 Surface Water Classifications

The NYSDEC classifies surface waters into several categories, depending on whether the water body is freshwater or tidal. As indicated by the NYSDEC, "All waters of the state are provided a class and standard designation based on existing or expected best usage of each water or waterway segment." Descriptions of these classifications are provided in **Appendix A**. As depicted in **Figure 5**, the portion of the Creek located north of West Lake is classified as C(TS). This indicates that this area could be suitable for fish and wildlife propagation and survival. The (TS) modifier indicates that the water quality standards for this area are those for trout spawning waters. West Lake is classified as B(T) indicating that the lake could be suitable for both recreation and fishing, in addition to fish and wildlife propagation and survival. The (T) modifier indicates that the lake could be suitable as a trout water, and water quality standards for such waters apply to this lake.

The entirety of the creek located south of West Lake is classified as SC, indicating that this portion of the creek is comprised of saline waters and therefore tidally influenced. The SC classification indicates that these waters could sustain fish, shellfish and wildlife propagation and survival. In general, the areas of the creek both north and south of West Lake could be appropriate for recreation; however, other factors now affecting the creek (e.g., water quality, invasive species) may not make them appropriate locations for recreation. All surface waterbody classifications are depicted on **Appendix A**.

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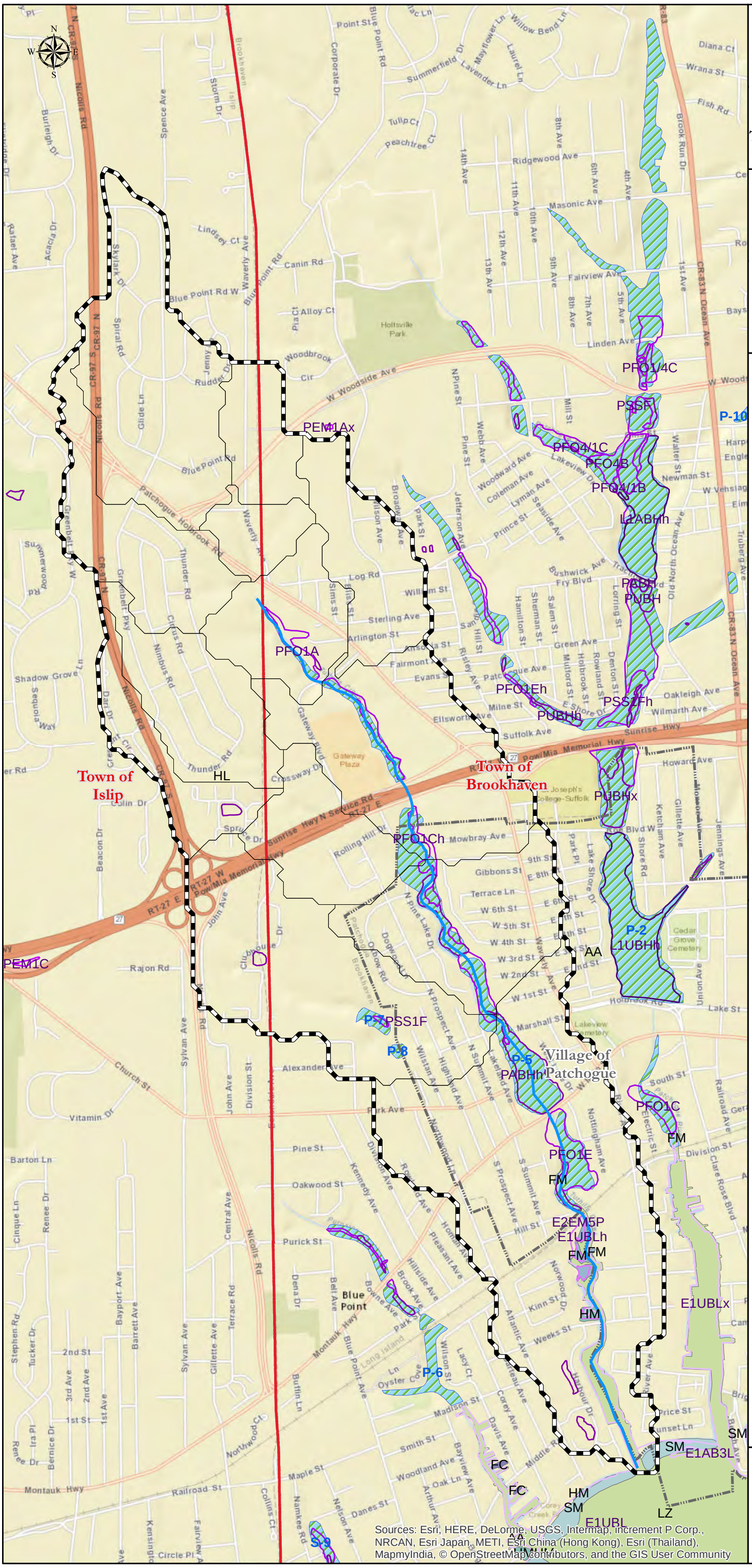
TUTHILLS CREEK WATERSHED MANAGEMENT PLAN

FIGURE 4

FRESHWATER AND TIDAL WETLANDS

SOURCE: NYSDEC;
ESRI Web Mapping Service
SOURCE DATE: 2006



Legend

- Tuthills Creek Watershed
- Tuthills Creek Subwatersheds
- Tuthills Creek
- Town Boundary
- Village Boundary

National Wetlands Inventory

Wetland Type

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- NYSDEC Freshwater Wetlands

NYSDEC Tidal Wetlands

Tidal Wetland Category

- FC
- FM
- HM
- LZ
- SM

1 inch = 1,500 feet

0 750 1,500 3,000 Feet

Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

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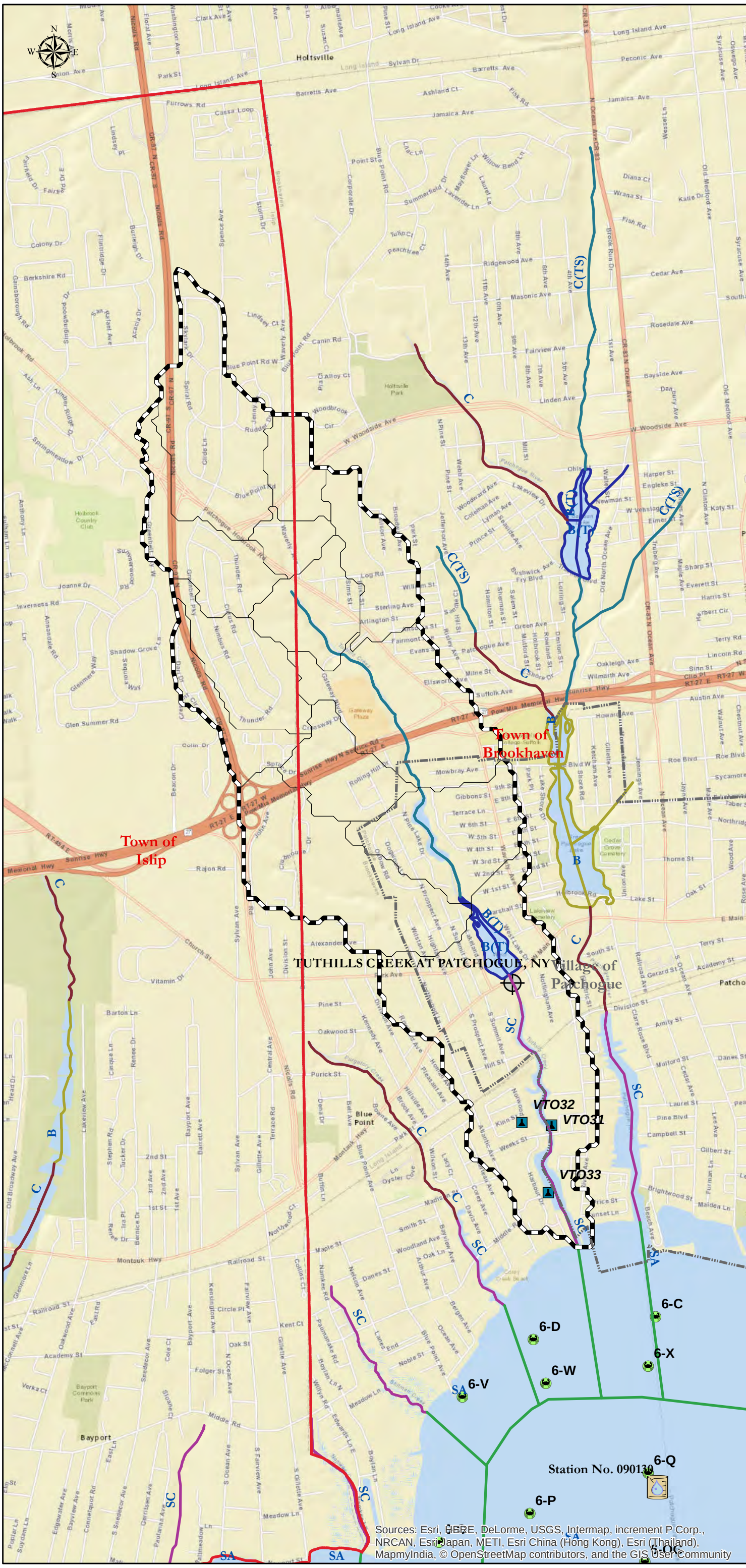
TUTHILLS CREEK WATERSHED MANAGEMENT PLAN

FIGURE 5

SURFACE WATER QUALITY & CLASSIFICATION MAP

SOURCE: NYSDEC; SCDHS; Town of Brookhaven; USGS; ESRI Web Mapping Service
SOURCE DATE: 2015



Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Legend

- Town Boundary
- Village Boundary
- Tuthills Creek Watershed
- Tuthills Creek Subwatersheds

NYSDEC Water Classification

- B
- B(T)
- C
- C(T)
- SA
- SC

- USGS Inactive Surface Water Sites
- SCDHS Sampling Station
- NYSDEC Shellfish Sampling Station
- Tuthills Creek
- CCE Coliform Sample Site

1 inch = 2,000 feet

0 1,000 2,000 4,000 Feet

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2.5.3 Surface Water Quality

Very limited surface water quality data is available from the USGS, NYSDEC and SCDHS for Tuthills Creek. A summary of available data is provided below. Additional information regarding the applicable water quality thresholds, and the regulations that established the threshold is provided in **Appendix B**, including the NYSDEC Part 703, the NYS CALM, and Peconic Estuary Program total nitrogen standards.[1]

USGS Station

A single inactive USGS surface water sampling station exists on Tuthills Creek (**Figure 5**). Two samples at this station were taken; one in 1993 and one in 1994. Samples included analysis for volatile organic compounds (VOC's), semi-volatile organic compounds (SVOC's) and pesticides. Review of the data for this station reveals that no VOC's, SVOC's or pesticides were detected.

NYSDEC CALM Data

As part of the NYSDEC's required monitoring of waterbodies under the Clean Water Act Section 305 (b), West Lake is sampled on a rotating basis to determine its health. Sampling of West Lake was last conducted by the NYSDEC in August 2013 (**Appendix B**) and included analysis of chlorophyll-α, phosphorus, ammonia, nitrogen, secchi disk depth, amongst other standard parameters. Review of this data indicates only one parameter exceeded applicable standards: secchi disk depth. No further data was available to indicate the cause of the reduction in water clarity. It is noted that the value for chlorophyll-α was approaching the threshold value of 10 µg/L and as such, it is possible that the reduced clarity was caused by algae or aquatic flora.

SCDHS Surface Water Quality Data

The SCDHS maintains one surface water sampling station within Patchogue Bay (to which Tuthills Creek flows). This station has been regularly sampled since 1976. 771 samples have been collected at this station, through the end of 2013. A summary of Patchogue Bay sampling station data collected by the SCDHS from 1976-2013 is provided in **Appendix B**.

2.5.4 Shellfish Closure Areas

Shellfish Closure Areas are defined by 6 NYCRR Part 41 and identified by the NYSDEC, which will permanently, seasonally, or temporarily close shellfish harvesting areas due to poor sanitary conditions in the waters surrounding the shellfish beds. State regulations are promulgated through the US FDA's National Shellfish Sanitation Program (NSSP) which provides regulations for the sanitary control of shellfish produced and sold for human consumption. A portion of the NYSDEC regulation is included as **Appendix C** of this

[1] Although Tuthills Creek is not within the Peconic Estuary, the value for total nitrogen for surface waters is currently the only established threshold for total nitrogen in surfaces waters.

document. Shellfish harvesting areas are monitored and regulated by the NYSDEC Bureau of Marine Resources. In addition to permanently closed areas, the NYSDEC monitors Conditional Shellfish areas, which are open to shellfish harvesting at certain times of the year dependent upon water quality (which is directly dependent upon the volume of rainfall or snow melts, i.e., stormwater runoff).

The tidal portion of Tuthills Creek located south of the Long Island Railroad overpass and the immediate area surrounding the mouth of the creek are permanently closed for shellfishing. In general, the inner portion of Patchogue Bay, between the bulkhead at the end of Blue Point Avenue and the southern terminus of Dunton Avenue is permanently closed for shellfishing. This closure is directly related to water quality, as the stations established within the bay regularly exhibit high levels of fecal coliform.

In October 2015 the NYS DEC seasonally closed (May 1 –Sept.30) an additional 1,028 acres for the harvest of shellfish in Patchogue Bay. In general, the area of Patchogue Bay and tributaries lying north of a line extending westerly from the southernmost tip of land at Howells Point (local landmark) to the southernmost tip of the fixed dock at the entrance to the boat basin at Sayville Yacht Club (local landmark) is now also seasonally closed to shellfishing.[2]

2.5.5 Harmful Algal Blooms

Harmful Algal Blooms (HAB's) are occurrences of large quantities of algae that when present at high concentrations present a threat to humans and shellfish. Harmful algal blooms result from excessive levels of nitrogen. The Harmful Algal Event Database (www.haedat.iode.org) provides data regarding HAB events in the United States. The available dataset was reviewed and although several algal blooms were noted in the Great South Bay, none of the available data was specific to Patchogue Bay or Tuthills Creek. However, due to the proximity of Patchogue Bay to the Great South Bay, Patchogue Bay may have been impacted by these blooms. In general, the information provided in the database for Great South Bay in proximity to Patchogue Bay indicated seven occurrences of blooms in a seventeen year period, between 1992 and 2009. All of the recorded blooms have been comprised of *Aureococcus anophagefferens*, the algae associated with brown tide. *Aureococcus anophagefferens* is particularly damaging to marine life, as it can restrict growth, reproduction, and survivorship of shellfish and eelgrass.

2.6 Groundwater

2.6.1 Hydrogeology

The major water-bearing units beneath the Tuthills Creek Watershed are of geologic origin and include the Upper Glacial aquifer, the Magothy aquifer, and the Lloyd aquifer. The

[2] For further information see: http://www.dec.ny.gov/outdoor/103483.html.

Monmouth green sand has a relatively poor permeability and acts primarily as a confining layer above the Magothy aquifer. Most fresh groundwater used for water supply purposes within the area of the watershed is derived from water contained within the Upper Glacial aquifer, but some is withdrawn from the underlying Magothy aquifer **(Schubert, 1999)**.

2.6.2 Groundwater Elevation and Flow

Groundwater in the Tuthills Creek watershed is derived from precipitation. Rainfall and meltwater entering the ground ("recharge") passes downward through the unsaturated zone to a level below which all porous layers are saturated. The upper surface of this level is referred to as the "water table". Groundwater is generally a mild expression of topography, therefore the water table coincides with surface water levels along the shorelines of the Tuthills Creek watershed, and rises in elevation towards the northern, western and eastern edges of the watershed boundaries.

The elevation of groundwater underlying the Tuthills Creek watershed ranges from approximately 48 feet above mean sea level (msl) in the northernmost part of the watershed, to zero (0) at the above ground surface in areas of wetlands and surface water (see **Figure 6**). In general, groundwater underlying the Tuthill Creek watershed area flows from higher elevations on the west and east sides of the Creek towards surface water perpendicular to the contours of equal groundwater elevation. As groundwater migrates away from areas of higher elevation toward the creek network, it eventually discharges to surface water along coastal areas. Near the shore, water entering the system tends to flow horizontally along a shallow flow system and is discharged from the subsurface into streams. Water that enters the system farther inland generally flows vertically downward deeper into the Upper Glacial aquifer before flowing toward the shores of surface water where it is discharged as subsurface outflow. Areas located just outside of the Tuthills Creek watershed contribute groundwater to alternate bodies of water including: Cannan Lake, Greater Patchogue Lake and the Patchogue River to the east, Purgatory Creek to the west, the Atlantic Ocean to the south.

The rate of groundwater flow in the aquifer is dependent on the hydraulic conductivity (or the ease with which water is transmitted through the saturated pore space of an aquifer). Groundwater flow is also influenced by porosity of the aquifer sediments and the amount of available void space in the soil. These factors are used to estimate groundwater travel times within an aquifer, which is important in relation to contamination and discharge. Generally, the Upper Glacial aquifer within the Tuthills Creek Watershed exhibits a horizontal hydraulic conductivity of 255 feet per day (ft/day) and a vertical hydraulic conductivity of 27 ft/day. **Figure 7** provides groundwater travel time and contributing areas to Tuthills Creek.

Water table fluctuations occur in response to changes in the hydrologic water budget (precipitation, evapotranspiration, runoff and recharge) and result in changes in recharge. Seasonal fluctuations in the water table occur because the water table rises during the early part of the year (due to snow melt and spring rainfall), and declines from the beginning of

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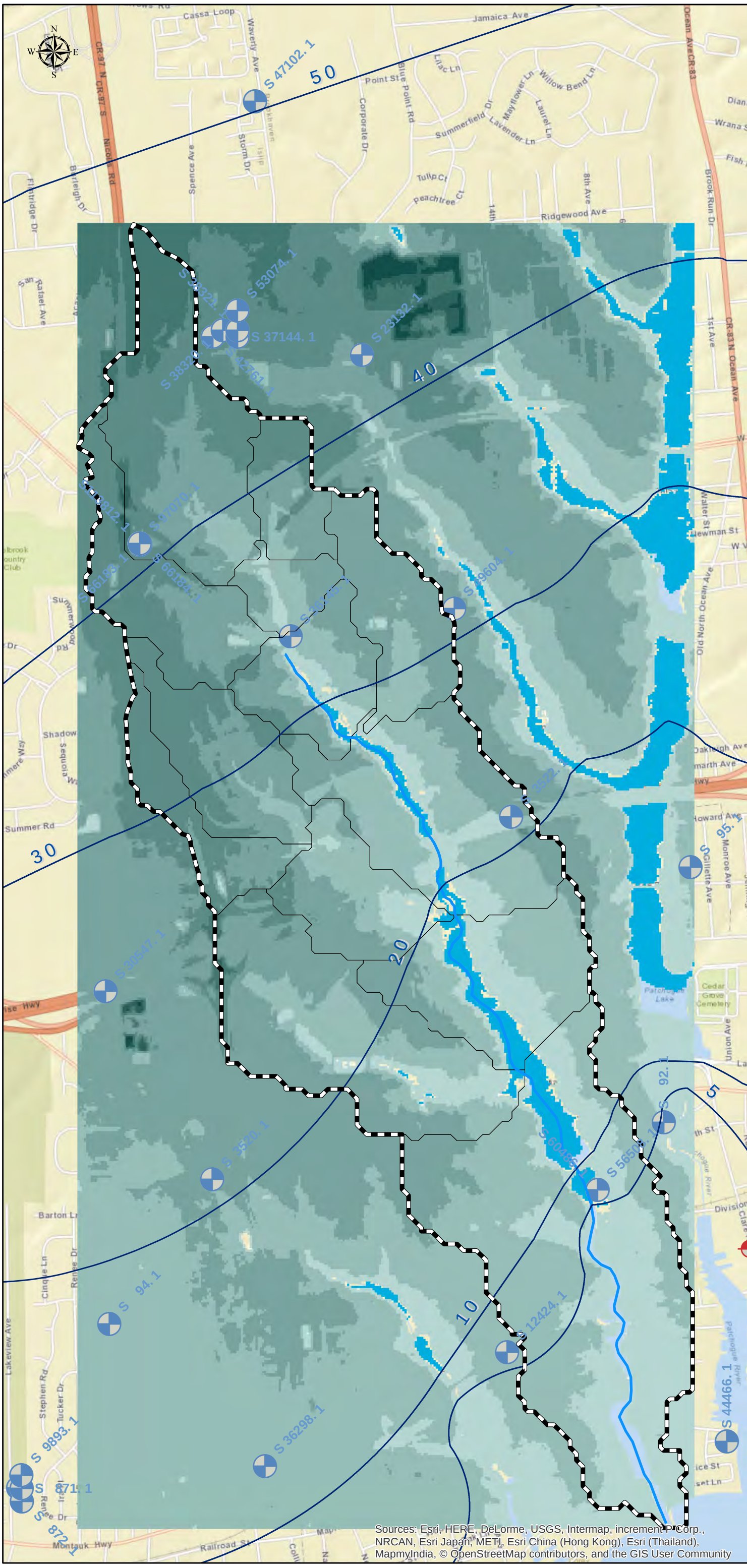
TUTHILLS CREEK WATERSHED MANAGEMENT PLAN

FIGURE 6

WATER TABLE CONTOUR MAP

SOURCE: USGS, 2010; USGS;
ESRI Web Mapping Service
SOURCE DATE: 2010



Legend

- Tuthills Watershed
- Tuthills Creek Subwatersheds
- Tuthills Creek
- Water Table Contour (feet asl)
- USGS Active Groundwater Monitoring Sites
- USGS Inactive Groundwater Monitoring Sites

Depth to Water (2010)

- Surface Water
- 0 - 10
- 10-20
- 20-30
- 30-40
- 40-50
- 50-60
- 60-71

1 inch = 1,500 feet

0 750 1,500 3,000 Feet

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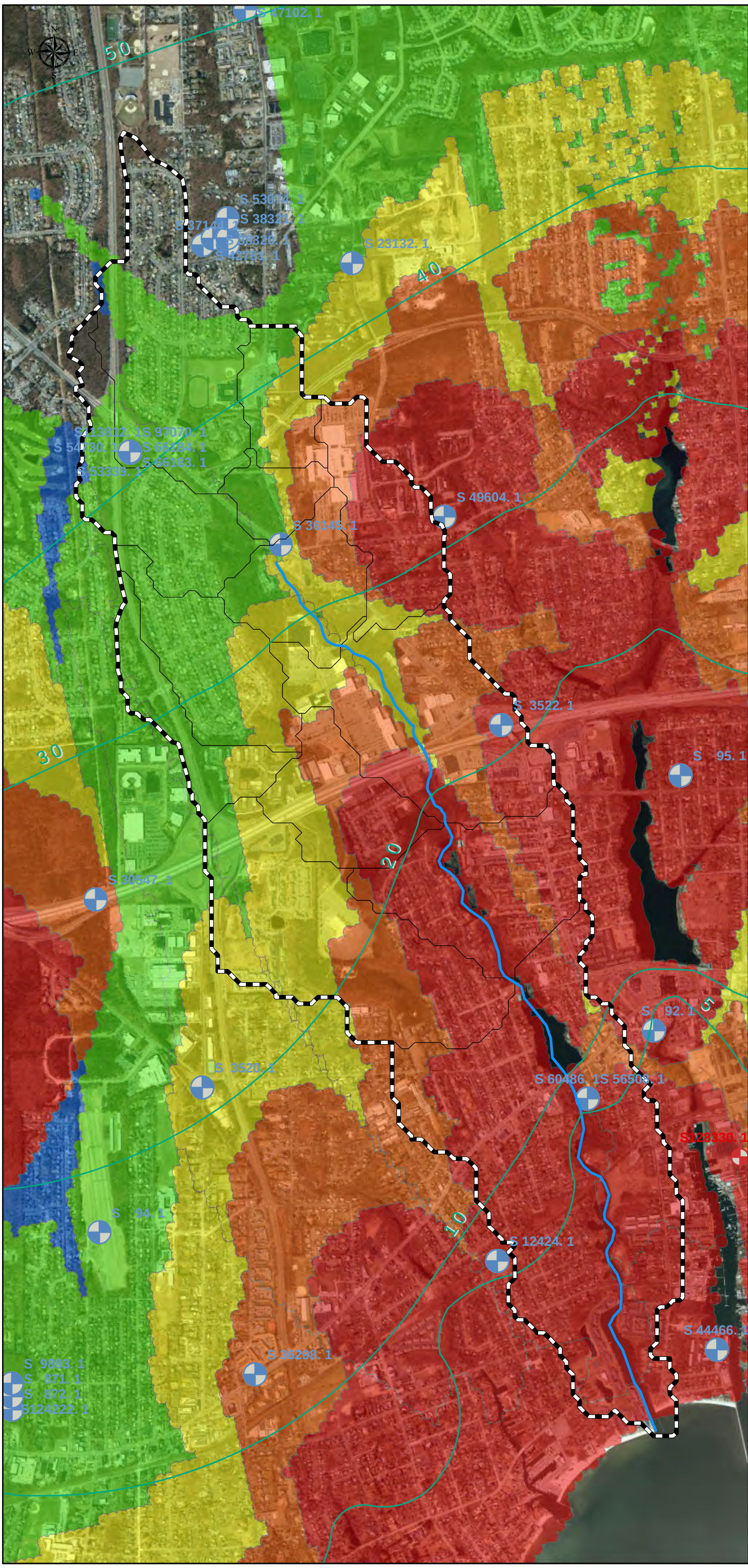

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TUTHILLS CREEK WATERSHED MANAGEMENT PLAN

FIGURE 7

GROUNDWATER CONTRIBUTING AREA

SOURCE: SCWRMP; NYSGIS Orthoimagery Program
SOURCE DATE: 2010; 2013

Legend

- TuthillsWatershed
- Water Table Contour (feet asl)
- Tuthills Creek
- Tuthills Creek Subwatersheds
- USGS Active Groundwater Monitoring Sites
- USGS Inactive Groundwater Monitoring Sites
- 0-2 Year Groundwater Contributing Area
- 2-5 Year Groundwater Contributing Area
- 5-10 Year Groundwater Contributing Area
- 10-25 Year Groundwater Contributing Area
- 25-50 Year Groundwater Contributing Area

1 inch = 1,500 feet

0 750 1,500 3,000 Feet

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summer through late fall. Water table fluctuations also occur as a result of longer term climatic conditions such as droughts and periods of high rainfall. Groundwater pumpage also affects water table elevations on a more localized basis, dependent upon pumpage rates and well placement.

2.6.3 Groundwater Quality

The Tuthills Creek watershed area derives its water supply from groundwater stored in the aquifer beneath Long Island. Protection of groundwater quality and maintaining an adequate supply of fresh groundwater is therefore of paramount importance to ensure availability of water supply for human consumption. Additionally, protection of groundwater quality is necessary to ensure the health of the natural resources and surface waters to which groundwater flows, such as those of Tuthills Creek and Patchogue Bay. Additionally, acceptable water quality is especially important to Tuthills Creek which discharges to Patchogue Bay for maintaining favorable fishing conditions and for supporting the seasonal population that visit the area for recreation.

Groundwater can become impaired when pollutants are infiltrated into the soil. In the Tuthills Creek watershed area, nitrogen is a groundwater contaminant of concern due to land use density, landscaping fertilizers and improperly functioning wastewater systems. Pathogens (disease-causing bacteria) are another groundwater contaminant of concern in the Tuthills Creek drainage area, also due to poorly functioning cesspools and septic systems. Cesspools and septic systems that do not have adequate unsaturated leaching depth below the leaching pool discharge do not allow for sufficient conversion of ammonia to nitrate and therefore have a greater groundwater impact (and surface water impact when placed in areas proximate to surface water). Therefore, since portions of the Tuthills Creek watershed have been characterized as having a shallow depth to groundwater (specifically in the areas close to surface water and in the southern end of the watershed), nitrogen and pathogen impacts to groundwater and surface water are a concern. This is an existing condition based on historic development.

In 1978, the Long Island Regional Planning Board completed the Comprehensive Waste Treatment Management Study (known as the 208 study funded under Section 208 of the Water Pollution Control Act) that established a basis for control of density of development to maintain water quality. In 1980, SCDHS promulgated Article 6 of the SCSC that identified groundwater management zones (GMZ's) and lot sizes for residential development. Lot sizes ranged from 20,000 SF (approximate equivalent of 2 units per acre) in zones other than deep aquifer recharge areas and areas that contribute to water quality of the Long Island south shore bays, to 40,000 SF (approximate equivalent of 1 unit per acre) for long term water supply aquifer recharge areas and areas that contribute to water quality of south shore bays.

The Tuthills Creek watershed lies in GMZ VI, which is characterized as a shallow flow system and is identified as a surface water impact area due to long residence times in Great

South Bay and Moriches Bay. High priority alternatives to limit impact to surface waters in this zone consist of the following:

- minimization of population density by encouraging large lot development;
- control of stormwater runoff;
- control of animal populations and animal waste disposal;
- new landfills should be permitted under current New York State policy provided they are landward of primary coastal zones and sufficient depth to water;
- restriction of fertilizer use;
- require nitrogen removal for treatment plants recharging effluent;
- prohibit new development along streams and shorelines due to low flushing rates and create buffer zones where possible along all water bodies and protect all remaining marine wetlands;
- prohibit the use of certain chemical cleaners in on-lot systems; and
- provide for routine maintenance of on-site disposal systems.

Groundwater wells in the area of Tuthills Creek from which data was collected include wells maintained by the Suffolk County Water Authority (SCWA), the New York Department of Environmental Conservation (NYSDEC) and the United States Geological Survey (USGS). Observation wells that have data available for the area within the watershed are maintained by the USGS (see **Figure 6)**. These wells are not routinely monitored for water quality. Since there is no routine monitoring occurring in the area, there is limited data available regarding the groundwater quality of the Tuthills Creek watershed; however, a limited number of wells were monitored by the previously noted agencies for some water quality constituents during 1998-2000 with one well monitored as recently as 2012. Data collected during this period (summarized in **Table 2-2** below) indicated that water quality in the vicinity of Tuthills Creek is generally acceptable. No volatile organic compounds (VOCs), perchlorate, or pesticides were detected in groundwater samples. In addition, nitrite concentrations ranged from non-detect to 2 mg/l and nitrate concentrations ranged from non-detect to 20 mg/l.

An overview of contaminants of concern in groundwater in the Tuthills Creek watershed area is provided based on review of water quality reports from the local water purveyor. The Tuthills Creek area is serviced by the Suffolk County Water Authority (SCWA) and lies within Distribution Area 1. In order to comply with State regulations, each distribution area issues an annual report to inform residents of the quality of their drinking water and involves analysis of a variety of organic and inorganic compounds (metals) as well as total coliform, nitrate, nitrite, total trihalomethanes (disinfection by-products) and synthetic organic compounds. The most recent reports available for review were from 2015.

Table 2-2
GROUNDWATER QUALITY RESULTS

Well S No.	VOC's	Nitrite	Nitrate	Pesticides	Dates Data Collected	Number of Samples
S 36145.1	nondetect	0 mg/L	0.3 mg/l	not analyzed	1971	1
S 49604.1	nondetect	0.012-2 mg/L	9.7-20 mg/L	not analyzed	1973 - 1985	3
S 54730.1	nondetect	nondetect	0.1-0.72 mg/L	not analyzed	1979 - 1999	10
S 59744.1	nondetect	0-0.007 mg/L	0-0.06 mg/L	nondetect*	1979 - 2012	11
S 60486.1	nondetect	nondetect	0-0.02 mg/L	not analyzed	1979 - 1985	8
S 66183.1	nondetect	0.25-0.48 mg/L	5.8-6 mg/L	not analyzed	1983 - 1985	5
S 66184.1	nondetect	nondetect	nondetect	not analyzed	1983 - 2004	7
S 97070.1	nondetect	nondetect	nondetect	not analyzed	1999 - 2000	6
S 113812.1	nondetect	0-0.016 mg/L	0-0.088 mg/L	not analyzed	1999 - 2000	20

*-Pesticides analyzed include: Hexazinone, Simazine, Prometryn,, Cyanazine, Fonofos, Malathion, <Metolachlor, Diazinon, Atrazine, Alachlor and Acetchlor.
Samples provided in Table 2-2 were collected between 1998-2012.

Review of the results presented in the Distribution Area 1 report indicated that three (3) radioactive compounds were detected but are attributable to the erosion of natural deposits. In addition, the report indicated that varying concentrations of several analyzed inorganics which included barium, boron, cadmium, calcium, chloride, chromium, copper, iron, lead manganese, magnesium, nickel, nitrate, perchlorate, potassium, silicon and zinc were detected. The likely sources of these compounds are the erosion of natural deposits, galvanized pipe, saltwater intrusion, household plumbing, natural occurrences, alloys, coatings manufacturing, batteries, fertilizer and septic tanks. Concentrations for all of these compounds were found to be within their respective groundwater standard limits.

The annual SCWA report also indicated that several synthetic organic compounds, specific pharmaceuticals and pesticides as well as volatile organic compounds were also detected but at levels below their respective groundwater limits. All of these compounds may be attributable to man-made activity. In addition, only one disinfectant product (chlorine) was detected at a concentration below their respective groundwater standard limit. A summary of the reports results can be found in **Appendix D**.

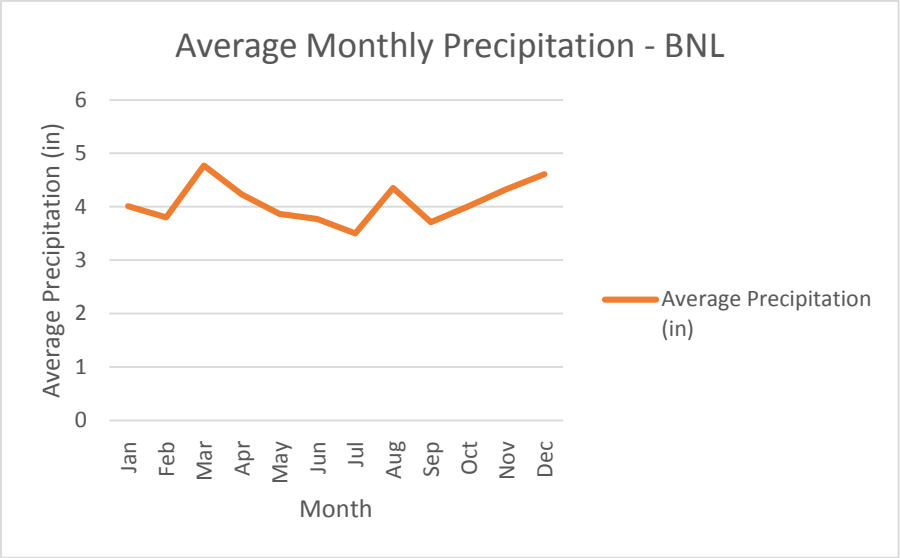
Based on water quality reports from local water purveyors, iron is the only constituent that exceeded drinking water standards. Iron is naturally present as a result of leaching of the metal from geologic deposits, particularly as a result of the low pH of water recharging and in storage in the aquifer. Iron is primarily an aesthetic parameter that can result in discoloration of water with minimal health concerns in the relatively low concentrations detected. The remaining compounds detected are either naturally occurring compounds, or result from corrosion of household plumbing.

It is noted that no Federal or State listed superfund sites occur within the watershed boundaries.

2.7 Precipitation

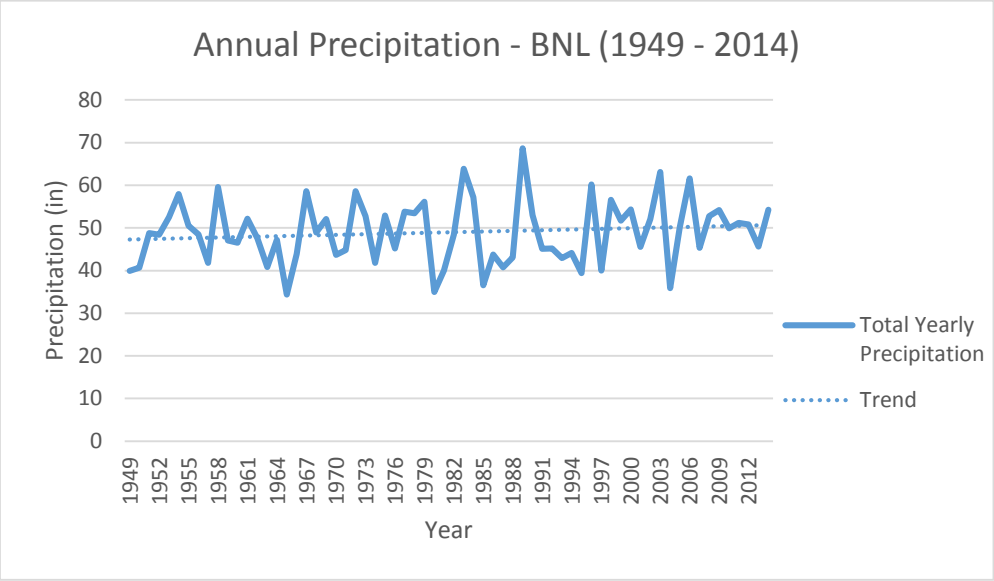
Precipitation trends in the watershed area are typical of that of the Long Island region. Data for Long Island was obtained from Brookhaven National Laboratory's Meteorological Services website and analyzed for monthly and annual trends. **Graph 1** illustrates average monthly precipitation while **Graph 2** illustrates annual precipitation from 1949 to 2014. As illustrated in **Graph 1**, the majority of precipitation occurs between November and March, while precipitation declines during mid-spring and summer months. The highest average precipitation occurs in March, which averages 4.77 inches within that month. The smallest average quantity of precipitation occurs in July, which only averaged 3.5 inches of precipitation.

Graph 1
Average Monthly Precipitation – BNL



As illustrated in **Graph 2**, annual total precipitation varies from year to year as a result of varying climate conditions. The dataset indicates that 1965 experienced the lowest quantity of precipitation, receiving only 34.35 inches of precipitation, while 1989 experienced the greatest quantity of precipitation, receiving 68.66 inches. The data illustrate an increasing trend in annual precipitation at this station.

Graph 2
Annual Precipitation – BNL (1949 – 2014)



2.8 Flood Zones

The Federal Emergency Management Agency (FEMA) has prepared Flood Insurance Rate Maps (FIRM) which identify potential flooding zones as well as the frequency with which areas may be subject to flooding. There are five (5) flood zones which have been identified along the tidal portion of the creek and the area immediately surrounding the remainder of the creek, north of West Lake. **Table 2-3** provides a summary and description of each of these flood zones. The location of each flood zone is illustrated in **Figure 8**.

Table 2-3
FEMA FLOOD ZONES

Flood Zones	Description of Flooding Conditions
Zone X	Area of minimal flood hazard, usually depicted on FIRMs as above the 500-year flood level
0.02% Change Annual Flood Hazard	"500-year flood" - has a 0.02 percent chance of a flood occurring in any year.
Zone A	Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown.
Zone AE	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. The base floodplain where base flood elevations are provided.

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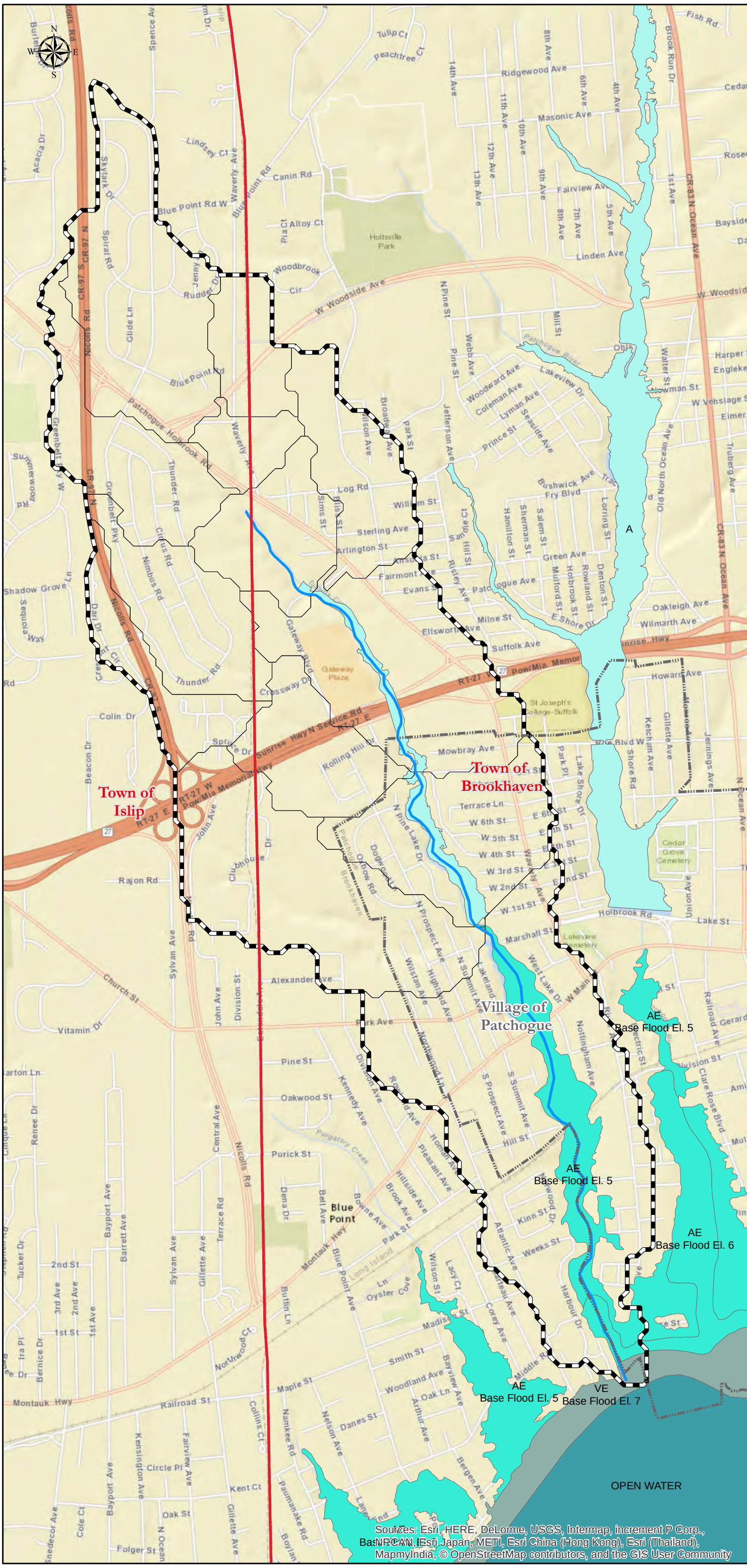
TUTHILLS CREEK WATERSHED MANAGEMENT PLAN

FIGURE 8

FEMA FLOOD ZONES

SOURCE: FEMA;
ESRI Web Mapping Service
SOURCE DATE: 2009



Legend

- Town Boundary
- Village Boundary
- TuthillsWatershed
- Tuthills Creek
- Tuthills Creek Subwatersheds

FEMA Flood Zones

- A
- AE
- OPEN WATER
- VE

1 inch = 1,500 feet

0 750 1,500 3,000 Feet

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Flood Zones	Description of Flooding Conditions
Zone VE	Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.

Source: Federal Emergency Management Agency (FEMA)

As illustrated, the majority of areas susceptible to flooding occur within the low-lying areas adjacent to the creek. The area south of West 1st Street is defined as Flood Zone AE with a Base Flood Elevation (BFE) of 5 feet asl. A small area south of Harbor Drive is defined as Flood Zone AE with a BFE of 6 feet asl. The southernmost portion of the creek is within Flood Zone VE, where the BFE is 7 feet asl. The remaining area within a defined flood zone, located north of West 1st Street, is within Flood Zone A and no BFE is provided.

Additionally, Sea, Lake and Overland Surge from Hurricanes (SLOSH) data was reviewed to determine potential flooding areas from hurricanes (**Figure 9**). This dataset was developed by the National Weather Service to estimate potential surge heights from each hurricane category. As illustrated, the majority of the low lying areas along the southern portion of the creek, south of Main Street, would be vulnerable to surge from category 1 and 2 hurricanes. The majority of the southernmost portion of the watershed, south of Main Street, would be vulnerable to category 3 and greater hurricanes, while the area immediately surrounding West Lake and the creek south of Sunrise Highway could experience storm surge from a category 4 or greater hurricane.

Generally, both data sets illustrate similar key areas susceptible to flooding during major storm events, indicating that flooding within the Tuthills Creek watershed would mainly occur in areas of low topographic elevation. It is noted, however, that the SLOSH data illustrates a greater portion of the watershed vulnerable to surge from category 3 and above hurricanes, suggesting that existing drainage structure and land use may play a role in flooding in addition to topography.

2.9 Natural Resources

2.9.1 Wetlands

Freshwater Wetlands

Freshwater wetlands (i.e., ponds and marshes) are located throughout the Tuthills Creek watershed. The NYSDEC has identified three freshwater wetlands within the Tuthills Creek Watershed; these areas comprise approximately 76.1 acres of wetland systems. These freshwater wetlands are all catalogued by the NYSDEC on the Patchogue and Sayville United States Geological Survey (USGS) 7.5-minute quadrangle maps and are illustrated in **Figure 4**. NYSDEC classifies freshwater wetlands into four categories, which are described in §664.5 of the NYSDEC regulations. Class I wetlands are considered the most pristine and therefore the most valuable, while Class IV wetlands lack

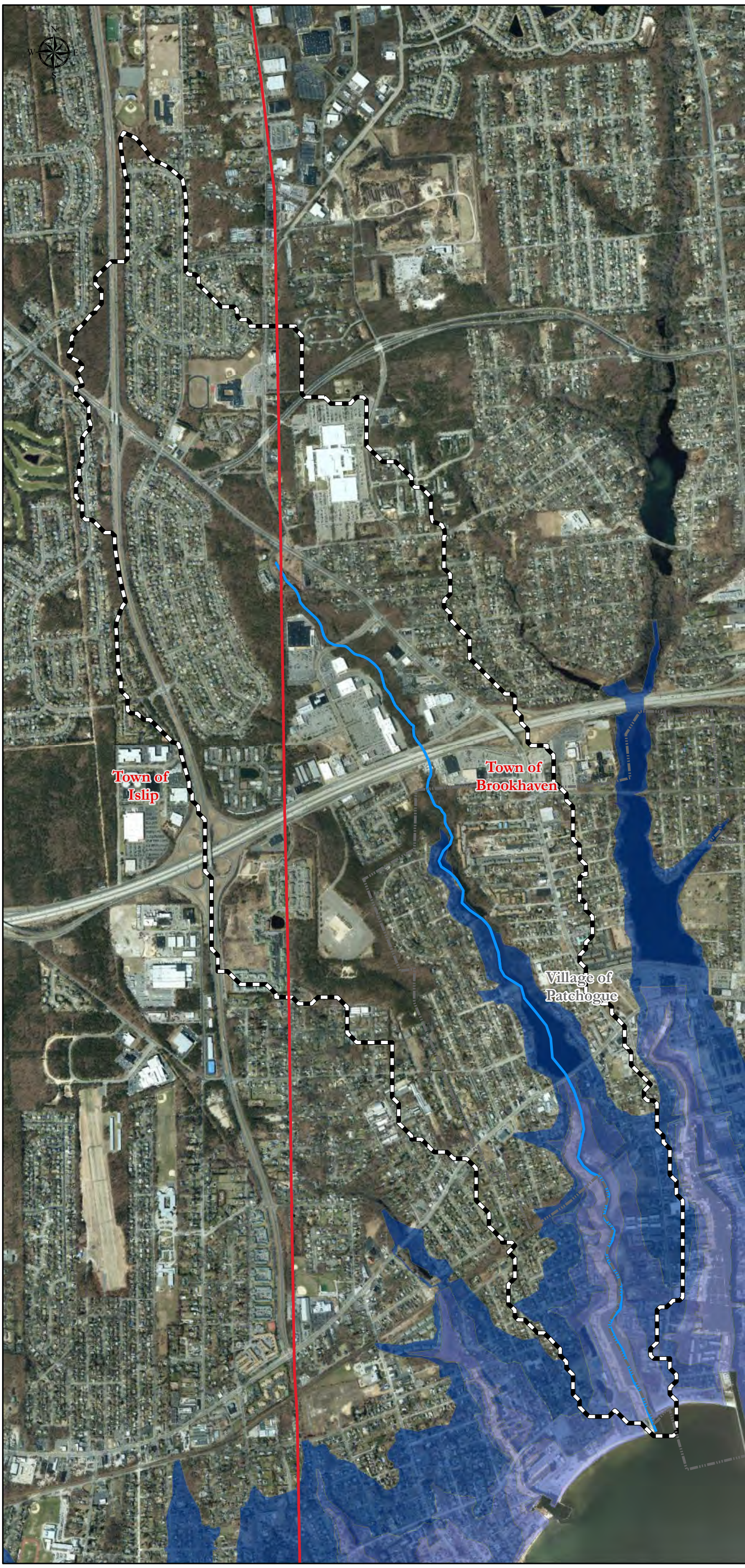

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FIGURE 9

SEA, LAKE AND OVERLAND SURGE FROM HURRICANES (SLOSH) MAP

SOURCE: NYSEMO; NYSGIS Orthoimagery Program
SOURCE DATE: 2006; 2013

Legend

- Town Boundary
- Village Boundary
- TuthillsWatershed
- Tuthills Creek

SLOSH Zone

- Storm Surge from a Category 1 Hurricane
- Storm Surge from a Category 2 Hurricane
- Storm Surge from a Category 3 Hurricane
- Storm Surge from a Category 4 Hurricane

1 inch = 1,500 feet

0 750 1,500 3,000 Feet

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characteristics which would give the wetland a high value. **Table 2-4** below lists each wetland, their approximate size, and the NYSDEC classification.

Table 2-4
NYSDEC FRESHWATER WETLANDS

NYSDEC Freshwater Wetland Number	NYSDEC Classification	NYSDEC Wetland Acreage	Acreage of Wetland Within the Watershed
P-5	I	71.4	71.4
P-7	II	3.4	3.4
P-8	II	1.3	1.3
Grand Total	**---**	**76.1**	**76.1**

As illustrated in **Table 2-4** above, the majority of the freshwater wetland area within the watershed is Class I, while the two smaller wetlands are Class II. This is indicative of the generally good quality of freshwater wetlands within the watershed. It is noted that the largest freshwater wetland, P-5, is a 71.4 acre wetland complex associated with the floodplain of Tuthills Creek and includes West Lake. This wetland complex begins in the headwaters of Tuthills Creek, south of Waverly Ave and continues south to where the wetlands turn brackish and tidal wetlands begin in the area north of the Long Island Railroad tracks. This wetland is generally of high quality as it is a Class I wetland. The two wetlands of moderate quality (P-7 and P-8) are located adjacent to one another in the west-central portion of the watershed.

Tidal Wetlands

The tidal wetlands within the watershed are located where Tuthills Creek intersects and interfaces with tidal waters from Patchogue Bay. These wetlands contain saline waters, which originate from the ocean-fed surface waters associated with the bay. These features are formed by coastal processes and, with the exception of formerly connected tidal wetlands, are subject to tidal influence. These areas are not only vital to the ecological systems to which they serve, but also function to control storm surges during flood and major storm events which may impact sensitive watershed areas. The NYSDEC maintains a series of tidal wetlands maps which document the location and type of tidal wetlands within New York State and includes a complete inventory for the area of the Tuthills Creek watershed. Tidal wetlands within the watershed are illustrated in **Figure 4**. The NYSDEC classifies tidal wetlands into fourteen distinct categories. Definitions for those categories present within the Tuthills Creek watershed are provided below.

SM - Coastal Shoals, Bars and Mudflats: The tidal wetland zone that at high tide is covered by saline or fresh tidal waters, at low tide is exposed or is covered by water to a maximum depth of approximately one foot, and is not vegetated.

LZ - Littoral Zone: The tidal wetland zone that includes all lands under tidal waters which are not included in any other category. There shall be no LZ under waters deeper than six feet at mean low water.

HM - High Marsh: The normal upper most tidal wetland zone usually dominated by salt meadow grass, *Spartina patens*; and spike grass, *Distichlis spicata*. This zone is periodically flooded by spring and storm tides and is often vegetated by low vigor, *Spartina alterniflora* and Seaside lavender, *Limonium carolinianum*. Upper limits of this zone often include black grass, *Juncus gerardi*; chairmaker's rush, *Scirpus sp.*; marsh elder, *Iva frutescens*; and groundsel bush, *Baccharis halimifolia*.

FM - Fresh Marsh: The tidal wetland zone found primarily in the upper tidal limits of the riverine system where significant fresh water dominates the tidal zone. Species normally associated with this zone include narrow leaved cattail, *Typha angustifolia*; tall brackish water cordgrass, *Spartina pectinata* and/or *Spartina cynosuroides*; and the more typically emergent freshwater species such as arrow arum, *Peltandra sp.*; pickerel weed, *Ponderia sp.*; and cutgrass, *Leersia sp.*

The tidal wetlands located within the Tuthills Creek Watershed are a mix of vegetated and non-vegetated wetland areas. In the southernmost portion of the watershed, along the confluence with Patchogue Bay, the area consists of LZ within the creek and SM along the eastern and western banks, suggesting that mudflat areas occur in this area, which are habitat for fish and shellfish. Vegetated tidal wetlands, consisting of HM and FM, exist primarily in the watershed area between Weeks Street and West Main Street. This vegetated tidal wetland area likely receives freshwater runoff from the concentration of residential and commercial properties in the immediate area. The quality of these wetland areas will depend heavily on the amount of anthropogenic disturbance and influence the wetland areas receive.

2.9.2 Habitats

NYSDOS Significant Coastal Fish & Wildlife Habitat

NYSDOS has designated one Significant Coastal Fish & Wildlife Habitats (SCFWH)near the Tuthills watershed, which is identified as Great South Bay East. This area is designated due to the presence of rare, threatened or endangered species and populations of waterfowl which use the area, the rarity of the ecosystem, the availability of sport fishing, and the irreplaceability of the ecosystem. The habitat narrative which describes the reasoning behind the SCFWH designation for the habitat is provided in **Appendix E.**

As discussed in the habitat narrative, the habitat area was designated as a SCFWH for the following reasons:

- Great South Bay East is the largest, protected shallow coastal bay in New York State.
- Piping plover (endangered species), least tern (threatened species) and common tern (threatened species) utilize the habitat for nesting and feeding areas.

- The bay has a commercial hard clam industry of statewide significance and is a waterfowl hunting area of county-wide significance.
- This area supports one of the largest concentrations of wintering waterfowl in New York State, and population levels of diving ducks are unusual in the northeastern U.S.
- The habitat on Great South Bay East is irreplaceable.

Significant Natural Communities

Data provided by the New York Natural Heritage Program (NYNHP) was reviewed for the watershed (**Figure 10**). As illustrated, no significant natural communities identified by the NYNHP are located within the watershed boundaries. Additionally, South Shore Estuary Reserve (SSER) habitat data was reviewed to determine if any significant aquatic habitats were present within the watershed and areas in the immediate vicinity of the mouth of the creek. As illustrated on **Figure 10**, only unconsolidated sediments and unknown benthic habitat areas are located within the tidal portion of the creek and in the immediate vicinity of the mouth of the creek; no submerged aquatic vegetation is present within the watershed.

2.10 Climate Change & Sea Level Rise

In November 2014, the United Nations Intergovernmental Panel on Climate Change (IPCC) released their fifth assessment of climate change and its impacts. According to that assessment, as the average temperature of the earth increases, sea level is anticipated to rise due to thermal expansion, glacier melt and the melt of polar ice sheets. The report indicates that sea level rise is predicted to range from 0.63 feet to approximately 2.76 feet globally, with regional differences resulting in greater or lesser changes in rise. A regional estimate for Long Island sea level rise was developed by Coastal Resilience, a partnership between The Nature Conservancy and NOAA, under a variety of scenarios. The maximum sea level rise anticipated for the south shore of Long Island is anticipated to be approximately 2 feet; on average, sea level rise is anticipated to be approximately 18 inches.

Model results from www.coastalresilience.org were examined for the Tuthills Creek watershed area, and revealed that the areas along the creek south of West Lake are the most likely to be impacted by sea level rise. In particular the area immediately north of the railroad tracks on the east side of the creek would experience the greatest increase in flooding due to sea level rise, assuming a high sea level rise scenario with no storm surge (i.e., conditions on a normal day without significant wind or precipitation) for the year 2080. Under a scenario in which sea level rise is high, and storm surge is equivalent to that of a Category 3 hurricane, a significant area south of Sunrise Highway would be flooded within the watershed. Further, the model provided by www.coastalresilience.org indicates that the mouth of Tuthills Creek is a high priority habitat for conservation as this area contributes to reducing current risk of flooding from sea level rise.

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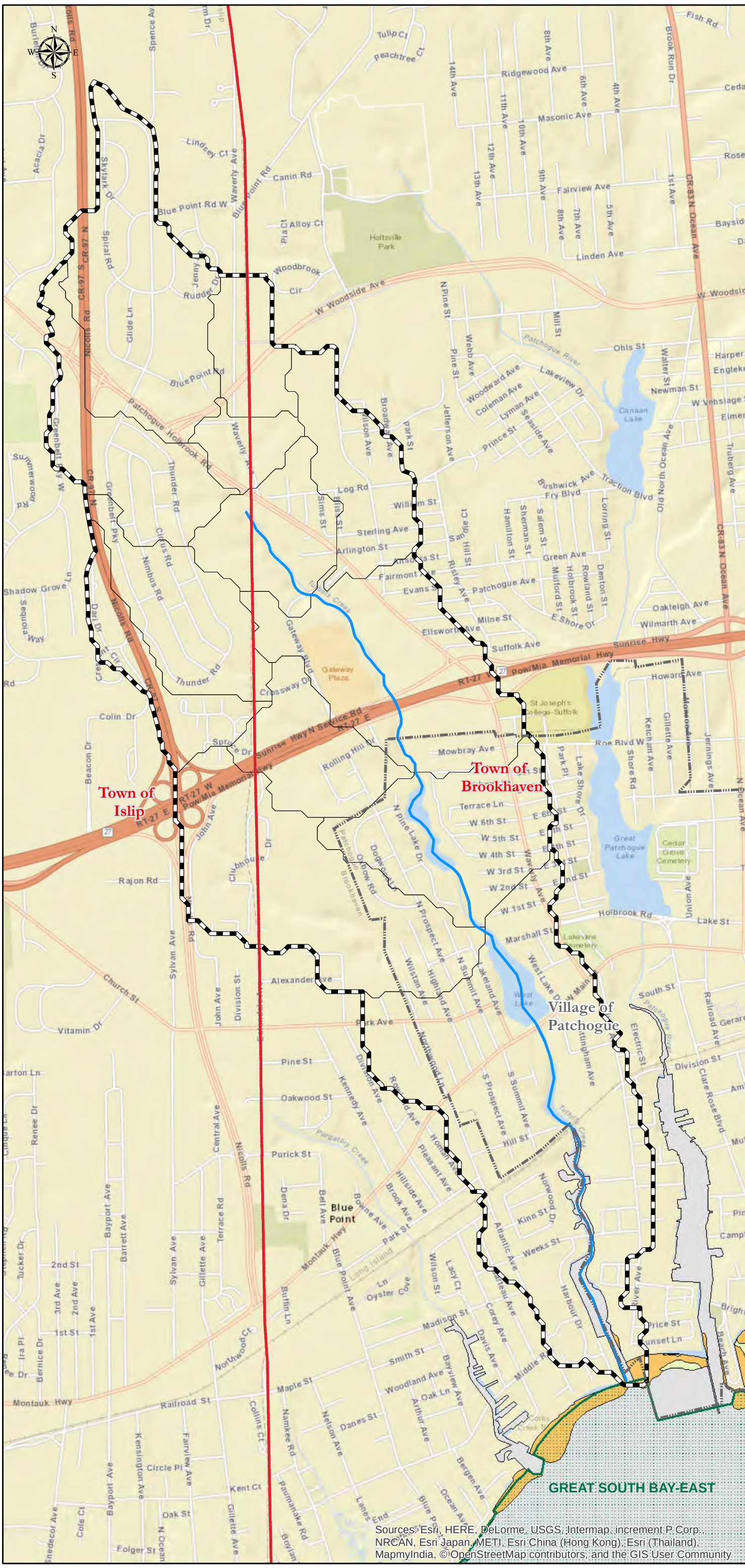
FIGURE 10

SIGNIFICANT NATURAL RESOURCES

SOURCE: NYSDOS; NYNHP;
ESRI Web Mapping Service
SOURCE DATE:



Legend

- Tuthills Creek Watershed
- Tuthills Creek Subwatersheds
- Tuthills Creek
- Town Boundary
- Village Boundary
- Anadramous Fish Run (none)
- NYNHP Significant Natural Communities (none)
- NYS Signficant Coastal Fish & Wildlife Habitat

SSER Habitats

- Land
- Reef/Hardbottom
- Submersed Aquatic Vegetation (SAV)
- Tidal Marsh
- Unconsolidated Sediments
- Unknown Benthic Habitat

1 inch = 1,500 feet

0 750 1,500 3,000 Feet

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2.11 Human & Socioeconomic Resources

2.11.1 Zoning

Zoning within the Tuthills Creek watershed is established separately for the jurisdictional areas of the Towns of Islip and Brookhaven and the Village of Patchogue. **Table 2-5** summarizes the zoning categories for each of the three municipalities in the watershed.

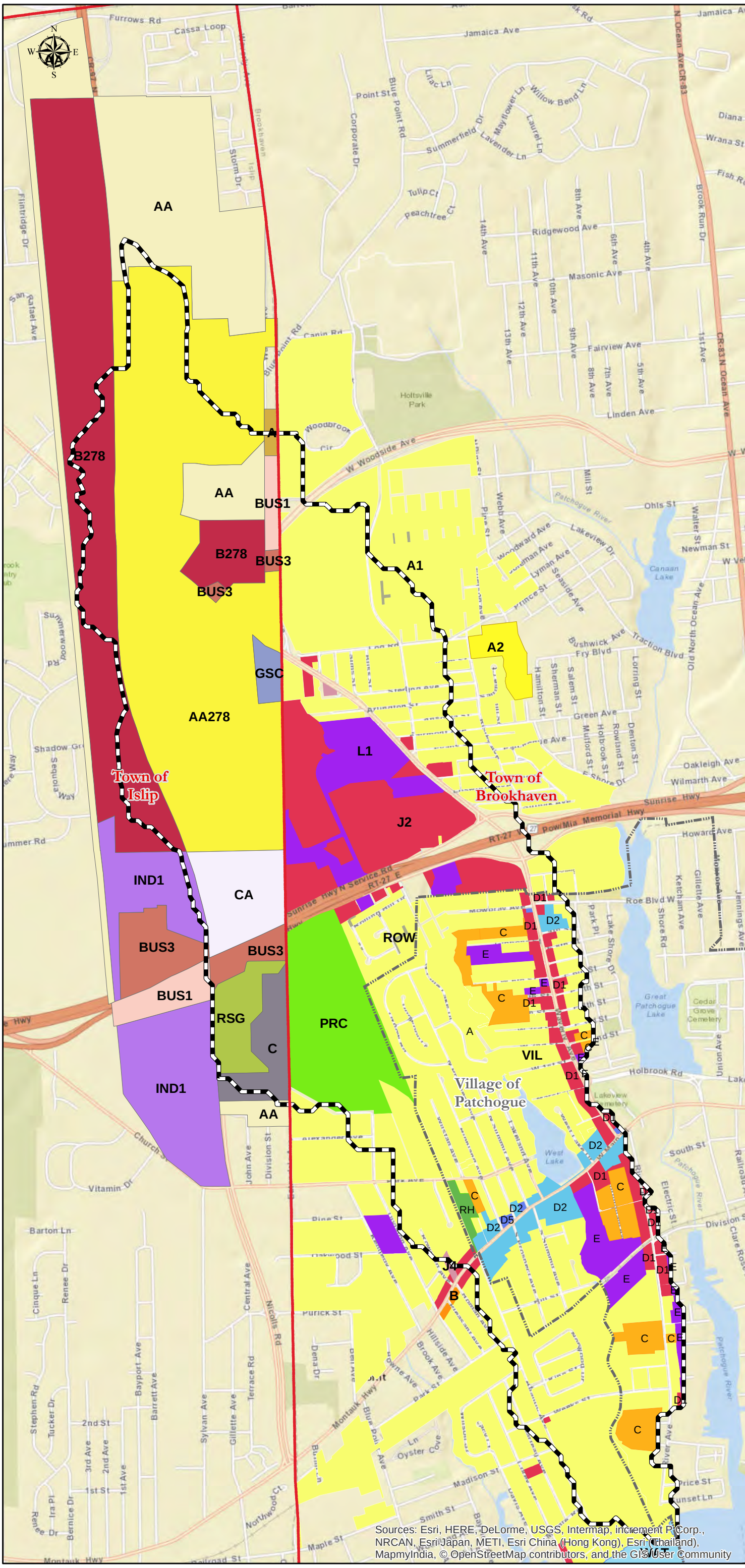
Table 2-5
ZONING DISTRICTS

Zoning Category	Town of Brookhaven	Town of Islip	Village of Patchogue
Residential Zones	A1 – 40,000 SF lot	AA – 20,000 SF lot A – 11,250 SF lot B – 7,500 SF lot CA – Attached Single Family Dwelling	A – 10,000 SF lot C – 5,000 SF lot
Commercial Zones	J2 – General Business J4 – Professional and Business Offices	B1 – General Business B3 – General Business and Restaurants GSC – General Service C District (Nursing Homes, Hospitals, Day Care)	D1 – General Business D2 – General Business and Golf Courses, Laundromats and Wholesale Stores D5 – Automotive Businesses and Miniature Storage Facilities
Industrial Zones	L1 – Light Industry	IND 1 – General Industrial	E – General Industrial
Recreational	N/A	RSG – Recreational	N/A

As illustrated in **Figure 11**, the majority of the watershed (approximately 72%) is residentially zoned, while approximately 16% of the watershed is industrially zoned. The remaining 12% of the watershed is commercially zoned. Although the watershed is primarily residentially zoned, approximately one third of the watershed is zoned for uses which typically have greater impervious coverage, and therefore could, if so developed, increase stormwater runoff to surface waters.

2.11.2 Demographics

Data from the 2010 census and ESRI Business Analyst were utilized to estimate the population of the Tuthills Creek watershed area. 2010 census data reveals that the population within the Tuthills Creek watershed is 10,169 persons, while 2014 estimates



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TUTHILLS CREEK WATERSHED MANAGEMENT PLAN

FIGURE 11

ZONING MAP

SOURCE: Town of Brookhaven, Town of Islip, Village of Patchogue Zoning Map
ESRI Web Mapping Service
SOURCE DATE: 2014; 2014; 2008

Legend

- Town Boundary
- Village Boundary
- Tuthills Creek Watershed

Town of Brookhaven Zoning

- A1
- A2
- B
- J2
- J4
- L1
- PRC
- ROW
- WAT

Town of Islip Zoning

- A
- AA
- AA278
- B278
- BUS1
- BUS3
- C
- CA
- GSC
- IND1
- RSG

Village of Patchogue Zoning

- A
- C
- D1
- D2
- D5
- E
- RH

NOTE: Village of Patchogue zoning is an approximation of the location of the zoning district boundaries, and should not be utilized for site specific analysis purposes. For approved Village Zoning Districts, see the Village of Patchogue's official zoning map.

1 inch = 1,500 feet

0 750 1,500 3,000 Feet

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indicate a population level of 10,447 persons, representing a 2.73% increase in population within the watershed since the collection of the 2010 census data. Estimates for 2019 indicate a population of 10,720 persons within the watershed, which represents a 5.42% population increase over the 2010 population. As illustrated in **Figures 12a and 12b**, despite the slight increase in population, the relative population density within the watershed has not changed significantly since the 2000 census. The most densely populated area within the watershed is located within a multifamily residential complex located on the south side of East 2nd Street. Higher density areas also exist within the residential area in the southwest portion of the watershed. The majority of the remainder of the watershed is developed with residential and commercial uses which have lower population density per acre. A copy of the census data and projections are provided in **Appendix F**.

2.12 Land Use and Land Cover

2.12.1 Land Use

Quantifying and identifying land use and land cover within a watershed is one of the most important tasks in characterizing a watershed. Land use and land cover provide a reflection of the impervious surfaces within a watershed, which generally contribute the greatest quantity of pollutants running off into surface waterbodies during rain events. By identifying the areas with the greatest quantity of impervious surfaces, improvement projects targeted at either reducing these surfaces or capturing and treating runoff from these surfaces can be identified. Additionally, industrial and commercial uses generally contain the greatest quantity of impervious surfaces, and also have the potential to contribute harsher pollutants (chemical solvents, by products of industrial processes, etc.) to stormwater runoff. As a result, these uses are often appropriate targets for stormwater improvements. Both land use and land cover within the Tuthills Creek watershed are described in further detail below.

The Tuthills Creek surface watershed is 1,761.23 acres in size and is primarily occupied by medium density residential uses (26.72%), roadways (17.59%), vacant land (17.03%), high density residential uses (11.42%) and commercial uses (10.27%) (**Table 2-6**). Commercial uses are notably concentrated around Sunrise Highway, Montauk Highway, and Waverly Avenue, while the medium density residential uses and vacant land are interspersed throughout the watershed. Parks and open space, institutional uses, and low density residential uses occupy a combined total of 13.55% of the watershed. The largest block of public open space is located in the north central portion of the watershed, and the largest institutional use is associated with the IRS facility located in the northeast portion of the watershed. The remainder of the watershed is occupied by surface waters, utilities, parks and recreation, industrial uses and marinas, which occupy less than 4% of the watershed. Land use within the watershed is depicted in **Figure 13**.

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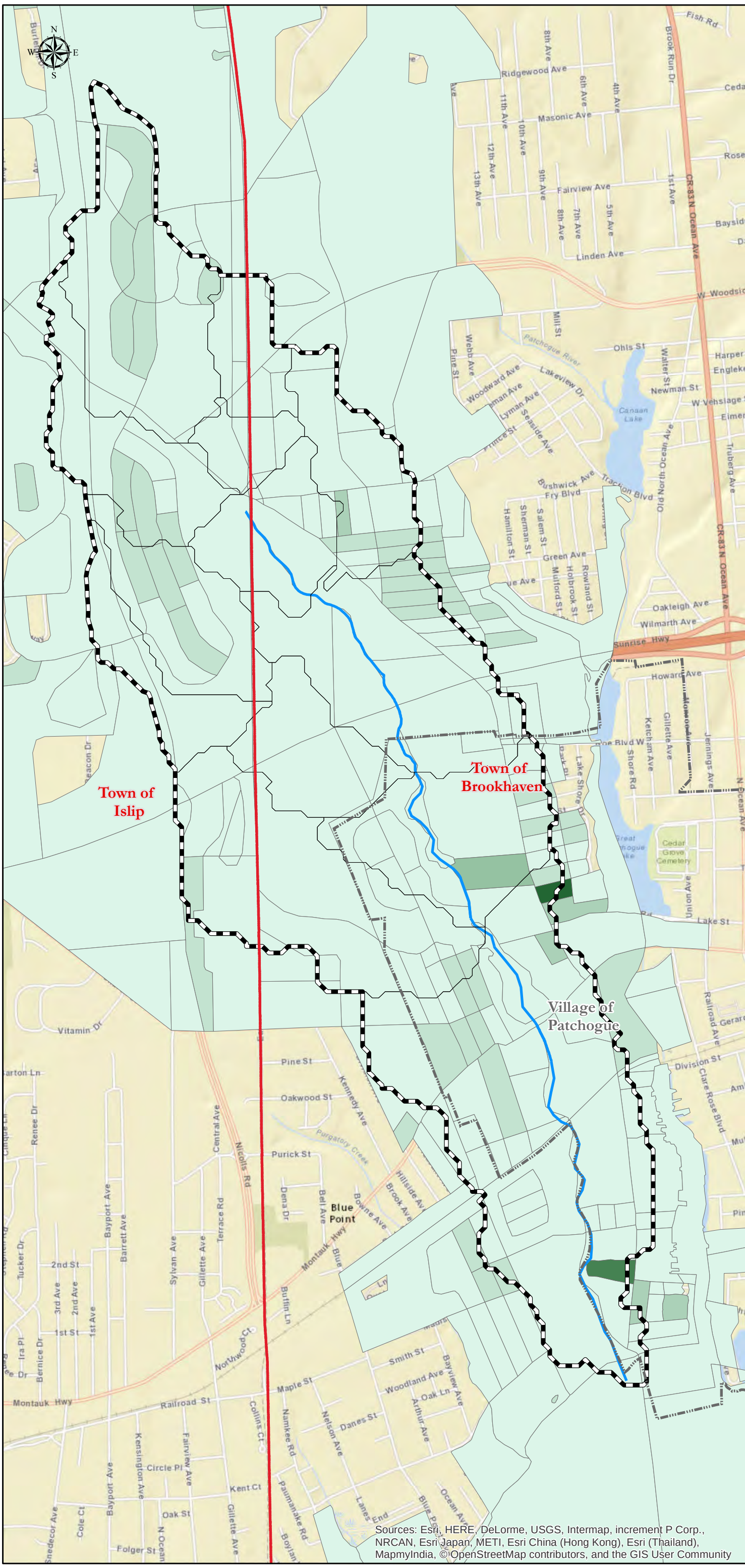
TUTHILLS CREEK WATERSHED MANAGEMENT PLAN

FIGURE 12a

POPULATION DENSITY - 2000

SOURCE: US Census;
ESRI Web Mapping Service
SOURCE DATE: 2000



Legend

- Town Boundary
- Village Boundary
- Tuthills Creek Watershed
- Tuthills Creek Subwatersheds
- Tuthills Creek

Population Density (population/acre)

- 0.00 - 10.00
- 10.01 - 20.00
- 20.01 - 30.00
- 30.01 - 40.00
- 40.01 - 50.00
- 50.01 - 60.00
- 60.01 - 70.00
- 70.01 - 80.00
- 80.01 - 90.00
- 90.01 - 100.00

1 inch = 1,500 feet

0 750 1,500 3,000 Feet

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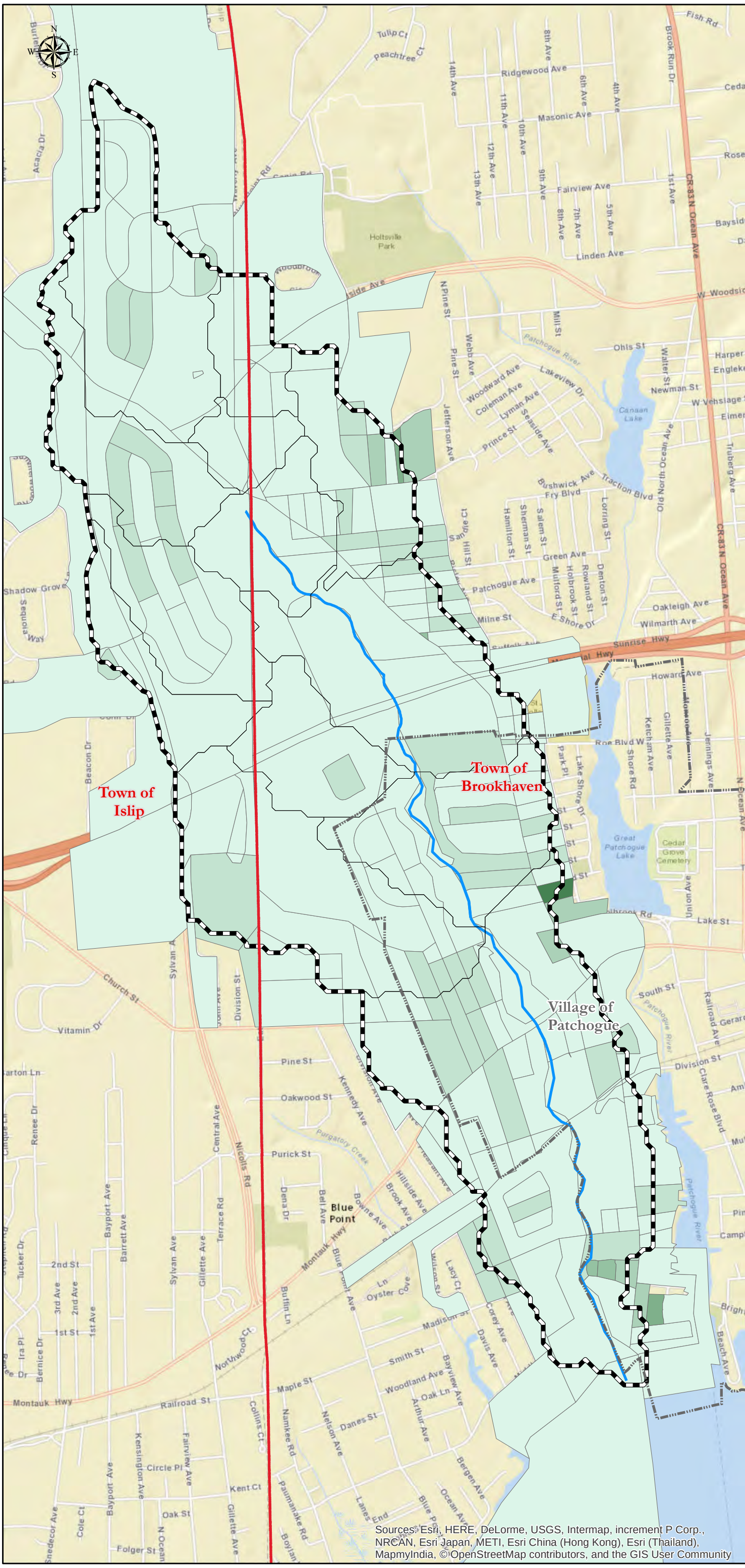
TUTHILLS CREEK WATERSHED MANAGEMENT PLAN

FIGURE 12b

POPULATION DENSITY - 2010

SOURCE: US Census;
ESRI Web Mapping Service
SOURCE DATE: 2010



Legend

- Town Boundary
- Village Boundary
- Tuthills Creek Watershed
- Tuthills Creek Subwatersheds
- Tuthills Creek

Population Density (population/acre)

- 0.00 - 10.00
- 10.01 - 20.00
- 20.01 - 30.00
- 30.01 - 40.00
- 40.01 - 50.00
- 50.01 - 60.00
- 60.01 - 70.00
- 70.01 - 80.00
- 80.01 - 90.00
- 90.01 - 100.00

1 inch = 1,500 feet

0 750 1,500 3,000 Feet

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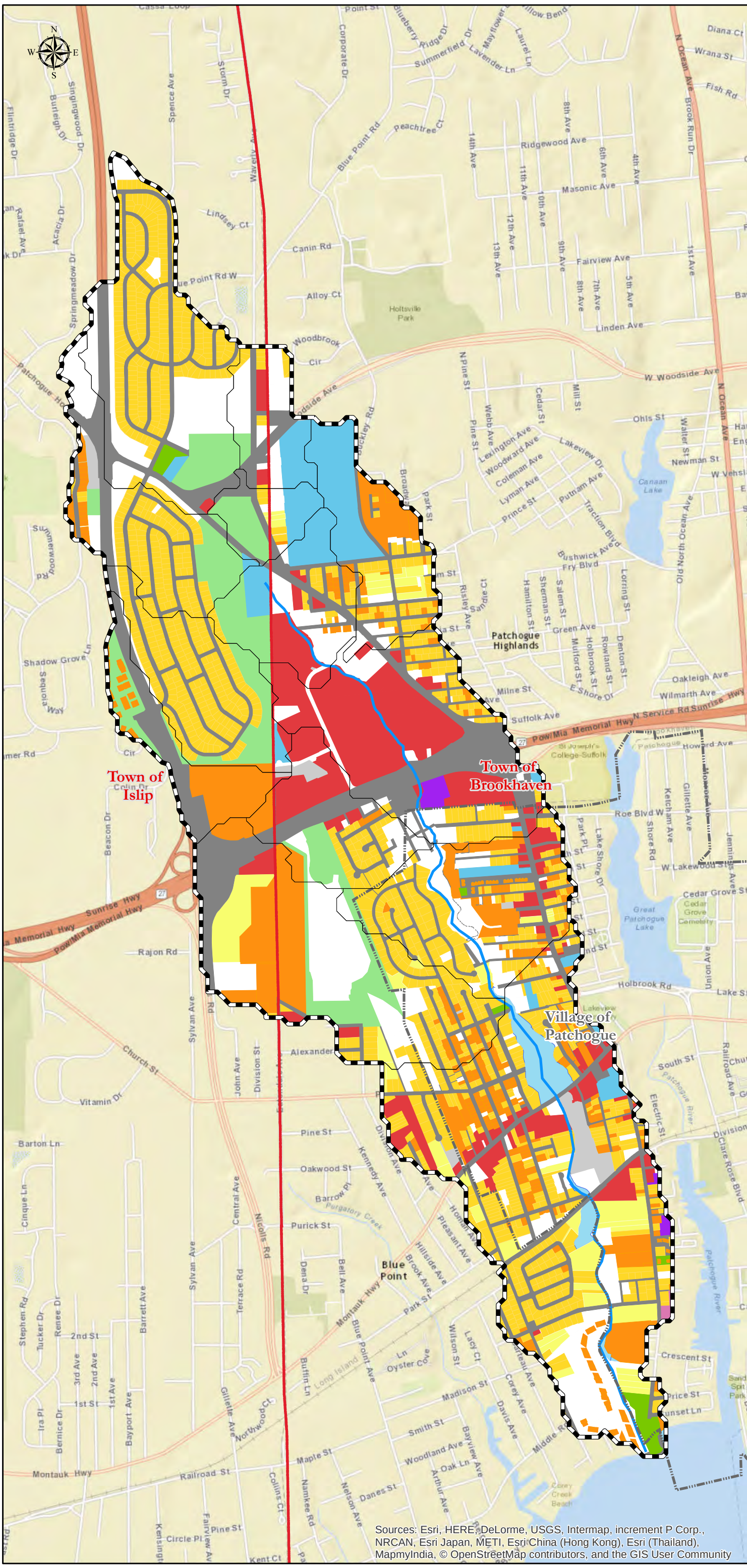
TUTHILLS CREEK WATERSHED MANAGEMENT PLAN

FIGURE 13

LAND USE MAP

SOURCE: Town of Brookhaven; SC Real Property; ESRI Web Mapping Service
SOURCE DATE: 2014



Legend

- Tuthills Creek Watershed
- Tuthills Creek Subwatersheds
- Town Boundary
- Village Boundary
- Tuthills Creek

Land Use

- Commercial
- High Density Residential
- Industrial
- Institutional
- Low Density Residential
- Marina
- Medium Density Residential
- Parks & Open Space
- Parks & Recreation
- Surface Water
- Transportation
- Utilities
- Vacant

1 inch = 1,500 feet

0 750 1,500 3,000 Feet

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Table 2-6
LAND USE

Land Use	Area (Acres)	Percent of Watershed
Commercial	180.916	10.27%
High Density Residential	201.162	11.42%
Industrial	5.756	0.33%
Institutional	82.015	4.66%
Low Density Residential	67.86	3.85%
Marina	1.286	0.07%
Medium Density Residential	470.681	26.72%
Parks & Open Space	88.736	5.04%
Parks & Recreation	12.393	0.70%
Surface Water	21.023	1.19%
Transportation	309.863	17.59%
Utilities	19.634	1.11%
Vacant	299.909	17.03%
TOTAL	**1,761.23**	**100.00%**

Land cover data represents the biophysical use of the surface of the earth. Land cover data for Tuthills Creek watershed was obtained from the 2011 USGS National Land Cover Dataset (NLCD). This dataset is generated from 30 meter resolution Landsat imagery that classifies land cover based on the color bands provided by the Landsat imagery. A depiction of the 2011 NLCD data is provided in **Figure 14**, and coverage quantities are provided in **Table 2-7** below.

Table 2-7
LAND COVER

Land Cover Class	Area (Acres)	Percent of Watershed
Barren Land	1.88	0.11%
Deciduous Forest	28.54	1.62%
Developed, High Intensity	155.28	8.82%
Developed, Low Intensity	527.47	29.95%
Developed, Medium Intensity	589.74	33.48%
Developed, Open Space	291.49	16.55%
Emergent Herbaceous Wetlands	17.64	1.00%
Evergreen Forest	79.23	4.50%
Mixed Forest	10.09	0.57%
Open Water	14.86	0.84%
Shrub/Scrub	4.72	0.27%

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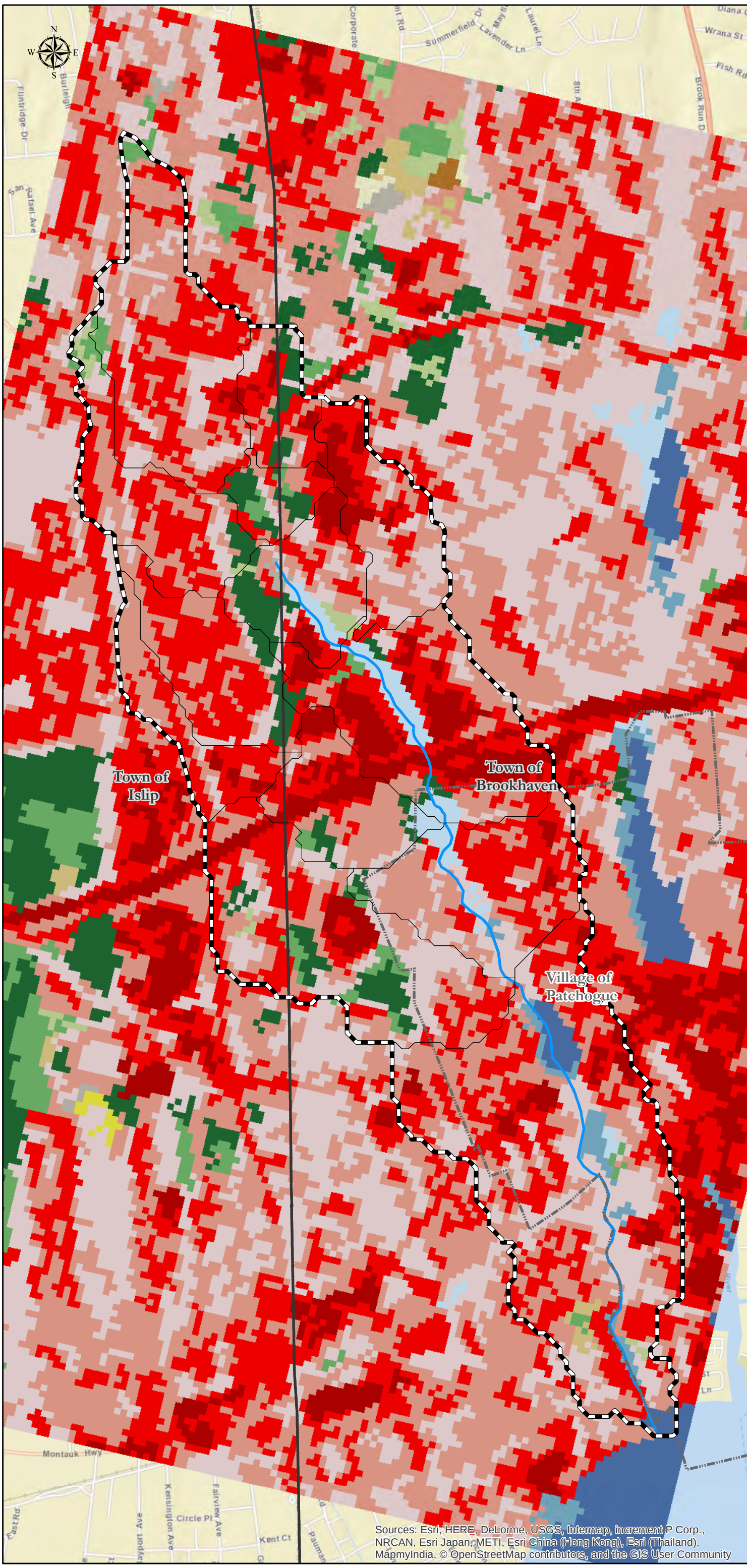
TUTHILLS CREEK WATERSHED MANAGEMENT PLAN

FIGURE 14

LAND COVER MAP

SOURCE: National Land Cover Dataset;
ESRI Web Mapping Service
SOURCE DATE: 2011



Legend

- Tuthills Creek Watershed
- Tuthills Creek Subwatersheds
- Town Boundary
- Village Boundary
- Tuthills Creek

NLCD Land Cover Classification Legend

- 11 Open Water
- 12 Perennial Ice/ Snow
- 21 Developed, Open Space
- 22 Developed, Low Intensity
- 23 Developed, Medium Intensity
- 24 Developed, High Intensity
- 31 Barren Land (Rock/Sand/Clay)
- 41 Deciduous Forest
- 42 Evergreen Forest
- 43 Mixed Forest
- 51 Dwarf Scrub*
- 52 Shrub/Scrub
- 71 Grassland/Herbaceous
- 72 Sedge/Herbaceous*
- 73 Lichens*
- 74 Moss*
- 81 Pasture/Hay
- 82 Cultivated Crops
- 90 Woody Wetlands
- 95 Emergent Herbaceous Wetlands

* Alaska only

1 inch = 1,500 feet

0 750 1,500 3,000 Feet

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Land Cover Class	Area (Acres)	Percent of Watershed
Woody Wetlands	40.29	2.29%
TOTAL	**1,761.23**	**100.00%**

As illustrated in **Table 2-7**, the majority of the watershed is occupied by Developed, Medium Intensity areas (589.74 acres) and Developed, Low Intensity areas (527.47 acres), which is a reflection of the primarily residential nature of the watershed. 291.49 acres of the watershed are occupied by Developed, Open Space areas, which represent lower density developments and older neighborhoods that have significant tree cover due to the age of the neighborhoods. Developed, High Intensity uses are representative of the large commercial centers and major roadways within the watershed. The remaining categories (Deciduous Forest, Emergent Herbaceous Wetlands, Evergreen Forest, Mixed Forest, Open Waters, Shrub/Scrub and Woody Wetlands) represent the types of vacant vegetated land and open space within the watershed.

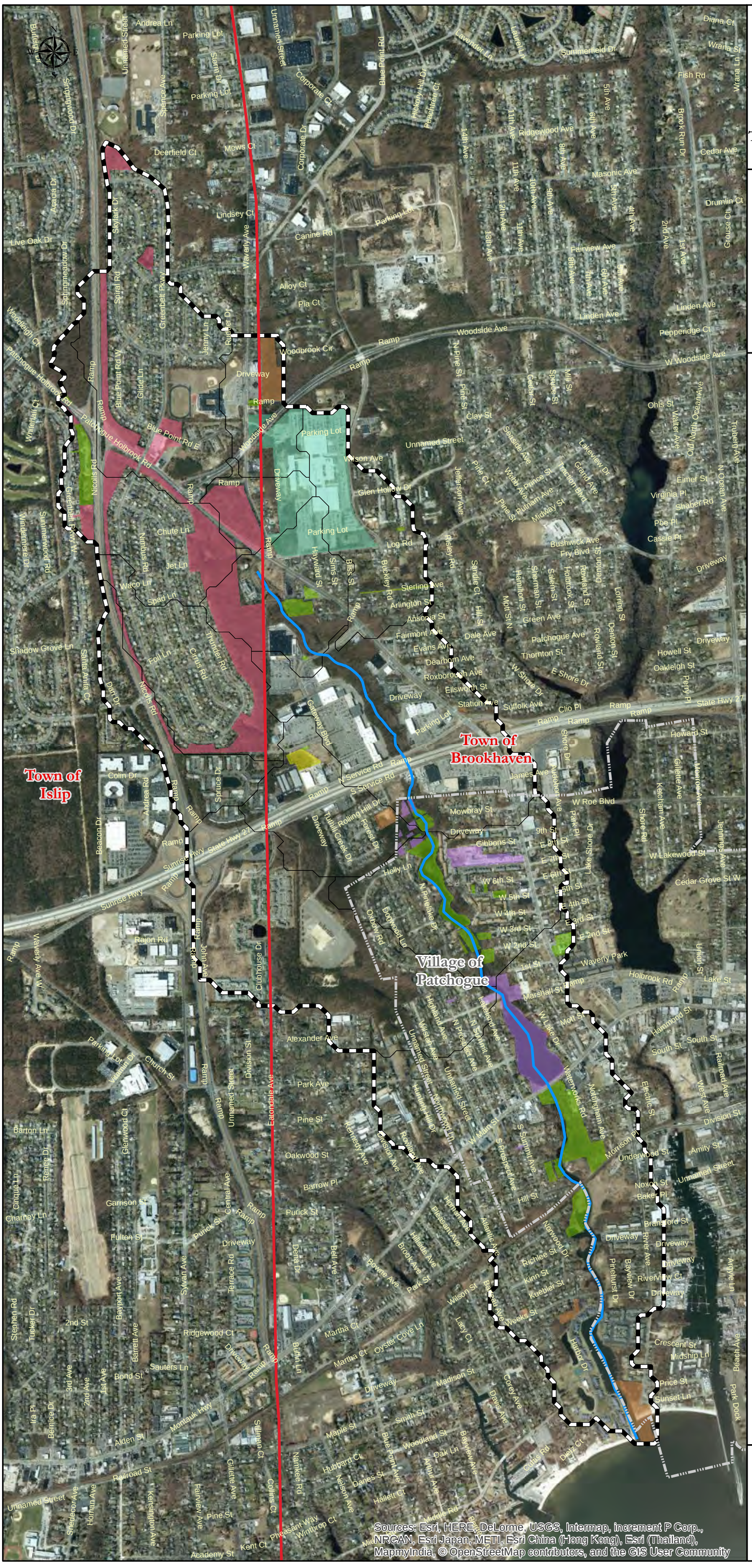
In general, the existing land use and land cover within the watershed reflect the largely developed nature of the watershed; limited vacant vegetated land and open space remain.

2.12.2 Publicly Owned Land

Publicly owned lands within the watershed generally consist of protected land and lands used for municipal purposes. Depending on the location of public land, the needs of the watershed, and the ability to make use of identified holdings, these lands may also provide opportunities for improvements (such as stormwater detention and/or treatment) which can result in improved drainage conditions as well as the removal of pollutants from stormwater runoff.

Figure 15 depicts the publicly owned land within the watershed boundary. As illustrated, the Town of Islip and Suffolk County own the majority of the public land within the watershed. The IRS facility is the only federally owned parcel within the watershed. Several smaller parcels of land owned by the State, Town of Brookhaven, and the Village of Patchogue are interspersed throughout the watershed.

More specifically, New York State owns a single recharge basin located on the south side of Crossway Boulevard. Suffolk County parcels are interspersed throughout the watershed, however, there is a concentration of County owned land along the creek and in wooded areas immediately adjacent to the creek. The Town of Islip owns a large tract of open space surrounding a residential development located in the northwest portion of the watershed. Limited lands owned by the Town of Brookhaven exist, which consist of vacant wooded land adjacent to the north of the IRS facility, a recharge basin located south of Rolling Hill Drive, a small parking lot located on the northeast corner of Atlantic Avenue and Weeks street, vacant wooded land located on the south side of Weeks Street, west of Harbor Drive, and a parcel with frontage on both Tuthills Creek and Patchogue Bay. Patchogue Village owned lands are limited to West Lake basketball and tennis courts



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TUTHILLS CREEK WATERSHED MANAGEMENT PLAN

FIGURE 15

PUBLICLY OWNED LANDS

SOURCE: Town of Brookhaven; Suffolk County; NYSGIS Orthoimagery Program
SOURCE DATE: 2014; 2014; 2013

Legend

- Tuthills Creek Watershed
- Tuthills Creek
- Tuthills Creek Subwatersheds
- Town Boundary
- Village Boundary

Publicly Owned Lands

- Town of Brookhaven
- Suffolk County
- Town of Islip
- New York State
- Village of Patchogue
- Federally Owned

1 inch = 1,500 feet

0 750 1,500 3,000 Feet

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(Belzak Tennis Courts) located on the east side of Lakeland Avenue, a small vacant lot located on the east side of North Prospect Avenue, and the Village Public Works facility located on the west side of Waverly Avenue.

2.13 Infrastructure

Infrastructure within the Tuthills Creek watershed includes the road system, stormwater infrastructure, areas served by sanitary sewer districts, areas with individual on-site sanitary treatment systems, and fresh water supply. The Long Island Railroad runs through the southern portion of the watershed, south of Montauk Highway. The nearest LIRR stop is in Patchogue, approximately 0.35 miles to the east of the eastern watershed boundary.

2.13.1 Transportation

Within the 1,761.23 acre watershed, approximately 52.93 miles of roadway exist. Of the total roadways, 11.42 miles are comprised of County roadways and 4.67 miles are State owned roadways. County roadways consist of C.R. 65 (Atlantic Avenue/Division Street/Middle Road/River Avenue/Weeks Street), C.R. 19 (Holbrook Road/Patchogue Holbrook Road/Waverly Avenue), C.R. 85 (West Main Street/Montauk Highway) and C.R. 97 (Nicolls Road), C.R. 61 (Waverly Avenue) and C.R. 99 (Woodside Avenue). The State roadway is solely comprised of S.R. 27, Sunrise Highway. The remainder of the roadways are either Town roads, Village roads or are privately owned.

Some public transportation is locally available. The Long Island Railroad runs through the southern portion of the watershed, south of Montauk Highway. A local stop (Patchogue Rail Station) is located 0.35 miles east of the watershed.

2.13.2 Stormwater Infrastructure

A Municipal Separate Storm Sewer System (MS4) is a conveyance, or system of conveyances owned by a state, city, town or other public entity that discharges to waters of the U.S. and is used for collecting or conveying stormwater. Stormwater infrastructure data were compiled from the Town of Brookhaven, Town of Islip, Village of Patchogue, Suffolk County and New York State Department of Transportation (DOT). The Town of Brookhaven's data was collected over time as part of their MS4 reporting requirements. Data providers and dates the stormwater inventory were collected for the Town of Islip include: Bowne AE&T Group (2003), Cashin Associates, P.C. (2003 and 2005), Greenman-Pedersen Inc. (2005-2006 and 2008-2009), Town of Islip (2008-2009), Cornell Cooperative Extension of Suffolk County (2009-2011), Keyspan (date unknown) and Speck SpatialTech (date unknown). Village of Patchogue data is collected and maintained by J.R. Holzmacher, P.E., and was provided for analysis in this report. Cornell Cooperative Extension collects and maintains drainage infrastructure data for Suffolk County. As illustrated in **Figure 16a**, nine direct outfall pipes are located along the creek. All of the

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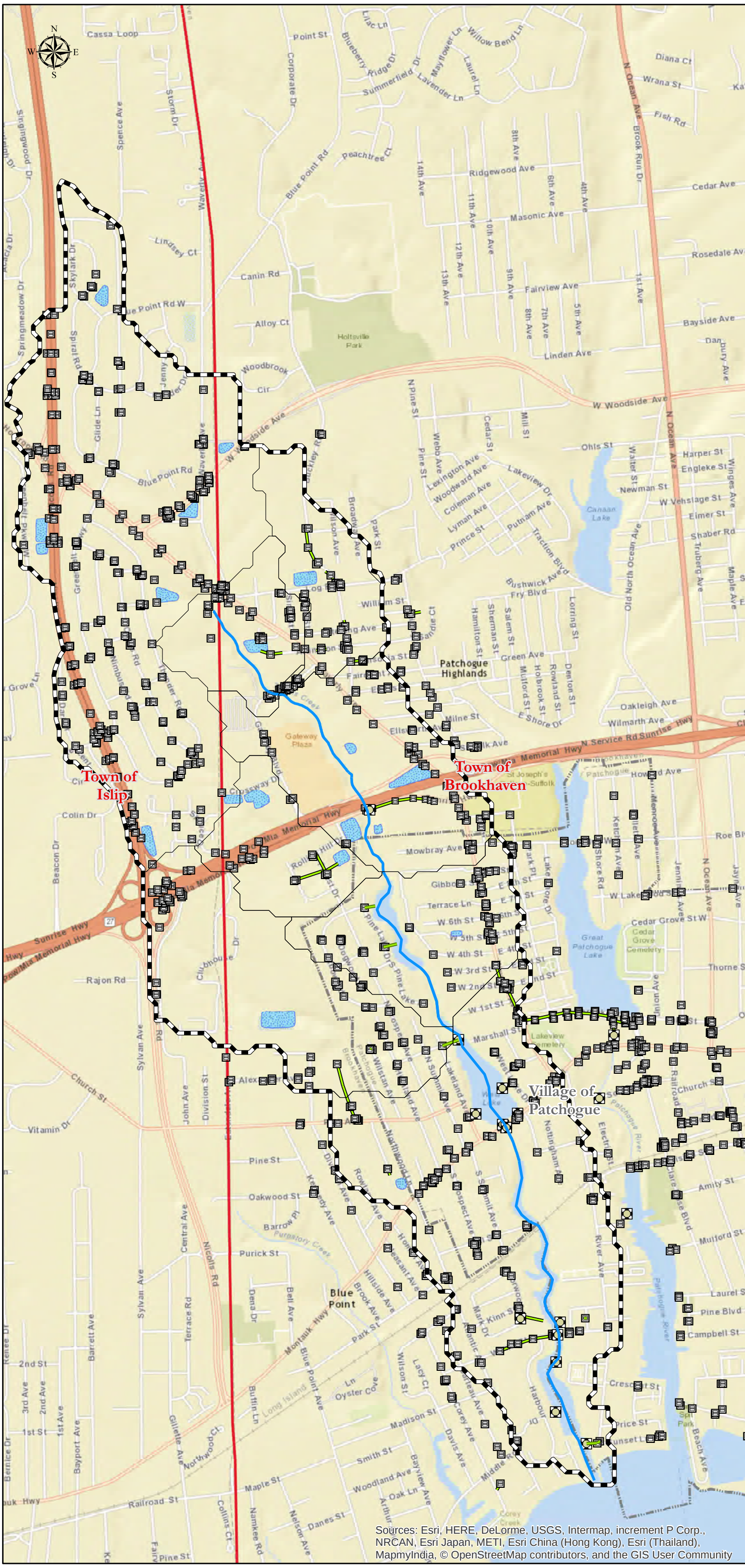
TUTHILLS CREEK WATERSHED MANAGEMENT PLAN

FIGURE 16a

STORMWATER INFRASTRUCTURE MAP

SOURCE: Suffolk County LiDAR;
ESRI Web Mapping Service
SOURCE DATE: 2006



Legend

- Tuthills Watershed
- Tuthills Creek Subwatersheds
- Tuthills Creek
- Drainage Structure
- Outfalls
- Stormwater Piping
- Recharge Basins
- Town Boundary
- Village Boundary

1 inch = 1,500 feet

0 750 1,500 3,000 Feet

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outfalls are located south of Sunrise Highway, however, other unmapped discharges may exist in the northern portions of the creek.

Substantial upland catchment exists within the northern portions of the watershed (north of Sunrise Highway) in both the Town of Brookhaven and Town of Islip. Catchment in these areas consists of catch basins and leaching pools that drain through subsurface soils, and several recharge basins which receive runoff from surrounding development. While some upland catchment exists in the southern portion of the watershed within the Town of Brookhaven in the form of catch basins, leaching pools and four recharge basins, limited catchment exists in this portion of the watershed (with the exception of catchment provided on County owned roadways) within the Village of Patchogue. As a result, there is greater potential for runoff from surrounding development to reach the creek in the southern portion of the watershed.

2.13.3 Wastewater Treatment

There are eight (8) sewage treatment plants or districts located within the Tuthills Creek Watershed which service a portion of the properties within the Tuthills Creek watershed (see **Figure 16b**). These include the Suffolk County Parkland Sewer District, the Patchogue Sewer District, the Watergate Apartments Sewage Treatment Plant, the IRS Service Center Sewage Treatment Plant, the Fairway Manor Sewage Treatment Plant, the Birchwood Glen Sewage Treatment Plant, the Spruce Pond Garden Apartments Sewage Treatment Plant, and the Sunrise at Holbrook Sewage Treatment Plant. These facilities utilize processes which limit the amount of nitrogen that is discharged to the environment.

The federally owned sewage treatment plant serves the IRS Service Center, and is located in the northern portion of the watershed. This plant has a permitted flow of 0.085 million gallons per day (mgd), and provides tertiary treatment which discharges to groundwater. An area within the northwest portion of the watershed is contracted through the County to be served by Sewer District 14 (Parkland). This district has a capacity of 1.25 mgd and provides tertiary treatment. A very small portion of the watershed (located on the northwest side of East First Street) is located within the Village of Patchogue Sewer District, which serves the Heatherwood House at Patchogue. The remainder of the sewage treatment plants that serve areas within the watershed are privately owned.

Table 2-8 below provides details regarding each privately owned plant, which is depicted in **Figure 16b**.

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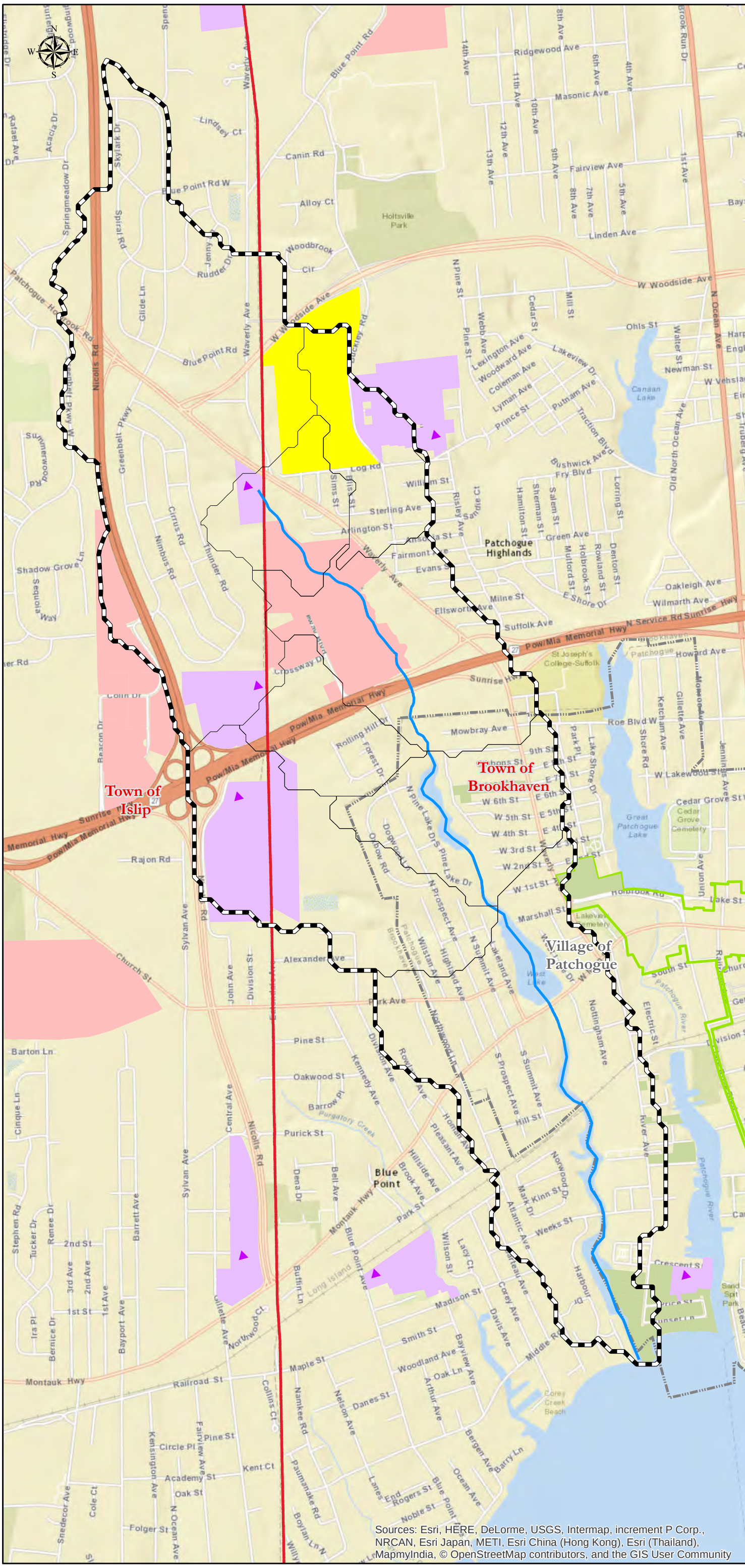
TUTHILLS CREEK WATERSHED MANAGEMENT PLAN

FIGURE 16b

SANITARY INFRASTRUCTURE MAP

SOURCE: Suffolk County;
ESRI Web Mapping Service
SOURCE DATE: 2016



Legend

- TuthillsWatershed
- Tuthills Creek Subwatersheds
- Tuthills Creek
- Town Boundary
- Village Boundary

Municipal Sewer Contractees

- Town
- Village

Municipal Sewer Districts

- Town Sewer Area
- Federal Sewer Districts
- Town Sewer Districts
- Village Sewer Districts
- Private Sewage Treatment Plants
- Private Sewer Areas
- Suffolk County Sewage Treatment Plants
- Suffolk County Sewer Contractees

1 inch = 1,500 feet

0 750 1,500 3,000 Feet

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Table 2-8
PRIVATELY OWNED WASTEWATER TREATMENT PLANTS

Plant Name	ID Number	Type of Treatment	Acres Served	Permitted Flow	Level of Treatment
Spruce Pond Garden Apartments	P-IS-31	Sequencing Batch Reactor	30.23	0.08 mgd	Tertiary
Sunrise at Holbrook	P-IS-34	Cromaglass	8.03	0.011 mgd	Tertiary
Fairway Manor	P-IS-06	Extended Aeriation – Denitrification Filter	69.86	0.0725 mgd	Tertiary
Birchwood Glen	P-BR-05	Extended Aeriation – Denitrification Filter	43.58	0.10 mgd	Tertiary

Properties in the remainder of the watershed rely on individual on-site sanitary wastewater treatment systems. The age and functionality of these systems is unknown as some structures have been expanded or restored, while others have had very little change since being built. High potential for poorly functioning sanitary systems exists within the southern portion of the watershed. As illustrated in **Figure 16b,** this area is unsewered and also has shallow depth to groundwater (less than 8 feet), suggesting that some sanitary systems may not have adequate separation distance to groundwater and therefore are not functioning properly. As a result, these systems could be contributing nitrogen and coliform pollution to the creek and Patchogue Bay.

2.14 Stormwater Analysis

2.14.1 Pollutants in Stormwater

A number of contaminants are generated throughout the Tuthills Creek watershed. These include a wide variety of substances, such as animal waste, vehicular fluids, pesticides, fertilizers, sediment, debris, and road de-icing chemicals, etc. They are all commonly transported overland and through municipal separate storm sewer systems (MS4s) to Long Island surface waterbodies. Tuthills Creek and Patchogue Bay are no exception. When stormwater is discharged to waterbodies from municipal stormsewer systems, it is typically untreated. As noted above, stormwater contaminants are deleterious to water quality. They are also harmful to people, fisheries, wildlife and habitats.

In an effort to reduce the flow of disease causing bacteria (pathogens) to Patchogue Bay, the US EPA and the NYS DEC adopted a pathogens TMDL which calls for a 90%

reduction in pathogens discharges from the MS4s (NYS DOT, Suffolk County, Village of Patchogue, Town of Islip, and Town of Brookhaven) that discharge to it.

The Patchogue Bay pathogens TMDL separated the Bay into two sections; one that received the majority of stormwater contributions from Swan River and one that received the majority of stormwater runoff from Mud Creek. Tuthills Creek is located in closest proximity to Swan River and as a result, the analysis information utilized in the TMDL for the Swan River area is utilized for comparison in this document. Data analysis within the TMDL indicated that at the majority of sampling stations, pathogen levels regularly exceeded thresholds for fecal coliform in the inner bay. The TMDL attributed this to a combination of MS4 non-point source contributions, rural land, forest areas and waterfowl. As such, a 90% reduction goal in pathogens was set for the portion of Patchogue Bay in proximity to Swan River from non-point sources.

2.14.2 Cornell Cooperative Extension Coliform Data & DNA Analysis

In 2012, the Town of Brookhaven contracted Cornell Cooperative Extension (CCE) to conduct illicit discharge monitoring and DNA analysis of storm sewer system outfalls at three locations within the Tuthills Creek Watershed (see **Figure 5**). Of these outfalls, one was determined to have input from a sump pump (outfall VTO33). That outfall was visited on five occasions in 2012, and samples were collected to determine the presence of coliforms in the discharge. No coliforms were detected in any of the samples, and as a result, no further DNA testing was performed on these samples. Further testing has not occurred on these outfalls.

2.14.3 Pollutant Load Analysis

In order to determine which subwatersheds are the most impacted given the above described conditions, a pollutant load analysis was conducted. The model utilized for the analysis is the Watershed Treatment Model developed by the Center for Watershed Protection, as the model is currently approved and accepted by the NYSDEC. Pollutants modeled for included fecal coliform, total phosphorus, total nitrogen, and total suspended solids (TSS). Model inputs include factors such as land use, housing density, depth to groundwater, and soils. A summary of the model results for each subwatershed are provided in **Table 2-9** below.

Table 2-9
Existing Stormwater Pollutant Load Summary

Sub-watershed	Pollutant					Watershed Size (Acres)
	TN (lb/year)	TP (lb/year)	TSS (lb/year)	Fecal Coliform (billion/year)	Runoff Volume (acre-feet/year)	
1	4,582.30	857.70	171,908.50	155,543.00	632.70	430.01
2	2,470.30	469.40	86,832.40	63,892.30	257.00	215.39
3	2,495.80	457.80	61,731.20	49,166.70	191.80	136.16
4	4,456.60	719.80	125,864.80	105,826.50	416.20	190.54
5	1,162.20	194.30	40,830.50	34,350.40	138.10	82.85
6	781.30	139.90	41,041.90	27,893.30	113.30	60.50
7	1,753.10	330.50	43,543.50	32,408.40	125.60	98.16
8	1,004.30	155.90	34,012.20	32,163.70	130.20	82.16
9	1,496.60	260.80	41,855.00	42,991.00	171.40	89.30
10	1,534.60	280.50	51,639.00	33,850.40	134.00	104.73
11	367.30	58.00	14,948.40	11,394.00	46.20	33.75
12	563.70	87.70	24,547.70	18,768.20	76.90	50.99
13	3,473.70	630.10	93,212.00	58,493.80	226.10	186.71
TOTAL	**26,141.80**	**4,642.40**	**801,967.10**	**666,741.70**	**2,659.50**	**1,761.25**

Figure 17a graphically illustrates the nitrogen load results for each subwatershed, where **Figure 17b** illustrates the estimated fecal coliform load provided by the model. As illustrated, Subwatersheds 1 and 4 appear to generate the greatest contribution of all pollutants to the waterbody. It is noted that this comparison is based on load contribution alone, and does not compare the pollutant load contribution per acre. **Table 2-10** illustrates the pollutant contribution per acre for each watershed.

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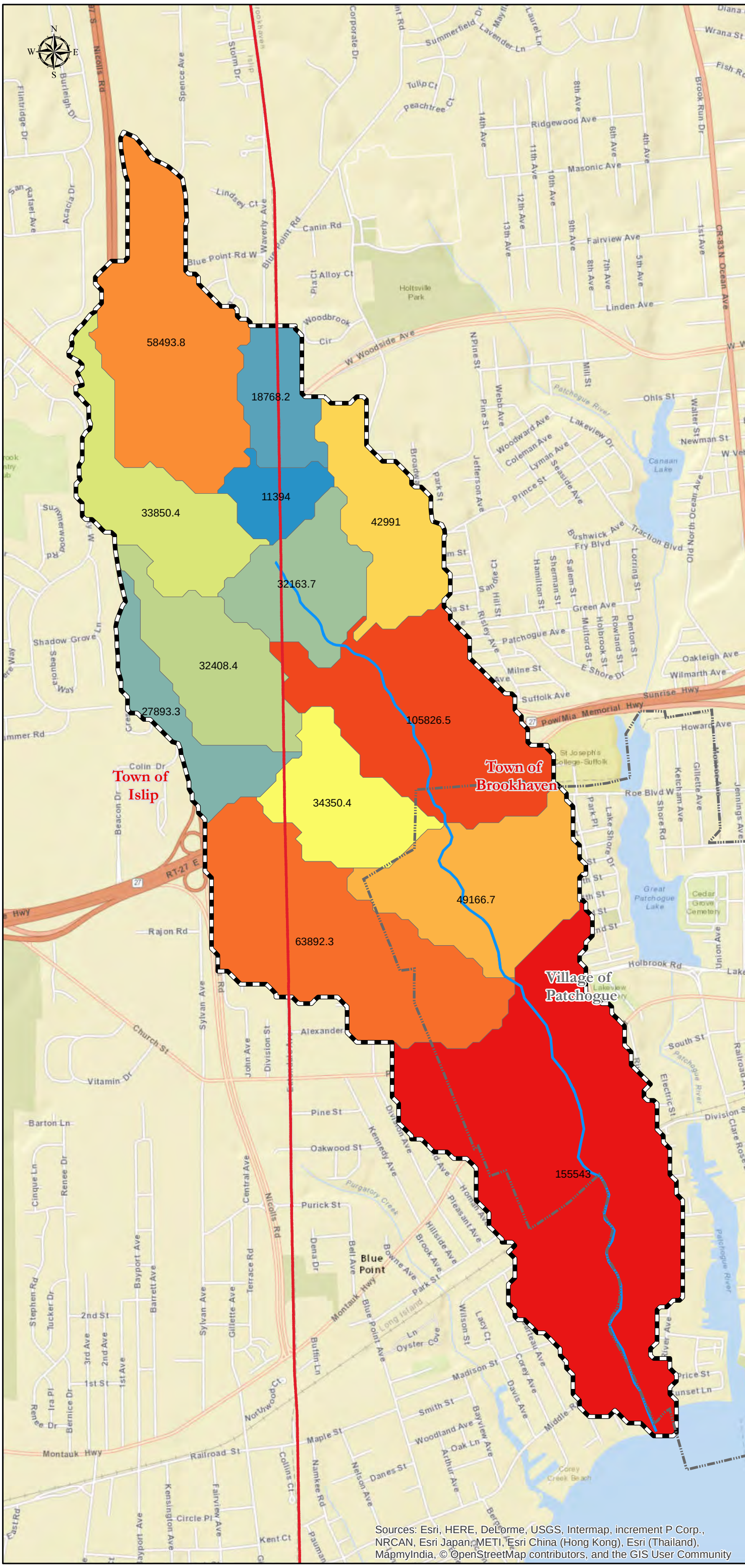
TUTHILLS CREEK WATERSHED MANAGEMENT PLAN

FIGURE 17a

POLLUTANT LOAD BY SUBWATERSHED - EXISTING CONDITIONS

SOURCE: Suffolk County Real Property; CWP WTM; ESRI Web Mapping Service
SOURCE DATE: 2015



Legend

- Town Boundary
- Village Boundary
- Tuthills Creek Watershed
- Tuthills Creek

Existing Pathogen Load (Billion per Year)

- 11394
- 18768.2
- 27893.3
- 32163.7
- 32408.4
- 33850.4
- 34350.4
- 42991
- 49166.7
- 58493.8
- 63892.3
- 105826.5
- 155543

1 inch = 1,500 feet

0 750 1,500 3,000 Feet

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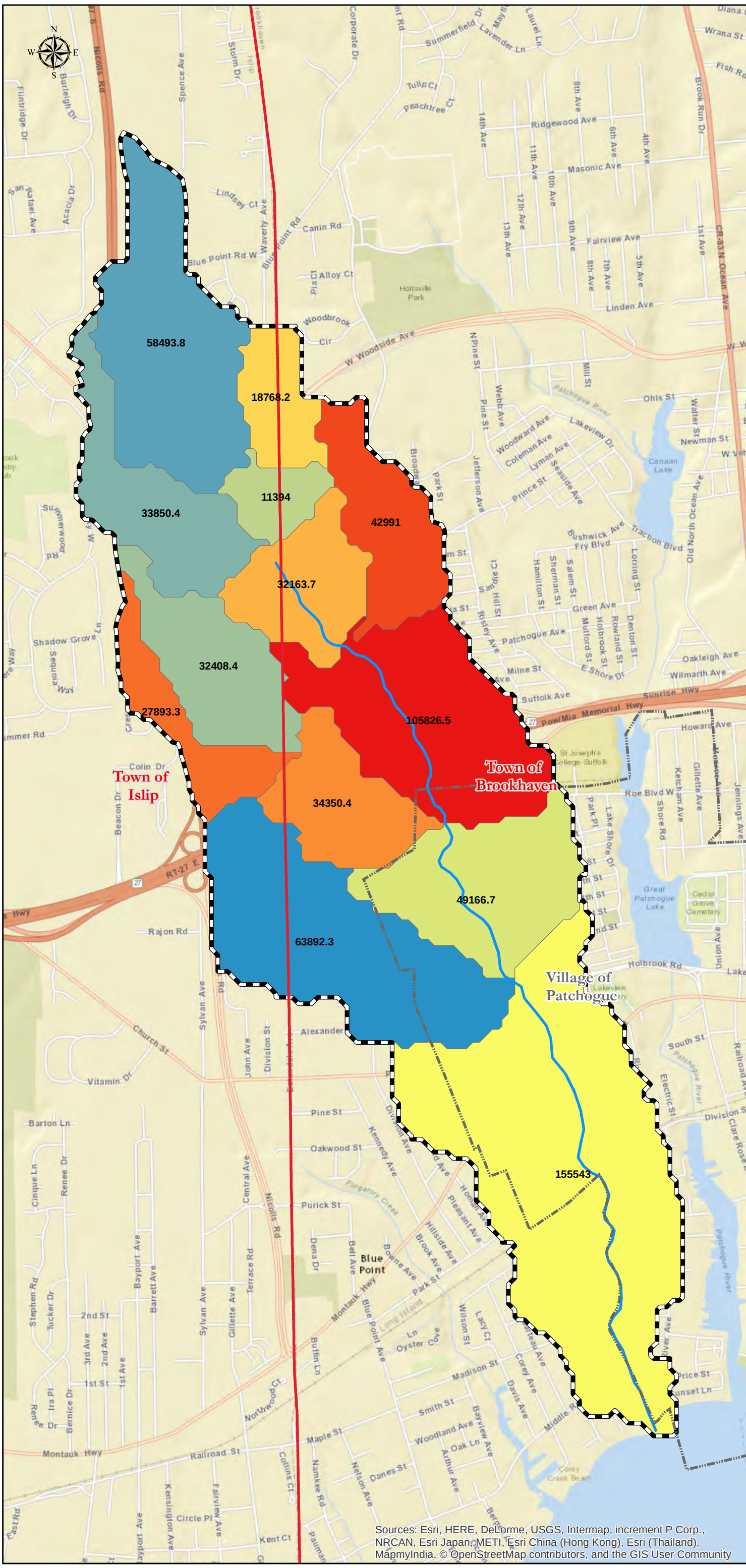
New York Department of State

TUTHILLS CREEK WATERSHED MANAGEMENT PLAN

FIGURE 17b
POLLUTANT LOAD CONCENTRATION BY SUBWATERSHED - EXISTING CONDITIONS

SOURCE: Suffolk County Real Property; CWP WTM; ESRI Web Mapping Service
SOURCE DATE: 2015



Legend

- Town Boundary
- Village Boundary
- Tuthills Creek Watershed
- Tuthills Creek

Existing Pathogen Load (Billion per Year/Acre)

- 296.64
- 313.29
- 323.22
- 330.16
- 337.6
- 361.1
- 361.72
- 368.08
- 391.48
- 414.61
- 461.05
- 481.42
- 555.4

1 inch = 1,500 feet

0 750 1,500 3,000 Feet

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Table 2-10
Existing Pollutant Load Summary – Pollutant Load Per Acre

Subwatershed	Pollutant			
	TN (lb/year per acre)	TP (lb/year per acre)	TSS (lb/year per acre)	Fecal Coliform (billion/year)
1	10.66	1.99	399.78	361.72
2	11.47	2.18	403.14	296.64
3	18.33	3.36	453.37	361.10
4	23.39	3.78	660.57	555.40
5	14.03	2.35	130.72	414.61
6	12.91	2.31	678.38	461.05
7	17.86	3.37	443.60	330.16
8	12.22	1.90	413.98	391.48
9	16.76	2.92	468.70	481.42
10	14.65	2.68	493.07	323.22
11	10.88	1.72	442.92	337.60
12	11.06	1.72	481.42	368.08
13	18.60	3.37	499.23	313.29

When "normalizing" the pollutant loads through comparison of load per acre, subwatershed 4 has the greatest contribution of nitrogen, phosphorus and fecal coliform, but only the second greatest contribution of total suspended solids. The greatest contribution of total suspended solids comes from subwatershed 6. Subwatersheds 7 and 13 had the second greatest contribution of total phosphorus, while subwatershed 13 provides the second greatest contribution of total nitrogen. Subwatershed 9 provides the second greatest contribution of total suspended solids. The comparison of **Table 2-9** to **Table 2-10** illustrates that the largest subwatershed does not necessarily exhibit the greatest concentration of pollutants discharged to Tuthills Creek, and that the land use factors within the subwatersheds are important when estimating pollutant loads. As a result, both the total load estimate per subwatershed and the load per acre per subwatershed are utilized in determining appropriate subwatershed recommendations, which are further described in **Section 4.0**.

In addition to examining the pollutant load under existing conditions, the pollutant load for future conditions that consider currently planned/approved projects were estimated for each watershed. Future and "in-progress" projects within the watershed include development of the former movie theater property and development of existing residences for a storage facility. **Table 2-11** below illustrates the results of the model in consideration of these projects.

Table 2-11
Future Stormwater Pollutant Load Summary

Subwatershed	Pollutant					
	TN (lb/year)	TP (lb/year)	TSS (lb/year)	Fecal Coliform (billion/year)	Runoff Volume (acre-feet/year)	Watershed Size (Acres)
1	4,603.00	859.70	172,392.60	156,540.20	636.70	430.01
2	2,728.80	531.20	92,330.40	76,462.70	306.80	215.39
3	2,510.10	461.10	62,034.80	49,847.90	194.40	136.16
4	4,456.60	719.80	125,864.80	105,826.50	416.20	190.54
5	1,189.10	200.60	41,387.90	35,624.30	143.10	82.85
6	781.30	139.90	41,041.90	27,893.30	113.30	60.50
7	1,753.10	330.50	43,543.50	32,408.40	125.60	98.16
8	1,004.30	155.90	34,012.20	32,163.70	130.20	82.16
9	1,496.60	260.80	41,855.00	42,991.00	171.40	89.30
10	1,534.60	280.50	51,639.00	33,850.40	134.00	104.73
11	367.30	58.00	14,948.40	11,394.00	46.20	33.75
12	563.70	87.70	24,547.70	18,768.20	76.90	50.99
13	3,473.70	630.10	93,212.00	58,493.80	226.10	186.71
TOTAL	**26,462.20**	**4,715.80**	**838,810.20**	**682,264.40**	**2,720.90**	**1,761.25**

As illustrated, subwatersheds 1 and 4 continue to provide the greatest concentration of pollutants carried in stormwater runoff to the creek under future conditions (**Figure 18a** and **18b**). However, as illustrated in **Table 2-12**, when comparing pollutant loads per acre, subwatershed 3 replaces subwatershed 7 as the second largest contributor of phosphorus to the creek. While an increase in pollutant loads is estimated under future conditions for subwatersheds 1, 2, 3 and 5, the relative ranking in terms of pollutant contribution to the creek remains the same for all other modeled pollutants.

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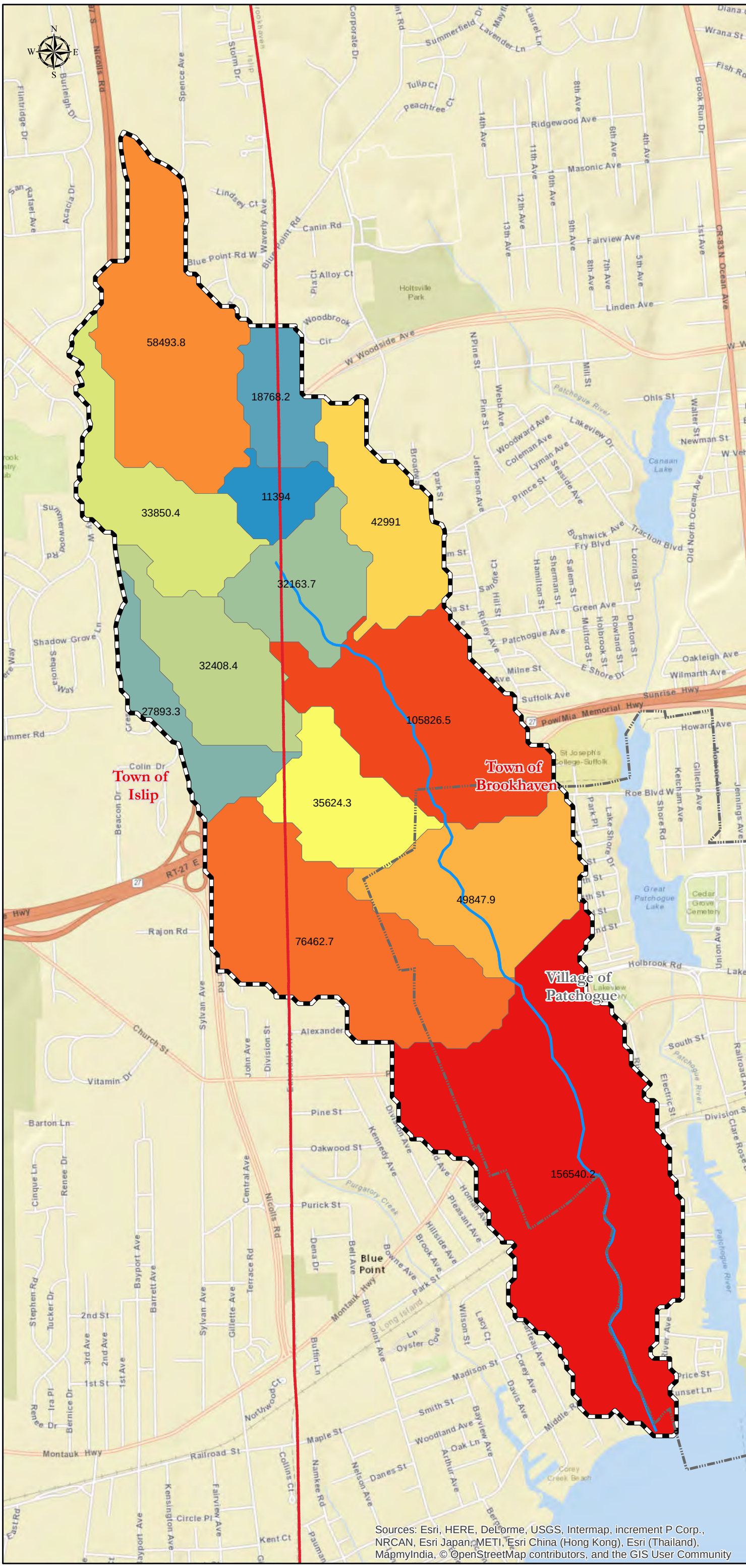
TUTHILLS CREEK WATERSHED MANAGEMENT PLAN

FIGURE 18a

POLLUTANT LOAD BY SUBWATERSHED - FUTURE CONDITIONS

SOURCE: Suffolk County Real Property; CWP WTM; ESRI Web Mapping Service
SOURCE DATE: 2015



Legend

- Town Boundary
- Village Boundary
- Tuthills Creek Watershed
- Tuthills Creek

Future Pathogen Load (Billions/year)

- 11394
- 18768.2
- 27893.3
- 32163.7
- 32408.4
- 33850.4
- 35624.3
- 42991
- 49847.9
- 58493.8
- 76462.7
- 105826.5
- 156540.2

1 inch = 1,500 feet

0 750 1,500 3,000 Feet

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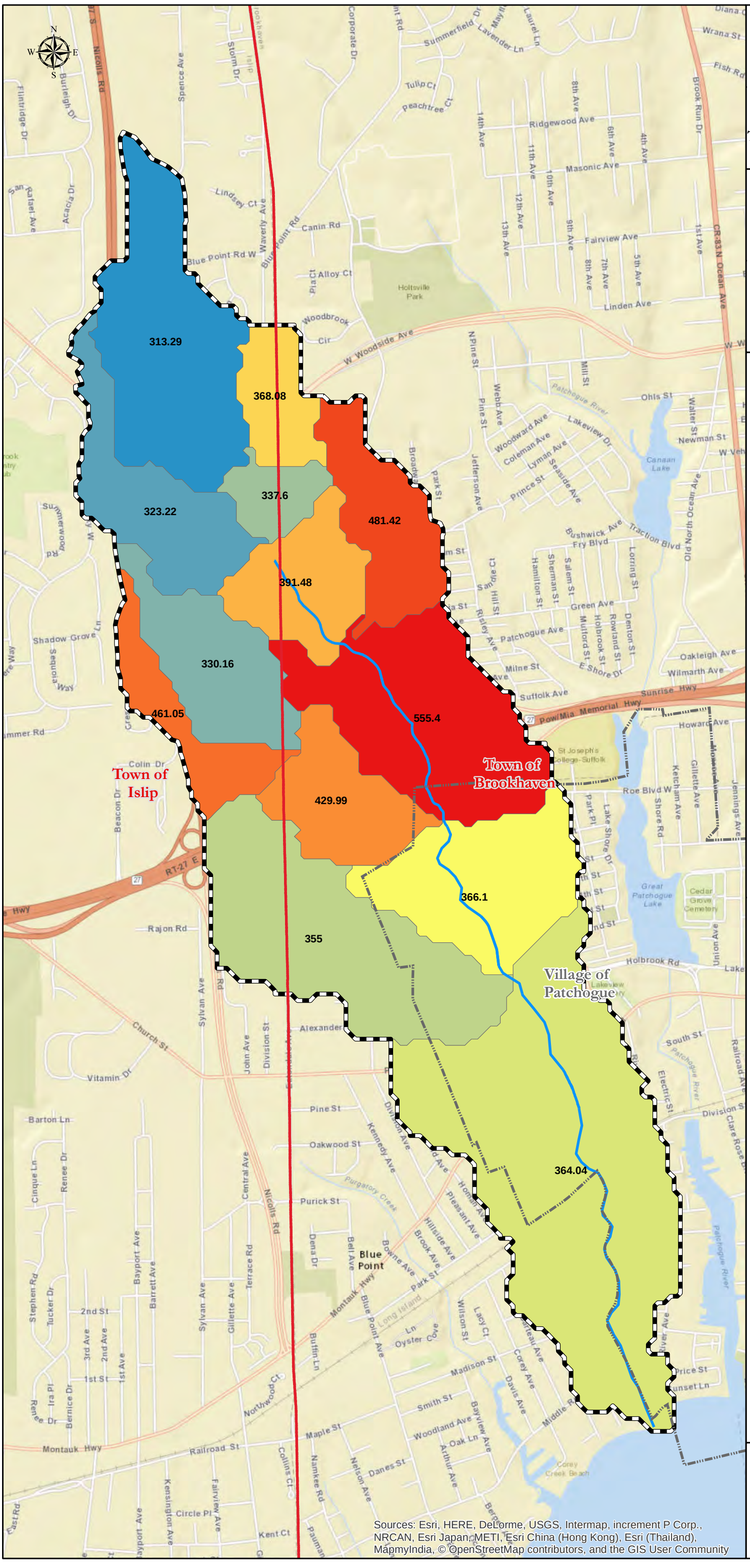
TUTHILLS CREEK WATERSHED MANAGEMENT PLAN

FIGURE 18b
POLLUTANT LOAD CONCENTRATION BY SUBWATERSHED - FUTURE CONDITIONS

SOURCE: Suffolk County Real Property; CWP WTM; ESRI Web Mapping Service
SOURCE DATE: 2015



Legend

- Town Boundary
- Village Boundary
- Tuthills Creek Watershed
- Tuthills Creek

Future Pathogen Load
Billion per year/Acre

- 313.29
- 323.22
- 330.16
- 337.6
- 355
- 364.04
- 366.1
- 368.08
- 391.48
- 429.99
- 461.05
- 481.42
- 555.4

1 inch = 1,500 feet

0 750 1,500 3,000 Feet

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Table 2-12
Future Pollutant Load Summary – Pollutant Load Per Acre

Subwatershed	Pollutant			
	TN (lb/year per acre)	TP (lb/year per acre)	TSS (lb/year per acre)	Fecal Coliform (billion/year)
1	10.70	2.00	400.90	364.04
2	12.67	2.47	428.67	355.00
3	18.43	3.39	455.60	366.10
4	23.39	3.78	660.57	555.40
5	14.35	2.42	499.55	429.99
6	12.91	2.31	678.38	461.05
7	17.86	3.37	443.60	330.16
8	12.22	1.90	413.98	391.48
9	16.76	2.92	468.70	481.42
10	14.65	2.68	493.07	323.22
11	10.88	1.72	442.92	337.60
12	11.06	1.72	481.42	368.08
13	18.60	3.37	499.23	313.29

Section 3.0
Description and Assessment of Local Laws, Programs & Practices Affecting Water Quality

3.0 DESCRIPTION AND ASSESSMENT OF LOCAL LAWS, PROGRAMS AND PRACTICES AFFECTING WATER QUALITY

Water quality and habitat degradation within the Tuthills Creek watershed are regulated through a variety of Federal, State, County, Town and Village legislation. The Town of Brookhaven, Town of Islip and Village of Patchogue have programs and practices designed to reduce pollutants carried by stormwater runoff to surface waters. This section serves to identify existing applicable Federal, State, County, Town and Village legislation aimed at watershed protection, describes existing Town and Village best management programs and practices, and identifies any gaps within legislation and practices currently implemented. This assessment was utilized to develop the recommendations provided in **Section 4.0** for additional best management practices or legislation that could be implemented to further protect water quality.

3.1 Federal and State Regulations and Programs

Federal Agencies

US Environmental Protection Agency (USEPA)
The mission of the EPA is to protect human health and the environment. Developing and enforcing environmental regulations, providing financial assistance, performing environmental research, sponsoring and promoting partnerships and programs, and monitoring hazardous materials and reporting related information to the public are several of the duties of the EPA. The EPA engages in active oversight over the federal regulations for which NYSDEC has administrative and enforcement responsibilities throughout New York State. The USEPA is a significant source of funding to the NYSDEC, and potentially to Tuthills Creek watershed municipalities and stakeholders.

Army Corps of Engineers (US Department of Defense) (USACE)
The US Army Corps of Engineers (USACE) is responsible for flood control, navigation, shore protection, environmental restoration, hazardous, toxic and radiological waste site management, and water resource management and regulation. Depending upon the type of waterway and its usage, the USACE may have responsibility for approving, funding, and/or conducting dredging projects.

Fish and Wildlife Service (US Department of the Interior) (USFWS)
The US Fish and Wildlife Service (USFWS) mission is to conserve, protect and enhance fish, wildlife and plants and their habitats for the continuing benefit of the American people. The USFWS is a source of technical information, and potentially funding support, for coastal restoration and protection projects.

United States Geologic Survey (USGS)
The United States Geologic Survey (USGS) offers an array of services and data related to hydrologic research and development, wildlife and fisheries management, invasive species, geographic information systems, mapping, costal management and watershed planning. The USGS is an important source of hydrologic technical expertise and water

quality data on Long Island. The USGS can be a valuable partner in efforts to address the impacts of on-site sanitary wastewater treatment systems to groundwater and Tuthills Creek.

National Oceanic and Atmospheric Administration (NOAA)
NOAA is a science-based federal agency, whose mission is to a) understand and predict changes in climate, weather, oceans, and coasts, b) share that knowledge and information with others and, c) conserve and manage coastal and marine ecosystems and resources. NOAA tools and resources can be of great value to Tuthills Creek municipalities and its community of stakeholders in ensuring their resiliency and ability to recover from severe weather events and the effects of sea level rise and flooding.

National Pollutant Discharge Elimination System (NPDES)
Administered at the federal level by the USEPA, the NPDES permit program addresses water pollution by regulating point sources (such as sewage treatment plants and stormsewer systems) that discharge pollutants to waters of the United States. Created in 1972 by the Clean Water Act, the NPDES permit program authorizes state governments to adopt and administer State Pollution Discharge Elimination System (SPDES) programs to perform many permitting, administrative, and enforcement aspects of the NPDES program at the state level. In New York, the NYSDEC implements the federal regulations, including discharges to waters of the United States, under the SPDES program. The NPDES and SPDES programs address several point source stormwater pollution sectors, including, for example, municipal separate storm sewer systems (MS4s), industrial facilities, and construction activities.

State Agencies

New York State Department of State (NYSDOS), Office of Planning and Development
The Office of Planning and Development helps protect and enhance coastal and inland water resources and encourages appropriate land use. The Office also works in partnership with local governments in preparation of Local Waterfront Revitalization Programs (LWRPs), which serve as comprehensive land and water use plans, as well as inter-municipal watershed management plans which identify problems and threats and opportunities for achieving long lasting improvements in water quality and establish priorities for action. Financial assistance for the preparation and implementation of such programs and plans is made available through the Environmental Protection Fund (EPF).

New York State Department of Environmental Conservation (NYSDEC)
The Department of Environmental Conservation works to reduce water pollution through technical assistance for prevention, education, and monitoring. The NYSDEC also provides financial assistance to local governments for a variety of water quality projects. The Department has extensive regulatory authority through its administration of the New York State Environmental Conservation Law.

New York State Department of Agriculture and Markets
The Department of Agriculture and Markets provides administrative support to the State Soil and Water Conservation Committee (SWCC), which in turn provides guidance to the County Soil and Water Conservation Districts (SWCD).

New York State Department of Health (NYSDOH)
The Department of Health monitors impacts of nonpoint source pollution through water quality monitoring and reporting programs. New York Public Health Law contains statutes regulating the protection of public water supplies from contamination due to source and nonpoint source pollution.

Federal and State Regulations and Programs

Non-Point Source Management Program

Section 312 of the Clean Water Act requires States to develop programs for controlling nonpoint sources of pollution. The NYSDEC is the lead agency for developing New York's Nonpoint Source Management Program. NYSDEC coordinates funding for the program's implementation and conducts water quality studies to evaluate the program's success. NYSDEC has developed a Priority Waterbodies List, which identifies waters that are impaired or threatened by point and nonpoint sources of pollution. NYSDEC bases this list on water quality information generated through its monitoring and assessment studies and by reaching out to stakeholders in local communities. The *NYS Section 303(d) List of Impaired/TMDL Waters* identifies those waters that do not support appropriate uses and that may require development of a Total Maximum Daily Load (TMDL), which limits the amount of pollutants that can be discharged to the waterbody in question. The Section 303(d) List is updated every two years. Priority Waterbodies Lists assist state, regional and local governments to establish local water quality priorities.

SPDES Stormwater Programs

- Municipal Separate Storm Sewer Systems (MS4s)
  A Municipal Separate Storm Sewer System is a conveyance, or system of conveyances owned by a state, city, town or other public entity that discharges to waters of the U.S. and is used for collecting or conveying stormwater. Current Federal stormwater regulations include all municipalities with a population of at least 50,000, or a population density of 1,000 people per square mile. All regulated MS4s are required to develop stormwater management programs. The Towns of Brookhaven and Islip, and the Village of Patchogue are regulated under the MS4 program.

  Coverage under the General Permit which regulates stormwater discharges from municipal separate storm sewer systems (GP-0-15-003, hereafter "MS4 General Permit") is required in order to be authorized to discharge stormwater conveyed

through the municipal storm sewer system to waterbodies of New York State. Regulated municipalities are required to develop a Stormwater Management Program (SWMP) "designed to reduce the discharge of pollutants from small MS4s to the maximum extent practicable". Special requirements apply when stormwater is discharged to waters identified on the New York State 303(d) list or to waters covered by an EPA-approved Total Maximum Daily Load (TMDL).

Municipal stormwater management programs are required to identify measurable goals and best management practices for six program components, known as "Minimum Control Measures. These include: Public Education and Outreach, Public Participation and Involvement, Illicit Discharge Detection and Elimination. Construction Site Runoff Control, Post-Construction Runoff Control, and Pollution Prevention and Good Housekeeping.

- Construction Activity
  The General Permit for Stormwater Discharges from Construction Activity (GP-0-15-002) (hereafter "Construction Permit") was adopted to reduce pollutants entering stormwater runoff from construction activities. This permit program requires the owner/operator of a proposed construction site with disturbance of 1 acre or greater (that discharges to surface water or municipal drainage systems that discharge to surface waters), to prepare a Stormwater Pollution Prevention Plan (SWPPP) and obtain permit coverage prior to the initiation of construction activities. The Construction Permit requires temporary erosion and sediment controls to prevent off-site flow of stormwater runoff, and requires regular inspection and maintenance of all erosion controls and stormwater management practices installed at construction sites.

- Multi-Sector General Permit for Industrial Activity
  The SPDES permit requirements for stormwater discharges from industrial activities are administered under the NYSDEC Multi-Sector General Permit (MSGP) for Stormwater Discharges Associated with Industrial Activity GP-0-12-001. This permit is site specific and is intended to address industrial facilities with stormwater discharges to surface water. Covered facilities include a wide range of manufacturing, industrial storage, transportation-related, and other activities. Under this permit, the operator of qualifying industrial uses must develop and implement a Stormwater Pollution Prevention Plan (SWPPP) which identifies specific best management practices (BMPs) to be implemented and maintained at the facility to minimize the presence of pollutants in stormwater discharges. The permit also requires water quality monitoring for various pollutants, depending on the industrial activity.

- Vessel Sewage
  The Federal Clean Water Act provides for the control of vessel sewage through the establishment of areas in which discharges of sewage from vessels are not permitted. These areas are known as 'No Discharge Zones" (NDZs). In 2009 the waters within the South Shore Estuary Reserve, including Patchogue Bay, were established as a Federal No Discharge Zone in which "adequate facilities for the safe and sanitary

removal and treatment of sewage from all vessels are reasonably available for the waters of the South Shore Estuary Reserve." " Establishment of the Patchogue Bay No Discharge Zone and the required pump-out/sanitary facilities have likely resulted in decreased nitrogen and bacteria impacts to Tuthills Creek.

Safe Drinking Water Act

The Safe Drinking Water Act of 1974 (SDWA) authorized EPA to regulate public water systems to protect the public's health. The EPA set standards for chemicals that might be found in water that could potentially have adverse effects. EPA has 25 drinking water standards, 10 of which are for synthetic organics. These drinking water protection measures are also written into the state and county regulations. The 1996 amendment of the SDWA places a strong emphasis on the protection of surface and groundwater sources used for public drinking water. As a result of these amendments, states must develop a Source Water Assessment Program (SWAP) and complete assessments of the sources of drinking water used by public water systems.

Source Water Assessment Program

A mission of the New York State Department of Health (DOH) is to protect and promote the health of the citizens of New York State. Within the DOH, the Bureau of Public Water Supply Protection has the primary responsibility of administering the Public Water System Supervision program (PWSS) and for assuring that safe, potable water, in adequate quantities, is provided throughout the state. This is accomplished through:

- Oversight of local water supply regulatory programs;
- Training and certification of water supply operators;
- Maintenance of a statewide database on individual public water systems;
- Development and initiation of enforcement policies;
- Plan review;
- Maintenance of a water quality surveillance program; and
- Providing technical assistance to both regulatory units and water suppliers.

3.2 Suffolk County Regulations & Programs

Suffolk County Water Quality Protection and Restoration Program

The Suffolk County Water Quality Protection and Restoration Program (WQPRP) was approved by the Suffolk County Legislature in 1987 to advance water quality protection and restoration initiatives, and to promote land stewardship. The WQPRP is funded through a countywide ¼% sales tax, dedicated to water quality protection in Suffolk County. The WQPRP funds implementation projects that result in the restoration or protection of surface water quality. Eligible projects could include the control and abatement of agricultural and other nonpoint pollution sources, aquatic habitat restoration, pollution prevention initiatives, and education and outreach programs that address vessel waste no-discharge zones. The municipalities and stakeholders within the Tuthills Creek watershed are eligible to apply for Suffolk County WQPRP funds.

Local Law 41 – 2007: Fertilizer Limitations

In 2007, the Suffolk County Legislature adopted Local Law 41 – 2007 entitled "A Local Law to Reduce Nitrogen Pollution by Reducing Use of Fertilizer in Suffolk County." The legislature recognized that over-application and/or misuse of fertilizer products has led to the degradation of local water quality, and has harmed groundwater, drinking water, and wetlands and surface waters within the County of Suffolk. In addition to recognizing the impacts to groundwater and drinking water, the legislature acknowledged that fertilizers are responsible for approximately 50% of the total nitrogen loads to groundwater and throughout medium-density residential land uses in Suffolk County. As a result, this law was passed and includes the following regulations:

- Fertilizer is not to be applied to County owned properties.
- Fertilizer shall not be applied to any turf on any non-County owned real property by any person between November 1 and April 1 of every year.

Exceptions to the above include lands utilized in farm operations, golf courses (provided that they use only the minimum amount of slow release fertilizer as necessary), athletic fields (provided that the fields utilize best management practices) and newly seeded or sodded areas. The law also provides for expansion of educational programs and materials geared towards fertilizer use reduction. Home improvement contractors that apply fertilizers are required to obtain a license for fertilizer application and receive training in turf management. Compliance with the Suffolk County Fertilizer Limitations Law is intended to result in lower discharges of nitrogen to Tuthills Creek.

Suffolk County Sanitary Code Article 6

Article 6 provides standards for new development and subdivisions within Suffolk County. The article establishes a minimum area necessary per dwelling unit for use of conventional sanitary systems. Under current standards developments located within Groundwater Management Zone VI (which includes the Tuthills Creek drainage area) must provide a minimum lot area per unit of 40,000 SF. Evaluation of the feasibility of expanding connections to existing sewage treatment plants is also covered by Article 6.

Suffolk County Sanitary Code Article 7

The purpose of Article 7 of the Suffolk County Sanitary Code is to safeguard all the water resources of Suffolk County, especially in deep recharge areas and water supply sensitive areas, from discharges of sewage, industrial and other wastes, toxic or hazardous materials, and stormwater runoff by preventing and controlling such sources. This article regulates the discharge of industrial wastes, sewage, toxic or hazardous materials, or other wastes to surface or groundwater from uses pre-dating the enactment of the law, as well as new sources. These discharges are prohibited in deep recharge or water supply sensitive areas. It also regulates the storage of toxic or hazardous materials.

Suffolk County Sanitary Code Article 12

Suffolk County Department of Health Services Article 12 is intended to "… safeguard

the water resources of the County of Suffolk from toxic or hazardous materials pollution by controlling or abating pollution from such sources and also by preventing further pollution from new sources…" Article 12 is a model law which is very stringent in the protection of Suffolk County's water resources. Conformance to Article 12 requires that hazardous substances be disposed of properly, and that storage facilities be permitted and installed as per the requirements outlined in the article. Any storage of hazardous materials would be subject to design review under Article 12, ensuring that a proper system will be utilized to prevent contaminants from entering the water supply.

3.3 Town and Village Regulations and Practices

The following sections provide a summary of local regulations outlined by various chapters in Town of Brookhaven, Town of Islip and Village of Patchogue Codes. In addition, a review of standardized Town and Village practices is provided in order to provide a complete overview of the Towns' and Village's current stormwater control measures.

3.3.1 Local Laws and Regulations- Town of Brookhaven

Chapter 10A: Feeding of waterfowl and Pigeons
This chapter prohibits the feeding of waterfowl and pigeons within Town parks to reduce water quality problems associated with excessive waterfowl populations.

Chapter 13: Boat Control
This chapter requires persons in charge of or occupying boats docked at or moored to land, docks, piers or wharves abutting navigable waters to observe all of the health and sanitary regulations of the Town of Brookhaven and the County of Suffolk. Discharging of toilets or oil is prohibited in all areas designated as navigable waters within Town regulated waterways.

Chapter 23: Dog Control and Animal Welfare
This chapter prohibits people from allowing dogs to defecate on public properties, or on private property without the permission of the property owner. This chapter requires people to immediately remove all feces in a sanitary manner and then seal and deposit them in a garbage receptacle, and prohibits feces from being deposited in sewers or drains, whether storm or sanitary.

Chapter 33: Flood Damage Prevention
This chapter regulates land uses and conditions which are dangerous to health, safety and property due to water or erosion hazards, or which result in increases in erosion, flood heights, or velocities. It requires that land uses vulnerable to floods, be protected against flood damage at the time of initial construction. It controls the alteration of natural floodplains, stream channels, and natural protective barriers and controls filling, grading, dredging and other development which may increase erosion or flood damages. The

chapter also regulates the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards to other lands.

Chapter 35: Grading

The purpose of this chapter is to regulate and control the regrading of land in order to prevent serious and irreparable damage to natural resources, to minimize and retard the erosive effects of wind and water, to prevent the depreciation of property values, to prevent the removal of lateral support for abutting streets, lands and structures, to prevent damage to natural watersheds, to provide adequate drainage for surface water runoff, to protect persons and property from the hazards of periodic flooding and, in general, to protect the health, welfare and safety of the residents of the Town.

Chapter 45: Littering and Dumping

This chapter prohibits the dumping of litter and/or hazardous wastes, and provides an efficient means of cleaning up illegally dumped litter and/or hazardous wastes in order to aid in the protection of the groundwater aquifer. The law prohibits a person from causing litter and/or hazardous waste to be thrown or deposited in or upon public or private land.

Chapter 47: Petroleum Substances, Disposition of

This chapter prohibits the disposal of any petroleum substance unless it is deposited directly into a container, drum or storage tank, and makes it unlawful for any person to allow any petroleum substance to be disposed of on any ground, pavement or roadway or to be discharged or seep into any sewer, leaching pool, stream, lake, well or other body of water. This chapter further requires and specifies the appropriate disposal of waste oils by service stations, repair shops, and junk yards.

Chapter 82 and 88: Neighborhood Preservation and Blighted Property Restoration

This chapter requires proper maintenance of private properties to ensure such properties have properly functioning sanitary systems and enables the Town to address any such property with unhealthy conditions or otherwise deemed a public nuisance. These regulations also allow for the Town to designate and remediate a blighted property if such property is a detriment to public health.

Chapter 70: Tree Preservation

This chapter requires a permit for tree removal for any tree greater than three inches in diameter measuring three feet from ground level. The tree must have a minimum height of six feet for a permit to be required.

Chapter 78: Water Resource: Appropriation and Use of Subterranean Waters

This code regulates activities within subterranean waters so that the residents of the Town will be ensured of an ample supply of clean and safe drinking water. The law prohibits anyone from removing subterranean waters located within the Town or discharging any industrial waste without first having obtained a permit for such activity from the Town Board.

Chapter 81: Wetlands and Waterways

In order for the Town to help protect and preserve underwater lands, tidal wetlands and freshwater wetlands, the Town regulates activities within and adjacent to such wetlands to help protect the valuable attributes and functions they provide; to prevent the despoliation and destruction of natural resources whenever practicable; and to regulate the use and development of natural resources. This chapter applies to all lands defined as wetlands or waterways, to any activity in a jurisdictional area of a wetland or waterway, or to any activity that has the potential to adversely impact wetlands or waterways.

Chapter 85: Zoning

This chapter establishes the zoning districts within the Town, the allowable uses in each district, and the dimensional regulations for each district. In particular, several districts require the retention of buffers for sites, and no trees can be removed on a site until the Planning Board conducts the appropriate site plan review and approval (for developments that require such approval).

Chapter 86: Stormwater Management and Erosion Control

The central purpose of this Chapter is to regulate non-stormwater discharges to the municipal separate storm sewer system (MS4). The objectives of this Chapter include:

1) To regulate the contribution of pollutants to the MS4 since such systems are not designed to accept, process or discharge non-stormwater wastes;
2) To prohibit illicit connections, activities and discharges to the MS4; and
3) To promote public awareness of the hazards involved in the improper discharge of trash, yard waste, lawn chemicals, pet waste, wastewater, grease, oil, petroleum products, cleaning products, and paint products.

Chapter 86A: Prohibition of Illicit Discharges and Connections to the Town of Brookhaven Municipal Separate Storm Sewer System

The primary purposes of this chapter are to establish minimum stormwater management requirements within the Town of Brookhaven by:

- Minimizing increases in stormwater runoff from land development activities in order to reduce flooding, siltation, increases in stream temperature, and stream bank erosion; and
- Minimizing increases in pollution caused by stormwater runoff from land development activities, which would otherwise degrade local water quality.

Chapter SR: Subdivision Regulations

The purpose of this regulation is to ensure that all subdivisions meet the stormwater requirements of Chapter 86.

Chapter SR: Drainage Plans

The Town of Brookhaven requires all drainage plans to include detailed plans of all stormwater drainage facilities, street profiles and other utilities which may be required by the Planning Board. The drainage plans must be prepared by a licensed professional

engineer in conformance with the design criteria and standards of the Town.

3.3.2 Local Laws and Regulations - Town of Islip:

Chapter 7 Pesticides
This chapter prohibits the application of pesticides or plant regulators on any Town owned parcel or land, unless classified as an exception. The Town requires the use of organic lawn care materials on all Town-owned parcels of land, except Town-owned golf courses.

Chapter 12 Animals
This chapter prohibits individuals from allowing a dog to defecate, soil or commit any nuisance on any common thoroughfare, sidewalk, passageway, bypath, play area, park or any place where people congregate or walk or on any public property.

Chapter 13A Environmental Council
The Town of Islip has established an Environmental Council for the conservation of the environment in order to foster a unified action on environmental problems in the Town. The Council advises the Town Board on all matters affecting the preservation, development and use of the natural and man-made features and conditions of the Town of Islip; and develops public information programs to foster increased understanding of the nature of environmental problems and issues.

Chapter 15 Excavations and Topsoil Removal
This chapter requires a permit for any excavation, except for the construction of a wall, driveway, sidewalk or building. Provisions for dust control must be made. This chapter also provides laws for topsoil removal, the application of limestone, fertilizer and seed mixtures, and annual timeframes in which work may be performed.

Chapter 21 Solid Waste
Requires that recyclable materials generated by residents of the Town of Islip for which an economic market exists are to be separated and placed out for collection. Solid waste generated within the Town of Islip may only be disposed of at a disposal facility, unless a permit is issued by the Town of Islip. It is unlawful for any generator of hazardous wastes, liquid wastes and/or solvents, ignitable wastes, or pesticides, to dispose upon publicly or privately owned property, or storm drains, sumps, ponds, wells, or waterways, any of the substances described in the code.

Chapter 32 Littering
Disposal of litter within the Town of Islip is prohibited except when litter is placed in public receptacles, authorized private receptacles or official disposal areas. The litter being placed in these receptacles must be disposed of in a manner that would prevent it from being carried or deposited on streets or sidewalks or other public, private or commercial property. Owners and occupants of residential or commercial property are

required to keep the property, sidewalk and street in front of the property free from litter.

Chapter 43A Sewers

The Town of Islip regulates non-stormwater discharges to the municipal separate storm sewer system (MS4) as required by federal and state law. The objectives of Chapter 43A are: to regulate the contribution of pollutants to the MS4 ; to prohibit illicit connections, activities and discharges to the MS4; and to promote public awareness of the hazards involved in the improper discharge of pollutants into the MS4.

Chapter 47 Stormwater Management and Erosion and Sediment Control

This Law was adopted by the Town of Islip to establish minimum stormwater management requirements and controls. This local law seeks to meet those purposes by achieving the following objectives:

- Minimize increases in stormwater runoff from land development activities in order to reduce flooding, siltation, increases in stream temperature, and streambank erosion and maintain the integrity of stream channels; and
- Minimize increases in pollution caused by stormwater runoff from land development activities which would otherwise degrade local water quality.

Chapter 47B Subdivision Improvements

This Chapter governs subdivision applications to the Town of Islip Planning Board, which has authority to approve and/or modify such applications. Planning Board approvals include but are not limited to: the installation of curbs and/or sidewalks; the installation of leaching basins or positive drainage; the construction or reconstruction of roads; the dedication of land upon which curbs, sidewalks and roads are to be built; and the installation of trees.

Chapter 66 Water Quality

The purpose of this local law is to protect the Town's people, aquifer system, waterways, and wildlife from the harmful effects of hazardous substances. This chapter prohibits the discharge of hazardous substances, except the discharge of sewage, into approved disposal systems. Unlawful discharge includes but is not limited to: failure of underground liquid storage tanks, pipes or connections; failure of aboveground liquid storage systems; disposal in landfills, drainage systems, any waterways or on the land surface; spills which occur during transport on public or private property; disposal or storage of contaminated material, including but not limited to soil, sand or gravel, anywhere in the Town of Islip. This law also regulates hazardous liquid storage systems with a capacity of one thousand one hundred (1,100) gallons or more.

Chapter 67 Wetlands and Watercourses

The intent of this law is to provide for the protection, preservation, proper maintenance and use of watercourses, coastal wetlands and tidal marshes in order to minimize their disturbance; prevent damage from erosion, turbidity or siltation, salt water intrusion, loss of fish, shellfish or other beneficial marine organisms, aquatic wildlife and vegetation and the destruction of the natural habitat, the danger of flood and storm tide damage and

pollution; to otherwise protect the quality of watercourses, coastal wetlands, tidal waters, marshes, shorelines, watersheds and water recharge areas, underground water reserves, beaches and natural drainage systems for their conservation, economic, aesthetic, recreational and other public uses and values; and further to protect the Town's potable fresh water supplies from the dangers of drought, overdraft, pollution and misuse or mismanagement.

Chapter 68 Zoning
The primary intent of this chapter is to ensure the most appropriate use of land in the Town of Islip

3.3.3 Local Laws and Regulations - Village of Patchogue

Chapter 143 Animals
This chapter prohibits allowing a dog to defecate on any public property and requires sanitary removal of any fecal matter. It further prohibits allowing a dog, cat or other animal to defecate on private property without the permission of the owner. This chapter also prohibits providing food to any waterfowl on publicly owned lands or waterways within the Incorporated Village of Patchogue.

Chapter 210 Flood Damage Prevention
One of the central purposes of this chapter is to minimize public and private losses due to flood conditions and to regulate land uses which are dangerous to health, safety and property due to water or erosion hazards, or which result in increases in erosion or in flood heights or velocities. The chapter requires that properties vulnerable to floods, be protected against flood damage at the time of initial construction; controls the alteration of natural floodplains, stream channels, and natural protective barriers which are involved in the accommodation of floodwaters; controls filling, grading, dredging and other development which may increase erosion or flood damages; regulates the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards to other lands; and provides provisions for participation in the National Flood Insurance Program.

Chapter 216 Freshwater Wetlands
This Chapter provides for the authority of Patchogue Village to regulate activities that may impact freshwater wetlands in accordance with the New York State Freshwater wetlands Act.

Chapter 353 – Sewage Disposal
This chapter regulates septic tanks and cesspools located within the Village of Patchogue limits and requires that they be designed, constructed and maintained in accordance with the latest standards of the Suffolk County Department of Health Services regulations and regulates the maintenance and operation of public wastewater disposal systems

Subsection 353 - Grease Traps
Provides provisions to ensure the Village's sanitary sewer system is not impacted by grease, kitchen oils, and other substances discharged from food establishments.

Chapter 365 – Solid Waste
This Chapter defines Solid Waste, and prohibits the placement, deposition or storage of any refuse on or in any street, drain, ditch, or body of water or public place within the Incorporated Village of Patchogue except in containers especially provided for such purpose by the Superintendent of Public Works, and in no event, upon the premises of another except with the consent of the owner or occupant thereof. The chapter specifies how solid waste may be stored, and provides regulation as to places and hours of collection.

Chapter 369 – Stormwater Management
The primary purpose of Local Law No. 6-2009[1] is to establish minimum stormwater management requirements and controls within the Village of Patchogue by minimizing increases in stormwater runoff from land development activities in order to reduce flooding, siltation, increases in stream temperature, and streambank erosion.

Chapter 370 – Storm Sewers
The purpose of this article is to regulate non-stormwater discharges to the municipal separate storm sewer system (MS4) to the maximum extent practicable as required by federal and state law. This article establishes methods for controlling the introduction of pollutants into the MS4 in order to comply with requirements of the SPDES General Permit for Municipal Separate Storm Sewer Systems. The objectives of this article are to:

- Regulate the contribution of pollutants to the MS4 since such systems are not designed to accept, process or discharge non-stormwater wastes;
- Prohibit illicit connections, activities and discharges to the MS4;and
- Promote public awareness of the hazards involved in the improper discharge of trash, yard waste, lawn chemicals, pet waste, wastewater, grease, oil, petroleum products, cleaning products, paint products, hazardous waste, sediment and other pollutants into the MS4.

Chapter 377 – Subdivision of Land
The purpose of this regulation is to ensure that all subdivisions meet the stormwater requirements of Chapter 435 of the Village of Patchogue Code.

Chapter 422 – Waterways and Watercraft
This chapter prohibits the throwing or discarding of litter, wastepaper, bags, discarded fish or crab bait, refuse or other discarded or waste materials or substances on a dock: and requires persons using a dock to keep the dock clean and free from litter, and to either remove litter when leaving or to dispose of litter in receptacles that may be provided for that purpose. Watercraft speeds are limited to four miles per hour and large wakes are not permitted to protect safety of bathers and reduce erosion from wakes.

Chapter 435 Article XV: Zoning – Stormwater Control
This chapter requires the preparation of a SWPPP in accordance with Local Law No. 6-2009 (Ch. 369: Stormwater Management).

3.3.4 Municipal Programs and Best Management Practices

The Towns of Brookhaven and Islip and the Village of Patchogue all have programs that utilize best management practice to minimize or completely remove stormwater impacts to Tuthills Creek. A summary of each program is provided in **Table 3-1** below.

3.4 Best Management Practice Gap Analysis

The Genesee/Fingers Lakes Regional Planning Council in cooperation with the NYSDOS developed a Municipal Nonpoint Assessment Form that was designed to identify gaps in laws and practices for municipalities to guide recommendations for improvement. The form divides BMP's into six groups: Development, Forestry and Agriculture, Waterways and Wetlands, Marinas, Roads and Bridges and Onsite Wastewater Treatment Systems. Each BMP is assessed to determine if a local law, program, or practice is in place that enforces the BMP, and to what degree the BMP is enforced by the law, program or practice. The scoring system for each BMP is as follows:

- **Fully (2 points)**: The municipality implements the practice or its equivalent across the entire area of the municipality. The practice is a) codified in municipal code; b) included in internal operating procedure guidelines or manuals; c) included in specification manuals, or d) is part of a special municipal initiative.
- **Partially (1 point**): The municipality implements the practice or its equivalent in a specific area of the municipality or implements part of the practice or its equivalent. The practice is a) routinely followed but not codified in municipal code; or b) routinely followed but not included in written internal operating procedure guidelines or manuals which may or may not include specifications.
- **Not at all (0 points)**: The municipality does not implement the practice or its equivalent.
- **Not applicable (n/a)**: The practice does not appear to be relevant to the municipality.

The purpose of this analysis is to identify areas where changes or improvements to municipal practices may be beneficial to the watershed. The complete assessment table identifying gaps in local laws, programs, and practices, for each municipality is provided as **Tables 3-2 through 3-4**. A summary table of the analysis is provided in **Table 3-1** below. The identified gaps are denoted with an "x" in the table below and are discussed further in **Section 4.0**, **Recommendations**.

Table 3-1
Regulatory Gap Analysis Summary

Regulatory Gap Analysis Summary				
BMP Number	**Best Management Practices (BMP)**	**Town of Brookhaven Regulatory Gap**	**Town of Islip Regulatory Gap**	**Village of Patchogue Regulatory Gap**
Section 1 - Development				
Part A - Existing Development				
1-04	Acquire additional land for locating treatment facilities		x	x
1-05	Encourage homeowners to place compost piles away from waterbodies and roadways		x	x
1-11	Encourage water conservation		x	x
1-15	Discourage feeding of waterfowl		x	
Part B - New Development and Substantial Redevelopment				
1-26	Minimize the creation of impervious areas		x	x
1-29	Redistribute topsoil within the boundaries of the disturbed land for seeding and planting		x	x
1-30	Stabilize disturbed soils as soon as possible			x
1-31	Minimize the use of cut and fill operations. Conform such operations to topography and soils to minimize erosion potential and adequately accommodate runoff			x
1-35	Target training for contractors, inspectors and zoning and planning officials.			x
1-36	Require tree surveys and/or cutting plans.		x	x
1-38	Encourage cluster development.			x
1-40	Enact limits on driveway grades.			x
1-41	For redevelopment, employ regulations that provide for technologically advanced (on and off) site wastewater treatment systems to optimize efficiencies and address "challenging" sites	x	x	x
Section 3 - Waterways and Wetlands				
Part A - Modified Waterways				
3-14	Special zoning considerations to protect wetland areas			x
Section 4 - Marinas				
Part A - Existing Marinas				
4-19	Prohibit motorized vessels from areas (define areas) that contain important shallow-water habitats		x	x
Section 5 - Roads and Bridges				
Part A - Existing Roads and Bridges				
5-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) - according to best management practices		x	

Regulatory Gap Analysis Summary				
BMP Number	**Best Management Practices (BMP)**	**Town of Brookhaven Regulatory Gap**	**Town of Islip Regulatory Gap**	**Village of Patchogue Regulatory Gap**
5-03	Include high percentage of indigenous plants in new landscaping on public-owned properties (excluding arboretums, horticultural gardens, and site requiring turf grasses)		x	
5-05	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities		x	
Part B - New Roads and Bridges				
5-09	Retain and protect trees and other natural vegetation on and near disturbed sites			x
5-11	Minimize the creation of impervious areas	x	x	x
5-14	Redistribute topsoil within the boundaries of the disturbed land for seeding and planting	x	x	x
5-16	Minimize the use of cut and fill operations. Conform such operations to topography and soils to minimize erosion potential and adequately accommodate runoff		x	
Section 6 - Onsite Wastewater Treatment Systems				
6-05	Inspection of all OWTS at property transfer or within 1 year prior to transfer	x	x	x

The full assessment of local laws and practices is provided below as **Tables 3-2 (Town of Brookhaven), Table 3-3 (Town of Islip)** and **Table 3-4 (Village of Patchogue)**.

Table 3-2: Town of Brookhaven Regulatory Gap Analysis

Town of Brookhaven				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
Section 1 - Development				
Part A - Existing Development				
1-01	Identify retrofit opportunities	NYS MS4 GP 0-15-003, Tuthills Creek WMP - in development	2a & 2b	Required by GP-0-15-003 Part IX for Patchogue Bay sewershed.
1-02	Identify habitat and natural conveyance system restoration opportunities	Tuthills Creek WMP - in development	1	Full implementation expected with adoption of Tuthills Creek Watershed Management Plan
1-03	Establish retention/detention areas	Tuthills Creek WMP - in development	1	Full implementation expected with adoption of Tuthills Creek Watershed Management Plan
1-04	Acquire additional land for locating treatment facilities	Tuthills Creek WMP - in development	~~2b~~	To be conducted as per Tuthills WMP recommendations
1-05	Encourage homeowners to place compost piles away from waterbodies and roadways	Town of Brookhaven Town Code Chapter 85-892	1a	Applies to horse manure composting only
1-06	Encourage proper use and disposal of lawn and other household chemicals	Town of Brookhaven Town Code Chapter 86A, Town STOP program	2a, 2b & 2d	
1-07	Institute turf management practices on golf courses and parks and recreation areas	N/A	N/A	
1-08	Undertake storm drain stenciling	Town practice as part of their MS4 program	1b	
1-09	Encourage volunteer programs, such as adopt-a-highways and adopt-a-stream, etc.	The Town has various volunteer programs, including Adopt-a-road	2b	
1-10	Include high percentage of indigenous plants in new landscaping on privately-owned properties (excluding arboretums, horticultural gardens, and sites requiring turf grasses)	Town of Brookhaven Town Code Chapter 81	1	Applies to properties within 150 feet of wetlands only
1-11	Encourage water conservation	Town of Brookhaven Town Code Chapter85-847	1a & 2d	Code applies to irrigation only
1-12	Develop outreach programs targeted at specific problems related to water quality management & resource conservation	NYS GP-0-15-003 (MS4 educational materials)	2d	

Town of Brookhaven				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
1-13	Encourage proper control of pet wastes	Town of Brookhaven Town Code Chapter 23, NYS GP-0-15-003	2a	Required by GP-0-15-003 Part IX for Patchogue Bay sewershed.
1-14	Encourage continued operation of private storm water runoff control structures	NYS GP 0-15-002, Town of Brookhaven Town Code Chapter 86	2a	
1-15	Discourage feeding of waterfowl	Town of Brookhaven Town Code Chapter 10A, NYS GP-0-15-003	2a	Required by GP-0-15-003 Part IX for Patchogue Bay sewershed.
1-16	Discourage the introduction of exotic aquatic species (Eurasion water milfoil, zebra mussels, water chestnut, etc.	Suffolk County Resolution 614-2007, 6 NYCRR Part 575	2a	
1-17	Encourage continued (periodic) operation and maintenance of private septic disposal systems	NYS GP-0-15-003	1	Partially required by GP-0-15-003 Part IX for Patchogue Bay sewershed
1-18	Effective and consistent application and enforcement of stormwater regulations & requirements	NYS GP 0-15-002, Town of Brookhaven Town Code Chapter 86	~~1~~ 2a, 2b	GP-0-15-002 and Chapter 86 do not apply to disturbances of less than one acre
1-19	Require certification of existing on-site septic systems for property transfers or building expansions.	NYS GP-0-15-003, SCDHS Article 6, Special Permit/Building Permit Review Process	1	Identification and regulation of poorly functioning sanitary systems discharging to MS4 is required pursuant to NYSDEC MS4 General Permit
1-20	Require entire property (existing as well as proposed) to be included in stormwater analysis/calculation.	NYS GP 0-15-002	1	Does not apply to disturbances of less than one acre
Part B - New Development and Substantial Redevelopment				
1-21	Minimize the amount of land disturbed and the duration of disturbance	NYS GP 0-15-002, Town of Brookhaven Town Code Chapter 86	1	
1-22	Preserve natural features and conform substantially with the natural boundaries and alignment of waterbodies	Town of Brookhaven Town Code Chapter 81, NYSDEC Stormwater Management Design Manual	1	Encouraged by NYSDEC Stormwater Management Design Manual
1-23	Retain and protect trees and other natural vegetation on and near disturbed sites	Town of Brookhaven Town Code Chapter 70, 81, and 85	1	
1-24	Account for topography and soil type in efforts to minimize erosion potential	NYS GP 0-15-002, Town of Brookhaven Town Code Chapter 86	1	Applies to disturbance of one acre or more; or a disturbance of less than one acre that is part of a larger common plan of development, notwithstanding multiple and distinct activities may occur at different times and/or different schedules.

Town of Brookhaven				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
1-25	Maintain runoff rates similar to pre-construction levels	NYS GP 0-15-002, Town of Brookhaven Town of Brookhaven Town Code Chapter 86	2a, 2b	Does not apply to disturbances of less than one acre
1-26	Minimize the creation of impervious areas	Town of Brookhaven Town Code Chapter 85, Site Plan Review Process	2a	Town code requires buffers (whether natural or landscaped) for all zoning districts
1-27	Control increased runoff caused by changed surface conditions to minimize the danger of flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction	NYS GP 0-15-002, Town of Brookhaven Town Code Chapter 86	1	Does not apply to disturbances of less than one acre
1-28	Use temporary vegetation and mulching to protect exposed and critical areas during development	NYS GP 0-15-002, Town of Brookhaven Town Code Chapter 86	1	Does not apply to disturbances of less than one acre
1-29	Redistribute topsoil within the boundaries of the disturbed land for seeding and planting	Town of Brookhaven Town Code Chapter 53	1a	Applies to lands to be mined only
1-30	Stabilize disturbed soils as soon as possible	NYS GP 0-15-002, Town of Brookhaven Town Code Chapter 86	1	Does not apply to disturbances of less than one acre
1-31	Minimize the use of cut and fill operations. Conform such operations to topography and soils to minimize erosion potential and adequately accommodate runoff	Town of Brookhaven Town Code Chapter 35, Chapter 86	2a	
1-32	Use appropriate solid and hazardous waste generation and disposal practices including source controls and recycling	SCDHS Article 7 & 12, Town of Brookhaven Town Code Chapter 45, Throwing it Out in Brookhaven booklet	2a	
1-33	Encourage construction site management techniques which include the proper handling and disposal of pesticides and petroleum products and containers	NYS GP 0-15-002, Town of Brookhaven Town Code Chapter 86	1	Does not apply to disturbances of less than one acre
1-34	Ensure proper operation and maintenance of runoff management facilities	NYS GP 0-15-002, Town of Brookhaven Town Code Chapter 86, NYS GP-0-15-003	1	Does not apply to disturbances of less than one acre
1-35	Target training for contractors, inspectors and zoning and planning officials.	NYS GP 0-15-003, Town brochure to contractors regarding required pollution prevention procedures	1b	
1-36	Require tree surveys and/or cutting plans.	Town Code Chapter 70	2a	

Town of Brookhaven				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
1-37	Develop priority list for BMP's -use of vegetative low areas for retention/infiltration.	NYS GP 0-15-003, Tuthills Creek WMP	2b	Full implementation expected with completion of Tuthills Creek Watershed Management Plan
1-38	Encourage cluster development.	Town of Brookhaven Town Code Chapter 85	2a	
1-39	Require connection to and/or extension of existing water & sewer if project is within 500 feet of existing public infrastructure	SCDHS Article 6	2a	Applies to properties within sewer districts
1-40	Enact limits on driveway grades.	Town of Brookhaven Town Code Chapter 35, Chapter 86	2a	
1-41	For redevelopment, employ regulations that provide for technologically advanced (on and off) site wastewater treatment systems to optimize efficiencies and address "challenging" sites		0	
1-42	Implement Federal/State Stormwater (SPDES) Phase II requirements	NYS GP 0-15-002, Town of Brookhaven Town Code Chapter 86, GP-0-15-003	2a, 2b & 2d	
Section 2 - Forestry and Agriculture				
Part A - Forestry				
2-01	Consider potential water quality impacts when selecting silviculture system (yarding system, site preparation, pesticides employment, etc.)	N/A	N/A	
2-02	Consider harvesting practices	N/A	N/A	
2-03	Seasonal preference for logging operations	N/A	N/A	
2-04	Have specialists (geologist, soil scientist, geotechnical engineer, wildland hydrologist) review plans in high erosion hazard areas	N/A	N/A	
2-05	Preplan harvest areas, skid trails, and access so as to be on stable soils, avoiding steep gradients, multiple stream crossings, poor drainage areas, etc.	N/A	N/A	
2-06	Limit grades of access roads.	N/A	N/A	
2-07	Require stabilization of roads/drives to forestry site.	N/A	N/A	

Town of Brookhaven				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
2-08	Employ natural topography and contour for design of road network	N/A	N/A	
2-09	Require stormwater controls for increased runoff from ground cover modification	N/A	N/A	
2-10	Consider site restoration	N/A	N/A	
Part B - Agriculture				
2-11	Use Agricultural Environmental Management (AEM)	N/A	N/A	
2-12	Require farms seeking agricultural value assessment to participate in AEM	N/A	N/A	
Section 3 - Waterways and Wetlands				
Part A - Modified Waterways				
3-01	Develop an operation and maintenance program for existing modified streams that includes identification of opportunities and actions to restore habitat and the physical and chemical characteristics of these streams.	Tuthills Creek WMP - in development	1	Implementation expected with adoption of Tuthills Creek Watershed Management Plan
3-02	Improve stream quality by controlling instream sedimentation and selectively clearing debris	Tuthills Creek WMP - in development	1	Implementation expected with adoption of Tuthills Creek Watershed Management Plan
3-03	Establish or reestablish riparian buffers	NYSDEC Article 24 & 25 Permitting, Town of Brookhaven Town of Brookhaven Town Code Chapter 81, Wetland Permit	2a	
3-04	Prevent animal wastes from entering waterbodies	Town of Brookhaven Town Code Chapter 23	2a	
3-05	Attempt vegetative stabilization before undertaking structural measures	NYSDEC Article 24 & 25 Permitting, Town of Brookhaven Town Code Chapter 81, Wetland Permit	2a	
3-06	Design and construct shore erosion control facilities, in accordance with an erosion and sedimentation control plan, in areas where marsh creation and soil bioengineering are ineffective or where existing protection methods are being flanked or are failing	NYSDEC Article 24 & 25 Permitting, NYS GP 0-15-002, Town of Brookhaven Town Code Chapter 81, Wetland Permit; Chapter 76	2a	

Town of Brookhaven				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
3-07	Schedule the periodic maintenance of sediment control measures, and inspect and repair them as needed in conformance with established schedule.	NYS GP 0-15-002, Town of Brookhaven Town Code Chapter 86	2a	
3-08	Protect stream banks through direct nonstructural means, such as new vegetation or protection of existing vegetation; direct structural means, such as revetments and bulkheads; indirect nonstructural means, such as regulating irrigation near stream banks or rerouting overbank drainage; or indirect structural means, such as deflecting channel flow away from stream banks with dikes, board fences and gabions	NYSDEC Article 24 & 25 Permitting, Town of Brookhaven Town Code Chapter 81, Wetland Permit, Tuthills Creek WMP	2a	Implementation expected with adoption of Tuthills Creek Watershed Management Plan
3-09	Use setbacks to minimize disturbance of land adjacent to stream banks and shorelines	NYSDEC Article 24 & 25 Permitting, Town of Brookhaven Town Code Chapter 81, Wetland Permit	2a	
3-10	Prevent discharges to waterbodies in amounts that would adversely affect the taste, color or odor of the waters, or would impair the waters for their best usages	NYS GP 0-15-002, NYS GP-0-15-003, Town of Brookhaven Town Code Chapter 86A	2a	
Part B - Wetlands and Riparian Area Management and Restoration				
3-11	Consider wetlands and riparian areas and their non-point source (nps) control potential on a watershed scale	Tuthills Creek WMP - in development	1	Full implementation expected with completion of Tuthills Creek Watershed Management Plan
3-12	Identify existing functions of those wetland and riparian areas with significant nps control potential when implementing nps management practices. Do not alter wetlands or riparian areas to improve their water quality at the expense of their other functions	Tuthills Creek WMP - in development	1	Full implementation expected with completion of Tuthills Creek Watershed Management Plan
3-13	Conduct permitting, licensing, certification and non-regulatory nps pollution activities in a manner that protects wetland functions	NYSDEC SPDES Permitting	2a	
3-14	Special zoning considerations to protect wetland areas	Town of Brookhaven Town Code, Chapter 85	2a	Wetland Overlay District

Town of Brookhaven				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
3-15	Use appropriate pretreatment practices such as vegetated systems or detention or retention basins to prevent adverse impacts to wetland functions that affect nps pollution abatement from hydrologic changes, sedimentation, or contaminants	NYS GP 0-15-002, Town of Brookhaven Town of Brookhaven Town Code Chapter 86	1	Does not apply to disturbances of less than one acre
3-16	All projects should require wetlands certification.	NYSDEC Article 24 & 25 Permitting, Town Code Chapter 81	2a	
Section 4 - Marinas				
Part A - Existing Marinas				
4-01	Clean maintenance areas regularly preferably by vacuuming to remove trash, sandings, paint chips, etc.	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-02	Prevent residue from being carried into surface waters by performing abrasive blasting within plastic tarp enclosures on windless days or within spray booths	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-03	Provide proper disposal/recycling facilities to marina patrons, preferably covered receptacles	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-04	Establish fish cleaning areas, and implement rules governing the conduct of fish cleaning operations	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-05	Educate boaters on the importance of proper fish cleaning practices	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-06	Implement fish composting where appropriate	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-07	Store materials in areas impervious to the type of material stored. Build curbs, berms, or other barriers around the areas to contain spills	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-08	Use separate, clearly labeled containers for the disposal of oil, gasoline, antifreeze, diesel, kerosene, and mineral spirits	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed

Town of Brookhaven				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
4-09	Target outreach programs about proper disposal at marina patrons through the use of signs, mailings, and other means	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-10	Promote the use in bilges of oil-absorbing materials, and replace them as necessary, preferably recycling, or disposing of them in accordance with petroleum disposal regulation	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-11	Use a container under the air vent while refueling inboard tanks if the tank vents are not equipped with a fuel/air separator	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-12	Prohibit in-water hull scraping or any underwater process to remove paint from boat hulls	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-13	Wash the boat hull above the waterline by hand, using only necessary amounts of detergents and cleaning compounds that are phosphate-free and biodegradable	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-14	Prohibit the use of detergents and cleaning compounds containing ammonia, sodiumhypochloride, chlorinated solvents, petroleum distillates, alcohol, or lye	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-15	Educate individuals about the importance of trash reduction and recycling through: interpretive and instructional signs placed at marinas and boat-launching sites, pamphlets or flyers, newsletters, inserts in billings, meetings and presentations, workshops, and certification programs	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-16	Inspect pump out facilities regularly, and repair them, if practical, under a maintenance contract with a competent contractor	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-17	Add language to slip lease agreements mandating the use of pump out facilities and specifying penalties for failure to comply	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-18	Place dye tablets in holding tanks to identify and discourage illegal disposal	Federal No Discharge Zone requirements - 74 FR 59177	2a	

Town of Brookhaven				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
4-19	Prohibit motorized vessels from areas (define areas) that contain important shallow-water habitats	Town of Brookhaven Code Chapter 10	1a	Prohibits use within the vicinity of bathing areas
4-20	Establish and enforce no-wake zones to decrease turbidity and reduce erosion potential from boat wakes	Brookhaven Town of Brookhaven Town Code Chapter 13	2a	Town Law prohibits boats operating at a speed in excess of 12 miles per hour in any channel or at a speed in excess of five miles per hour within 100 feet of any area designated as a boat basin, marina, harbor, river, stream, creek or bathing area, or an anchored or moored vessel
Part B - New Marinas				
4-21	Design and site marinas to maximize exchange of marina basin water. Limit basins and channels with square corners that tend to trap flotsam, and place dock structures in a manner that promotes circulation	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-22	Perform a preconstruction assessment, which includes a water quality monitoring and modeling methodology, to predict post-construction water quality conditions	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-23	Monitor water quality during construction to protect ambient water quality to the maximum practicable extent	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-24	Develop a marina siting policy to discourage development in areas containing important habitat designated by local, State, or federal agencies	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-25	Conduct surveys and employ rapid bioassessment techniques to assess historic habitat function (e.g. spawning, nursery, and migration pathways) and potential impacts to these and other biological functions and resources	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-26	Encourage the redevelopment or expansion of existing marina facilities that have demonstrated minimal environmental impacts instead of developing new marina facilities	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed

Town of Brookhaven				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
4-27	Consider alternative sites with minimal potential environmental impacts when the use of previously disturbed sites is not feasible	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-28	Minimize disturbance of indigenous vegetation in the riparian area	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-29	Use soil bioengineering or plants, wherever conditions allow, to restore damaged habitat along shorelines and streambanks	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-30	Use properly designed and constructed engineering practices that minimize shoreline disturbance in areas where soil bioengineering and plants are ineffective	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-31	Use appropriate shore erosion control methods, such as returns or return walls, in areas where existing protection methods are being flanked or are failing	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-32	Plan and design all streambank, shoreline, and navigation structures so that they do not transfer erosion energy to or otherwise cause visible loss of surrounding streambanks or shorelines	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-33	Locate and design fuel stations so that spills can be contained in a limited area	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-34	Design and install underground fuel storage tanks according to State regulations, including the provision of detection systems and automatic fuel tank and pump leak shut-offs	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-35	Provide aboveground fuel tanks and fueling areas with a curbed or diked storage area to handle containment volumes meeting State (and local) codes and inspect regularly	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-36	Use preferred pump out systems: fixed-point, portable, dedicated slip side, and pump out boats	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed

Town of Brookhaven				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
4-37	Design onsite wastewater treatment systems to specifically handle waste from vessels	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-38	Post pump out facility location and regulations at the marina. Charge fees that encourage rather than discourage facility use. Consider offsetting the cost of maintaining pump out facilities by fuel sales where these facilities are conveniently located in close proximity to one another	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
Part C - All Marinas (Existing and New)				
4-39	Restrict boat repair and maintenance activities to clearly marked designated areas to prevent debris from falling into the water and preventing invasive species	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-40	Secure all fueling facilities and storage areas with appropriate shut-off devices and security locks and inspect regularly	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-41	Design fueling stations with spill containment equipment that is stored in a clearly marked location, accessible to work and storage areas. Post emergency phone numbers in a prominent location	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-42	Design a spill contingency plan	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-43	Inspect and maintain all containment berms or devices in accordance with State regulations. Investigate immediately signs of leakage or spillage, and undertake cleanup in accordance with applicable best management practices	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-44	Have a trained operator present and prepared to respond to accidental spills	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-45	Maintain daily inventory records to identify abnormal loss or gain of liquid	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed

Town of Brookhaven				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
4-46	Prohibit the cleaning of hoses, fittings, pumps, and other accessory equipment on piers, docks or adjacent upland to prevent runoff into the marina basin or other surface or groundwater	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-47	Create and/or maintain a dedicated fund for maintenance in the case of government-owned facilities	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
4-48	Restrict the operation of pump out facilities to trained marina personnel only	N/A	N/A	There are no marinas in the Town of Brookhaven portion of the Tuthills Creek Watershed
Section 5 - Roads and Bridges				
Part A - Existing Roads and Bridges				
5-01	Conduct road and bridge maintenance (de-icing material usage and storage, pot-hole repair, bridge washing, scraping and painting, etc.) according to best management practices	Highway Department Roadway Maintenance Practices, NYS GP-0-15-003	2b	
5-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) -according to best management practices	Highway Department Mowing and Property Maintenance Program, NYS GP-0-15-003	2b	
5-03	Include high percentage of indigenous plants in new landscaping on public-owned properties (excluding arboretums, horticultural gardens, and site requiring turf grasses)	Town practice	1b	Agreement with LINPI to stock and utilize native plants for revegetation
5-04	Implement a regular inspection and maintenance plan of existing structures	Highway Department Catch Basin Inspection and Cleaning Program, NYS GP-0-15-003	1a	
5-05	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities	NYS MS4 GP 0-15-003, Tuthills Creek WMP - in development	2b	Implementation expected with adoption of Tuthills Creek Watershed Management Plan
5-06	Require percentage of roads to be tested with non-ice and non-sand de-icing.	Town practice	1b	The Town is evaluating the use of beet juice as a deicer on select roadways
Part B - New Roads and Bridges				

Town of Brookhaven				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
5-07	Minimize the amount of land disturbed and the duration of disturbance	NYS GP 0-15-002, Town of Brookhaven Town of Brookhaven Town Code Chapter 86	2a	
5-08	Preserve natural features and conform substantially with the natural boundaries and alignment of waterbodies	Roadway design process, NYSDOT review, NYSDEC Article 24 & 25 Permitting, Town of Brookhaven Town Code Chapter 81, Wetland Permit	2a	Encouraged by NYSDEC Stormwater Management Design Manual.
5-09	Retain and protect trees and other natural vegetation on and near disturbed sites	Town of Brookhaven Town Code Chapter 86, Subdivision/Special Permit Review, Town Site Plan Review	2b	
5-10	Retain additional runoff sites	NYS GP 0-15-002, Town of Brookhaven Town of Brookhaven Town Code Chapter 86	2a	
5-11	Minimize the creation of impervious areas		0	Required by NYSDEC Stormwater Management Design Manual.
5-12	Treat increased runoff caused by changed surface conditions to minimize the danger of flooding, erosion and pollutants entering waterbodies prior to, during and after construction	NYS GP 0-15-002, Town of Brookhaven Town of Brookhaven Town Code Chapter 86A	2a	
5-13	Use temporary vegetation and mulching to protect exposed and critical areas during development	NYS GP-0-15-002, Town of Brookhaven Town of Brookhaven Town Code Chapter 86	2a	
5-14	Redistribute topsoil within the boundaries of the disturbed land for seeding and planting		0	
5-15	Stabilize disturbed soils as soon as possible	NYS GP 0-15-002, Town of Brookhaven Town of Brookhaven Town Code Chapter 86	2a	
5-16	Minimize the use of cut and fill operations. Conform such operations to topography and soils to minimize erosion potential and adequately accommodate runoff	Town of Brookhaven Town of Brookhaven Town Code, Chapter 85	1b	Guideline is advisory in nature

Town of Brookhaven				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
5-17	Control erosion and sedimentation prior to, during and after site preparation and construction	NYS GP 0-15-002, Town of Brookhaven Town of Brookhaven Town Code, Chapter 86	2a	
5-18	Require long term stormwater management plan.	NYS GP 0-15-002, GP-0-15-003,Town of Brookhaven Town of Brookhaven Town Code, Chapter 86	2a	
5-19	Require long term sedimentation control & maintenance.	NYS GP 0-15-002, GP-0-15-003, Town of Brookhaven Town Code, Chapter 86, Town Highway Catch Basin Inspection and Cleaning Program, Town Highway Street Sweeping Program	2a	
Part C - All Roads and Bridges (existing and new)				
5-20	Target existing public holdings, such as parks, for removing unnecessary impervious surfaces	Tuthills Creek WMP - in development	2b	Implementation expected with adoption of Tuthills Creek Watershed Management Plan
5-21	Incorporate New York State Department of Transportation design and guidance documents, standard specifications, and procedural manuals (*Highway Design Manual, Environmental Procedures Manual,* Maintenance Guidelines, etc.) into local laws and operating procedures	Town Highway Department Programs, Roadway design requirements	2b	
5-22	Ensure application of appropriate solid and hazardous waste generation and disposal practices including source controls and recycling	Highway Yard Good Housekeeping Practice	2b	
5-23	Ensure proper operation and maintenance of runoff management facilities	Highway Yard Good Housekeeping Practice, Highway Catch Basin & Inspection Cleaning Program, Highway Street Sweeping Program, GP-0-15-003	2b	
5-24	Participate in Cornell Local Roads Program activities and training	Staff training conducted on a regular basis	2b	
5-25	Target training programs at highway officials, contractors, construction workers, inspectors, zoning and planning officials	Town Practice, GP-0-15-003	2b	

Town of Brookhaven				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
5-26	Target training and outreach programs about the proper handling of materials, leakage and spill prevention and spill response procedures at maintenance staff and workers	Town Highway Practice, GP-0-15-003	2b	
Section 6 - Onsite Wastewater Treatment Systems				
6-01	Conduct regular inspections of OWTS at a frequency adequate to determine failure and undertake required maintenance	SCDHS Article 6 Regulations, NYS GP 0-15-003	2a	Identification of OWTS discharging to the MS4 is required by GP-0-15-003 Part IX for Patchogue Bay sewershed.
6-02	Institute setback guidelines	SCDHS Article 6 Regulations, Town Code Chapter 81	2a	
6-03	Promulgate plumbing codes that require practices that are compatible with OWTS	SCDHS Article 6 Regulations	2a	
6-04	Target outreach programs at homeowners, contractors and developers	NYS GP 0-15-003	1b	NYSDEC MS4 General Permit Part IX requires pathogen specific public education/outreach in the Patchogue Bay storm sewershed area
6-05	Inspection of all OWTS at property transfer or within 1 year prior to transfer		0	
6-06	Require all properties within 500' of municipal service to connect.	SCDHS Article 6 Regulations	2a	
6-07	Set goals for effluent limits (nitrogen, phosphorous, BOD, etc.)	SCDHS Article 6 Regulations, NYSDEC Water Quality Regulations (6 NYCRR §703), Pathogen Total Maximum Daily Load, MS4 General Permit	2a	

Table 3-3: Town of Islip Regulatory Gap Analysis

Town of Islip				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
Section 1 - Development				
Part A - Existing Development				
1-01	Identify retrofit opportunities	NYS MS4 GP 0-15-003, Tuthills Creek WMP - in development	2a & 2b	Required by GP-0-15-003 Part IX for Patchogue Bay sewershed.
1-02	Identify habitat and natural conveyance system restoration opportunities	Tuthills Creek WMP - in development	1	Full implementation expected with adoption of Tuthills Creek Watershed Management Plan
1-03	Establish retention/detention areas	Tuthills Creek WMP - in development	1	Full implementation expected with adoption of Tuthills Creek Watershed Management Plan
1-04	Acquire additional land for locating treatment facilities		0	To be initiated as per Tuthills WMP recommendations.
1-05	Encourage homeowners to place compost piles away from waterbodies and roadways		0	
1-06	Encourage proper use and disposal of lawn and other household chemicals	Town of Islip Town Code Chapter 21, Town WRAP Program, Town STOP Program	2a	
1-07	Institute turf management practices on golf courses and parks and recreation areas	N/A	N/A	
1-08	Undertake storm drain stenciling	KIC Storm Drain Project	1d	
1-09	Encourage volunteer programs, such as adopt-a-highways and adopt-a-stream, etc.	KIC Adopt-a Highway, Adopt-A-Spot Program	1d	Full implementation expected with adoption of Tuthills Creek Watershed Management Plan
1-10	Include high percentage of indigenous plants in new landscaping on privately-owned properties (excluding arboretums, horticultural gardens, and sites requiring turf grasses)	Town of Islip Subdivision and Land Development Regulations	2d	
1-11	Encourage water conservation		0	
1-12	Develop outreach programs targeted at specific problems related to water quality management & resource conservation	NYS MS4 GP 0-15-003 Educational Materials, KIC outreach activities	2b and 2d	

Town of Islip				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
1-13	Encourage proper control of pet wastes	Town of Islip Town Code, Chapter 12	2a	Prohibition does not apply to that portion of a street lying between the curblines. Required by GP-0-15-003 Part IX for Patchogue Bay sewershed.
1-14	Encourage continued operation of private storm water runoff control structures	NYS GP 0-15-002, Town of Islip Town Code Chapter 47	2a	
1-15	Discourage feeding of waterfowl		0	Required by GP-0-15-003 Part IX for Patchogue Bay sewershed.
1-16	Discourage the introduction of exotic aquatic species (Eurasion water milfoil, zebra mussels, water chestnut, etc.)	Suffolk County Resolution 614-2007, 6 NYCRR Part 575	2a	
1-17	Encourage continued (periodic) operation and maintenance of private septic disposal systems	NYS GP-0-15-003	1	Identification and regulation of poorly functioning sanitary systems discharging to MS4 by local law is required pursuant to NYSDEC MS4 General Permit
1-18	Effective and consistent application and enforcement of stormwater regulations & requirements	NYS GP 0-15-002, Town of Islip Town Code Chapter 47	2a & 2b	Does not apply to disturbances of less than one acre
1-19	Require certification of existing on site septic systems for property transfers or building expansions.	SCDHS Article 6, Special Permit/Building Permit Review Process	2a & 2b	Identification and regulation of poorly functioning sanitary systems discharging to MS4 by local law is required pursuant to NYSDEC MS4 General Permit
1-20	Require entire property (existing as well as proposed) to be included in stormwater analysis/calculation.	NYS GP 0-15-002	1	Does not apply to disturbances of less than one acre
Part B - New Development and Substantial Redevelopment				
1-21	Minimize the amount of land disturbed and the duration of disturbance	NYS GP 0-15-002, Town of Islip Town Code Chapter 47	1	Does not apply to disturbances of less than one acre
1-22	Preserve natural features and conform substantially with the natural boundaries and alignment of waterbodies	Town of Islip Town Code Chapter 67, Town of Islip Subdivision and Land Development Regulations, NYS Stormwater Design Manual	2a	Encouraged by NYSDEC Stormwater Management Design Manual
1-23	Retain and protect trees and other natural vegetation on and near disturbed sites	Town of Islip Town Code Chapter 13, 47, 57 , Town of Islip Subdivision and Land Development Regulations	2a	

Town of Islip				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
1-24	Account for topography and soil type in efforts to minimize erosion potential	NYS GP 0-15-002, Town of Islip Town Code Chapter 47, Town of Islip Subdivision and Land Development Regulations	1	Does not apply to disturbances of less than one acre
1-25	Maintain runoff rates similar to pre-construction levels	NYS GP 0-15-002, Town of Islip Town Code Chapter 47, Town of Islip Subdivision and Land Development Regulations	1	Does not apply to disturbances of less than one acre
1-26	Minimize the creation of impervious areas	NYS GP 0-15-002, NYS Stormwater Design Manual	1a	Required by NYSDEC Stormwater Management Design Manual, does not apply to disturbances of less than one acre
1-27	Control increased runoff caused by changed surface conditions to minimize the danger of flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction	NYS GP 0-15-002, Town of Islip Town Code Chapter 47	1	Does not apply to disturbances of less than one acre
1-28	Use temporary vegetation and mulching to protect exposed and critical areas during development	NYS GP 0-15-002, Town of Islip Town Code Chapter 47	1	Does not apply to disturbances of less than one acre
1-29	Redistribute topsoil within the boundaries of the disturbed land for seeding and planting		0	
1-30	Stabilize disturbed soils as soon as possible	NYS GP 0-15-002, Town of Islip Town Code Chapter 47	1	Does not apply to disturbances of less than one acre
1-31	Minimize the use of cut and fill operations. Conform such operations to topography and soils to minimize erosion potential and adequately accommodate runoff	Town of Islip Subdivision and Land Development Regulations	2a	
1-32	Use appropriate solid and hazardous waste generation and disposal practices including source controls and recycling	Suffolk County Article 7 & 12, Town of Islip Town Code Chapter 21	2a	
1-33	Encourage construction site management techniques which include the proper handling and disposal of pesticides and petroleum products and containers	NYS GP 0-15-002, Town STOP Program	1	Does not apply to disturbances of less than one acre
1-34	Ensure proper operation and maintenance of runoff management facilities	NYS GP 0-15-002, GP-0-15-003, Town of Islip Town Code Chapter 43A	2a	

Town of Islip				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
1-35	Target training for contractors, inspectors and zoning and planning officials.	Town practice, GP-0-15-003	1b	
1-36	Require tree surveys and/or cutting plans.		0	
1-37	Develop priority list for BMP's -use of vegetative low areas for retention/infiltration.	NYS GP 0-15-003	1b	Does not apply to disturbances of less than one acre
1-38	Encourage cluster development.	Town of Islip Town Code Chapter 68, NYS Stormwater Design Manual	1b	Encouraged by NYSDEC Stormwater Management Design Manual
1-39	Require connection to and/or extension of existing water & sewer if project is within 500 feet of existing public infrastructure	SCDHS Article 6	2a	
1-40	Enact limits on driveway grades.	Town of Islip Subdivision and Land Development Regulations	2a	
1-41	For redevelopment, employ regulations that provide for technologically advanced (on and off) site wastewater treatment systems to optimize efficiencies and address "challenging" sites		0	
1-42	Implement Federal/State Stormwater (SPDES) Phase II requirements	NYS GP 0-15-002, Town of Islip Town Code Chapter 47, GP-0-15-003	2a	
Section 2 - Forestry and Agriculture				
Part A - Forestry				
2-01	Consider potential water quality impacts when selecting silviculture system (yarding system, site preparation, pesticides employment, etc.)	N/A	N/A	
2-02	Consider harvesting practices	N/A	N/A	
2-03	Seasonal preference for logging operations	N/A	N/A	
2-04	Have specialists (geologist, soil scientist, geotechnical engineer, wildland hydrologist) review plans in high erosion hazard areas	N/A	N/A	
2-05	Preplan harvest areas, skid trails, and access so as to be on stable soils, avoiding steep gradients, multiple stream crossings, poor drainage areas, etc.	N/A	N/A	
2-06	Limit grades of access roads.	N/A	N/A	

Town of Islip				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
2-07	Require stabilization of roads/drives to forestry site.	N/A	N/A	
2-08	Employ natural topography and contour for design of road network	N/A	N/A	
2-09	Require stormwater controls for increased runoff from ground cover modification	N/A	N/A	
2-10	Consider site restoration	N/A	N/A	
Part B - Agriculture				
2-11	Use Agricultural Environmental Management (AEM)	N/A	N/A	
2-12	Require farms seeking agricultural value assessment to participate in AEM	N/A	N/A	
Section 3 - Waterways and Wetlands				
Part A - Modified Waterways				
3-01	Develop an operation and maintenance program for existing modified streams that includes identification of opportunities and actions to restore habitat and the physical and chemical characteristics of these streams.	Tuthills Creek WMP - in development	1d	Full implementation expected with adoption of Tuthills Creek Watershed Management Plan
3-02	Improve stream quality by controlling instream sedimentation and selectively clearing debris	Tuthills Creek WMP - in development	1d	Full implementation expected with adoption of Tuthills Creek Watershed Management Plan
3-03	Establish or reestablish riparian buffers	NYSDEC Article 24 & 25 Permitting, Town of Islip Code Chapter 67	2a	
3-04	Prevent animal wastes from entering waterbodies	Town of Islip Town Code Chapter 12	2a	
3-05	Attempt vegetative stabilization before undertaking structural measures	NYSDEC Article 24 & 25 Permitting, Town of Islip Code Chapter 67	2a	
3-06	Design and construct shore erosion control facilities, in accordance with an erosion and sedimentation control plan, in areas where marsh creation and soil bioengineering are ineffective or where existing protection methods are being flanked or are failing	NYSDEC Article 24 & 25 Permitting, NYS GP 0-15-002, Town of Islip Code Chapter 67	2a	

Town of Islip				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
3-07	Schedule the periodic maintenance of sediment control measures, and inspect and repair them as needed in conformance with established schedule.	NYS GP 0-15-002	1	Only applies to disturbances of 1 acre or more
3-08	Protect stream banks through direct nonstructural means, such as new vegetation or protection of existing vegetation; direct structural means, such as revetments and bulkheads; indirect nonstructural means, such as regulating irrigation near stream banks or rerouting overbank drainage; or indirect structural means, such as deflecting channel flow away from stream banks with dikes, board fences and gabions	Town of Islip Code Chapter 67	2a	
3-09	Use setbacks to minimize disturbance of land adjacent to stream banks and shorelines	NYSDEC Article 24 & 25 Permitting, Town of Islip Code Chapter 67	2a	
3-10	Prevent discharges to waterbodies in amounts that would adversely affect the taste, color or odor of the waters, or would impair the waters for their best usages	NYS GP 0-15-002, GP-0-15-003, Town of Islip Code Chapter 68-10	2a	
Part B - Wetlands and Riparian Area Management and Restoration				
3-11	Consider wetlands and riparian areas and their non-point source (NPS) control potential on a watershed scale	N/A	N/A	No regulated wetlands are located in the Town of Islip portion of the Tuthills Creek Watershed
3-12	Identify existing functions of those wetland and riparian areas with significant nps control potential when implementing nps management practices. Do not alter wetlands or riparian areas to improve their water quality at the expense of their other functions	N/A	N/A	No regulated wetlands are located in the Town of Islip portion of the Tuthills Creek Watershed
3-13	Conduct permitting, licensing, certification and non-regulatory nps pollution activities in a manner that protects wetland functions	N/A	N/A	No regulated wetlands are located in the Town of Islip portion of the Tuthills Creek Watershed
3-14	Special zoning considerations to protect wetland areas	N/A	N/A	No regulated wetlands are located in the Town of Islip portion of the Tuthills Creek Watershed

Town of Islip				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
3-15	Use appropriate pretreatment practices such as vegetated systems or detention or retention basins to prevent adverse impacts to wetland functions that affect nps pollution abatement from hydrologic changes, sedimentation, or contaminants	N/A	N/A	No regulated wetlands are located in the Town of Islip portion of the Tuthills Creek Watershed
3-16	All projects should require wetlands certification.	N/A	N/A	No regulated wetlands are located in the Town of Islip portion of the Tuthills Creek Watershed
Section 4 - Marinas				
Part A - Existing Marinas				
4-01	Clean maintenance areas regularly preferably by vacuuming to remove trash, sandings, paint chips, etc.	N/A	N/A	No marinas are located in the Town of Islip portion of the Tuthills Creek Watershed
4-02	Prevent residue from being carried into surface waters by performing abrasive blasting within plastic tarp enclosures on windless days or within spray booths	N/A	N/A	No marinas are located in the Town of Islip portion of the Tuthills Creek Watershed
4-03	Provide proper disposal/recycling facilities to marina patrons, preferably covered receptacles	N/A	N/A	No marinas are located in the Town of Islip portion of the Tuthills Creek Watershed
4-04	Establish fish cleaning areas, and implement rules governing the conduct of fish cleaning operations	N/A	N/A	No marinas are located in the Town of Islip portion of the Tuthills Creek Watershed
4-05	Educate boaters on the importance of proper fish cleaning practices	N/A	N/A	No marinas are located in the Town of Islip portion of the Tuthills Creek Watershed
4-06	Implement fish composting where appropriate	N/A	N/A	No marinas are located in the Town of Islip portion of the Tuthills Creek Watershed
4-07	Store materials in areas impervious to the type of material stored. Build curbs, berms, or other barriers around the areas to contain spills	N/A	N/A	No marinas are located in the Town of Islip portion of the Tuthills Creek Watershed
4-08	Use separate, clearly labeled containers for the disposal of oil, gasoline, antifreeze, diesel, kerosene, and mineral spirits	N/A	N/A	No marinas are located in the Town of Islip portion of the Tuthills Creek Watershed
4-09	Target outreach programs about proper disposal at marina patrons through the use of signs, mailings, and other means	N/A	N/A	No marinas are located in the Town of Islip portion of the Tuthills Creek Watershed

Town of Islip				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
4-10	Promote the use in bilges of oil-absorbing materials, and replace them as necessary, preferably recycling, or disposing of them in accordance with petroleum disposal regulation	N/A	N/A	No marinas are located in the Town of Islip portion of the Tuthills Creek Watershed
4-11	Use a container under the air vent while refueling inboard tanks if the tank vents are not equipped with a fuel/air separator	N/A	N/A	No marinas are located in the Town of Islip portion of the Tuthills Creek Watershed
4-12	Prohibit in-water hull scraping or any underwater process to remove paint from boat hulls	N/A	N/A	No marinas are located in the Town of Islip portion of the Tuthills Creek Watershed
4-13	Wash the boat hull above the waterline by hand, using only necessary amounts of detergents and cleaning compounds that are phosphate-free and biodegradable	N/A	N/A	No marinas are located in the Town of Islip portion of the Tuthills Creek Watershed
4-14	Prohibit the use of detergents and cleaning compounds containing ammonia, sodiumhypochloride, chlorinated solvents, petroleum distillates, alcohol, or lye	N/A	N/A	No marinas are located in the Town of Islip portion of the Tuthills Creek Watershed
4-15	Educate individuals about the importance of trash reduction and recycling through: interpretive and instructional signs placed at marinas and boat-launching sites, pamphlets or flyers, newsletters, inserts in billings, meetings and presentations, workshops, and certification programs	N/A	N/A	No marinas are located in the Town of Islip portion of the Tuthills Creek Watershed
4-16	Inspect pump out facilities regularly, and repair them, if practical, under a maintenance contract with a competent contractor	N/A	N/A	No marinas are located in the Town of Islip portion of the Tuthills Creek Watershed
4-17	Add language to slip lease agreements mandating the use of pump out facilities and specifying penalties for failure to comply	N/A	N/A	No marinas are located in the Town of Islip portion of the Tuthills Creek Watershed
4-18	Place dye tablets in holding tanks to identify and discourage illegal disposal	N/A	N/A	No marinas are located in the Town of Islip portion of the Tuthills Creek Watershed
4-19	Prohibit motorized vessels from areas (define areas) that contain important shallow-water habitats		0	
4-20	Establish and enforce no-wake zones to decrease turbidity and reduce erosion potential from boat wakes	N/A	N/A	There are no navigable waters within the Tuthills Creek Watershed within the Town of Islip
Part B - New Marinas				

Town of Islip				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
4-21	Design and site marinas to maximize exchange of marina basin water. Limit basins and channels with square corners that tend to trap flotsam, and place dock structures in a manner that promotes circulation	N/A	N/A	There are no opportunities to construct new marinas in the Town of Islip land within the Tuthills Creek Watershed
4-22	Perform a preconstruction assessment, which includes a water quality monitoring and modeling methodology, to predict post-construction water quality conditions	N/A	N/A	There are no opportunities to construct new marinas in the Town of Islip land within the Tuthills Creek Watershed
4-23	Monitor water quality during construction to protect ambient water quality to the maximum practicable extent	N/A	N/A	There are no opportunities to construct new marinas in the Town of Islip land within the Tuthills Creek Watershed
4-24	Develop a marina siting policy to discourage development in areas containing important habitat designated by local, State, or federal agencies	N/A	N/A	There are no opportunities to construct new marinas in the Town of Islip land within the Tuthills Creek Watershed
4-25	Conduct surveys and employ rapid bioassessment techniques to assess historic habitat function (e.g. spawning, nursery, and migration pathways) and potential impacts to these and other biological functions and resources	N/A	N/A	There are no opportunities to construct new marinas in the Town of Islip land within the Tuthills Creek Watershed
4-26	Encourage the redevelopment or expansion of existing marina facilities that have demonstrated minimal environmental impacts instead of developing new marina facilities	N/A	N/A	There are no opportunities to construct new marinas in the Town of Islip land within the Tuthills Creek Watershed
4-27	Consider alternative sites with minimal potential environmental impacts when the use of previously disturbed sites is not feasible	N/A	N/A	There are no opportunities to construct new marinas in the Town of Islip land within the Tuthills Creek Watershed
4-28	Minimize disturbance of indigenous vegetation in the riparian area	N/A	N/A	There are no opportunities to construct new marinas in the Town of Islip land within the Tuthills Creek Watershed
4-29	Use soil bioengineering or plants, wherever conditions allow, to restore damaged habitat along shorelines and streambanks	N/A	N/A	There are no opportunities to construct new marinas in the Town of Islip land within the Tuthills Creek Watershed

Town of Islip				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
4-30	Use properly designed and constructed engineering practices that minimize shoreline disturbance in areas where soil bioengineering and plants are ineffective	N/A	N/A	There are no opportunities to construct new marinas in the Town of Islip land within the Tuthills Creek Watershed
4-31	Use appropriate shore erosion control methods, such as returns or return walls, in areas where existing protection methods are being flanked or are failing	N/A	N/A	There are no opportunities to construct new marinas in the Town of Islip land within the Tuthills Creek Watershed
4-32	Plan and design all streambank, shoreline, and navigation structures so that they do not transfer erosion energy to or otherwise cause visible loss of surrounding streambanks or shorelines	N/A	N/A	There are no opportunities to construct new marinas in the Town of Islip land within the Tuthills Creek Watershed
4-33	Locate and design fuel stations so that spills can be contained in a limited area	N/A	N/A	There are no opportunities to construct new marinas in the Town of Islip land within the Tuthills Creek Watershed
4-34	Design and install underground fuel storage tanks according to State regulations, including the provision of detection systems and automatic fuel tank and pump leak shut-offs	N/A	N/A	There are no opportunities to construct new marinas in the Town of Islip land within the Tuthills Creek Watershed
4-35	Provide aboveground fuel tanks and fueling areas with a curbed or diked storage area to handle containment volumes meeting State (and local) codes and inspect regularly	N/A	N/A	There are no opportunities to construct new marinas in the Town of Islip land within the Tuthills Creek Watershed
4-36	Use preferred pump out systems: fixed-point, portable, dedicated slip side, and pump out boats	N/A	N/A	There are no opportunities to construct new marinas in the Town of Islip land within the Tuthills Creek Watershed
4-37	Design onsite wastewater treatment systems to specifically handle waste from vessels	N/A	N/A	There are no opportunities to construct new marinas in the Town of Islip land within the Tuthills Creek Watershed
4-38	Post pump out facility location and regulations at the marina. Charge fees that encourage rather than discourage facility use. Consider offsetting the cost of maintaining pump out facilities by fuel sales where these facilities are conveniently located in close proximity to one another	N/A	N/A	There are no opportunities to construct new marinas in the Town of Islip land within the Tuthills Creek Watershed
Part C - All Marinas (Existing and New)				

Town of Islip				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
4-39	Restrict boat repair and maintenance activities to clearly marked designated areas to prevent debris from falling into the water and preventing invasive species	N/A	N/A	There are no opportunities to construct new marinas within the Town of Islip portion of the Tuthills Creek Watershed, nor do any marinas currently exist in this portion of the watershed.
4-40	Secure all fueling facilities and storage areas with appropriate shut-off devices and security locks and inspect regularly	N/A	N/A	There are no opportunities to construct new marinas within the Town of Islip portion of the Tuthills Creek Watershed, nor do any marinas currently exist in this portion of the watershed.
4-41	Design fueling stations with spill containment equipment that is stored in a clearly marked location, accessible to work and storage areas. Post emergency phone numbers in a prominent location	N/A	N/A	There are no opportunities to construct new marinas within the Town of Islip portion of the Tuthills Creek Watershed, nor do any marinas currently exist in this portion of the watershed.
4-42	Design a spill contingency plan	N/A	N/A	There are no opportunities to construct new marinas within the Town of Islip portion of the Tuthills Creek Watershed, nor do any marinas currently exist in this portion of the watershed.
4-43	Inspect and maintain all containment berms or devices in accordance with State regulations. Investigate immediately signs of leakage or spillage, and undertake cleanup in accordance with applicable best management practices	N/A	N/A	There are no opportunities to construct new marinas within the Town of Islip portion of the Tuthills Creek Watershed, nor do any marinas currently exist in this portion of the watershed.
4-44	Have a trained operator present and prepared to respond to accidental spills	N/A	N/A	There are no opportunities to construct new marinas within the Town of Islip portion of the Tuthills Creek Watershed, nor do any marinas currently exist in this portion of the watershed.
4-45	Maintain daily inventory records to identify abnormal loss or gain of liquid	N/A	N/A	There are no opportunities to construct new marinas within the Town of Islip portion of the Tuthills Creek Watershed, nor do any marinas currently exist in this portion of the watershed.

Town of Islip				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
4-46	Prohibit the cleaning of hoses, fittings, pumps, and other accessory equipment on piers, docks or adjacent upland to prevent runoff into the marina basin or other surface or groundwater	N/A	N/A	There are no opportunities to construct new marinas within the Town of Islip portion of the Tuthills Creek Watershed, nor do any marinas currently exist in this portion of the watershed.
4-47	Create and/or maintain a dedicated fund for maintenance in the case of government-owned facilities	N/A	N/A	There are no opportunities to construct new marinas within the Town of Islip portion of the Tuthills Creek Watershed, nor do any marinas currently exist in this portion of the watershed.
4-48	Restrict the operation of pump out facilities to trained marina personnel only	N/A	N/A	There are no opportunities to construct new marinas within the Town of Islip portion of the Tuthills Creek Watershed, nor do any marinas currently exist in this portion of the watershed.
Section 5 - Roads and Bridges				
Part A - Existing Roads and Bridges				
5-01	Conduct road and bridge maintenance (deicing material usage and storage, pot-hole repair, bridge washing, scraping and painting, etc.) according to best management practices	GP-0-15-003, Town Stormwater Management Program	2	
5-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) - according to best management practices		0	
5-03	Include high percentage of indigenous plants in new landscaping on public-owned properties (excluding arboretums, horticultural gardens, and site requiring turf grasses)		0	
5-04	Implement a regular inspection and maintenance plan of existing structures	GP-0-15-003, Town Stormwater Management Program	2	
5-05	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities		0	
5-06	Require percentage of roads to be tested with non-ice and non-sand de-icing.	Town Stormwater Management Program	2b	

Town of Islip				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
Part B - New Roads and Bridges				
5-07	Minimize the amount of land disturbed and the duration of disturbance	NYS GP 0-15-002, Town of Islip Town Code Chapter 15	2a	
5-08	Preserve natural features and conform substantially with the natural boundaries and alignment of waterbodies	Roadway design process, NYSDOT review, NYSDEC Article 24 & 25 Permitting	2a	
5-09	Retain and protect trees and other natural vegetation on and near disturbed sites	Town of Islip Subdivision and Land Development Regulations	2a	
5-10	Retain additional runoff sites	NYS GP 0-15-002, Town of Islip Subdivision and Land Development Regulations	2a	
5-11	Minimize the creation of impervious areas	NYS Stormwater Design Manual	0	Required by NYSDEC Stormwater Management Design Manual; does not apply to disturbances of less than 1 acres
5-12	Treat increased runoff caused by changed surface conditions to minimize the danger of flooding, erosion and pollutants entering waterbodies prior to, during and after construction	NYS GP 0-15-002, Town of Islip Town Code Chapter 47	2a	
5-13	Use temporary vegetation and mulching to protect exposed and critical areas during development	NYS GP 0-15-002, Town of Islip Town Code Chapter 47	2a	
5-14	Redistribute topsoil within the boundaries of the disturbed land for seeding and planting		0	
5-15	Stabilize disturbed soils as soon as possible	NYS GP 0-15-002, Town of Islip Town Code Chapters 15 & 47	2a	
5-16	Minimize the use of cut and fill operations. Conform such operations to topography and soils to minimize erosion potential and adequately accommodate runoff		0	
5-17	Control erosion and sedimentation prior to, during and after site preparation and construction	NYS GP 0-15-002, Town of Islip Town Code Chapter 47	2a	
5-18	Require long term stormwater management plan.	NYS GP 0-15-002, Town of Islip Town Code Chapter 47,GP-0-15-003	1	Applies to disturbances of 1 acre or greater

Town of Islip				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
5-19	Require long term sedimentation control & maintenance.	NYS GP 0-15-002, Town of Islip Town Code Chapter 47, GP-0-15-003	1	Applies to disturbances of 1 acre or greater
Part C - All Roads and Bridges (existing and new)				
5-20	Target existing public holdings, such as parks, for removing unnecessary impervious surfaces	Tuthills Creek WMP - in development	1	Full implementation expected with adoption of Tuthills Creek Watershed Management Plan
5-21	Incorporate New York State Department of Transportation design and guidance documents, standard specifications, and procedural manuals (*Highway Design Manual, Environmental Procedures Manual,* Maintenance Guidelines, etc.) into local laws and operating procedures	Town Highway Department Programs	2	
5-22	Ensure application of appropriate solid and hazardous waste generation and disposal practices including source controls and recycling	Town Good Housekeeping Practice	2	
5-23	Ensure proper operation and maintenance of runoff management facilities	Town Good Housekeeping Practice, GP-0-15-003	2	Operation and maintenance detailed in 2015 MS4 report
5-24	Participate in Cornell Local Roads Program activities and training	Part of Town training program	1b	
5-25	Target training programs at highway officials, contractors, construction workers, inspectors, zoning and planning officials	Town Good Housekeeping Practice, GP-0-15-003	2	As per Town 2015 MS4 report, 95% of staff and municipal officials have been trained
5-26	Target training and outreach programs about the proper handling of materials, leakage and spill prevention and spill response procedures at maintenance staff and workers	Town Good Housekeeping Practice, GP-0-15-003	2	As per Town 2015 MS4 report, 95% of staff and municipal officials have been trained
Section 6 - Onsite Wastewater Treatment Systems				
6-01	Conduct regular inspections of OWTS at a frequency adequate to determine failure and undertake required maintenance	SCDHS Article 6 Regulations, NYS GP 0-15-003	2a	Identification of OWTS discharging to the MS4 is required by GP-0-15-003 Part IX for Patchogue Bay sewershed.
6-02	Institute setback guidelines	SCDHS Article 6 Regulations	2a	
6-03	Promulgate plumbing codes that require practices that are compatible with OWTS	SCDHS Article 6 Regulations	2a	

Town of Islip				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
6-04	Target outreach programs at homeowners, contractors and developers	NYS GP 0-15-003	1b	NYSDEC MS4 General Permit Part IX requires pathogen specific public education/outreach in the Patchogue Bay storm sewershed area
6-05	Inspection of all OWTS at property transfer or within 1 year prior to transfer		0	
6-06	Require all properties within 500' of municipal service to connect.	SCDHS Article 6 Regulations	2a	
6-07	Set goals for effluent limits (nitrogen, phosphorous, BOD, etc.)	SCDHS Article 6 Regulations, NYSDEC Water Quality Regulations (6 NYCRR §703), Pathogen Total Maximum Daily Load, MS4 General Permit	2a	

Table 3-4: Village of Patchogue Regulatory Gap Analysis

Village of Patchogue				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
Section 1 - Development				
Part A - Existing Development				
1-01	Identify retrofit opportunities	NYS MS4 GP 0-15-003, Tuthills Creek WMP - in development	2a & 2b	Required by GP-0-15-003 Part IX for Patchogue Bay sewershed
1-02	Identify habitat and natural conveyance system restoration opportunities	Tuthills Creek WMP - in development	1	Full implementation expected with adoption of Tuthills Creek Watershed Management Plan
1-03	Establish retention/detention areas	Tuthills Creek WMP - in development	1	Full implementation expected with adoption of Tuthills Creek Watershed Management Plan
1-04	Acquire additional land for locating treatment facilities		0	
1-05	Encourage homeowners to place compost piles away from waterbodies and roadways		0	
1-06	Encourage proper use and disposal of lawn and other household chemicals	Village Household Hazardous Waste Program	1a	Part of the Village's 2015 MS4 Report
1-07	Institute turf management practices on golf courses and parks and recreation areas	N/A	N/A	
1-08	Undertake storm drain stenciling	Part of the Village Stormwater Management Program	1b	Storm drain stenciling occurred in 2015 as per the Village's 2015 MS4 Report
1-09	Encourage volunteer programs, such as adopt-a-highways and adopt-a-stream, etc.	Part of the Village Stormwater Management Program	1b	
1-10	Include high percentage of indigenous plants in new landscaping on privately-owned properties (excluding arboretums, horticultural gardens, and sites requiring turf grasses)	Part of Village Education Materials	1b	Within the Village's "Keeping Our Waters Clean" brochure
1-11	Encourage water conservation		0	
1-12	Develop outreach programs targeted at specific problems related to water quality management & resource conservation	Part of the Village Stormwater Management Program	1b	
1-13	Encourage proper control of pet wastes	Village Code Chapter 143	2a	Required by GP-0-15-003 Part IX for Patchogue Bay sewershed

Village of Patchogue				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
1-14	Encourage continued operation of private storm water runoff control structures	NYS GP 0-15-002, Village Code Chapter 369	2a	
1-15	Discourage feeding of waterfowl	Village Code Chapter 143	2a	Required by GP-0-15-003 Part IX for Patchogue Bay sewershed
1-16	Discourage the introduction of exotic aquatic species (Eurasion water milfoil, zebra mussels, water chestnut, etc.	Suffolk County Resolution 614-2007, 6 NYCRR Part 575	2a	
1-17	Encourage continued (periodic) operation and maintenance of private septic disposal systems	NYS GP-0-15-003; Village Stormwater Management Program Septic Education	1	Identification and regulation of poorly functioning sanitary systems discharging to MS4 by local law is required pursuant to NYSDEC MS4 General Permit
1-18	Effective and consistent application and enforcement of stormwater regulations & requirements	NYS GP 0-15-002, Village of Patchogue Village Code Chapter 369	1	Does not apply to disturbances of less than one acre
1-19	Require certification of existing on-site septic systems for property transfers or building expansions.	SCDHS Article 6, Special Permit/Building Permit Review Process	2a & 2b	Identification and regulation of poorly functioning sanitary systems discharging to MS4 by local law is required pursuant to NYSDEC MS4 General Permit
1-20	Require entire property (existing as well as proposed) to be included in stormwater analysis/calculation.	NYS GP 0-15-002	1	Does not apply to disturbances of less than one acre
Part B - New Development and Substantial Redevelopment				
1-21	Minimize the amount of land disturbed and the duration of disturbance	NYS GP 0-15-002, Village of Patchogue Village Code Chapters 369 & 435	2a	
1-22	Preserve natural features and conform substantially with the natural boundaries and alignment of waterbodies	Village of Patchogue Village Code 435, NYSDEC Stormwater Management Design Manual	1	Encouraged by NYSDEC Stormwater Management Design Manual
1-23	Retain and protect trees and other natural vegetation on and near disturbed sites	Village of Patchogue Village Code 435	2a	
1-24	Account for topography and soil type in efforts to minimize erosion potential	NYS GP 0-15-002, Village of Patchogue Village Code Chapters 369 & 435	1	
1-25	Maintain runoff rates similar to pre-construction levels	NYS GP 0-15-002, Village of Patchogue Village Code Chapters 369 & 435	1	

Village of Patchogue				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
1-26	Minimize the creation of impervious areas		0	
1-27	Control increased runoff caused by changed surface conditions to minimize the danger of flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction	NYS GP 0-15-002, Village of Patchogue Village Code Chapters 369 & 435	1	
1-28	Use temporary vegetation and mulching to protect exposed and critical areas during development	NYS GP 0-15-002, Village of Patchogue Village Code Chapters 369 & 435	1	
1-29	Redistribute topsoil within the boundaries of the disturbed land for seeding and planting		0	
1-30	Stabilize disturbed soils as soon as possible	NYS GP 0-15-002, Village of Patchogue Village Code Chapters 369 & 435	0	
1-31	Minimize the use of cut and fill operations. Conform such operations to topography and soils to minimize erosion potential and adequately accommodate runoff		0	
1-32	Use appropriate solid and hazardous waste generation and disposal practices including source controls and recycling	Village of Patchogue Code Chapter 365	2a	
1-33	Encourage construction site management techniques which include the proper handling and disposal of pesticides and petroleum products and containers	NYS GP 0-15-002	1	Does not apply to disturbances of less than one acre
1-34	Ensure proper operation and maintenance of runoff management facilities	NYS GP 0-15-002, Village of Patchogue Village Code Chapters 369 & 370, GP-0-15-003	1	
1-35	Target training for contractors, inspectors and zoning and planning officials.		0	
1-36	Require tree surveys and/or cutting plans.		0	
1-37	Develop priority list for BMP's -use of vegetative low areas for retention/infiltration.	NYS GP 0-15-002, Village of Patchogue Village Code Chapters 369 & 370	1b	
1-38	Encourage cluster development.		0	

Village of Patchogue				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
1-39	Require connection to and/or extension of existing water & sewer if project is within 500 feet of existing public infrastructure	SCDHS Article 6	2a	
1-40	Enact limits on driveway grades.		0	
1-41	For redevelopment, employ regulations that provide for technologically advanced (on and off) site wastewater treatment systems to optimize efficiencies and address "challenging" sites		0	
1-42	Implement Federal/State Stormwater (SPDES) Phase II requirements	NYS GP 0-15-002, Village of Patchogue Village Code 369, GP-0-15-003	2a	
Section 2 - Forestry and Agriculture				
Part A - Forestry				
2-01	Consider potential water quality impacts when selecting silviculture system (yarding system, site preparation, pesticides employment, etc.)	N/A	N/A	
2-02	Consider harvesting practices	N/A	N/A	
2-03	Seasonal preference for logging operations	N/A	N/A	
2-04	Have specialists (geologist, soil scientist, geotechnical engineer, wildland hydrologist) review plans in high erosion hazard areas	N/A	N/A	
2-05	Preplan harvest areas, skid trails, and access so as to be on stable soils, avoiding steep gradients, multiple stream crossings, poor drainage areas, etc.	N/A	N/A	
2-06	Limit grades of access roads.	N/A	N/A	
2-07	Require stabilization of roads/drives to forestry site.	N/A	N/A	
2-08	Employ natural topography and contour for design of road network	N/A	N/A	
2-09	Require stormwater controls for increased runoff from ground cover modification	N/A	N/A	
2-10	Consider site restoration	N/A	N/A	
Part B - Agriculture				

Village of Patchogue				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
2-11	Use Agricultural Environmental Management (AEM)	N/A	N/A	
2-12	Require farms seeking agricultural value assessment to participate in AEM	N/A	N/A	
Section 3 - Waterways and Wetlands				
Part A - Modified Waterways				
3-01	Develop an operation and maintenance program for existing modified streams that includes identification of opportunities and actions to restore habitat and the physical and chemical characteristics of these streams.	Tuthills Creek WMP - in development	1	
3-02	Improve stream quality by controlling instream sedimentation and selectively clearing debris	Tuthills Creek WMP - in development	1	
3-03	Establish or reestablish riparian buffers	NYSDEC Article 24 & 25 Permitting	2a	
3-04	Prevent animal wastes from entering waterbodies	Village Code Chapter 143	2a	
3-05	Attempt vegetative stabilization before undertaking structural measures	NYSDEC Article 24 & 25 Permitting	2a	
3-06	Design and construct shore erosion control facilities, in accordance with an erosion and sedimentation control plan, in areas where marsh creation and soil bioengineering are ineffective or where existing protection methods are being flanked or are failing	NYSDEC Article 24 & 25 Permitting, NYS GP 0-01-001	2a	
3-07	Schedule the periodic maintenance of sediment control measures, and inspect and repair them as needed in conformance with established schedule.	NYS GP 0-15-002	1	Does not apply to disturbances of less than one acre
3-08	Protect stream banks through direct nonstructural means, such as new vegetation or protection of existing vegetation; direct structural means, such as revetments and bulkheads; indirect nonstructural means, such as regulating irrigation near stream banks or rerouting overbank drainage; or indirect structural means, such as deflecting channel flow away from stream banks with dikes, board fences and gabions	NYSDEC Article 24 & 25 Permitting	2a	

Village of Patchogue				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
3-09	Use setbacks to minimize disturbance of land adjacent to stream banks and shorelines	NYSDEC Article 24 & 25 Permitting	2a	
3-10	Prevent discharges to waterbodies in amounts that would adversely affect the taste, color or odor of the waters, or would impair the waters for their best usages	NYS GP 0-15-002, GP-0-15-003	2a	
Part B - Wetlands and Riparian Area Management and Restoration				
3-11	Consider wetlands and riparian areas and their non-point source (nps) control potential on a watershed scale	Tuthills Creek WMP - in development	1	
3-12	Identify existing functions of those wetland and riparian areas with significant nps control potential when implementing nps management practices. Do not alter wetlands or riparian areas to improve their water quality at the expense of their other functions	Tuthills Creek WMP - in development	1	
3-13	Conduct permitting, licensing, certification and non-regulatory nps pollution activities in a manner that protects wetland functions	NYSDEC SPDES Permitting	1	
3-14	Special zoning considerations to protect wetland areas		0	
3-15	Use appropriate pretreatment practices such as vegetated systems or detention or retention basins to prevent adverse impacts to wetland functions that affect nps pollution abatement from hydrologic changes, sedimentation, or contaminants	NYS GP 0-15-002	1	
3-16	All projects should require wetlands certification.	NYSDEC Article 24 & 25 Permitting	2a	
Section 4 - Marinas				
Part A - Existing Marinas				
4-01	Clean maintenance areas regularly preferably by vacuuming to remove trash, sandings, paint chips, etc.	N/A	N/A	There are no marinas within the Village of Patchogue portion of the Tuthills Creek Watershed
4-02	Prevent residue from being carried into surface waters by performing abrasive blasting within plastic tarp enclosures on windless days or within spray booths	N/A	N/A	There are no marinas within the Village of Patchogue portion of the Tuthills Creek Watershed

Village of Patchogue				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
4-03	Provide proper disposal/recycling facilities to marina patrons, preferably covered receptacles	N/A	N/A	There are no marinas within the Village of Patchogue portion of the Tuthills Creek Watershed
4-04	Establish fish cleaning areas, and implement rules governing the conduct of fish cleaning operations	N/A	N/A	There are no marinas within the Village of Patchogue portion of the Tuthills Creek Watershed
4-05	Educate boaters on the importance of proper fish cleaning practices	N/A	N/A	There are no marinas within the Village of Patchogue portion of the Tuthills Creek Watershed
4-06	Implement fish composting where appropriate	N/A	N/A	There are no marinas within the Village of Patchogue portion of the Tuthills Creek Watershed
4-07	Store materials in areas impervious to the type of material stored. Build curbs, berms, or other barriers around the areas to contain spills	N/A	N/A	There are no marinas within the Village of Patchogue portion of the Tuthills Creek Watershed
4-08	Use separate, clearly labeled containers for the disposal of oil, gasoline, antifreeze, diesel, kerosene, and mineral spirits	N/A	N/A	There are no marinas within the Village of Patchogue portion of the Tuthills Creek Watershed
4-09	Target outreach programs about proper disposal at marina patrons through the use of signs, mailings, and other means	N/A	N/A	There are no marinas within the Village of Patchogue portion of the Tuthills Creek Watershed
4-10	Promote the use in bilges of oil-absorbing materials, and replace them as necessary, preferably recycling, or disposing of them in accordance with petroleum disposal regulation	N/A	N/A	There are no marinas within the Village of Patchogue portion of the Tuthills Creek Watershed
4-11	Use a container under the air vent while refueling inboard tanks if the tank vents are not equipped with a fuel/air separator	N/A	N/A	There are no marinas within the Village of Patchogue portion of the Tuthills Creek Watershed
4-12	Prohibit in-water hull scraping or any underwater process to remove paint from boat hulls	N/A	N/A	There are no marinas within the Village of Patchogue portion of the Tuthills Creek Watershed
4-13	Wash the boat hull above the waterline by hand, using only necessary amounts of detergents and cleaning compounds that are phosphate-free and biodegradable	N/A	N/A	There are no marinas within the Village of Patchogue portion of the Tuthills Creek Watershed

Village of Patchogue				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
4-14	Prohibit the use of detergents and cleaning compounds containing ammonia, sodiumhypochloride, chlorinated solvents, petroleum distillates, alcohol, or lye	N/A	N/A	There are no marinas within the Village of Patchogue portion of the Tuthills Creek Watershed
4-15	Educate individuals about the importance of trash reduction and recycling through: interpretive and instructional signs placed at marinas and boat-launching sites, pamphlets or flyers, newsletters, inserts in billings, meetings and presentations, workshops, and certification programs	N/A	N/A	There are no marinas within the Village of Patchogue portion of the Tuthills Creek Watershed
4-16	Inspect pump out facilities regularly, and repair them, if practical, under a maintenance contract with a competent contractor	N/A	N/A	There are no marinas within the Village of Patchogue portion of the Tuthills Creek Watershed
4-17	Add language to slip lease agreements mandating the use of pump out facilities and specifying penalties for failure to comply	N/A	N/A	There are no marinas within the Village of Patchogue portion of the Tuthills Creek Watershed
4-18	Place dye tablets in holding tanks to identify and discourage illegal disposal	N/A	N/A	There are no marinas within the Village of Patchogue portion of the Tuthills Creek Watershed
4-19	Prohibit motorized vessels from areas (define areas) that contain important shallow-water habitats		0	
4-20	Establish and enforce no-wake zones to decrease turbidity and reduce erosion potential from boat wakes	Village Code Chapter 422	1b	Prohibits dangerous wakes, limits speed of boats to 4 miles per hour, prohibits boats within 600 feet of a bathing beach
Part B - New Marinas				
4-21	Design and site marinas to maximize exchange of marina basin water. Limit basins and channels with square corners that tend to trap flotsam, and place dock structures in a manner that promotes circulation	N/A	N/A	There are no opportunities to construct new marinas in the Village of Patchogue land within the Tuthills Creek Watershed
4-22	Perform a preconstruction assessment, which includes a water quality monitoring and modeling methodology, to predict post-construction water quality conditions	N/A	N/A	There are no opportunities to construct new marinas in the Village of Patchogue land within the Tuthills Creek Watershed
4-23	Monitor water quality during construction to protect ambient water quality to the maximum practicable extent	N/A	N/A	There are no opportunities to construct new marinas in the Village of Patchogue land within the Tuthills Creek Watershed

Village of Patchogue				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
4-24	Develop a marina siting policy to discourage development in areas containing important habitat designated by local, State, or federal agencies	N/A	N/A	There are no opportunities to construct new marinas in the Village of Patchogue land within the Tuthills Creek Watershed
4-25	Conduct surveys and employ rapid bioassessment techniques to assess historic habitat function (e.g. spawning, nursery, and migration pathways) and potential impacts to these and other biological functions and resources	N/A	N/A	There are no opportunities to construct new marinas in the Village of Patchogue land within the Tuthills Creek Watershed
4-26	Encourage the redevelopment or expansion of existing marina facilities that have demonstrated minimal environmental impacts instead of developing new marina facilities	N/A	N/A	There are no opportunities to construct new marinas in the Village of Patchogue land within the Tuthills Creek Watershed
4-27	Consider alternative sites with minimal potential environmental impacts when the use of previously disturbed sites is not feasible	N/A	N/A	There are no opportunities to construct new marinas in the Village of Patchogue land within the Tuthills Creek Watershed
4-28	Minimize disturbance of indigenous vegetation in the riparian area	N/A	N/A	There are no opportunities to construct new marinas in the Village of Patchogue land within the Tuthills Creek Watershed
4-29	Use soil bioengineering or plants, wherever conditions allow, to restore damaged habitat along shorelines and streambanks	N/A	N/A	There are no opportunities to construct new marinas in the Village of Patchogue land within the Tuthills Creek Watershed
4-30	Use properly designed and constructed engineering practices that minimize shoreline disturbance in areas where soil bioengineering and plants are ineffective	N/A	N/A	There are no opportunities to construct new marinas in the Village of Patchogue land within the Tuthills Creek Watershed
4-31	Use appropriate shore erosion control methods, such as returns or return walls, in areas where existing protection methods are being flanked or are failing	N/A	N/A	There are no opportunities to construct new marinas in the Village of Patchogue land within the Tuthills Creek Watershed
4-32	Plan and design all streambank, shoreline, and navigation structures so that they do not transfer erosion energy to or otherwise cause visible loss of surrounding streambanks or shorelines	N/A	N/A	There are no opportunities to construct new marinas in the Village of Patchogue land within the Tuthills Creek Watershed

Village of Patchogue				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
4-33	Locate and design fuel stations so that spills can be contained in a limited area	N/A	N/A	There are no opportunities to construct new marinas in the Village of Patchogue land within the Tuthills Creek Watershed
4-34	Design and install underground fuel storage tanks according to State regulations, including the provision of detection systems and automatic fuel tank and pump leak shut-offs	N/A	N/A	There are no opportunities to construct new marinas in the Village of Patchogue land within the Tuthills Creek Watershed
4-35	Provide aboveground fuel tanks and fueling areas with a curbed or diked storage area to handle containment volumes meeting State (and local) codes and inspect regularly	N/A	N/A	There are no opportunities to construct new marinas in the Village of Patchogue land within the Tuthills Creek Watershed
4-36	Use preferred pump out systems: fixed-point, portable, dedicated slip side, and pump out boats	N/A	N/A	There are no opportunities to construct new marinas in the Village of Patchogue land within the Tuthills Creek Watershed
4-37	Design onsite wastewater treatment systems to specifically handle waste from vessels	N/A	N/A	There are no opportunities to construct new marinas in the Village of Patchogue land within the Tuthills Creek Watershed
4-38	Post pump out facility location and regulations at the marina. Charge fees that encourage rather than discourage facility use. Consider offsetting the cost of maintaining pump out facilities by fuel sales where these facilities are conveniently located in close proximity to one another	N/A	N/A	There are no opportunities to construct new marinas in the Village of Patchogue land within the Tuthills Creek Watershed
Part C - All Marinas (Existing and New)				
4-39	Restrict boat repair and maintenance activities to clearly marked designated areas to prevent debris from falling into the water and preventing invasive species	N/A		There are no opportunities to construct new marinas in the Village of Patchogue portion of the Tuthills Creek Watershed, nor do any marinas currently exist within Village of Patchogue jurisdiction.
4-40	Secure all fueling facilities and storage areas with appropriate shut-off devices and security locks and inspect regularly	N/A		There are no opportunities to construct new marinas in the Village of Patchogue portion of the Tuthills Creek Watershed, nor do any marinas currently exist within Village of Patchogue jurisdiction.

Village of Patchogue				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
4-41	Design fueling stations with spill containment equipment that is stored in a clearly marked location, accessible to work and storage areas. Post emergency phone numbers in a prominent location	N/A		There are no opportunities to construct new marinas in the Village of Patchogue portion of the Tuthills Creek Watershed, nor do any marinas currently exist within Village of Patchogue jurisdiction.
4-42	Design a spill contingency plan	N/A		There are no opportunities to construct new marinas in the Village of Patchogue portion of the Tuthills Creek Watershed, nor do any marinas currently exist within Village of Patchogue jurisdiction.
4-43	Inspect and maintain all containment berms or devices in accordance with State regulations. Investigate immediately signs of leakage or spillage, and undertake cleanup in accordance with applicable best management practices	N/A		There are no opportunities to construct new marinas in the Village of Patchogue portion of the Tuthills Creek Watershed, nor do any marinas currently exist within Village of Patchogue jurisdiction.
4-44	Have a trained operator present and prepared to respond to accidental spills	N/A		There are no opportunities to construct new marinas in the Village of Patchogue portion of the Tuthills Creek Watershed, nor do any marinas currently exist within Village of Patchogue jurisdiction.
4-45	Maintain daily inventory records to identify abnormal loss or gain of liquid	N/A		There are no opportunities to construct new marinas in the Village of Patchogue portion of the Tuthills Creek Watershed, nor do any marinas currently exist within Village of Patchogue jurisdiction.
4-46	Prohibit the cleaning of hoses, fittings, pumps, and other accessory equipment on piers, docks or adjacent upland to prevent runoff into the marina basin or other surface or groundwater	N/A		There are no opportunities to construct new marinas in the Village of Patchogue portion of the Tuthills Creek Watershed, nor do any marinas currently exist within Village of Patchogue jurisdiction.
4-47	Create and/or maintain a dedicated fund for maintenance in the case of government-owned facilities	N/A		There are no opportunities to construct new marinas in the Village of Patchogue portion of the Tuthills Creek Watershed, nor do any marinas currently exist within Village of Patchogue jurisdiction.

Village of Patchogue				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
4-48	Restrict the operation of pump out facilities to trained marina personnel only	N/A		There are no opportunities to construct new marinas in the Village of Patchogue portion of the Tuthills Creek Watershed, nor do any marinas currently exist within Village of Patchogue jurisdiction.
Section 5 - Roads and Bridges				
Part A - Existing Roads and Bridges				
5-01	Conduct road and bridge maintenance (deicing material usage and storage, pot-hole repair, bridge washing, scraping and painting, etc.) according to best management practices	GP-0-15-003; Village Standard Operating Procedure	1b	
5-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) - according to best management practices	GP-0-15-003; Village Standard Operating Procedure	1b	
5-03	Include high percentage of indigenous plants in new landscaping on public-owned properties (excluding arboretums, horticultural gardens, and site requiring turf grasses)	Village Standard Operating Procedure	1b	First consideration is given to drought resistant, low maintenance and salt tolerant plantings first, then use of natives is considered secondarily
5-04	Implement a regular inspection and maintenance plan of existing structures	GP-0-15-003; Village Standard Operating Procedure	1b	Drains with filter inserts have filter replacement every six months
5-05	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities	Village Standard Operating Procedure	1b	None identified within the Tuthills Creek Watershed
5-06	Require percentage of roads to be tested with non-ice and non-sand de-icing.	Village Standard Operating Procedure	1b	Use of beet juice attempted, not found to have a significant benefit given the cost of the product
Part B - New Roads and Bridges				
5-07	Minimize the amount of land disturbed and the duration of disturbance	NYS GP 0-15-002	1	Does not apply to disturbances of less than one acre
5-08	Preserve natural features and conform substantially with the natural boundaries and alignment of waterbodies	Roadway design process, NYSDOT review, NYSDEC Article 24 & 25 Permitting	2a	
5-09	Retain and protect trees and other natural vegetation on and near disturbed sites		0	

Village of Patchogue				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
5-10	Retain additional runoff sites	NYS GP 0-15-002	1	Does not apply to disturbances of less than one acre
5-11	Minimize the creation of impervious areas		0	
5-12	Treat increased runoff caused by changed surface conditions to minimize the danger of flooding, erosion and pollutants entering waterbodies prior to, during and after construction	NYS GP 0-15-002	1	Does not apply to disturbances of less than one acre
5-13	Use temporary vegetation and mulching to protect exposed and critical areas during development	NYS GP 0-15-002	1	Does not apply to disturbances of less than one acre
5-14	Redistribute topsoil within the boundaries of the disturbed land for seeding and planting		0	
5-15	Stabilize disturbed soils as soon as possible	NYS GP 0-15-002	1	Does not apply to disturbances of less than one acre
5-16	Minimize the use of cut and fill operations. Conform such operations to topography and soils to minimize erosion potential and adequately accommodate runoff	Roadway design process, NYSDOT review	1	
5-17	Control erosion and sedimentation prior to, during and after site preparation and construction	NYS GP 0-15-002	1	
5-18	Require long term stormwater management plan.	NYS GP 0-15-002,GP-0-15-003	1	
5-19	Require long term sedimentation control & maintenance.	NYS GP 0-15-002,GP-0-15-003	1	
Part C - All Roads and Bridges (existing and new)				
5-20	Target existing public holdings, such as parks, for removing unnecessary impervious surfaces	Tuthills Creek WMP - in development	1	Full implementation anticipated with the completion of the Tuthills Creek WMP
5-21	Incorporate New York State Department of Transportation design and guidance documents, standard specifications, and procedural manuals (*Highway Design Manual, Environmental Procedures Manual,* Maintenance Guidelines, etc.) into local laws and operating procedures	Village Standard Operating Procedure	1b	Specifications for road repaving, etc. followed by the Village
5-22	Ensure application of appropriate solid and hazardous waste generation and disposal practices including source controls and recycling	Village Good Housekeeping Practice	1b	Hazardous waste not accepted at the Village DPW yard within the watershed. Recyclables are collected and sorted.

Village of Patchogue				
BMP Number	**Best Management Practices (BMP)**	**Existing Means of Implementation (law, regulation, practice, etc.)**	**Degree of Implementation***	**Notes**
5-23	Ensure proper operation and maintenance of runoff management facilities	Village Standard Operating Procedure	1b	
5-24	Participate in Cornell Local Roads Program activities and training	Village Standard Operating Procedure	1b	Training conducted regularly on a rotating basis
5-25	Target training programs at highway officials, contractors, construction workers, inspectors, zoning and planning officials	Village Standard Operating Procedure	1b	Training conducted regularly on a rotating basis
5-26	Target training and outreach programs about the proper handling of materials, leakage and spill prevention and spill response procedures at maintenance staff and workers	Village Standard Operating Procedure, GP-0-15-003	1b	Training conducted regularly on a rotating basis
Section 6 - Onsite Wastewater Treatment Systems				
6-01	Conduct regular inspections of OWTS at a frequency adequate to determine failure and undertake required maintenance	SCDHS Article 6 Regulations, NYS GP 0-15-003	2a	Identification of OWTS discharging to the MS4 is required by GP-0-15-003 Part IX for Patchogue Bay sewershed.
6-02	Institute setback guidelines	SCDHS Article 6 Regulations	2a	
6-03	Promulgate plumbing codes that require practices that are compatible with OWTS	SCDHS Article 6 Regulations	2a	
6-04	Target outreach programs at homeowners, contractors and developers	NYS GP 0-15-003	1b	NYSDEC MS4 General Permit Part IX requires pathogen specific public education/outreach in the Patchogue Bay storm sewershed area
6-05	Inspection of all OWTS at property transfer or within 1 year prior to transfer		0	
6-06	Require all properties within 500' of municipal service to connect.	SCDHS Article 6 Regulations, Village of Patchogue Code Chapter 353	2a	
6-07	Set goals for effluent limits (nitrogen, phosphorous, BOD, etc.)	SCDHS Article 6 Regulations, NYSDEC Water Quality Regulations (6 NYCRR §703), Pathogen Total Maximum Daily Load, MS4 General Permit	2a	

Section 4.0
Recommendations

4.0 RECOMMENDATIONS

The characterization of water resources within the Tuthills Creek Watershed, input from the CAC and the public, and regulatory considerations were all considered and factor into the development of recommendations for the watershed. The overall intent of this document is to identify those measures that can be implemented to reduce existing water quality impacts, make meaningful strides toward water quality improvement, and prevent or mitigate potential future impacts to water quality. The recommendations provided herein will be incorporated into **Section 5.0**, **Implementation**, which will further evaluate each recommendation as well as specific improvement projects, with respect to priority in scheduling and methods for implementation.

Recommendations are divided into seven categories: Waterbody Recommendations, Stormwater Runoff and Water Quality Recommendations, Municipal Facility Recommendations, Wastewater Recommendations, Regulatory Recommendations, Natural Resource and Invasive Species Management and Public Education and Stewardship. Each recommendation has a designated identification number for ease of reference in the Implementation Plan, following this section; this number is provided prior to the main description of each of the recommendations. For specific improvement projects, an additional identification number is provided to the project to aid in project prioritization; this number is listed at the end of each project description or location.

4.1 Waterbody Recommendations

As documented in **Section 2.5.3**, there is a lack of water quality data for the creek. These recommendations are provided to address that lack of data that may inform future land use and management decisions. Additionally, recommendations specific to the surface water portions of Tuthills Creek are provided.

W-1: Establish a program for regular water quality monitoring of the creek at key locations.

Very little data is currently available that provides information to the health of the creek. The creek would benefit from a regular monitoring program to provide baseline data throughout the year. A protocol for water quality monitoring should be developed to include monthly dry weather and wet weather monitoring. Locations could include the mouth of the creek, a station within the tidal portion of the creek, a station at West Lake, and additional stations equally spaced within the remainder of the creek. At a minimum, basic water quality parameters that should be assessed include nitrogen, phosphorus, pathogens, total suspended solids, dissolved oxygen, temperature and clarity. If necessary, other sampling parameters can be analyzed should other pollutants be suspected within the waterway. In addition to the water quality monitoring of Long Island waters conducted by state and county agencies, there are several highly respected and long-standing water quality monitoring programs on Long Island that are administered by environmental

organizations with local citizens. Recommendation V-7 provides information regarding opportunities to work with local interest groups on water quality monitoring efforts.

W-2: Establish a blueway trail within the navigable portion of the creek.

Limited recreational opportunities currently existing within the watershed and adjacent to the creek. A blueway trail would aid in fostering interest in the creek and would provide a unique view of the natural environment surrounding the creek. The trail could include strategic locations for non-motorized boat access, including the potential for new public access locations along the waterfront (see Upland Recommendations in **Section 4.2** below). Additionally, existing developments along the water (such as the existing docks at the Bayview Apartments, Fairharbor Cooperative, or The Harbor at Blue Point) may be interested in participating in the establishment of landing locations for their residents.

W-3: Investigate dredging existing sediment accumulation within the Creek south of Weeks Street Culvert and north of the LIRR bridge.
Removal of the deposits within the area of the creek south of the Weeks Street Culvert and north of the LIRR bridge over the creek would improve water circulation in the creek, which is beneficial for water quality.

W-4: Reestablish habitat for wildlife within and along the shorelines of the creek.
Several opportunities for wildlife enhancement exist along the creek. Wildlife such as osprey, turtles and oysters would aid in benefitting the health of the creek. Turtle habitat could be created at select locations, and platforms for osprey nests could be added along the shoreline. Additionally, seeding oysters within the tidal portion of the creek would aid in providing natural filtration for the waterway, providing natural enhancement of the quality of water within the creek.

4.2 Upland Recommendations

This section details recommendations that would apply to the upland areas that contribute to surface waters, involving: stormwater runoff reduction; municipal facility improvements; upland wastewater management; regulatory guidance; natural resource enhancement and invasive species control; and, stewardship and public education. All recommendations pertain to land surface areas and would aid in improving environmental conditions including groundwater and surface water quality. It is noted that the locations for site specific recommendations are illustrated in **Figure 4-1**. Locations are numbered to match the recommendation number provided below. If multiple locations are appropriate for a particular recommendation, a letter sub designation is provided for that specific location.

4.2.1 Watershed Protection Area & Open Space Acquisition

WP-1: Identify parcels with significant wetland area for consideration by the Town's Open Space Committee.

Town of Brookhaven
and
New York Department of State

TUTHILLS CREEK WATERSHED MANAGEMENT PLAN

FIGURE 19

RECOMMENDATIONS

SOURCE: NYSGIS Orthoimagery Program, 2013; ESRI Web Mapping Service

Legend

- Tuthills Creek Watershed Boundary
- WP-1 (Open Space acquisition)
- Wetland Boundary
- N-1 (Native Restoration and enhancement)
- N-2A - N-2G (Conduct restoration on impacted public lands)
- P-1A - P-1D (Public access through potential acquisition)
- P-2 (Provide public access to views and connection to trail)
- P-3 (Create a bike trial with markers and connection to Blueway Trail)
- S-1A - S-1E (Pretreatment to direct outfalls)
- S-3A - S-3F (Pavement reduction and stormwater catchment)
- S-4 (Infiltration green infrastructure practices)
- S-5 (Investigate flooding condictions/possible subsurface pipe)
- S-6 (Median modification for stormwater treatment using infiltration green infrastructure practices)
- V-1 (Encourage infiltration practices and green infrastructure in large parking areas)
- W-2 (Blueway Trail)
- W-3 (Restore stream flow through sediment removal)

1 inch = 1,500 feet

0 750 1,500 3,000 Feet

Nelson, Pope & Voorhis, LLC
Environmental Planning & Consulting

Based on the presence of significant wetlands, a list of properties for consideration of acquisition or purchase of development rights is provided in **Appendix G**. Preservation of these parcels reduces future development opportunities within the most sensitive areas in close proximity to the Creek.

WP-2: Adopt clearing restrictions to limit disturbances to existing natural areas and limit fertilizer dependent vegetation to no more than 15% of lot areas within parcels located within the 0-5 year groundwater contributing area.

The Town and Village should consider the adoption of an Overlay Zone that provides for additional watershed protection through the preservation of natural areas and limitations on fertilizer dependent vegetation.

4.2.2 Public Access & Recreation

P-1: Improve public access opportunities to the Tuthills Creek waterfront by prioritizing acquisition of key parcels suitable for establishment of creekside public parks and landings for the proposed blueways trail with upland links to the community.

Due to the limited available public open space currently available immediately adjacent to the Creek, the acquisition of parcel(s) suitable for recreational use would increase public knowledge and enjoyment of the Creek. Several prime parcels adjacent to the creek should be prioritized for acquisition if such parcels are offered for sale:

- Parcel south of Fairharbor Drive (P-1A)
- Parcel on the northeast side of the crossing of Weeks Street and Tuthills Creek (P-1B)
- Parcel located at 204 River Avenue (P-1C)
- Parcel located on the south side of Waverly Ave., opposite Log Rd. (P-1D)

These parcels could be restored to remove invasive species, improved with seating, walking trails and educational signage, as well as established as a non-motorized boat launch location for kayak, paddle board and fishing access in locations naturally protected from wind.

P-2: Enhance publicly owned parkland to encourage public access.

The Town of Brookhaven owns a parcel on the southwest end of River Avenue, which is preserved as dedicated open space and as a result, improvements related only to enhancing and restoring the open space can be conducted (i.e., use of the site for drainage improvements, whether for green infrastructure or gray infrastructure would not be permitted). Creation of a walking trail to provide public access to bay views is recommended, as well as investigation of the establishment of a kayak/paddle board launch location that connects to a potential blueway (waterway) trail.

The Village of Patchogue owns a small parcel on the southwest side of West Lake, which currently provides water access and is commonly used for fishing access. Parking is currently available on the south side of Montauk Highway, and the NYS Department of Transportation (NYSDOT) has recently completed traffic calming improvements to this portion of the roadway in an effort to improve pedestrian safety. These improvements include pedestrian crossing warning signage, sidewalks with guardrails on each side of the roadway and a center median to slow traffic. To improve safety for patrons using the parking on the south side of Montauk Highway, the Village could considered discussing the possibility of a new crosswalk in proximity to the parcel with the NYSDOT.

P-3: Create a bike trail with interest markers that connects the blueway trail to community areas of interest.

Much of the lands immediately adjacent to the Creek are privately owned, and bisected by the LIRR tracks and Sunrise Highway, which limit the opportunity for pedestrian or bike trails with creek views from the lower to the upper reaches of the watershed. A bike trail with signage and markers at points of interest could be established to lead visitors to various publicly accessible viewscapes along the creek, as well as additional connections to the Village's Main Street to the east where additional recreational, shopping and dining options are available.

4.2.3 Stormwater Improvements

S-1: Provide pretreatment to direct outfalls and at road ends, where feasible. Pretreatment options could include separator chambers, or in-line biological treatment (raingardens, tree boxes, constructed wetlands, etc.).

Older drainage systems often have direct discharges to waterbodies and do not have any form of pollutant treatment prior to the discharge point. While removing the direct discharges can often be challenging, providing pretreatment in the form of separator chambers, catch basin inserts and/or biological treatment systems can be beneficial to the drainage system. The Towns and Village have already installed various catch basin inserts to provide stormwater filtration prior to discharge to waterbodies. Retrofitting of existing drainage systems provides a means to address water quality in areas where limited stormwater storage can be accommodated due to shallow groundwater and physical space constraints. Potential locations that would benefit from some form of pretreatment and retrofit options include:

- Weeks Street in proximity to the creek crossing (S-2A)
- West Main Street, east of the creek (S-2B)
- Village Park at the intersection of Hillside Avenue and Lakeland Avenue (S-2C)
- Park Avenue Road End (S-2D)

- Burchell St./Richlee St./Kinn St./Kuebler St./Norwood Dr./Mark Dr. neighborhood (S-2E)

S-2: Explore publicly owned parcels within the watershed for opportunities to redirect stormwater.

Although limited publically owned land exists within the watershed, the available land and roadway right of ways can serve as excellent opportunities for stormwater treatment. Restrictions on Town owned parcels should first be identified (i.e., parcels purchased as open space, areas of high groundwater or wetlands, etc.). Where feasible, plans could be developed to redirect stormwater to purchased parcels to provide enhanced treatment of pollutants.

S-3: Consider pavement reduction and stormwater catchment in road ends with excess unutilized paved area and within wide residential roadways through the installation of planted medians.

Due to the age of some of the developments within the watershed, excessively wide streets or road ends with unnecessary pavement exist. As impervious surfaces are a major contributor to pollutants in stormwater; reducing impervious area (excess paved area) and replacing the surfaces with vegetated surfaces, some which could be designed for biological stormwater uptake and filtration, would improve stormwater quality. Potential locations for such improvements include:

- Hill Street (pavement reduction at road end) (S-3A)
- Park Avenue (planted medians) (S-3B)
- Lakeland Avenue (planted medians) (S-3C)
- West 1st Street (pavement reduction at road end) (S-3D)
- Hillside Avenue (planted medians) (S-3E)
- Marshall Street (pavement reduction at road end) (S-3F)

S-4: Investigate use of infiltration practices, water quality structures and biological treatment options at the ends of Waterworks Road and Nottingham Avenue, and within Park Avenue to reduce overland flow of stormwater towards the Creek.

The southern ends of both Waterworks Road and Nottingham Avenue appear to have a lack of existing drainage infrastructure and are in close proximity to wetlands. Depending on area soils and depth to groundwater, the installation of infrastructure would aid in improving the quality of stormwater that flows directly to wetlands. Additionally, public input noted chronic flooding problems on Park Avenue due to overland flow of stormwater along the roadway. Additionally, catchment and recharge of runoff in these areas will address the chronic flooding problems on Park Avenue that were noted during Tuthills Creek citizens advisory public comment sessions.

S-5: Conduct a study to determine the source of persistent flooding and a potential buried culvert beneath Wilstan Avenue to determine potential remedial actions.

Several residents have expressed concerns regarding flooding at this location during storm events. Anecdotal information provided by residents indicate that this area of the residential development was built on a former stream bed associated with the wetlands to the northeast. Residents have indicated that historic fill and potentially a drainage pipe, meant to continue to permit flow of the stream bed between the wetlands and the creek, may have been installed when the development was built. As records regarding the particular drainage information associated with this development are not available, a study should be conducted to investigate the existing drainage infrastructure in this area, determine if a buried pipe does in fact exist and if so, if that pipe is clogged, and determine what actions can be taken to alleviate flooding at this location.

S-6: Modify the medians on Waverly Avenue to allow for the treatment of stormwater through the use of infiltration practices and/or biological treatment practices.

Currently, the medians on Waverly Avenue consist of paved surfaces which contribute to stormwater runoff. A study to determine if additional infiltration can be placed within the medians or if biological treatment practices are feasible within the medians would aid in improving the quality of stormwater runoff.

S-7: Encourage the use of green infrastructure/ practices on public lands and at public facilities such as recreational facilities, fire departments and public schools.

Publicly used facilities serve as excellent opportunities for demonstration of green infrastructure techniques, and can serve to educate the public on how such techniques can be utilized at home. Potential green infrastructure techniques that can be utilized at public facilities include:

- Installation of infiltration practices within parking lots.
- Improvement of the habitat quality within existing recharge basins and green spaces.
- Installation of rain gardens and/or bioretention areas.
- Installation of rain barrels.
- Installation of pervious pavement.

4.2.4 Groundwater and Wastewater Recommendations

G-1: Evaluate feasibility to connect existing higher density areas to nearby sewer districts.

The watershed is currently partially served by Federal, County, Village and private sewer districts. Capacity may exist within the sewage treatment plants to allow for expansion of sewer connections for higher density residential and businesses in close proximity to the sewer district, with a priority for properties within the 0-5 year groundwater contributing area to the Creek (see **Figure 7**). The Village of Patchogue has begun investigations of a potential expansion of their sewer district which would provide for connections of a significant additional area of the Village, including sensitive areas within the Tuthills Creek Watershed area. Increased connections to sewage treatment plants would greatly reduce nitrogen inputs to groundwater, which ultimately reaches Tuthills Creek. Sewage treatment plans are much more effective at nitrogen removal than traditional cesspools and septic systems, particularly those Tuthills areas with shallow depth to groundwater.

G-2: Work with the SCDHS to encourage and incentivize the use of alternative sanitary treatment methods.

Significant advances in technology have been made in wastewater treatment systems since the implementation of SCDHS Article 6. While the SCDHS is currently utilizing a pilot program to study use of these systems in residential areas, the program is only in its initial stages. The Towns and Village could work with the SCDHS to expand the pilot program for residents within the watershed located in areas with shallow depth to groundwater and within the five year groundwater contributing zone; as water quality would benefit the most from improvements to these systems (see **Appendix H** for case studies).

G-3: Establish septic system replacement cost-share program for aged and poorly functioning on-site wastewater treatment systems.

It is recognized that sanitary system replacement can be an economic hardship for some homeowners due to the expense of the systems and the expense of design and permits for residents located in areas with shallow depth to groundwater. As such, a cost-share program would aid in making sanitary system replacement more affordable and would facilitate and encourage homeowner compliance. Similar programs have been successful in other communities throughout the country, including a recent program initiated by the Town of Southampton for a septic system rebate program that allows for rebates associated with the upgrade, repair, or replacement of existing septic systems that comply with the Suffolk County Department of Health Services regulations.

4.2.5 Natural Resource & Invasive Species Management

N-1: Restore the Town owned parkland located at the south end of River Avenue, at the mouth of the creek to enhance habitat.

This parcel is currently vegetated and receives stormwater runoff from the surrounding residential area through overland flow. The majority of the parcel has been previously disturbed as evidenced by the phragmites monoculture on portions of the site and the

prevalence of invasive species on site. Restoring this property with native species would enhance the habitat value of the site and would aid in enhancing the water quality filtration properties provided by the vegetation. It is noted that this parcel is preserved as dedicated open space and as a result, improvements related only to enhancing and restoring the open space can be conducted (i.e., use of the site for drainage improvements, whether for green infrastructure or gray infrastructure would not be permitted). The Town could consider restoring the shoreline along the creek side of the property where a poorly functioning bulkhead currently exists.

N-2: Conduct restoration on currently impacted publicly owned land to improve natural treatment of stormwater runoff.

Although public lands are limited within the watershed, many of the lands that are public are currently impacted by dumping, prior disturbance, and invasive species. Restoration of these lands, including revegetating areas that are currently disturbed by dumping, would aid in providing additional filtration of stormwater runoff through these areas. Publicly owned parcels that were visibly impacted by disturbance, dumping, or invasive species that would benefit from restoration include:

- The Town owned lot on the west side of the creek, on the south side of Weeks Street (N-2A)
- The County owned lot on the west side of the creek, south of the railroad (N-2B)
- Southwest portion of West Lake on the northwest side of West Main Street (N-2C)
- The Town owned parcel on West Lake Drive (N-2D)
- The County owned lot at the end of West 3rd Street (N-2E)
- The Village owned land at the end of West 1st Street (N-2F)
- The Village owned land at the end of West 2nd Street (N-2G)

4.2.6 Regulatory Recommendations

R-1: Adopt a local law requiring that new or replacement sanitary systems in areas with shallow depth to groundwater or within 500 feet of surface water utilize best available technology.

Advances in wastewater treatment occur on a regular basis, and promoting improved wastewater treatment would benefit the health of the creek. As areas with shallow depth to groundwater or areas that are within a short travel time of groundwater to the creek have a higher potential to carry nutrients and pathogens to the creek, improvements to sanitary systems in these areas is critical to improving water quality. The Town of Brookhaven has introduced a proposal for the creation of a Nitrogen Protection Zone, designed to require stricter nitrogen removal standards for sanitary systems associated with newly constructed structures within 500 feet of surface waters. These requirements would also apply to structures undergoing substantial reconstruction or expansion. This initiative should be

considered for all unsewered areas within the Watershed that are within 500 feet of surface water.

R-2: Adopt a regulation to require inspection and certification once every five years for sanitary systems. Explore the establishment of a cost share program to aid in septic system inspection and certification.

All sanitary systems within the groundwater contributing area to Tuthills Creek have the potential to contribute nutrients to the Creek. Areas with sanitary systems situated in locations with shallow depth to groundwater have the greatest potential to discharge nutrients and pathogens to Tuthills Creek. Sanitary systems without adequate vertical separation between the bottom of the leaching pool and groundwater do not function properly as there is insufficient conversion of ammonia to nitrite and nitrate (the nitrification part of the intended treatment process) and reduced natural attenuation of the sediments separating the system from groundwater.

A program which requires regular sanitary system inspection and maintenance could be established to require property owners to provide proof of inspection and certification of sanitary systems once every five years. In addition to inspection by a licensed contractor, certification of the system could also be achieved through proof of maintenance (i.e., pumping of the sanitary system) within the three year time frame or proof of new system installation compliant with current SCDHS requirements (i.e., systems constructed after 1981). If inspection revealed a failing system or a system which could not be certified pursuant to SCDHS requirements (aged system), the system would either have to be pumped or replaced, depending on the severity of the failure. Once property owners demonstrate certification of a SCDHS approved system (updated since 1981), no additional submission/proofs of a compliant systems would be required (which may encourage property owners to replace antiquated systems rather than continually pumping the systems).

As described in recommendation **G-2**, a cost share program could aid in relieving some of the economic hardship that would be experienced by residents on limited income. Cost share implementation could include grants to the residents, rebates, or discounts on the services needed for certification if certain financial criteria are met.

4.2.7 Stewardship & Public Education Recommendations

V-1: Work with local commercial landowners and businesses to encourage the use of Green Infrastructure practices in locations where excessive pavement, lack of drainage, direct discharge and/or close proximity to the creek exist.

The watershed contains several areas of concentrated commercial and institutional uses with large areas of pavement. A cooperative program with commercial landowners could be implemented to promote use of green infrastructure on their properties, including rain

gardens, bioretention areas, pervious pavement, rain barrels, catch basin inserts and storm separator chambers. The program could include incentives for landowners to implement such practices, such as rebates, tax incentives or discounts on materials.

V-2: Conduct landscape management education for homeowners and businesses with waterfront parcels.

Several residential areas, particularly south of West Lake, have landscaped surfaces either in close proximity or immediately adjacent to the creek. Lawns in particular are vectors for nutrients carried in stormwater from fertilizer application and animal waste. As a result, education to homeowners regarding best management practices for turf maintenance would be beneficial to reducing nutrient input into the waterway. Suffolk County's "Healthy Lawns Clean Water" website is an excellent resource for best management practices that could be utilized for public education (http://healthylawns.suffolkcountyny.gov/bmps/bmps.htm).

V-3: Develop educational materials detailing the benefits of natural buffers along shorelines.

Vegetative buffers provide for biological and physical filtration of stormwater prior to runoff reaching waterbodies. Encouraging the installation and maintenance of natural buffers could be fostered through educational materials demonstrating the benefits and aesthetic appeal of such buffers. Such information could be provided on the Town's website or on public information documents that contain "QR" codes that would direct the public to the Town's website.

V-4: Develop educational materials providing information on green infrastructure (e.g., rain gardens, rain barrels, etc.) and its benefits to homeowners.

In order to encourage homeowners to utilize green infrastructure on their properties, educational materials outlining the benefits of such practices could be developed and provided to homeowners. Materials could include information such as the benefits of rain barrels and "do it yourself" instructions on how to construct the barrels. Information on what a rain garden is, how it benefits the homeowner and how it ultimately benefits the creek would also be useful to homeowners not familiar with the concept of green infrastructure.

V-5: Obtain funding for a "Septic System Pumpout, Water Conservation and Education program."

An educational program and/or materials would aid in communicating the importance of sanitary system maintenance and the impacts of failing systems to water quality. Include information that clearly outlines beneficial maintenance practices for optimal system functioning and educate property owners of common actions that are detrimental to the functioning of the system, such as use of harsh chemicals and certain detergents. Such a program could garner participation in sanitary system maintenance and potentially improve water quality in the long term.

V-6: Utilize existing public information documents available through the Long Island Invasive Species Management Area (LIISMA) group and Cornell Cooperative Extension to increase public understanding regarding the harmful effects of invasive species.

Both LIISMA and Cornell Cooperative Extension have educational materials available regarding the impacts of invasive species and the benefits of native species, as well as literature outlining alternatives to invasive species commonly used in landscaping. Town participation in LIISMA and coordination with Cornell could provide a cost effective means of distributing materials to local residents and business owners to assist with the control of invasive species. Such information could be provided on the Town's website or on public information documents that contain "QR" codes that would direct the public to the Town's website. Public workshops in partnership with local libraries or through local gardening groups and nurseries can also be an effective method to increasing public awareness of this issue.

V-7: Work with existing organizations to utilize volunteers to assist with water quality monitoring activities.

Water quality monitoring can be a time consuming endeavor for Town government and staff that may have limited resources to contribute to the effort. In order to accomplish regular monitoring, many municipalities have begun "citizen science" volunteer monitoring whereby volunteers are trained in water quality monitoring and reporting methods. It is recommended that volunteer efforts be tapped for water quality monitoring activities to augment governmental personnel and provide a means of conducting beneficial monitoring and tracking of water quality. There are several long-standing water quality monitoring programs on Long Island that are administered by environmental organizations with the support of local citizens. These programs have been conducted with the support of municipal partners and/or grant funding in accordance with EPA approved Quality Assurance Project Plan (QAPP) protocols and standards. It is noted that it is important that any such program operate within the approved framework of an EPA QAPP to ensure data credibility.

Section 5.0
Implementation Strategy

5.0 IMPLEMENTATION STRATEGY

The Watershed Management Plan for Tuthills Creek has been designed to improve water quality within the Creek and of stormwater runoff entering the Creek by promoting education, environmental stewardship, best management practices for future land use actions and routine municipal maintenance activities, and improvements in stormwater collection and treatment. By implementing the pollution preventative and corrective actions outlined in the WMP for general best management practices, public education and outreach, stormwater improvement strategies and priority actions, steps can be taken to improve water quality, restore habitat, reduce water quality impairments to shellfish in Patchogue Bay, and allow for recreational opportunities within the Creek.

5.1 Implementation Actions

The following implementation strategy (see **Table 5-1**) is meant to address the methods and means by which the Watershed Management Plan for Tuthills Creek will implement the projects and actions outlined in **Section 4.0**. This Section addresses different aspects of implementation including governmental jurisdiction, priority of the actions and potential funding sources to aid the Town in implementing the recommended actions outlined in **Section 4.0**.

Implementation of the Watershed Management Plan for Tuthills Creek involves many agencies, levels of government, civic groups, and citizens. Inter-governmental coordination and cooperation between the Town, County, State, non-profits, and the community is important to the success of the WMP. Groups such as: Suffolk County Cornell Cooperative Extension (CCE), NYSDEC, EPA, Sea Grant, and the Suffolk County Soil and Water Conservation District (SCSWCD) can also provide information on the development of educational, outreach and stewardship materials as well as educational materials at their disposal relating to subjects such as best management practices (BMP), sanitary system maintenance, and green infrastructure practices for use at home (e.g., rain barrels), etc. Opportunities for collective efforts are noted as applicable.

Cost ranges for implementation of various recommendations are also provided in **Table 20** ($: $0-$50,000; $$: $50,000-$100,000; $$$:$100,000-$300,000; $$$$: $300,000+). As funding for stormwater improvements is often limited, the recommendations are also ranged in terms of potential timeframes for completion, and are denoted as follows:

O - Ongoing projects, activities and programs are described as occurring annually or more frequently, as well as actions that occur on an ongoing basis, such as education and outreach or monitoring activities.

S - Short-term projects are activities or programs which could be initiated or even completed within one or two years of project initiation, and could occur at any time when funding is

available and there is an initiative. These projects have the potential to demonstrate immediate progress and success and/or help establish a framework for implementing subsequent program recommendations. Such projects or activities include development of stormwater retrofit plans to address Municipal Separate Storm Sewer Systems (MS4) requirements and pathogen reduction goals, development of educational and outreach materials, or revisions to Town and Village codes.

M - Mid-term projects involve continued programmatic and operational measures which may be conducted over two to five years and could begin at any time when funding is available and there is an initiative. Progress on land conservation, the protection of headwaters and unique landscapes, construction of large retrofit or restoration projects, Low Impact Development (LID) and green infrastructure implementation, or more complex planning studies are examples of possible mid-term projects.

L - Long-term projects consist of continued implementation of additional projects necessary to meet watershed management objectives and water quality goals, as well as an evaluation of progress, and updates to existing plans. Long-term recommendations are intended to begin within the next ten years, and could continue to be initiated in later years.

Additionally, potential funding sources have been identified for each recommendation (see **Section 5.2, Table 5-2** below for a description of each funding source).

Table 5-1: IMPLEMENTATION STRATEGY

ID No.	Recommendation	Implementation Strategy			
		Cost	Responsible Entity[1]	Timetable	Funding Sources [2]
WATERBODY RECOMMENDATIONS					
W-1	Establish a program for regular water quality monitoring of the creek at key locations	$	Town/ Village, NYSDEC	S/O	B-1b,c,d & e, C-1a, b, c, e, f, h, F-1a H-1c J-1, 2, 3, 4, K-1a
W-2	Establish a blueway trail within the navigable portion of the creek	$$	Town/ Village	M	F-1a, G-1c,
W-3	Investigate dredging existing sediment accumulation within the Creek south of Weeks Street Culvert and north of the LIRR bridge	$$ - $$$	Town/ Village	M	B-1d,e, C-1a,c,h, F-1a, H-1e, J-2c, M-1
W-4	Reestablish habitat for wildlife within and along the shorelines of the creek.	$$ - $$$	Town/ Village	M/L	C-1b,h, F-1a, G-1a
UPLAND RECOMMENDATIONS – Watershed Protection Area & Open Space Acquisition					
WP-1	Identify parcels with significant wetland area on Town's Open Space Acquisition list	$ - $$$$	Town	O	F-1a, J-2b, K-1a, b, c, Town

[1] Town of Brookhaven (Town); Suffolk County (SC) Department of Public Works (SCDPW); New York State Dept. of Transportation (DOT); New York State Department of Environmental Conservation (NYSDEC); SC Dept. of Health Services (SCDHS); SC Dept. of Environment & Energy (SCDEE); SC Department of Planning (SCDP);

[2] See **Table 5-2** for Funding Sources Key.

ID No.	Recommendation	Implementation Strategy			
		Cost	Responsible Entity[1]	Timetable	Funding Sources [2]
WP-2	Adopt clearing restrictions to limit disturbances to existing natural areas and limit fertilizer dependent vegetation to no more than 15% of lot areas within parcels located within the 0-5 year groundwater contributing area.	$	Town/ Village	S/O	Town/Village
PUBLIC ACCESS & RECREATION					
P-1	Improve public access opportunities to the Tuthills Creek waterfront by prioritizing acquisition of key parcels suitable for establishment of creekside public parks and landings for the proposed blueways trail with upland links to the community	$$$	Town/ Village	M/O	C-1b,h,I, F-1a, G-1b,c, H-1a,b, c
P-2	Enhance publicly owned parkland to encourage public access.	$$$	Town	M	C-1b,e,h,i, F-1a, G-1a, H-1b
P-3	Create a bike trail with interest markers that connect to the blueway trail to community areas of interest	$$$	Town/ Village	L	F-1a,G-1c, H-1b,
STORMWATER IMPROVEMENTS					
S-1	Provide pretreatment to direct outfalls and at road ends, where feasible. Pretreatment options could include separator chambers, in-line biological treatment (raingardens, tree boxes, constructed wetlands, etc.)	$$$	Town/ Village	S/M	A-1a, A-3b, B-1c, C-1-a,b, e, h, F-1a, H-1c,
S-2	Explore publicly owned parcels within the watershed for opportunities to redirect stormwater.	$$	Town/ Village	S/M	A-1a, B-1c, C-1a, F-1a, FEMA
S-3	Consider pavement reduction and stormwater catchment in road ends with excess unutilized paved area and within wide residential roadways through the installation of planted medians.	$$ - $$$	Town/ Village	M	A-1a, B-1c, C-1a,e,h, D-2b, E-2b, F-1a E-1 a, E2b, F-1a

ID No.	Recommendation	Implementation Strategy			
		Cost	Responsible Entity[1]	Timetable	Funding Sources [2]
S-4	Investigate use of infiltration practices, water quality structures and biological treatment options at the ends of Waterworks Road and Nottingham Avenue, and within Park Avenue to reduce overland flow of stormwater towards the Creek.	$$$	Town/ Village	S/M	A-1a, A-3b, B-1c, C-1a,e, h, E-2b, F-1a, H-1c
S-5	Conduct a study to determine the drainage and potential buried culvert beneath Wilstan Avenue, and to determine potential remedial actions to alleviate local flooding.	$$$	Village	M	C-1a,e, F-1a
S-6	Modify the medians on Waverly Avenue to allow for the treatment of stormwater through the use of infiltration practices and/or biological treatment practices	$$$	Town	M	A-1a, B-1c, C-1a, e, h, D1-a, D-2b, E-1a, F-1a
S-7	Encourage the use of green infrastructure/practices on public lands and at public facilities such as recreational facilities, fire departments.	$	Town/ Village	S/O	A-1a, B-1c, F-1a
GROUNDWATER AND WASTEWATER RECOMMENDATIONS					
G-1	Evaluate feasibility to connect existing higher density areas to nearby sewer districts	$$$	Town/ Village	M/L/O	A-2b, A-4c, C-1e, F-1a, H-1c,
G-2	Work with SCDHS to encourage and incentivize the use of alternative sanitary treatment methods	$$	Town, Village, SCDHS	M/O	A-2b, A-4c, C-1e, F-1a, H-1c
G-3	Consider a cost share program for replacement of aged sanitary systems	$$$$	Town/ Village	L	A-2b, A-4c, C-1e, F-1a, H-1c
NATURAL RESOURCE & INVASIVE SPECIES MANAGEMENT					
N-1	Restore the Town owned parkland located at the south end of River Avenue, at the mouth of the creek to enhance habitat.	$$$$	Town	M	C-1b,h, F-1a, G-1a

ID No.	Recommendation	Implementation Strategy			
		Cost	Responsible Entity[1]	Timetable	Funding Sources [2]
N-2	Conduct restoration on currently impacted publicly owned land to improve natural treatment of stormwater runoff	$$	Town/ Village	M/O	A-1a, C-1a, F-1a, H-1a, c, d
REGULATORY RECOMMENDATIONS					
R-1	Adopt a local law requiring that new or replacement sanitary systems in areas with shallow depth to groundwater or within 500 feet of surface water utilize best available technology.	$	Town	S	Town
R-2	Adopt a regulation to require inspection and certification once every five years for sanitary systems. Explore the establishment of a cost share program to aid in septic system inspection and certification	$	Town/ Village	S/O	Town/Village, B-1e, C-1e, F-1a, H-1c, d
STEWARDSHIP & PUBLIC EDUCATION RECOMMENDATIONS					
V-1	Work with local commercial landowners and businesses to encourage the use of Green Infrastructure practices in locations where excessive pavement, lack of drainage, direct discharge and/or close proximity to creek exist	$	Town/ Village	O	A-1a and Town/Village
V-2	Conduct turf management education for homeowners and businesses with waterfront parcels	$	Town/ Village	O	C-1g, F-1a, H-1a, J-3c, M-1a
V-3	Develop educational materials detailing the benefits of natural buffers along shorelines	$	Town/ Village	S/O	C-1g, F-1a, H-1a, J-3c, M-1a
V-4	Develop educational materials providing information on green infrastructure (e.g., rain gardens, rain barrels, etc.) and its benefits to homeowners	$	Town/ Village	S/O	C-1g, F-1a, H-1a, J-3c, M-1a
V-5	Obtain funding for a "Septic System Pumpout, Water Conservation and Education program."	$	Town/ Village	S/O	C-1g, F-1a, H-1a, J-3c, M-1a

ID No.	Recommendation	Implementation Strategy			
		Cost	Responsible Entity[1]	Timetable	Funding Sources [2]
V-6	Utilize existing public information documents available through the Long Island Invasive Species Management Area (LIISMA) group and Cornell Cooperative Extension to increase public understanding regarding the harmful effects of invasive species.	$	Town Village, LIISMA Cornell Cooperative Extension	O	Town/Village
V-7	Work with existing organizations to utilize volunteers to assist with water quality monitoring activities	$	Town/ Village	O	Town/Village

5.2 Funding Sources

The potential funding sources table is keyed to the implementation table for the specified recommendations. With each project recommendation listed, it is recommended that the appropriate Town and or Village officials contact agency representatives to discuss funding priorities and specific eligibility requirements. Note that there are specific public education funding sources listed. In addition, public education projects may be funded as a component of other construction type projects.

Many of the recommended projects may be funded under the Environmental Protection Agency's Clean Water Act amendments whose programs are administered in New York State mainly through the New York State Environmental Facilities Corporation. The program offers loans and grants for projects that rate high in overall State rankings. On an annual basis, the agency requests applications for projects to be included in the State's Intended Use Plan (IUP) which is the first step in the funding process. Because the New York State Department of State has funded the current study, implementation projects that are being recommended in this study may rank very high in pursuit of Environmental Protection Fund (EPF) grants. Included are the New York State Member Item Funding or Multi-Modal Program where the Town should contact their New York State and federal representatives to access this funding. This should be done in any year well in advance of April 1st when a new State budget takes effect.

Table 5-2
POTENTIAL FUNDING SOURCES

ID No.	Funding Sources	Program	Eligible Activities
A	New York State Environmental Facilities Corporation	1. Green Innovation Grant Program <u>Clean Water State Revolving Fund</u> 2. Federal Section 212- Point Source – Loan Financing 3. Federal Section 319- Non Point Source- Loan Financing 4. New York State Infrastructure Improvement Act	a. Innovative Stormwater Management projects: structural & non-structural practices for sediment, pesticide and fertilizer control that may include permeable pavement, bio-retention, stormwater street trees, etc, Funding available at 90% federal and 10% local. b. Water Quality improvement Projects- Loans and Grants for Point Source projects such as STPs and Sewers and Non-Point Source projects for stormwater management, land acquisition if related to preserving water quality- projects must be municipally owned-bio-retention, permeable surfaces. Provision for non-municipal projects. Low-interest Loans- for green or non-green projects/Low Interest loans for short and long-term financing. STPs Sewers-Design & Construction c. New Program that is incorporated into the State Revolving Fund. Grants available for the above.
B	New York State Department of Environmental Conservation (NYSDEC)	1. Water Quality Improvement Project (WQIP)	a. Municipal Wastewater Treatment b. Municipal Separate Storm Sewer Systems (MS4s) c. Nonagricultural Nonpoint Source Abatement and Control d. Aquatic Habitat Restoration e. Water Quality Management f. Green Innovation Practices

ID No.	Funding Sources	Program	Eligible Activities
		2. Urban Forestry Grant Program	g. 50/50 cost Share for tree planting along streams
C	Suffolk County Department of Economic Development and Planning	1. Water Quality Protection and Restoration Program, and Land Stewardship Initiatives	50% matching grants for: a. Nonpoint Source Abatement and Control – Remediation Projects b. Nonpoint Source Abatement and Control – Preservation Projects c. Aquatic Habitat Restoration Projects d. Agricultural Nonpoint Source Abatement and Control e. Pollution Prevention Initiatives f. Projects to implement "No-Discharge Zones" g. Programs for Education and Outreach (requires 50% local match) h. Other Nonpoint Source Pollution Remediation Projects i. Land Stewardship Initiative
D	FHWA administered by NYS DOT thru Suffolk County DPW- Federal Funding administered by NYS DOT / New York Metropolitan Planning Council (NYMTCC)	MAP-21 1. Surface Transportation System (STS) 2. Transportation Alternatives Program	a. Road Reconstruction and Drainage/Impervious Surfaces Stormwater Outflow devices. Roads must be designated on Federal Aid Urban system Maps b. Enhancements to the Transportation System-streetscapes, historic preservation, environmental improvements
E	New York State Dept. of Transportation	1. Consolidated Highway Improvement Program (CHIPS) 2. Multi-Modal Program	a. Drainage curb, sidewalks, permeable paving b. Drainage, curb, sidewalks, permeable paving
F	New York State Department of State (NYSDOS)	1. Local Waterfront Revitalization Program (LWRP) - Environmental Protection Funding (EPF)	a. Water Quality Improvement Projects are eligible if part of overall improvement project-planning & implementation e.g. Storm Drain inserts, various projects that protect harbors, education projects and studies
G	New York State Office of Parks, Recreation & Historic Preservation	1. Environmental Protection Fund (and available federal funding)	a. Parks Development Funding b. Land Acquisition for park purposes

ID No.	Funding Sources	Program	Eligible Activities
			c. Recreational Trails Program
H	Long Island Community Foundation	1. Competitive Grant Program (Environmental Category)	a. Promote sustainable land use, land management, and transportation alternatives b. Support and strengthen open space and farmland preservation efforts c. Improve and protect the health of the region's bodies of water d. Protect drinking water quality e. Preserve biological diversity through habitat conservation and protection f. Minimize climate change by reducing greenhouse gas emissions through the development of alternative energy sources and energy conservation, research and public education
I	Federal Emergency Management Agency (FEMA) thru NYS Division of Homeland Security & Emergency Services (DHSES) (formally NYS SEMO)	1. Flood Mitigation Assistance Program 2. Hazard Mitigation Grant Program	a.Various projects to prevent flooding and protecting public and private resources, e.g. road and property elevations, culverts, buyouts, projects must have a positive benefit-cost ratio, 75/25 funding
J	U.S. Environmental Protection Agency (Note on EPA Water Quality	1. Targeted Watersheds Grants Program	a. 75/25 federal funding for protecting and restoring water uses, forming partnerships using new technologies, market incentives and results-oriented strategies/capacity building grants are available.

ID No.	Funding Sources	Program	Eligible Activities
	Projects- QAPP-Quality Assurance Protection Plan must be EPA adopted at the time that application is submitted)	2. Surveys, Studies, Investigations, Demonstrations and Training Grants 3. Assessment and Watershed Protection Program Grants 4. Pesticide Environmental Stewardship Regional Grants 5. Section 320- National Estuary Program 6. Urban Waters Small Grants Program 7. Wetland Program Development Grants	Drainage, Resurfacing, Permeable paving. b. Planning, Wetlands Protection, Coastal and Estuarine Planning Treatment technologies. Examples: Development of Water Protection Guides for Communities Demonstration Projects c. Innovative Water Quality Assessment and Modeling Techniques, Training Handbooks d. Integrated Pest Management Approaches that Reduce the Risks Associated with Pesticide Use in Non-Agricultural Settings e. Protection of Water Quality Supplies, Protection and Propagation of a balanced , indigenous population of shellfish, fish and wildlife and Habitat Restoration f. Water Quality Improvement Projects – Stewardship, Public Education and Awareness g. Research, investigations, experiments, training, demonstrations, surveys and studies relative to water pollution
K	National Fish and Wildlife Foundation	1. National Wetland Program Development Grants and Five-Star Restoration Training Grants 2. Native Plant Conservation Initiative	Protect, Manage and Restore Wetlands and Streams by a. Monitoring & Assessment b Volunteers Wetland Restoration & Protection, and c. Wetland-Specific Water Quality Standards Partnership with Businesses, Community & Schools Projects that Benefit Multiple Species. Achieve a Variety of Habitat Degradation/High Priority Critical Conservation Need/Demo Projects with a High Level of Public Involvement/Leverage Funding Involving Partnerships d. Water Quality Improvement Projects – various initiatives and priorities
M	NYS Member Item Funding	1. Various- thru NYS Legislators	a. All initiatives

Section 6.0
References

6.0 REFERENCES

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APPENDICES

Appendix A

NYSDEC Surface Water Quality Classifications

APPENDIX A

NYSDEC SURFACE WATER QUALITY CLASSIFICATIONS

Freshwater Classification	Best Usage
AA	Source of water supply for drinking, culinary or food processing purposes; primary and secondary contact recreation; and fishing. Suitable for fish, shellfish and wildlife propagation and survival.
A	Source of water supply for drinking, culinary or food processing purposes; primary and secondary contact recreation; and fishing. Suitable for fish, shellfish and wildlife propagation and survival.
B	Primary and secondary contact recreation and fishing. Suitable for fish, shellfish and wildlife propagation and survival.
C	Suitable for fish, shellfish and wildlife propagation and survival. Also, for primary and secondary contact recreation, although other factors may limit the use for these purposes.
D	Due to such natural conditions as intermittency of flow, water conditions not being conducive to propagation of game fishery, or unsuitable stream bed conditions, the waters will not support fish propagation. Suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes.
Marine Water Classification	**Best Usage**
SA	Shellfishing for market purposes, primary and secondary contact recreation and fishing. Suitable for fish, shellfish and wildlife propagation and survival.
SB	Primary or secondary contact recreation and any fishing. Suitable for fish, shellfish and wildlife propagation and survival.
SC	Suitable for fish, shellfish and wildlife propagation and survival. Also, suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes.
I	Secondary contact recreation and fishing. Suitable for fish, shellfish and wildlife propagation and survival.
SD	Suitable for fish, shellfish and wildlife survival. This classification may be given to those waters that cannot meet the requirements for primary and secondary contact recreation and fish propagation for reasons of natural or man-made conditions.

Source: 6NYCRR Parts 700-705, Water Quality Regulations for Surface Waters and Groundwaters, effective September 1, 1991.
Note: Examples of Primary contact recreation include swimming, diving, and surfing. Examples of Secondary contact recreation include fishing and boating.

Appendix B

Surface Water Quality Evaluation Criteria and Sample Data

SURFACE WATER QUALITY EVALUATION CRITERIA

Analyte	Established Threshold	Regulating Authority
Clarity – Secchi Disc	Visibility is less than 6.6 feet	NYS Section 305(b) CALM Methodology – Public Bathing Use Assessment Criteria
Total Coliform – class SA waters	70 colonies/100 ml (single sample) 330 colonies/100ml (geometric mean)	6 NYCRR §47.3
Fecal Coliform – class SA waters	14 colonies/100 ml (single sample) 49 colonies/100 ml (geometric mean of samples)	6 NYCRR §47.3
Total Coliform – class B, C and SC waters	2,400 colonies/100 ml (monthly median) 5,000 colonies/100 ml (20% of samples from a minimum of 5 samples)	6 NYCRR §703.4
Fecal Coliform – class B, C and SC waters	200 colonies/100ml (monthly geometric mean)	6 NYCRR §703.4
Chlorophyl-α*	>10-15 µg/L	NYS Section 305(b) CALM Methodology – Recreation Use Assessment Criteria
Dissolved Oxygen – SA, SB and SC waters	<4.8 mg/L	6 NYCRR §703.3
Dissolved Oxygen – C (TS) waters	<7.0 mg/L	6 NYCRR §703.3
Dissolved Oxygen – B (T) waters	<6.0 mg/L	6 NYCRR §703.3
Total Nitrogen	>0.45 mg/L	Peconic Estuary Program
Ammonia – SA waters	>0.035 mg/L	6 NYCRR §703.5
Phosphorus	<20 µg/L	NYS Section 305(b) CALM Methodology – Recreation Use Assessment Criteria in Lakes
Brown Tide (*Aureococcus anopagefferens*) cell counts	<35,000 cells/ml – No impacts 35,000 – 200,000 cells/ml – reduction in growth and feeding of clams, mussels and scallops >200,000 – Significant impacts to shellfish and eelgrass	Gastrich & Wazniak, 2002

*Note: The CALM assessment criteria is currently being revised, which includes a revision in the threshold for chlorophyll-α. The value under consideration ranges from 10 to 15 µg/L. The conservative value of 10 µg/L is utilized for analysis purposes in this report.

GREAT SOUTH BAY/PATCHOGUE RIVER: SURFACE WATER QUALITY RESULTS

Station Location	Station Number	Data Collection Data Range	Total Time Period of Data Collection (Years)	Total Number of Samples Collected	Secchi Disc Clarity			Total Coliform			Fecal Coliform		
					Count of Samples Below Clarity Threshold (<6.6 feet)	Number of Samples	Percent of Samples Below Clarity Threshold	Count of Samples Above 70 colonies per 100 ml	Number of Samples	Percent of Samples Above 70 colonies per 100 ml	Count of Samples Above 14 colonies per 100 ml	Number of Samples	Percent of Samples Above 49 colonies per 100 ml
Great South Bay – Patchogue River	090130	09/14/1976 – 12/19/2013	37.29	771	420	437	96.11%	75	250	30.00%	114	187	60.96%

Chlorophyl-α			Dissolved Oxygen			Total Nitrogen (and Total Kjeldahl Nitrogen)*			Ammonia		
Count of Samples above 10 µg/L	Number of Samples	Percent of Samples above 10 µg/L	Count of Samples <4.8 mg/L	Number of Samples	Percent of Samples <4.8 mg/L	Count of Samples Above 0.45 mg/L	Number of Samples	Percent of Samples Above 0.45 mg/L	Count of Samples above 35 µg/L	Number of Samples	Percent of Samples above 35 µg/L
239	350	68.29%	9	679	1.33%	318	419	75.89%	80	276	28.99%

Aureococcus anopagefferens (brown tide) cells				
Count of Samples between 35,000 and 200,000 cells	Count of Samples greater than 200,000 cells	Number of Samples	Percent of Samples between 35,000 and 200,000 cells	Percent of Samples with greater than 200,000 cells
35	37	221	15.84%	16.74%

*TKN was collected up until 2000, when TN was collected and TKN was no longer utilize

West Lake DEC RIBS Sampling Data

OrganizationIdentifier	OrganizationFormalName	ActivityIdentifier	ActivityTypeCode	ActivityMediaName	ActivityMediaSubdivisionName	ActivityStartDate	ActivityStartTime/Time	ActivityStartTime/TimeZoneCode
21NYDECA_WQX	DOW - RIBS	21NYDECA_WQX-13LIS019	Sample-Routine	Water	Surface Water	8/27/2013	4:45:00	EDT
21NYDECA_WQX	DOW - RIBS	21NYDECA_WQX-13LIS019	Sample-Routine	Water	Surface Water	8/27/2013	4:45:00	EDT
21NYDECA_WQX	DOW - RIBS	21NYDECA_WQX-13LIS019	Sample-Routine	Water	Surface Water	8/27/2013	4:45:00	EDT
21NYDECA_WQX	DOW - RIBS	21NYDECA_WQX-13LIS019	Sample-Routine	Water	Surface Water	8/27/2013	4:45:00	EDT
21NYDECA_WQX	DOW - RIBS	21NYDECA_WQX-13LIS019	Sample-Routine	Water	Surface Water	8/27/2013	4:45:00	EDT
21NYDECA_WQX	DOW - RIBS	21NYDECA_WQX-13LIS019	Sample-Routine	Water	Surface Water	8/27/2013	4:45:00	EDT
21NYDECA_WQX	DOW - RIBS	21NYDECA_WQX-13LIS019	Sample-Routine	Water	Surface Water	8/27/2013	4:45:00	EDT
21NYDECA_WQX	DOW - RIBS	21NYDECA_WQX-13LIS019	Sample-Routine	Water	Surface Water	8/27/2013	4:45:00	EDT
21NYDECA_WQX	DOW - RIBS	21NYDECA_WQX-13LIS019	Sample-Routine	Water	Surface Water	8/27/2013	4:45:00	EDT
21NYDECA_WQX	DOW - RIBS	21NYDECA_WQX-13LIS019	Sample-Routine	Water	Surface Water	8/27/2013	4:45:00	EDT
21NYDECA_WQX	DOW - RIBS	21NYDECA_WQX-13LIS019	Sample-Routine	Water	Surface Water	8/27/2013	4:45:00	EDT
21NYDECA_WQX	DOW - RIBS	21NYDECA_WQX-13LIS019	Sample-Routine	Water	Surface Water	8/27/2013	4:45:00	EDT
21NYDECA_WQX	DOW - RIBS	21NYDECA_WQX-13LIS019	Sample-Routine	Water	Surface Water	8/27/2013	4:45:00	EDT

West Lake DEC RIBS Sampling Data

ActivityIdentifier	ActivityEndDate	ActivityEndTime/Time	ActivityEndTime/TimeZoneCode	ActivityDepthHeightMeasure/MeasureValue	ActivityDepthHeightMeasure/MeasureUnitCode	ActivityDepthAltitudeReferencePointText
21NYDECA_WQX-13LIS019				0.5	m	
21NYDECA_WQX-13LIS019				0.5	m	
21NYDECA_WQX-13LIS019				0.5	m	
21NYDECA_WQX-13LIS019				0.5	m	
21NYDECA_WQX-13LIS019				0.5	m	
21NYDECA_WQX-13LIS019				0.5	m	
21NYDECA_WQX-13LIS019				0.5	m	
21NYDECA_WQX-13LIS019				0.5	m	
21NYDECA_WQX-13LIS019				0.5	m	
21NYDECA_WQX-13LIS019				0.5	m	
21NYDECA_WQX-13LIS019				0.5	m	
21NYDECA_WQX-13LIS019				0.5	m	
21NYDECA_WQX-13LIS019				0.5	m	

West Lake DEC RIBS Sampling Data

ActivityIdentifier	ActivityTopDepthHeightMeasure/MeasureValue	ActivityTopDepthHeightMeasure/MeasureUnitCode	ActivityBottomDepthHeightMeasure/MeasureValue	ActivityBottomDepthHeightMeasure/MeasureUnitCode
21NYDECA_WQX-13LIS019				
21NYDECA_WQX-13LIS019				
21NYDECA_WQX-13LIS019				
21NYDECA_WQX-13LIS019				
21NYDECA_WQX-13LIS019				
21NYDECA_WQX-13LIS019				
21NYDECA_WQX-13LIS019				
21NYDECA_WQX-13LIS019				
21NYDECA_WQX-13LIS019				
21NYDECA_WQX-13LIS019				
21NYDECA_WQX-13LIS019				
21NYDECA_WQX-13LIS019				
21NYDECA_WQX-13LIS019				

West Lake DEC RIBS Sampling Data

ActivityIdentifier	ProjectIdentifier	ActivityConductingOrganizationText	MonitoringLocationIdentifier	ActivityCommentText	SampleAquifer	HydrologicCondition	HydrologicEvent
21NYDECA_WQX-13LIS019	LCI		21NYDECA_WQX-WESTL_140890_O				
21NYDECA_WQX-13LIS019	LCI		21NYDECA_WQX-WESTL_140890_O				
21NYDECA_WQX-13LIS019	LCI		21NYDECA_WQX-WESTL_140890_O				
21NYDECA_WQX-13LIS019	LCI		21NYDECA_WQX-WESTL_140890_O				
21NYDECA_WQX-13LIS019	LCI		21NYDECA_WQX-WESTL_140890_O				
21NYDECA_WQX-13LIS019	LCI		21NYDECA_WQX-WESTL_140890_O				
21NYDECA_WQX-13LIS019	LCI		21NYDECA_WQX-WESTL_140890_O				
21NYDECA_WQX-13LIS019	LCI		21NYDECA_WQX-WESTL_140890_O				
21NYDECA_WQX-13LIS019	LCI		21NYDECA_WQX-WESTL_140890_O				
21NYDECA_WQX-13LIS019	LCI		21NYDECA_WQX-WESTL_140890_O				
21NYDECA_WQX-13LIS019	LCI		21NYDECA_WQX-WESTL_140890_O				
21NYDECA_WQX-13LIS019	LCI		21NYDECA_WQX-WESTL_140890_O				
21NYDECA_WQX-13LIS019	LCI		21NYDECA_WQX-WESTL_140890_O				

West Lake DEC RIBS Sampling Data

ActivityIdentifier	SampleCollectionMethod/MethodIdentifier	SampleCollectionMethod/MethodIdentifierContext	SampleCollectionMethod/MethodName	SampleCollectionEquipmentName	ResultDetectionConditionText
21NYDECA_WQX-13LIS019	NYSDEC~SOP203	NYSDEC~SOP203	NYSDEC~SOP203	Water Bottle	
21NYDECA_WQX-13LIS019	NYSDEC~SOP203	NYSDEC~SOP203	NYSDEC~SOP203	Water Bottle	
21NYDECA_WQX-13LIS019	NYSDEC~SOP203	NYSDEC~SOP203	NYSDEC~SOP203	Water Bottle	
21NYDECA_WQX-13LIS019	NYSDEC~SOP203	NYSDEC~SOP203	NYSDEC~SOP203	Water Bottle	
21NYDECA_WQX-13LIS019	NYSDEC~SOP203	NYSDEC~SOP203	NYSDEC~SOP203	Water Bottle	
21NYDECA_WQX-13LIS019	NYSDEC~SOP203	NYSDEC~SOP203	NYSDEC~SOP203	Water Bottle	
21NYDECA_WQX-13LIS019	NYSDEC~SOP203	NYSDEC~SOP203	NYSDEC~SOP203	Water Bottle	
21NYDECA_WQX-13LIS019	NYSDEC~SOP203	NYSDEC~SOP203	NYSDEC~SOP203	Water Bottle	
21NYDECA_WQX-13LIS019	NYSDEC~SOP203	NYSDEC~SOP203	NYSDEC~SOP203	Water Bottle	
21NYDECA_WQX-13LIS019	NYSDEC~SOP203	NYSDEC~SOP203	NYSDEC~SOP203	Water Bottle	
21NYDECA_WQX-13LIS019	NYSDEC~SOP203	NYSDEC~SOP203	NYSDEC~SOP203	Water Bottle	
21NYDECA_WQX-13LIS019	NYSDEC~SOP203	NYSDEC~SOP203	NYSDEC~SOP203	Water Bottle	
21NYDECA_WQX-13LIS019	NYSDEC~SOP203	NYSDEC~SOP203	NYSDEC~SOP203	Water Bottle	

West Lake DEC RIBS Sampling Data

ActivityIdentifier	CharacteristicName	ResultSampleFractionText	ResultMeasureValue	ResultMeasure/MeasureUnitCode	MeasureQualifierCode	ResultStatusIdentifier	StatisticalBaseCode
21NYDECA_WQX-13LIS019	Chlorophyll a	Total	8.93	ug/l		Final	
21NYDECA_WQX-13LIS019	Silica	Dissolved	10.6	mg/l		Final	
21NYDECA_WQX-13LIS019	Chloride	Total	60.1	mg/l		Final	
21NYDECA_WQX-13LIS019	Phosphorus	Dissolved	0.0046	mg/l		Final	
21NYDECA_WQX-13LIS019	Phosphorus	Total	0.0129	mg/l		Final	
21NYDECA_WQX-13LIS019	Calcium	Total	10600	ug/l		Final	
21NYDECA_WQX-13LIS019	Inorganic nitrogen (nitrate and nitrite)	Total	1.76	mg/l		Final	
21NYDECA_WQX-13LIS019	Kjeldahl nitrogen	Total	0.28	mg/l		Final	
21NYDECA_WQX-13LIS019	True color	Total	16	PCU		Final	
21NYDECA_WQX-13LIS019	Alkalinity, total	Total	21.5	mg/l		Final	
21NYDECA_WQX-13LIS019	Ammonia-nitrogen	Total	0.01	mg/l	U	Final	
21NYDECA_WQX-13LIS019	Organic carbon	Total	1.9	mg/l		Final	
21NYDECA_WQX-13LIS019	Depth, Secchi disk depth		-1	m		Final	

West Lake DEC RIBS Sampling Data

ActivityIdentifier	ResultValueTypeName	ResultWeightBasisText	ResultTimeBasisText	ResultTemperatureBasisText	ResultParticleSizeBasisText	PrecisionValue	ResultCommentText	USGSPCode
21NYDECA_WQX-13LIS019	Actual							
21NYDECA_WQX-13LIS019	Actual							
21NYDECA_WQX-13LIS019	Actual							
21NYDECA_WQX-13LIS019	Actual							
21NYDECA_WQX-13LIS019	Actual							
21NYDECA_WQX-13LIS019	Actual							
21NYDECA_WQX-13LIS019	Actual							
21NYDECA_WQX-13LIS019	Actual							
21NYDECA_WQX-13LIS019	Actual							
21NYDECA_WQX-13LIS019	Actual							
21NYDECA_WQX-13LIS019	Actual							
21NYDECA_WQX-13LIS019	Actual							
21NYDECA_WQX-13LIS019	Actual							

West Lake DEC RIBS Sampling Data

ActivityIdentifier	ResultDepthHeightMeasure/MeasureValue	ResultDepthHeightMeasure/MeasureUnitCode	ResultDepthAltitudeReferencePointText	SubjectTaxonomicName	SampleTissueAnatomyName
21NYDECA_WQX-13LIS019					
21NYDECA_WQX-13LIS019					
21NYDECA_WQX-13LIS019					
21NYDECA_WQX-13LIS019					
21NYDECA_WQX-13LIS019					
21NYDECA_WQX-13LIS019					
21NYDECA_WQX-13LIS019					
21NYDECA_WQX-13LIS019					
21NYDECA_WQX-13LIS019					
21NYDECA_WQX-13LIS019					
21NYDECA_WQX-13LIS019					
21NYDECA_WQX-13LIS019					
21NYDECA_WQX-13LIS019					

West Lake DEC RIBS Sampling Data

ActivityIdentifier	ResultAnalyticalMethod/MethodIdentifier	ResultAnalyticalMethod/MethodIdentifierContext	ResultAnalyticalMethod/MethodName	MethodDescriptionText	LaboratoryName	AnalysisStartDate
21NYDECA_WQX-13LIS019	10200-H	APHA			CASROCH	9/17/2013
21NYDECA_WQX-13LIS019	I-2700-85	USDOI/USGS			CASROCH	9/17/2013
21NYDECA_WQX-13LIS019	300	USEPA			CASROCH	9/4/2013
21NYDECA_WQX-13LIS019	365.1	USEPA			CASROCH	9/5/2013
21NYDECA_WQX-13LIS019	365.1	USEPA			CASROCH	9/12/2013
21NYDECA_WQX-13LIS019	200.7	USEPA			CASROCH	9/9/2013
21NYDECA_WQX-13LIS019	353.2	USEPA			CASROCH	9/18/2013
21NYDECA_WQX-13LIS019	351.2	USEPA			CASROCH	9/13/2013
21NYDECA_WQX-13LIS019	2120-B	APHA			CASROCH	8/28/2013
21NYDECA_WQX-13LIS019	2320-B	APHA			CASROCH	9/5/2013
21NYDECA_WQX-13LIS019	350.1	USEPA			CASROCH	9/16/2013
21NYDECA_WQX-13LIS019	5310-C	APHA			CASROCH	9/19/2013
21NYDECA_WQX-13LIS019	SECCHI	21NYDECA_WQX				8/27/2013

ActivityIdentifier	ResultLaboratoryCommentText	DetectionQuantitationLimitTypeName	DetectionQuantitationLimitMeasure/MeasureValue	DetectionQuantitationLimitMeasure/MeasureUnitCode	PreparationStartDate
21NYDECA_WQX-13LIS019					
21NYDECA_WQX-13LIS019					
21NYDECA_WQX-13LIS019					
21NYDECA_WQX-13LIS019					
21NYDECA_WQX-13LIS019					
21NYDECA_WQX-13LIS019					
21NYDECA_WQX-13LIS019					
21NYDECA_WQX-13LIS019					
21NYDECA_WQX-13LIS019					
21NYDECA_WQX-13LIS019					
21NYDECA_WQX-13LIS019		Method Detection Level	0.005	mg/l	
21NYDECA_WQX-13LIS019					
21NYDECA_WQX-13LIS019					

Harmful Algal Bloom Event Database Results

event Name	event Year	region	original GridCode	monitoring Programme	programme Name	occurred Before	occurred Before Text	water Discoloration	high Phyto	seafood Toxin
"US-98-029"	1998	New York		0		1	recurring bloom since 1985	1	1	1
"US-95-004"	1995	New York.	US-08	1		1	1985; 1986 >1,000,000 cells/ml. 1988: 1,000 - 500,000 cells/ml (June-Aug). 1989: < 25,000 cells/ml (April-Sept). 1990: < 10,000 cells/ml (May-Dec). 1991: < 10,000 cells/ml (Jan-June). 1992: 1,000- 1000,000 cells/ml (Jan-Dec). 1993: < 1,000-260,000 cells/ml (Jan-Mar, Aug-Nov). 1994: up to 1,000,000 cells/ml (June-July). Up to 12,000 cells/ml (Aug-Oct).	0	1	0
"US-98-005"	1998	New York.	US-08	1		1	1985, 1986: >1,000,000 cells/ml.	1	0	0
"US-93-006"	1993	New York.	US-08	1		1	1985, 1986: > 1,000,000 cells/ml 1988: 10(3) - 500,000 cells/ml (June - August) 1989: < 25,000 cells/ml 1990: <10,000 cells/ml (January - June) 1991: <10,000 cells/ml (January - June) 1992: 1,000 - 1,000,000 cells/ml (January - December).	1	0	0
"US-92-011"	1992	New York.	US-08	1		1	1985, 1986: >1,000,000 cells/ml 1988: 10(3) - 500,000 cells/ml (June-August) 1989: 25,000 cells/ml (April - September) 1990: 10,000 cells/ml (May - December) 1991: 10,000 cells/ml (January-June).	1	0	0
"US-09-014"	2009	South Shore of Long Island		1	Suffolk County Dept. of Health Services for the South Shore Estuary Reserve Program	1	1986-2002	1	1	0
"US-07-013"	2007	New York		1	Routine water quality monitoring by the SCDHS for the South Shore Estuary Reserve Program	1	recurring bloom from 1986 to 2002	0	1	0

Harmful Algal Bloom Event Database Results

event Name	event Year	mass Mortal	foam Mucil	other Effect	other Effect Text	days	months	location Text	latitude	longitude	additional Location Info	event Date	initial Date	final Date	quarantine Start Date	quarantine End Date	additional Date Info	causative Known	pigment Analysis Info	additional Algae Info
"US-98-029"	1998	0	0	0		0	0	Great South Bay			bloom was present throughout much of the bay with highest concentr						late April t	1		
"US-95-004"	1995	0	0	0		0	8	Great South Bay, New York.			The bloom	7/5/1995					January-Au	1		
"US-98-005"	1998	0	0	0		0	3	Great South Bay.			The bloom was present throughout much of the bay with highest conc						From late A	1		
"US-93-006"	1993	0	0	0		0	7	Great South Bay.			The bloom was present throughout the bay from January through Mar						January th	1		
"US-92-011"	1992	0	0	0		0	12	Great South Bay.			The bloom was present throughout the bay with highest concentratio						January th	1		
"US-09-014"	2009	0	0	0		0	0	Suffolk County, New York			South SHore Estuary ,		########					1		
"US-07-013"	2007	0	0	0		0	0	Suffolk County, South Shore Estu			Great South Bay, South Shore of Long Island. Bayshore Cove.						June to Jul	1	32.9	

Harmful Algal Bloom Event Database Results

event Name	event Year	toxicity Detected	toxicity Range	humans Affected	fish Affected	natural Fish Affected	aquaculture Fish Affected	planktonic Affected	benthic Affected	shellfish Affected	birds Affected	other Terrestrial Affected	aquatic Mammals Affected	seaweed Affected	effects Comments	unexplained Toxicity	toxicity Comments	transvectors	event Biblio
"US-98-029"	1998	0		0	0	0	0	0	0	1	0	0	0	1		NULL			
"US-95-004"	1995	0		0	0	0	0	0	0	0	0	0	0	0		0			
"US-98-005"	1998	0		0	0	0	0	0	0	1	0	0	0	0		0			
"US-93-006"	1993	0		0	0	0	0	0	0	0	0	0	0	0	Its effects ar	0			
"US-92-011"	1992	0		0	0	0	0	0	0	1	0	0	0	0	Aesthetic (b	0			
"US-09-014"	2009	0		0	0	0	0	0	0	0	0	0	0	0		0			
"US-07-013"	2007	0		0	0	0	0	0	0	0	0	0	0	0		0			

Harmful Algal Bloom Event Database Results

event Name	event Year	syndrome Text	active	created_at	updated_at	checked_at	country Name	syndrome Name	causative Species Name	cell sPer Litre	comments	causative Species Name	cells Per Litre	comments
"US-98-029"	1998						UNITED STATES							
"US-95-004"	1995						UNITED STATES		Aureococcus anophagefferens	298	280,000,00			
"US-98-005"	1998						UNITED ST	OTHER	Aureococcus anophagefferens	298	>200,000,0			
"US-93-006"	1993						UNITED STATES		Aureococcus anophagefferens	298	< 1,000,00	Aureococc	298	<1,000,000
"US-92-011"	1992						UNITED STATES		Aureococcus anophagefferens	298	>1,000,000			
"US-09-014"	2009						UNITED STATES		Aureococcus anophagefferens	298	163,805			
"US-07-013"	2007						UNITED STATES		Aureococcus anophagefferens	298	117,064			

SCDHS Sample Station 090130 Results

Date	Time	BayStatior	Diurnal	Location	Replicate	Depth (ft)	Secchi (ft)	Temp (C)	D.O. (mg/l)	Sal (psu)	Cond (uS/cm)	pH	T. Coliform (MPN/100 ml)	F. Coliform (MPN/100 ml)	NH3 (mg/l)	NO2 (mg/l)	NO3 (mg/l)	NOx (mg/l)	Urea (mg/l)	TKN (mg/l)	DKN (mg/l)
9/14/1976	9:49	090130				6.0	1.0	21.1	8.8	25.8			23	9	0.015	0.005	0.021			1.60	0.50
9/17/1976	17:46	090130				8.0	1.0	22.5	7.4	26.4			9	< 3	0.028	0.004	0.011			1.20	0.50
9/18/1976	7:35	090130	A			8.0	1.0	21.7	5.4	26.0			430	4							
9/18/1976	17:15	090130	P			10.0	2.5	22.7	7.3	26.0			43	4	0.019	0.005	< 0.002			1.30	0.50
9/19/1976	7:45	090130				10.0	2.0	21.8	4.3	25.8			4	< 3							
9/21/1976	10:15	090130				10.0	1.0	21.8	7.2	26.2			23	4							
9/23/1976	10:04	090130				10.0	1.5	19.6	7.1	26.0			43	< 3	0.016	0.005	< 0.002			1.00	0.50
3/7/1977	10:49	090130				9.0	4.0	5.3		25.5			10	< 10	0.017	0.004	0.011			0.42	
4/13/1977	9:53	090130				10.0	4.0	11.2		25.3			< 10	< 10	0.027	0.003	0.003			0.63	0.63
4/25/1977	10:35	090130				8.0	4.0	12.2		26.2			< 10	< 10	0.017	0.003	0.009			0.48	0.21
6/27/1977	10:45	090130				10.0	2.0	22.6		26.5			10	10	0.010	0.003	< 0.002				
7/11/1977	11:06	090130				10.0	1.5			27.2			< 10	< 10	0.025	0.003	0.004				
7/27/1977	10:49	090130				6.0		22.3		27.5					0.017	0.005	0.002			1.30	0.62
8/9/1977	12:00	090130				9.0		27.7		27.7					0.010	0.003	0.002			1.11	0.46
8/23/1977	11:11	090130				9.0		22.8		26.9					0.013	0.003	0.002			0.62	
9/7/1977	11:47	090130				10.0	3.5	24.2		27.3					0.003	0.002	0.002			0.81	0.17
9/19/1977	11:57	090130				9.0	2.0	21.7		27.9					0.006	0.003	0.002			0.78	0.57
10/4/1977	12:30	090130				8.0	1.5	16.4		27.9			380	10	0.007	0.003	0.002			1.68	0.21
10/24/1977	10:55	090130				10.0	3.0	11.4		26.8			10	10	0.008	0.002	0.002			0.74	0.36
11/9/1977	12:32	090130				10.0	2.0	13.7		26.1			720	50	0.060	0.004	0.003			0.73	0.27
11/21/1977	11:20	090130				10.0	3.0	7.4		26.9			10	10	0.006	0.008	0.049			0.63	0.28
12/15/1977	12:42	090130				7.0	2.5	1.7	11.6	24.8			110	10	0.050	0.005	0.074			1.08	0.50
3/29/1978	12:14	090130					6.5	8.0		22.8					0.011	0.005	0.011			0.22	0.20
4/10/1978	11:45	090130				9.0	7.0	8.8		23.2					0.029	0.004	0.038			0.46	0.27
4/24/1978	11:30	090130				9.0	4.5	11.7		24.5					0.018	0.002	0.004			0.46	0.39
5/22/1978	12:20	090130					5.0	17.6		25.0					0.008	0.002	0.003			0.41	0.31
6/6/1978	12:50	090130				8.0	7.0	21.8		23.3					0.006	0.001	< 0.002			0.52	0.41
6/21/1978	11:00	090130				7.0	4.0	22.0		24.2					0.011	0.002	< 0.002			0.41	< 0.1
7/5/1978	14:00	090130				9.0	3.0	19.7		24.9					0.011	0.002	< 0.002			0.74	0.66
7/17/1978	11:31	090130					3.0	22.3		24.1					0.022	0.002	< 0.002			0.99	0.50
8/1/1978	13:15	090130				11.0	2.0	22.0		24.5					0.007	0.002	< 0.002			1.20	0.53
8/14/1978	11:40	090130				6.0	3.0	25.6		23.5					0.007	0.003	< 0.002			1.05	0.60
8/31/1978	11:30	090130				7.0	2.5	24.1		24.4					0.010	0.003	< 0.002			1.18	0.49
10/12/1978	13:25	090130				10.0	3.0	15.7		24.5					0.013	0.002	< 0.002			0.57	0.35
11/15/1978	12:04	090130				10.0	2.0	11.3		25.5					0.013	0.002	< 0.002			0.66	0.50
4/18/1979	11:50	090130					5.0	9.0		23.1					0.024	0.007	0.074			0.24	
5/2/1979	10:45	090130				9.0	5.0	14.3		22.2			10	< 10	0.013	0.003	0.014			0.46	0.15
5/16/1979	11:14	090130					6.0	18.1		22.0			20	< 10	0.066	0.004	0.031			0.36	0.27
5/28/1979	10:43	090130					2.0	17.6		21.8			50	10	0.014	0.002	0.012			1.20	0.78
6/21/1979	9:30	090130						21.4		21.8			40	< 10	0.007	0.002	< 0.002			0.55	0.27
7/11/1979	11:25	090130						22.6		22.8			< 10	< 10	0.007	0.002	< 0.002			0.90	0.29
8/1/1979	13:20	090130						29.4		22.6			40	40	0.006	0.003	< 0.002			0.84	0.59
8/22/1979	11:20	090130						22.3		23.3			130		0.018	0.015	0.003			0.53	
9/18/1979	10:30	090130						21.2		24.5			10	< 10	0.102	0.003	0.015			0.48	0.36
9/25/1979	11:52	090130						16.9		25.8			10	< 10	0.039	0.005	0.035			0.55	0.39
10/31/1979	12:52	090130						11.4					10	< 10	0.017	0.011	0.109			0.91	0.43
11/14/1979	11:01	090130								24.2			20	< 10	0.132	0.011	0.101			0.66	0.38
6/4/1980	11:50	090130								24.5				10	0.008	0.002	0.005			0.80	0.70
6/18/1980	11:07	090130						20.4		24.1			< 10	< 10	0.029	0.002	0.008			0.70	0.70
3/9/1981	12:00	090130						3.4		26.7			4	< 3	0.021	0.005	0.064			0.20	0.41
4/1/1981	12:47	090130						10.4		27.0			< 3	< 3	0.020	0.003	0.045				

SCDHS Sample Station 090130 Results

Date	Time	BayStatior	Diurnal	Location	Replicate	Depth (ft)	Secchi (ft)	Temp (C)	D.O. (mg/l)	Sal (psu)	Cond (uS/cm)	pH	T. Coliform (MPN/100 ml)	F. Coliform (MPN/100 ml)	NH3 (mg/l)	NO2 (mg/l)	NO3 (mg/l)	NOx (mg/l)	Urea (mg/l)	TKN (mg/l)	DKN (mg/l)
4/8/1981	11:09	090130					2.5	10.0		27.0			4	4	0.011	0.002	0.004			0.50	0.41
4/22/1981	12:22	090130					5.0	9.5		27.6					0.003	0.001	< 0.001			0.20	
5/6/1981	12:11	090130					7.5	15.7		30.5			4	< 3	0.025	0.003	0.003				
7/6/1981	10:00	090130					3.0	24.6		26.6					0.011	0.003	0.024			0.80	0.50
8/12/1981	13:40	090130					2.0	26.0		28.6					0.011	0.003	< 0.002			0.90	0.39
9/14/1981	13:43	090130					4.0			29.2					0.004	0.003	< 0.002			1.20	0.80
9/28/1981	11:20	090130					2.0	17.7							0.004	0.002	< 0.002			0.71	0.70
2/23/1982	12:57	090130				9.0	5.0	2.1		24.5					0.055	0.008	0.235			0.50	0.29
3/30/1982	10:32	090130						6.1		23.9					0.008	0.006	0.099			0.41	0.20
8/15/1983	11:22	090130						22.0		22.6			40	40	0.008	0.004	< 0.002			1.11	0.50
6/19/1984	13:20	090130						23.1		20.3			430	70	0.007	0.002	< 0.002			0.90	0.29
6/26/1984	11:15	090130						22.8		20.2			240	15	0.021	0.002	0.002			1.20	0.55
7/3/1984	10:45	090130						24.0					< 30	< 30	0.008	0.002	0.002			0.90	0.80
8/14/1984	12:10	090130						26.0		20.7			< 30	< 30	0.010	0.002	< 0.002			0.80	0.20
9/24/1984	14:00	090130						21.9		20.1			930	< 30	0.013	0.003	0.133			1.20	0.41
10/9/1984	14:10	090130						15.0		22.4			9	< 3	0.006	0.002	0.014				
11/27/1984	10:30	090130						4.8		23.6			< 3	< 3	0.032	0.003	0.098			0.60	
5/6/1985	10:49	090130						14.3		26.5			15	< 3	0.010	0.003	0.010				
6/19/1985	14:05	090130					1.0	22.1		25.5			9	4	0.010	0.004	0.010			1.20	0.50
8/13/1985	10:55	090130					1.5	26.1		26.2			< 3	< 3	0.010	0.004	< 0.01			1.30	
9/3/1985	14:40	090130					2.0	22.3		25.6			23	23	0.010	0.004	0.020			1.69	
11/13/1985	9:40	090130					2.0	12.0		28.5			43	23	0.020	0.003	0.010			0.90	0.41
11/19/1985	13:48	090130					2.0	11.0					460	240	< 0.01	0.003	0.020			0.80	0.29
12/9/1985	13:10	090130					2.0	3.6		26.3					0.041	0.006	0.140			0.41	0.20
12/10/1985	11:58	090130					2.0	4.0		26.4					0.060	0.003	0.181			0.80	0.29
7/9/1986	14:20	090130					2.0	25.6		28.2					< 0.01	0.003	0.050			1.11	0.29
3/25/1987	9:50	090130					5.0	8.3	9.6	24.9			3	< 3	< 0.01	0.004	0.050			0.60	0.50
6/23/1988	11:10	090130					1.5	24.4	5.9	25.8			4	2	0.020			0.014		0.53	< 0.06
6/28/1988	11:35	090130					2.0	22.3	7.5	25.8			17	7	0.032			0.023		0.34	< 0.06
7/7/1988	12:55	090130					2.0	24.5		26.2			< 2	< 2	0.032			0.013		0.85	0.32
7/25/1988	12:30	090130					2.0	25.8	6.6	25.3			130	50							
8/1/1988	9:45	090130					2.5	27.5	5.4				11	4							
8/10/1988	14:50	090130					2.0	29.3	6.9	27.6											
9/7/1988	9:20	090130					3.0	20.3	6.4	27.8			17	8							
9/14/1988	10:05	090130					2.5	20.3	7.1	27.2			1,600	900							
9/21/1988	9:20	090130					1.5	20.8	7.2	27.1			< 2	< 2	0.026			0.013			
10/5/1988	9:30	090130					2.0	16.7	7.7	27.2			240	50							
11/9/1988	11:35	090130					4.0	9.8		27.6			23	13	0.029			0.026			
12/1/1988	9:35	090130					3.0	6.8	9.5	26.2			50	50	0.064			0.076			
1/30/1989	9:50	090130					4.5	3.2	13.1	26.4			80	4	< 0.005			0.080		0.36	0.36
4/10/1989	9:13	090130					3.0	9.1	9.9	24.1			30	4	0.027			0.030		< 0.05	< 0.05
5/3/1989	9:40	090130					2.5	13.7	8.4	23.7			23	4	0.043			0.006		0.60	0.20
5/22/1989	9:03	090130					6.0	19.8	6.5	21.9			80	30	0.041			0.052		0.20	< 0.05
6/12/1989	9:25	090130					3.5	20.4		19.7			80	23	0.025			0.055		< 0.05	< 0.05
7/10/1989	9:50	090130					4.0	25.8	7.2	19.3			30	8	0.024			0.012		0.60	< 0.05
7/24/1989	9:12	090130					2.5	25.0	7.5	18.1					0.016			0.010		< 0.05	< 0.05
8/8/1989	8:31	090130					2.0	25.0	5.8	18.9					0.028			0.017		0.87	0.37
8/31/1989	9:11	090130					3.0	23.6	6.7	18.0			170	14	0.015			0.013		0.70	0.40
9/12/1989	10:47	090130					2.5	25.0	7.1	19.2			240	8	0.039			0.014		0.60	0.20
9/27/1989	9:38	090130					2.5	18.1	7.5	20.2			30	13	0.021			0.010		0.70	0.30
10/12/1989	8:24	090130					2.5	13.8	8.2	19.7			30	30	0.020			0.094		1.50	0.77

SCDHS Sample Station 090130 Results

Date	Time	BayStatior	Diurnal	Location	Replicate	Depth (ft)	Secchi (ft)	Temp (C)	D.O. (mg/l)	Sal (psu)	Cond (uS/cm)	pH	T. Coliform (MPN/100 ml)	F. Coliform (MPN/100 ml)	NH3 (mg/l)	NO2 (mg/l)	NO3 (mg/l)	NOx (mg/l)	Urea (mg/l)	TKN (mg/l)	DKN (mg/l)
11/8/1989	10:24	090130					2.5	12.3	9.2	19.1			30	23	0.029			0.110		0.89	0.29
11/27/1989	9:31	090130					2.0	2.4	11.1	21.6			30	13	0.113			0.146		0.56	0.34
3/19/1990	8:38	090130					3.0	9.7	8.6	23.1			50	23	< 0.005			0.169		0.15	< 0.05
4/9/1990	9:29	090130					3.5	7.0	9.8	24.1			2	< 2	0.007			0.048		0.24	< 0.05
5/1/1990	8:29	090130					4.0	14.4	8.1	23.6			130	50	0.010			0.067		0.72	0.44
5/15/1990	9:21	090130					4.0	16.0	8.7				80	20	0.010			0.027		0.50	0.33
6/13/1990	9:13	090130					4.0	19.5	7.5	21.2					0.015			0.080			
7/18/1990	12:12	090130					2.0	25.4	7.2	21.8			8	8	0.016			0.018		1.40	0.81
8/8/1990	7:36	090130					2.0	24.2	5.6	21.9			300	130	0.025			0.066		1.37	0.84
10/11/1990	9:30	090130					2.0	20.6	7.1	22.2			8	< 2	0.031			0.022		1.38	0.63
12/12/1990	9:11	090130					3.5	3.3	13.4	25.6			80	80	< 0.005			0.058		0.36	0.39
1/15/1991	10:23	090130					3.0	0.7	12.2	23.0			13	2	0.054			0.208		0.47	0.31
3/18/1991	9:04	090130					3.5	4.9	11.6	25.2			2	2	0.017			0.041		0.42	0.26
4/8/1991	9:21	090130					4.0	12.9	9.6	24.4			< 2	< 2	< 0.005			< 0.005		0.35	0.20
5/8/1991	9:42	090130					4.5	15.5	7.9	24.1			< 2	< 2	< 0.005			0.012		0.41	0.26
6/11/1991	10:15	090130					3.0	23.6	7.9	24.3			< 2	< 2	0.106			0.019		0.77	0.33
7/10/1991	7:35	090130					1.5	23.6		24.7											
7/16/1991	7:44	090130					2.0	24.4	10.2	24.2											
8/14/1991	7:50	090130					2.5	24.6		24.7											
10/2/1991	16:08	090130					1.0			22.7											
12/10/1991	10:07	090130					1.5	5.7	10.8	24.8			220	80	0.038			0.091		0.82	0.45
4/8/1992	8:58	090130					2.0	8.2	10.3	26.0			17	13	0.008			0.082		< 0.05	< 0.05
5/11/1992	9:35	090130					3.0	13.3	8.9	26.2			8	< 2				0.007		0.56	0.40
6/17/1992	11:50	090130					1.5	22.0	7.6	25.4					0.010			< 0.005		0.80	0.28
6/25/1992	11:45	090130					2.0	19.2	8.4	25.0											
6/30/1992	11:10	090130					1.5	22.2	7.3	25.5					0.026			0.014		0.98	0.41
7/17/1992	10:49	090130					2.0	23.6	6.1	25.1											
7/30/1992	8:51	090130					2.0	23.6	6.5	24.8			80	50	0.033			0.009		1.13	0.44
8/12/1992	8:47	090130					1.5	24.5	5.6	23.8			130	4	0.142			0.017		1.10	0.69
8/19/1992	9:16	090130					2.0	21.2		24.2			50	17	0.034			0.011		1.00	0.43
8/26/1992	12:23	090130					2.0	26.4	7.2	24.0			4	4	0.093			0.011		1.54	0.61
9/2/1992	9:26	090130					2.0	21.2	7.2	23.9			50	30	0.022			0.008		1.27	0.72
9/10/1992	10:14	090130					2.0		6.8	24.1			< 2	< 2	0.020			0.008		1.40	0.70
10/8/1992	10:21	090130					2.0	13.9	8.0	25.2					0.006			0.016		1.29	0.53
10/15/1992	11:50	090130					1.5	15.7	7.6	24.6			11	4	0.010			< 0.005		1.27	0.62
10/28/1992	10:47	090130					1.5	9.9	9.3	24.4			11	2	< 0.005			< 0.005		1.15	0.60
11/18/1992	10:27	090130					1.5	6.5	9.9	24.6			80	50	0.019			0.023		0.99	0.47
12/7/1992	10:37	090130					1.0	2.6	11.2	24.9			13	13	< 0.005			0.007		1.02	0.38
12/23/1992	11:50	090130					2.0	3.8	11.1	25.4			8	4	0.007			0.080		0.56	0.23
1/14/1993	10:52	090130					1.0	1.7	11.9	25.0			80	80	< 0.005			0.068		0.25	< 0.05
3/2/1993	10:06	090130					3.0	-0.6	12.9	25.6			2	< 2	0.008			0.169		0.39	0.33
3/16/1993	9:57	090130					0.5	-0.4	11.7	26.3			80	23	0.012			0.132		1.22	0.37
4/12/1993	9:29	090130					5.0	10.3	9.4	24.3			30	8	0.008			0.114		0.21	0.15
5/17/1993	10:33	090130					4.0	18.1	7.7	23.6			130	30	< 0.005			0.026		0.49	0.32
6/14/1993	9:37	090130					2.5	22.1	6.5	24.9			30	30	< 0.005			< 0.005		0.50	0.37
8/23/1993	8:52	090130					1.5	23.7	6.1	26.8			8	2	0.023			0.006		0.88	0.47
9/16/1993	9:24	090130					2.0	22.6	6.1	27.0			4	4	< 0.005			0.016		1.10	0.64
10/7/1993	9:23	090130							7.7	27.3			17	8	< 0.005			0.007		1.25	0.60
10/14/1993	8:56	090130					2.0	12.0	8.4	27.3			30	30	< 0.005			0.014		1.09	0.56
11/10/1993	8:49	090130					3.0		9.5	26.0			50	50	0.017			0.079		0.93	0.61
12/9/1993	8:54	090130					4.0	6.2	10.6	24.2			130	30	0.026			0.158		0.67	0.40

SCDHS Sample Station 090130 Results

Date	Time	BayStatior	Diurnal	Location	Replicate	Depth (ft)	Secchi (ft)	Temp (C)	D.O. (mg/l)	Sal (psu)	Cond (uS/cm)	pH	T. Coliform (MPN/100 ml)	F. Coliform (MPN/100 ml)	NH3 (mg/l)	NO2 (mg/l)	NO3 (mg/l)	NOx (mg/l)	Urea (mg/l)	TKN (mg/l)	DKN (mg/l)
3/23/1994	10:01	090130						4.8		22.9			130	130	0.086			0.241		0.52	0.31
4/20/1994	9:29	090130					3.5	13.3		22.0			30	7	0.038			0.204		0.57	0.39
5/11/1994	9:56	090130					3.5	14.8		22.3			13	2	0.026			0.074		0.93	0.61
6/2/1994	9:23	090130					3.5	18.6	8.2	24.3			13	< 2	0.006			0.012		0.85	0.48
6/23/1994	9:07	090130					3.5	24.8	8.4	24.4			17	13	0.018			0.038	0.03	1.16	0.71
7/7/1994	12:35	090130		B					5.2												
7/7/1994	12:35	090130					3.8	27.9	6.3	25.2			< 2	< 2	0.015			0.007	0.02	1.54	0.75
7/20/1994	13:00	090130		B					5.8												
7/20/1994	13:00	090130					3.0	27.4	7.4	25.9			< 2	< 2	0.005			0.022	0.03	1.56	0.94
8/3/1994	8:37	090130					3.0	26.9		27.3			50	8	< 0.005			0.017	0.03	1.39	
8/17/1994	9:13	090130		B					5.9												
8/17/1994	9:13	090130					2.5	23.0	6.5	26.6			4	< 2	0.008			0.018	0.03	1.44	0.89
9/14/1994	9:40	090130					2.5	20.4	7.6	27.2			< 2	< 2	0.012			0.017	0.02	1.20	0.58
10/26/1994	12:10	090130					2.5	14.5	8.3	26.6			23	13	0.013			0.035	0.02	1.17	0.61
11/23/1994	8:00	090130					1.0	8.8	8.5	27.5			30	30	< 0.005			< 0.005	0.03	1.55	0.63
12/14/1994	9:44	090130					1.0	3.3	10.9	27.2			240	130	0.016			0.022	0.01	1.02	0.49
1/31/1995	9:48	090130					2.5	0.8	11.8	27.5					0.008			0.027	0.02	0.69	0.25
3/29/1995	8:44	090130					5.0	8.4	9.7	25.9			9	7	0.012			0.033	0.01	0.69	0.42
5/16/1995	9:50	090130				8.0	6.0	14.8	7.8	26.3			80	13	0.024			0.045	0.02	0.68	0.54
6/21/1995	8:40	090130					2.0	21.1	6.8	26.9			< 2	< 2	0.011			< 0.005	< 0.005	1.17	0.63
7/5/1995	9:40	090130				8.0	2.5	23.0	7.5	27.4			8	< 2	0.006			< 0.005	0.02	0.93	0.38
7/19/1995	9:22	090130					2.0	26.0	5.6	27.1			170	50	0.014			< 0.005	0.02	1.25	0.73
8/2/1995	9:05	090130					2.5	27.3		27.7			22	2	< 0.005			< 0.005	0.02	1.40	0.75
8/16/1995	9:22	090130				8.5	2.0	26.8	6.2	27.7			30	11	0.009			< 0.005	0.02	1.70	0.78
8/30/1995	7:31	090130					2.5	21.7	6.8				11	2	0.012			< 0.005	0.01	1.40	0.77
3/19/1996	9:10	090130				8.6	6.0	5.4	11.0	26.0			13	13	0.010			0.015	0.02	0.63	0.29
3/19/1996	9:12	090130		B					11.0												
5/1/1996	10:50	090130				8.5	3.0	13.6	8.8	24.3			8	< 2	0.008			< 0.005	0.02	0.54	0.23
5/1/1996	10:51	090130		B				13.3	8.2												
6/13/1996	9:16	090130				8.5	3.0	23.4	6.9	24.1			< 2	< 2	< 0.005			0.014	0.01	0.67	0.30
6/13/1996	9:17	090130		B				23.4	6.6												
7/2/1996	13:18	090130				9.0	2.0	22.0	6.5	24.2			< 2	< 2	< 0.005			0.005	< 0.005	1.05	0.49
7/16/1996	9:48	090130				8.5	2.0	23.3	6.4	23.5			50	23	< 0.005			0.008	< 0.005	1.40	0.54
7/16/1996	9:50	090130		B					6.1												
8/8/1996	9:56	090130				8.0	3.0	25.0	7.1	23.4			< 2	< 2	0.009			< 0.005	< 0.005	1.20	0.54
8/8/1996	9:57	090130		B				25.0	6.9												
8/20/1996	9:49	090130				7.5	2.5	24.5	10.6	22.8			2	< 2	< 0.005			0.008	0.01	0.74	0.58
8/20/1996	9:51	090130		B				24.3	9.9												
9/25/1996	8:35	090130				10.0	2.0	17.8	7.3	23.5			21	2	0.018			0.027	0.01	0.98	0.60
9/25/1996	8:37	090130		B				17.7	7.3												
11/19/1996	9:27	090130				9.5	2.5	5.8	10.7	24.2			23	23	0.041			0.034	0.01	0.98	0.67
11/19/1996	9:29	090130		B				5.6	10.2												
12/4/1996	8:58	090130				8.5	2.0	5.7	10.2	23.2			240	240	< 0.005			0.018	< 0.005	1.00	1.12
12/4/1996	8:59	090130		B				5.7	9.5												
2/6/1997	9:21	090130				9.5	2.0	2.6	11.3	23.4			50	50	0.019			0.007	< 0.005	0.80	0.58
2/6/1997	9:23	090130		B				2.5	11.2												
3/5/1997	8:46	090130				9.0	5.0	4.8	10.0	24.0			13	8	< 0.005			0.048	< 0.005	0.44	0.47
3/5/1997	8:48	090130		B				4.8	9.9												
3/25/1997	8:57	090130				8.0	5.0	5.2	10.3	24.7			4	4	0.015			0.010	0.01	0.82	0.72
3/25/1997	8:59	090130		B				5.2	10.6												
5/7/1997	10:04	090130				8.5	2.0	12.3	8.0	24.2			30	8	0.023			< 0.005	0.04	0.70	0.58

SCDHS Sample Station 090130 Results

Date	Time	BayStatior	Diurnal	Location	Replicate	Depth (ft)	Secchi (ft)	Temp (C)	D.O. (mg/l)	Sal (psu)	Cond (uS/cm)	pH	T. Coliform (MPN/100 ml)	F. Coliform (MPN/100 ml)	NH3 (mg/l)	NO2 (mg/l)	NO3 (mg/l)	NOx (mg/l)	Urea (mg/l)	TKN (mg/l)	DKN (mg/l)
5/7/1997	10:06	090130		B				12.3	8.0												
6/26/1997	8:10	090130						25.3	6.0	25.6			< 2	< 2	< 0.005			< 0.005	0.01	0.38	0.25
6/26/1997	8:12	090130		B					5.9												
7/9/1997	8:38	090130				10.0	2.5	25.3	5.6	25.5			2	< 2	< 0.005			< 0.005	0.01	0.74	0.54
7/9/1997	8:39	090130		B				25.2	5.5												
8/5/1997	10:15	090130				11.0	3.5	24.4	5.9	25.7			22	6	< 0.005			< 0.005	0.07	0.82	0.83
8/5/1997	10:16	090130		B				24.4	5.7												
10/14/1997	9:55	090130					3.0	17.6		27.1			8	4	< 0.005			< 0.005	0.01	0.93	0.93
10/14/1997	9:56	090130		B				17.6													
12/4/1997	10:25	090130				11.0	3.0	3.8	10.8	26.3			23	23	0.035			0.037	0.01	0.48	0.76
12/4/1997	10:27	090130		B				3.7	10.7												
2/19/1998	10:16	090130				12.0	2.0	4.2	10.0	25.5			50	30	0.017			0.018	< 0.005	0.52	0.26
2/19/1998	10:18	090130		B				3.8	10.2												
3/31/1998	9:44	090130				9.0	4.0	12.5	9.9	23.9			2	2	0.016			0.026	0.04	0.61	0.45
3/31/1998	9:45	090130		B				12.4	10.0												
4/28/1998	10:40	090130				8.5	4.0	11.9	10.1	21.6			4	2	0.007			0.009	0.03	0.77	0.36
4/28/1998	10:41	090130		B				11.8	10.2												
5/6/1998	9:28	090130				11.0	3.5	15.5	8.7	21.0			7	< 2	0.017			< 0.005	< 0.005	0.46	0.39
5/6/1998	9:29	090130		B				15.3	8.8												
5/19/1998	9:27	090130				11.0	4.0	17.4	8.8	22.1			2	< 2	0.014			< 0.005	0.02	0.50	0.35
5/19/1998	9:28	090130		B				15.7	5.8												
6/4/1998	9:12	090130				11.0	2.5	19.0	6.7	21.4			4	2	0.014			< 0.005	0.02	0.62	0.53
6/4/1998	9:13	090130		B				19.0	5.4												
6/16/1998	9:42	090130				11.0	2.0	19.7	9.3	19.0			240	130	0.008			0.014	0.01	0.58	0.33
6/16/1998	9:43	090130		B				19.3	8.6												
7/1/1998	9:15	090130				11.0	2.0	22.6	5.8	19.5			8	2	0.021			< 0.005	0.02	1.30	0.39
7/1/1998	9:16	090130		B				22.6	5.7												
7/15/1998	9:28	090130				11.0	1.5	24.3	5.9	19.9			< 2	< 2	0.011			< 0.005	0.02	1.10	0.66
7/15/1998	9:29	090130		B				24.2	5.7												
8/12/1998	8:39	090130				7.5	2.0	25.9	6.1	20.2			500	21	0.010			< 0.005	0.01	1.80	1.07
8/12/1998	8:40	090130		B				26.0	5.9												
9/9/1998	9:19	090130				8.0	2.5	22.1	6.6	21.1			30	23	< 0.005			< 0.005	0.01	1.00	0.74
9/9/1998	9:20	090130		B				22.1	6.6												
10/15/1998	12:51	090130				8.5	2.5	15.4	8.0	23.6			240	130	0.011			< 0.005	0.01	1.10	0.81
10/15/1998	12:52	090130		B				15.4	8.0												
10/27/1998	10:30	090130				10.0	3.0	12.9	9.0	24.4			50	11	0.007			< 0.005	0.01	1.10	0.50
10/27/1998		090130		B				12.9	9.0												
11/18/1998	8:19	090130				6.5	2.5	8.5	8.1	24.8			23	23	0.008			< 0.005	0.02	0.90	0.62
11/18/1998	8:20	090130		B				8.6	8.3												
12/16/1998	9:31	090130				10.0	2.5	4.9	10.3	26.0			170	170	0.005			< 0.005	0.01	0.88	0.55
12/16/1998	9:32	090130		B				5.0	9.9												
1/20/1999	9:33	090130				11.0	3.5	2.3	10.9	24.7			21	11	0.050			0.035	0.01	0.53	0.35
1/20/1999	9:34	090130		B				2.2	10.9												
2/9/1999	9:39	090130				9.0	5.0	2.1	11.8	23.2			13	13	0.020			0.029	0.01	0.51	0.36
2/9/1999	9:40	090130		B				2.7	11.3												
3/2/1999	13:08	090130				12.0	4.0	3.8	11.0	23.8			13	8	0.016			0.024	< 0.005	0.57	0.32
3/2/1999	13:09	090130		B				3.7	12.2												
3/17/1999	8:42	090130				11.0	4.0	2.3	11.2	23.6			4	4	0.011			0.068	0.01	0.38	0.24
3/17/1999		090130		B				2.2	11.2												
3/31/1999	9:06	090130				9.0	6.0	7.2	10.3	24.0			8	8	0.014			0.011	0.01	0.43	0.26
3/31/1999	9:07	090130		B				7.2	10.3												

SCDHS Sample Station 090130 Results

Date	Time	BayStatior	Diurnal	Location	Replicate	Depth (ft)	Secchi (ft)	Temp (C)	D.O. (mg/l)	Sal (psu)	Cond (uS/cm)	pH	T. Coliform (MPN/100 ml)	F. Coliform (MPN/100 ml)	NH3 (mg/l)	NO2 (mg/l)	NO3 (mg/l)	NOx (mg/l)	Urea (mg/l)	TKN (mg/l)	DKN (mg/l)
4/14/1999	9:06	090130				10.0	6.0			23.4			< 2	< 2	0.023			0.019	0.01	0.40	0.21
4/28/1999	9:58	090130				10.0	5.5	12.5	9.1	23.0			30	17	0.008			0.008	0.02	0.53	0.30
4/28/1999	9:59	090130		B				12.5	9.2												
5/10/1999	9:38	090130				8.5	6.5	16.5	8.8	25.1			21	8	< 0.005			0.037	0.02	0.37	0.22
5/10/1999	9:39	090130		B				15.8	8.1												
5/27/1999	9:15	090130				8.0	7.0	17.6	6.6	24.5			30	8	0.030			0.058	0.02	0.56	0.38
5/27/1999	9:16	090130		B				17.6	7.0												
6/9/1999	10:03	090130				8.5	>8.5	24.1	5.7	25.3			2	< 2	0.039			< 0.005	< 0.005	0.48	0.42
6/9/1999	10:04	090130		B				24.1	5.7												
6/22/1999	9:50	090130				7.5	7.5	21.9	6.8	24.5			14	2	0.083			0.053	0.01	0.60	0.55
6/22/1999		090130		B				21.8	5.9												
7/14/1999	9:21	090130				9.0	>9	23.1	6.0	26.0			23	23	0.093			0.040	0.02	0.70	0.66
7/14/1999		090130		B				23.7	5.5												
7/27/1999	9:23	090130				11.0	7.0	27.7	5.6	26.5			50	21	0.114			0.038	0.02	0.85	0.63
7/27/1999	9:24	090130		B				27.7	5.3												
8/26/1999	10:10	090130				11.0	4.0	23.8	8.3	27.1			< 2	< 2	< 0.005			< 0.005	< 0.01	0.85	0.52
8/26/1999	10:11	090130		B				23.6	9.7												
9/9/1999	10:12	090130				9.0	3.5	24.6	5.9	26.9			7	7	< 0.005			< 0.005	0.02	1.20	0.18
9/9/1999	10:13	090130		B				24.6	5.0												
9/28/1999	9:11	090130				8.0	3.0	18.5	7.2	26.4			2	< 2	0.027			0.033	0.02	0.79	0.52
9/28/1999	9:12	090130		B				18.4	7.6												
10/27/1999	9:19	090130				11.0	1.5	11.2	9.5	25.2			240	30	< 0.005			0.010	< 0.01	1.10	0.51
10/27/1999	9:20	090130		B				11.4	10.0												
11/9/1999	9:22	090130				11.0	2.0	8.8	8.9	26.4			800	800	< 0.005			< 0.005	< 0.01	0.83	0.44
11/9/1999	9:23	090130		B				8.9	8.6												
11/23/1999	11:02	090130				9.0	2.0	9.5	10.5	24.7			30	2	0.019			0.208	0.01	0.73	0.48
11/23/1999	11:03	090130		B				7.5	8.6												
12/2/1999	9:36	090130				10.0	1.5	3.8	9.6	26.4			300	170	< 0.005			0.036	< 0.01	0.90	0.43
12/2/1999	9:37	090130		B				3.8	9.7												
12/8/1999	9:19	090130				8.5	1.5	5.8	9.6	25.8			80	30	< 0.005			0.030	< 0.01	0.96	0.35
12/8/1999	9:20	090130		B				6.0	9.3												
12/16/1999	9:06	090130				11.0	1.5	6.0	12.0	26.1			130	130	< 0.005			0.030	< 0.01	0.86	0.32
12/16/1999	9:07	090130		B				5.7	11.6												
12/21/1999	9:12	090130				12.0	1.5	5.2	10.4	25.0			50	30	< 0.005			< 0.005	< 0.01	0.97	0.34
12/21/1999	9:13	090130		B				5.2	10.7												
12/29/1999	9:58	090130				11.0	1.5		10.0	26.5			23	23	0.009			0.044	0.01	0.90	0.36
12/29/1999	9:59	090130		B					10.1												
1/5/2000	9:37	090130				11.0	1.5	4.4	9.6	26.5			17	17	0.046			0.058	0.02	0.91	0.38
1/5/2000	9:38	090130		B				4.3	9.8												
1/13/2000	9:18	090130				9.5	2.0	4.1	9.5	26.7			17	17	0.058			0.060	< 0.01	0.82	0.45
1/13/2000	9:19	090130		B				4.1	9.5												
2/17/2000	10:22	090130				11.0	3.0	1.1	11.0	25.8			23	8	0.064			0.124		0.72	0.47
2/17/2000	10:23	090130		B				1.0	10.9												
2/28/2000	10:12	090130				10.0	2.0	5.9	10.8	25.1			23	13	0.056			0.203		1.00	0.35
2/28/2000	10:13	090130		B				5.8	10.9												
3/8/2000	9:48	090130				8.5	3.5	7.5	10.8	25.8			< 2	< 2	0.006			0.164	< 0.01	0.59	0.31
3/8/2000	9:49	090130		B				7.3	9.9												
4/13/2000	9:18	090130				8.0	2.0	8.7	8.9	26.2			4	< 2	< 0.005			0.014	< 0.01	0.64	0.24
4/13/2000	9:19	090130		B				8.6	8.8												
4/27/2000	9:53	090130				12.0	1.5	9.4	9.1	25.2			500	170	0.006			0.026	0.02	0.58	0.27
4/27/2000	9:54	090130		B				9.2	8.0												

SCDHS Sample Station 090130 Results

Date	Time	BayStatior	Diurnal	Location	Replicate	Depth (ft)	Secchi (ft)	Temp (C)	D.O. (mg/l)	Sal (psu)	Cond (uS/cm)	pH	T. Coliform (MPN/100 ml)	F. Coliform (MPN/100 ml)	NH3 (mg/l)	NO2 (mg/l)	NO3 (mg/l)	NOx (mg/l)	Urea (mg/l)	TKN (mg/l)	DKN (mg/l)
5/17/2000	7:51	090130																			
5/24/2000	11:00	090130				11.0	1.5	15.4	9.6	25.0			40	< 20	0.007			< 0.005	0.03	0.92	0.30
5/24/2000	11:02	090130		B				15.2	9.4												
6/8/2000	9:44	090130				11.0	1.5	18.5	10.8	22.7			800	130	< 0.005			0.008	< 0.01	1.10	0.37
6/8/2000	9:45	090130		B				17.6	7.5												
6/20/2000	10:28	090130				11.0	1.5	21.7	8.5	23.4			80	< 20	0.005			< 0.005	0.03	0.99	0.45
6/20/2000	10:29	090130		B				21.0	7.4												
6/28/2000	10:55	090130				9.0	2.0														
6/30/2000		090130																			
7/5/2000	10:42	090130				11.0	2.5	25.6	6.8	23.6			40	40	< 0.005			< 0.005	0.01	1.10	0.44
7/5/2000	10:43	090130		B				25.5	6.6												
7/10/2000	8:25	090130				9.0	2.0														
7/18/2000	8:58	090130					2.5	25.2	6.6	23.6			< 20	< 20						1.30	0.58
7/18/2000	8:59	090130		B				25.1	6.2												
7/25/2000	9:30	090130				12.0	2.0	23.7	5.1												
7/25/2000	9:31	090130		B				23.8	4.9												
8/1/2000	9:26	090130				9.0	2.0	22.4	8.2	24.6			< 20	< 20	< 0.005			0.005	0.01	1.40	0.55
8/1/2000	9:27	090130		B				22.4	7.7												
8/15/2000	9:37	090130				10.0	2.0	21.6	6.8	24.4			20	< 20	< 0.005			< 0.005	< 0.01	1.40	0.58
8/15/2000	9:38	090130		B				2.6	6.6												
8/29/2000	11:02	090130				10.0	2.0	23.7	7.4	24.2			< 20	< 20	< 0.005			< 0.005	< 0.01		
8/29/2000	11:03	090130		B				23.8	7.4												
9/6/2000	10:01	090130				9.0	2.5	21.7	7.4												
9/6/2000	10:02	090130		B				21.8	7.4												
9/12/2000	9:40	090130				9.0	3.0	23.3	7.5	24.6			< 20	< 20	0.011			0.008	< 0.01		
9/12/2000	9:45	090130		B				23.2	7.2												
9/27/2000	9:47	090130				10.0	2.0	16.3	7.5	24.7			230	40	< 0.005			< 0.005	< 0.01		
9/27/2000	9:48	090130		B				16.6	6.9												
11/8/2000	9:08	090130				10.0	2.0	8.9	9.6				< 20	< 20	< 0.005			0.038	< 0.01		
11/8/2000	9:09	090130		B				9.2	9.1												
11/21/2000	9:30	090130				9.0	2.0	5.5	9.3						0.013			0.023	0.01		
11/21/2000	9:31	090130		B				5.5	9.4												
12/6/2000	9:56	090130				9.0	3.5	1.7	11.3						0.102			0.095	0.01		
12/6/2000	9:57	090130		B				1.7	11.5												
2/1/2001	9:30	090130				8.0	2.0	1.7	7.8						< 0.005			0.151	< 0.01		
2/1/2001	9:31	090130		B				1.7	7.6												
2/15/2001	9:47	090130				9.0	3.5	2.5	11.4						0.012			0.091	< 0.01		
2/15/2001	9:48	090130		B				2.1	11.5												
2/26/2001	9:25	090130				8.0	3.0	1.5	11.9				< 20	< 20	0.008			0.077	< 0.01		
2/26/2001	9:30	090130		B				1.1													
3/13/2001	10:14	090130				9.0	2.5	4.9	10.8	24.7			80	20	0.007			0.111	< 0.01		
3/13/2001	10:15	090130		B				3.8	11.0												
3/27/2001	9:48	090130				8.0	3.0	4.5	10.8	25.2					< 0.005			0.050	< 0.01		
3/27/2001	9:49	090130		B				4.5	10.8												
4/9/2001	15:48	090130																			
4/23/2001	10:49	090130				8.0	4.0	14.6	8.6	21.7			< 20	< 20	0.014			0.139	< 0.01		
4/23/2001	10:50	090130		B				13.2	8.3												
5/8/2001	9:07	090130				8.0	4.5	16.3	9.1						< 0.005			0.017	< 0.01		
5/8/2001	9:08	090130		B				16.6	8.8												
5/24/2001	9:27	090130				8.5	4.0	15.4	7.5						0.071			0.058	0.01		
5/24/2001	9:28	090130		B				15.5	7.1												

SCDHS Sample Station 090130 Results

Date	Time	BayStatior	Diurnal	Location	Replicate	Depth (ft)	Secchi (ft)	Temp (C)	D.O. (mg/l)	Sal (psu)	Cond (uS/cm)	pH	T. Coliform (MPN/100 ml)	F. Coliform (MPN/100 ml)	NH3 (mg/l)	NO2 (mg/l)	NO3 (mg/l)	NOx (mg/l)	Urea (mg/l)	TKN (mg/l)	DKN (mg/l)
6/5/2001	9:47	090130				8.5	3.5	18.9	9.2						< 0.005			0.031	< 0.01		
6/5/2001	9:48	090130		B				19.2	8.6												
6/19/2001	9:25	090130				9.0	>9	24.1	6.2						0.034			0.014	< 0.01		
6/19/2001	9:27	090130		B				24.1	6.2												
6/27/2001	9:34	090130					>9	26.2	6.8												
6/27/2001	9:35	090130		B				26.0	6.1												
7/3/2001	9:18	090130					>8.5	23.6	6.7						< 0.005			0.009	< 0.01		
7/3/2001	9:19	090130		B				23.8	6.6												
7/11/2001	9:46	090130					4.5	24.3	6.6												
7/11/2001	9:47	090130		B				24.3	6.6												
7/17/2001	14:00	090130				7.0	2.5	25.5	7.8						< 0.005			0.074	< 0.01		
7/17/2001	14:02	090130		B				24.6	5.0												
7/31/2001	9:38	090130				8.5	2.0	22.2	7.4						< 0.005			0.043	< 0.01		
7/31/2001	9:39	090130		B				22.8	5.3												
8/14/2001	10:44	090130				7.0	2.0	26.3	6.8						< 0.005			0.055	< 0.01		
8/14/2001	10:46	090130		B				26.0	6.8												
8/28/2001	9:50	090130				8.5	2.0	25.0	7.0						< 0.005			0.064	< 0.01		
8/28/2001	9:51	090130		B				25.1	5.1												
9/12/2001	9:55	090130				8.0	2.5	23.4	7.2						0.012			0.019	0.01		
9/12/2001	9:56	090130		B				23.6	6.4												
10/4/2001	9:50	090130				9.0	4.5	16.7	8.6				< 20	< 20	< 0.005			0.038	< 0.01		
10/4/2001	9:55	090130		B				16.6	5.2												
10/16/2001	10:20	090130				10.0	3.0	16.3	8.2				40	40	< 0.005			0.086	< 0.01		
10/16/2001	10:25	090130		B				16.2	8.1												
10/31/2001	10:32	090130				9.0	3.5	10.7	9.3				< 20	< 20	< 0.005			0.111	< 0.01		
10/31/2001	10:34	090130		B				10.7	9.1												
11/14/2001	10:23	090130				8.5	2.5	8.4	9.6				< 20	< 20	< 0.005			0.016	< 0.01		
11/14/2001	10:24	090130		B				8.7	9.6												
11/28/2001	10:03	090130				9.0	2.5	10.3	9.1				20	20	< 0.005			0.020	< 0.01		
11/28/2001	10:04	090130		B				10.5	9.2												
12/13/2001	9:49	090130				9.5	3.0	8.4	9.5				260	130	< 0.005			0.021	< 0.01		
12/13/2001	9:51	090130		B				8.3	9.3												
1/2/2002	11:42	090130				8.5	2.5	-0.5	11.2				20	20	< 0.005			0.020	< 0.01		
1/2/2002	11:44	090130		B				-0.5	11.2												
1/15/2002	10:50	090130				8.0	2.5	2.5	11.3				110	70	0.055			0.190	< 0.01		
1/15/2002	10:51	090130		B				2.3	11.2												
1/29/2002	10:06	090130				9.5	3.5	4.8	11.6				< 20	< 20	< 0.005			0.087	< 0.01		
1/29/2002	10:08	090130		B				4.7	11.5												
2/13/2002	12:15	090130				9.0	1.5	3.3	10.8				20	< 20	< 0.005			0.051	< 0.01		
2/13/2002	12:17	090130		B				3.3	10.7												
2/27/2002	9:45	090130				9.5	2.5	7.2	10.2				< 20	< 20	< 0.005			0.120	< 0.01		
2/27/2002	9:46	090130		B				7.2	10.1												
3/12/2002	13:39	090130				7.5	1.5	6.0	10.3				20	20	< 0.005			0.040	0.01		
3/12/2002	13:40	090130		B				5.9	10.2												
3/27/2002	10:10	090130				9.5	3.0	5.8	10.5				< 20	< 20	< 0.005			0.037	< 0.01		
3/27/2002	10:12	090130		B				5.7	10.5												
4/9/2002	10:37	090130				8.0	1.5	9.7	9.4				< 20	< 20	0.007			0.102	< 0.01		
4/9/2002	10:39	090130		B				9.6	9.4												
4/24/2002	9:18	090130				9.0	6.0	13.0	8.9												
4/24/2002	9:19	090130		B				13.4	8.9												
5/7/2002	10:33	090130				7.5	5.0	15.4	8.4				20	< 20	< 0.005			0.080	0.01		

SCDHS Sample Station 090130 Results

Date	Time	BayStatior	Diurnal	Location	Replicate	Depth (ft)	Secchi (ft)	Temp (C)	D.O. (mg/l)	Sal (psu)	Cond (uS/cm)	pH	T. Coliform (MPN/100 ml)	F. Coliform (MPN/100 ml)	NH3 (mg/l)	NO2 (mg/l)	NO3 (mg/l)	NOx (mg/l)	Urea (mg/l)	TKN (mg/l)	DKN (mg/l)
5/7/2002	10:35	090130		B				15.5	8.4												
5/21/2002	9:47	090130				8.0	>8	13.9	8.6				< 20	< 20	0.030			0.146	< 0.01		
5/21/2002	9:48	090130		B				13.9	8.5												
6/6/2002	10:03	090130				8.5	2.5	21.0	7.0				< 20	< 20	0.034			0.018	0.01		
6/6/2002	10:04	090130		B				20.9	6.6												
6/12/2002	10:14	090130				8.0	3.5	22.4	7.1				< 20	< 20	0.057			0.026	0.02		
6/12/2002	10:16	090130		B				22.2	7.1												
6/20/2002	8:55	090130				8.0	5.0	21.9	7.4				40	20	0.030			0.101	0.01		
6/20/2002	9:00	090130		B				21.8	7.1												
7/9/2002	9:53	090130				8.5	1.5	25.2	5.8				< 20	< 20	0.048			0.032	0.02		
7/9/2002	9:54	090130		B				25.3	5.8												
7/23/2002	9:54	090130				9.0	1.0	26.3	5.8				< 20	< 20	< 0.005			< 0.005	< 0.01		
7/23/2002	9:55	090130		B				26.5	5.8												
8/6/2002	10:10	090130				8.0	3.0	27.4	6.7				< 20	< 20	0.005			< 0.005	0.03		
8/6/2002	10:15	090130		B				27.4	6.7												
8/21/2002	11:55	090130				8.0		26.9	7.4				70	20	< 0.005			0.005	< 0.01		
8/21/2002	11:57	090130		B				26.3	6.0												
9/18/2002	10:40	090130				8.5	3.5	22.2	7.8				40	20	0.006			0.008	0.01		
9/18/2002	10:45	090130		B				22.0	7.0												
10/1/2002	10:00	090130				8.5	2.5	20.4	7.5				< 20	< 20	< 0.005			0.007	0.01		
10/1/2002	10:05	090130		B				20.3	7.4												
10/17/2002	10:03	090130				9.5	2.0	13.8	8.2				40	< 20	0.006			0.063	< 0.01		
10/17/2002	10:04	090130		B				14.0	7.6												
11/6/2002	10:23	090130				9.5	2.0	8.1	9.7				80	80	0.006			0.037	< 0.01		
11/6/2002	10:25	090130		B				8.1	9.7												
11/19/2002	9:57	090130				8.0	2.0	7.6	9.1				40	40	0.027			0.055	0.01		
11/19/2002	9:58	090130		B				7.9	8.9												
12/9/2002	9:51	090130				7.0	2.5	-0.2	12.3				20	20	0.135			0.143	0.03		
12/9/2002	9:52	090130		B				-0.3	12.4												
1/16/2003	10:34	090130				8.5	3.0	-1.1	13.4				20	20	0.005			0.071	< 0.01		
1/16/2003	10:35	090130		B				-0.8	13.4												
3/19/2003	10:12	090130				9.0	2.0	5.7	12.8				< 20	< 20	< 0.005			0.034	< 0.01		
3/19/2003	10:13	090130		B				5.8	12.8												
4/16/2003	10:25	090130				8.5	4.0	10.2	9.7				< 20	< 20	< 0.005			0.014			
4/16/2003	10:26	090130		B				10.5	9.8												
5/14/2003	9:55	090130				9.0	4.5	14.0	9.7				< 20	< 20	< 0.005			0.011			
5/14/2003	9:56	090130		B				14.3	9.7												
6/12/2003	10:18	090130				9.0	2.5	19.8	9.2				130	40	< 0.005			0.077			
6/12/2003	10:19	090130		B				19.6	8.4												
7/29/2003	10:14	090130				8.5	2.0	25.3	7.3				< 20	< 20	0.021			< 0.005			
7/29/2003	10:15	090130		B				25.4	7.1												
8/13/2003	10:18	090130				8.0	2.0	25.9	5.7				< 20	< 20	0.016			< 0.005			
8/13/2003	10:19	090130		B				26.0	5.6												
9/11/2003	9:52	090130				7.0	3.0	20.9	7.8				130	40	0.009			< 0.005			
9/11/2003	9:53	090130		B				21.1	7.4												
10/29/2003	10:35	090130				9.5	1.0	13.1	9.0				80	20	0.023			0.036			
10/29/2003	10:36	090130		B				13.2	9.0												
11/26/2003	10:08	090130				9.0	4.5	7.6	8.9				40	40	0.101			0.111			
11/26/2003	10:09	090130		B				8.0	8.5												
12/10/2003	10:40	090130				9.5	4.5	-0.3	13.0				20	< 20	0.057			0.131			
12/10/2003	10:41	090130		B				-0.4	11.8												

SCDHS Sample Station 090130 Results

Date	Time	BayStatior	Diurnal	Location	Replicate	Depth (ft)	Secchi (ft)	Temp (C)	D.O. (mg/l)	Sal (psu)	Cond (uS/cm)	pH	T. Coliform (MPN/100 ml)	F. Coliform (MPN/100 ml)	NH3 (mg/l)	NO2 (mg/l)	NO3 (mg/l)	NOx (mg/l)	Urea (mg/l)	TKN (mg/l)	DKN (mg/l)
1/7/2004	10:02	090130				8.5	1.5	2.4	11.1				40	40	0.035			0.066			
1/7/2004	10:03	090130		B				2.6	11.1												
2/26/2004	9:42	090130				8.0	5.0	0.7	12.8				20	20	< 0.005			0.078			
2/26/2004	9:43	090130		B				0.9	13.0												
3/31/2004	11:11	090130				8.0	5.0	7.1	10.8				< 20	< 20	0.024			0.035			
3/31/2004	11:12	090130		B				7.1	10.7												
4/21/2004	11:24	090130				7.5	2.5	13.4	9.1				40	40	0.019			0.032			
4/21/2004	11:25	090130		B				13.7	9.1												
7/1/2004	10:18	090130				10.0	3.0	23.7	6.6				< 20	< 20	0.087			0.034			
7/1/2004	10:19	090130		B				23.6	6.3												
8/3/2004	10:49	090130				10.0	2.0	26.2	6.1				40	< 20	0.043			0.007			
8/3/2004	10:50	090130		B				26.2	5.6												
9/15/2004	10:00	090130				10.0	4.0	21.8	6.0				< 20	< 20	0.046			0.106			
9/15/2004	10:01	090130		B				21.8	6.0												
11/24/2004	10:51	090130				9.5	9.5	8.1	9.8				< 20	< 20	0.041			0.043			
11/24/2004	10:52	090130		B				8.1	9.8												
12/15/2004	11:09	090130				8.5	3.5	4.5	11.3				130	80	0.042			0.086			
12/15/2004	11:10	090130		B				4.5	11.3												
1/13/2005	11:39	090130				9.5	3.0	3.4	12.3				< 20	< 20	< 0.005			0.050			
1/13/2005	11:40	090130		B				3.4	11.7												
2/24/2005	11:28	090130				9.0	3.0	1.4	12.2				< 20	< 20	< 0.005			0.060			
2/24/2005	11:29	090130		B				1.4	12.2												
3/10/2005	10:32	090130				9.0	3.0		12.9				< 20	< 20	0.018			0.048			
3/10/2005	10:33	090130		B				0.2	12.7												
3/24/2005	11:28	090130				9.5	1.5	4.3	10.8				< 20	< 20	0.029			0.070			
3/24/2005	11:29	090130		B				4.3	10.6												
4/7/2005	11:13	090130				8.0	5.0	10.4	10.1				< 20	< 20	0.029			0.063			
4/7/2005	11:14	090130		B				10.4	10.1												
4/26/2005	10:33	090130				8.5	2.5	12.2	9.2				< 20	< 20	0.043			0.106			
4/26/2005	10:34	090130		B				12.0	8.8												
5/10/2005	11:03	090130				9.0	4.5	13.8	9.8				20	< 20	0.012			0.038			
5/10/2005	11:04	090130		B				13.3	9.7												
5/25/2005	10:54	090130				8.5	2.5	14.8	8.2				< 20	< 20	0.013			< 0.005			
5/25/2005	10:55	090130		B				14.7	8.2												
6/8/2005	10:40	090130				7.5	4.0	23.5	9.8				20	< 20	0.008			0.024			
6/8/2005	10:41	090130		B				22.8	7.6												
6/22/2005	10:45	090130				9.0	6.0	22.3	6.2				< 20	< 20	0.016			0.017			
6/22/2005	10:46	090130		B				21.8	5.1												
7/6/2005	10:37	090130				9.0	9.0	24.1	6.2				< 20	< 20	< 0.005			0.029			
7/6/2005	10:38	090130		B				24.0	6.1												
8/18/2005	10:36	090130				9.0	5.5	25.6	7.0				< 20	< 20	0.010			0.015			
8/18/2005	10:37	090130		B				25.5	6.4												
9/15/2005	10:53	090130				9.0	7.0	24.7	7.4				< 20	< 20	< 0.005			0.017			
9/15/2005	10:54	090130		B				24.5	6.9												
10/6/2005	11:14	090130				8.0	6.5	21.2	5.5				< 20	< 20	0.125			0.033			
10/6/2005	11:15	090130		B				21.0	5.0												
10/20/2005	10:45	090130				8.0	3.0	14.7	7.3				80	20	0.317			0.092			
10/20/2005	10:47	090130		B				14.3	7.3												
11/2/2005	11:12	090130				8.5	4.5	10.8	10.0				< 20	< 20	0.258			0.113			
11/2/2005	11:13	090130		B				10.8	9.9												
11/17/2005	11:40	090130				9.0	3.0	11.8	9.3				< 20	< 20	0.149			0.199			

SCDHS Sample Station 090130 Results

Date	Time	BayStatior	Diurnal	Location	Replicate	Depth (ft)	Secchi (ft)	Temp (C)	D.O. (mg/l)	Sal (psu)	Cond (uS/cm)	pH	T. Coliform (MPN/100 ml)	F. Coliform (MPN/100 ml)	NH3 (mg/l)	NO2 (mg/l)	NO3 (mg/l)	NOx (mg/l)	Urea (mg/l)	TKN (mg/l)	DKN (mg/l)
11/17/2005	11:41	090130		B				11.7	9.4												
12/1/2005	11:20	090130				9.0	7.0	7.3	10.5				40	20	0.092			0.102			
12/1/2005	11:21	090130		B				7.3	10.5												
12/29/2005	10:41	090130				9.0	2.5	2.7	13.2				40	20	0.026			0.072			
12/29/2005	10:42	090130		B				2.7	13.0												
1/26/2006	11:50	090130				8.5	1.0	3.2	11.1				< 20	< 20				0.040			
1/26/2006	11:51	090130		B				3.1	11.1												
2/16/2006	10:56	090130				8.5	2.5	2.6	14.7				40	< 20	0.133			0.402			
2/16/2006	10:58	090130		B				1.8	12.7												
3/30/2006	10:50	090130				8.5	8.0	8.5	10.4				< 20	< 20	< 0.02			0.207			
3/30/2006	10:51	090130		B				8.0	10.5												
4/13/2006	10:20	090130				10.0	7.0	11.6	9.3				< 20	< 20	0.024			0.090			
4/13/2006	10:21	090130		B				11.5	9.3												
4/27/2006	10:22	090130				8.5	5.0	13.5	10.2				< 20	< 20	< 0.02			0.006			
4/27/2006	10:23	090130		B				12.8	10.9												
5/17/2006	10:21	090130				8.0	4.0	14.9	9.9				20	< 20	< 0.02			0.013			
5/17/2006	10:22	090130		B				14.8	9.3												
6/1/2006	10:55	090130				7.0	3.5	21.4	6.5				< 20	< 20	< 0.02			0.007			
6/1/2006	11:00	090130		B				21.4	6.4												
7/26/2006	11:17	090130				8.0	2.0	26.0	7.9				< 20	< 20	< 0.02			0.045			
7/26/2006	11:18	090130		B				25.5	7.0												
8/23/2006	10:28	090130				8.0	3.5	25.3	7.0				40	< 20	0.037			0.066			
8/23/2006	10:29	090130		B				24.9	5.0												
9/20/2006	10:13	090130				8.5	5.5	21.6	6.9				< 20	< 20	0.097			0.073			
9/20/2006	10:14	090130		B				21.4	6.8												
10/25/2006	10:39	090130				8.5	2.0	10.8	9.2				80	40	< 0.02			< 0.005			
10/25/2006	10:40	090130		B				10.8	9.1												
11/21/2006	10:27	090130				8.0	2.5	10.2	9.1				20	20	0.052			< 0.005			
11/21/2006	10:28	090130		B				10.2	9.1												
12/20/2006	11:44	090130				9.0	5.5	5.2	11.6				< 20	< 20	0.055			0.141			
12/20/2006	11:46	090130		B				5.2	11.5												
1/18/2007	10:40	090130				8.5	3.5	2.5	11.0				20	20	0.054			0.008			
1/18/2007	10:41	090130		B				2.5	11.0												
3/27/2007	10:20	090130				9.0	4.0	8.2	9.9				< 20	< 20	0.078			0.133			
3/27/2007	10:21	090130		B				7.7	10.1												
4/13/2007	11:35	090130				10.0	4.5	6.8	10.0						0.058			0.117			
4/13/2007	11:40	090130		B				6.8	10.0												
6/20/2007	10:35	090130				10.0	4.0	23.3	7.8				< 20	< 20	< 0.02			< 0.005			
6/20/2007	10:37	090130		B				23.4	7.6												
7/12/2007	13:00	090130				7.0	3.5	26.0	7.9												
7/12/2007	13:05	090130		B				25.3	6.5												
7/16/2007	10:45	090130				8.0	2.5	25.3	6.8				< 20	< 20	0.058			0.053			
7/16/2007	10:46	090130		B				25.3	5.0												
9/13/2007	10:37	090130				10.0	2.5	22.0	9.1				< 20	< 20	< 0.02			< 0.005			
9/13/2007	10:38	090130		B				22.1	7.3												
10/10/2007	11:08	090130				12.0	11.0	20.2	6.7				< 20	< 20	0.038			0.020			
10/10/2007	11:09	090130		B				20.2	6.6												
11/8/2007	10:57	090130				8.5	3.0	8.9	9.6				< 20	< 20	0.031			0.096			
11/8/2007	10:58	090130		B				9.3	8.8												
11/28/2007	10:40	090130				10.0	3.0	6.1	10.0				20	< 20	0.020			0.060			
11/28/2007	10:41	090130		B				6.1	10.0												

SCDHS Sample Station 090130 Results

Date	Time	BayStatior	Diurnal	Location	Replicate	Depth (ft)	Secchi (ft)	Temp (C)	D.O. (mg/l)	Sal (psu)	Cond (uS/cm)	pH	T. Coliform (MPN/100 ml)	F. Coliform (MPN/100 ml)	NH3 (mg/l)	NO2 (mg/l)	NO3 (mg/l)	NOx (mg/l)	Urea (mg/l)	TKN (mg/l)	DKN (mg/l)
12/12/2007	9:58	090130				8.0	4.0	3.2	12.5				< 20	< 20	< 0.02			0.080			
12/12/2007	9:59	090130		B				3.3	12.3												
1/10/2008	11:24	090130				9.5	2.0	3.0	12.6	26.2			< 20	< 20	< 0.02			< 0.005			
1/10/2008	11:25	090130		B				2.9	12.6	26.1											
2/7/2008	10:55	090130				9.5	6.0	4.3	10.8	24.0			20	20	0.040			0.152			
2/7/2008	10:56	090130		B				4.0	11.0	24.9											
3/6/2008	10:56	090130				10.0	3.0	5.7	10.9	24.0			20	< 20	< 0.02			0.124			
3/6/2008	10:57	090130		B				5.6	10.9	25.0											
4/10/2008	10:41	090130				9.0	3.5	10.5	11.5	24.5			< 20	< 20	< 0.02			0.009			
4/10/2008	10:42	090130		B				9.8	11.3	25.3											
5/7/2008	10:46	090130				7.5	3.0	16.4	9.4	25.3			< 20	< 20	< 0.02			< 0.005			
5/7/2008	10:47	090130		B				15.6	8.9	25.7											
5/15/2008	10:28	090130				12.0	2.0	14.4	10.2	25.2											
5/15/2008	10:29	090130		B				13.8	6.3	26.4											
5/22/2008	10:43	090130				8.0	2.0	14.0	9.2	25.9											
5/22/2008	10:44	090130		B				14.0	9.2	25.9											
5/30/2008	10:15	090130				9.0	1.8	19.2	9.4	24.8											
5/30/2008	10:16	090130						18.2	7.1	25.5											
6/5/2008	10:51	090130				8.0	1.5	19.9	8.0	25.0			< 20	< 20	< 0.02			< 0.005			
6/5/2008	10:52	090130		B				19.9	7.9	24.9											
6/10/2008	14:13	090130				9.0	2.0	26.3	8.0	24.7			< 20	< 20	< 0.02			< 0.005			
6/10/2008	14:14	090130		B				24.4	4.4	24.9											
6/19/2008	10:15	090130				9.0	4.0	23.0	6.3	23.2			80	< 20	0.025			0.070			
6/19/2008	10:18	090130		B				22.7	5.0	24.0											
6/26/2008	9:42	090130				7.0	3.0	23.9	4.8	23.9											
6/26/2008	9:43	090130		B				23.9	4.7	23.9											
7/1/2008	10:10	090130				8.0	3.0	25.9	6.1	24.3			< 20	< 20	0.027			< 0.005			
7/1/2008	10:11	090130		B				25.7	4.4	24.4											
7/8/2008	9:39	090130		B				25.4	6.2	25.2											
7/8/2008	9:41	090130				7.0	2.5	25.6	6.5	25.1											
7/15/2008	10:39	090130				7.0	3.0	27.0	7.7	24.2			80	20	< 0.02			0.022			
7/15/2008	10:40	090130		B				26.2	2.0	25.3											
7/30/2008	9:11	090130				8.0	2.5	25.7	6.3	25.1			80	< 20	0.029			< 0.005			
7/30/2008	9:12	090130		B				25.8	4.8	25.5											
8/27/2008	10:13	090130				8.0	2.0	22.9	7.2	26.2			< 20	< 20	< 0.02			< 0.005			
8/27/2008	10:14	090130		B				22.8	6.7	26.4											
9/18/2008	10:39	090130				9.0	2.3	21.6	7.3	25.8					< 0.02			< 0.005			
9/18/2008	10:40	090130		B				21.6	7.2	25.8											
10/7/2008	10:52	090130				9.0	2.0	15.2	9.0	25.6			40	< 20	< 0.02			< 0.005			
10/7/2008	10:53	090130		B				15.3	8.7	25.8											
10/15/2008	10:27	090130				10.0	1.5	17.3	7.8	25.6											
10/15/2008	10:28	090130		B				17.2	7.6	25.6											
10/21/2008	10:22	090130				8.0	2.0	12.7	9.1	25.5					< 0.02			< 0.005			
10/21/2008	10:23	090130		B				13.3	7.6	25.9											
10/31/2008	10:25	090130				8.0	2.0	9.1	8.9	25.8											
10/31/2008	10:26	090130		B				9.4	8.5	26.3											
11/20/2008	11:07	090130				7.5	2.0	5.2	10.1	26.3			70	20	< 0.02			0.014			
11/20/2008	11:08	090130		B				5.3	9.9	27.3											
12/11/2008	10:36	090130				8.5	2.0	4.5	10.9	25.5			70	70	0.026			0.086			
12/11/2008	10:37	090130		B				4.5	10.9	25.5											
1/13/2009	10:25	090130				8.5	3.0	-0.6	12.9	24.7			< 20	< 20	0.041			0.122			

SCDHS Sample Station 090130 Results

Date	Time	BayStatior	Diurnal	Location	Replicate	Depth (ft)	Secchi (ft)	Temp (C)	D.O. (mg/l)	Sal (psu)	Cond (uS/cm)	pH	T. Coliform (MPN/100 ml)	F. Coliform (MPN/100 ml)	NH3 (mg/l)	NO2 (mg/l)	NO3 (mg/l)	NOx (mg/l)	Urea (mg/l)	TKN (mg/l)	DKN (mg/l)
1/13/2009	10:26	090130		B				-0.5	12.8	24.7											
2/26/2009	10:28	090130				8.0	3.5	1.5	12.4	26.0					< 0.02			0.087			
2/26/2009	10:29	090130		B				1.4	12.5	26.8											
3/25/2009	10:40	090130				9.0	5.0	4.8	10.5	24.7			< 20	< 20	< 0.02			0.092			
3/25/2009	10:41	090130		B				4.8	10.5	25.1											
4/9/2009	10:47	090130				8.5	4.0	8.8	10.4	25.1			< 20	< 20	< 0.02			< 0.005			
4/9/2009	10:48	090130		B				8.6	10.1	25.6											
4/30/2009	10:53	090130				6.5	5.0	15.9	8.8	24.9			< 20	< 20	< 0.02			0.102			
4/30/2009	10:54	090130		B				15.4	8.7	25.2											
5/13/2009	10:25	090130				9.0	7.0	16.7	7.2	22.6			< 20	< 20	< 0.02			0.091			
5/13/2009	10:27	090130		B				16.4	7.3	23.2											
5/28/2009	11:07	090130				7.5	3.5	17.4	7.8	24.4			< 20	< 20	< 0.02			< 0.005			
5/28/2009	11:08	090130		B				17.3	7.8	24.3											
6/10/2009	11:16	090130				8.5	2.0	19.6	8.1	23.0											
6/10/2009	11:17	090130		B				19.5	7.1	23.7											
6/23/2009	10:26	090130				8.0	2.0	20.4	8.9	21.4			500	500	< 0.02			0.030			
6/23/2009	10:27	090130		B				20.2	8.4	21.8											
7/8/2009	10:12	090130				8.0	1.5	23.7	7.0	21.8			170	40	< 0.02			< 0.005			
7/8/2009	10:13	090130		B				23.5	6.7	21.8											
7/14/2009	9:52	090130				7.5	1.5	23.1	7.5	21.8											
7/14/2009	9:53	090130		B				22.8	6.4	22.1											
7/29/2009	10:32	090130				7.0	2.0	26.0	6.5	20.9			< 20	< 20	< 0.02			< 0.005			
7/29/2009	10:33	090130		B				25.8	5.7	21.1											
8/20/2009	10:03	090130				8.0	2.0	27.7	7.2	21.3			3,000	1,700	< 0.02			< 0.005			
8/20/2009	10:04	090130		B				27.4	4.8	22.0											
9/15/2009	10:45	090130				8.0	2.0	21.0	9.0	25.8			< 20	< 20	< 0.02			< 0.005			
9/15/2009	10:46	090130		B				21.1	6.8	27.4											
10/8/2009	10:28	090130				8.0	2.5	15.6	7.5	24.7			110	20	< 0.02			0.021			
10/8/2009	10:31	090130		B				15.7	7.0	24.9											
11/5/2009	9:26	090130				10.0	2.5	11.3	9.9	24.3			80	20	< 0.02			0.050			
11/5/2009	9:28	090130		B				11.9	8.9	25.3											
12/2/2009	10:44	090130				9.5	5.0	7.1	9.7	25.0			20	20	0.098			0.167			
12/2/2009	10:47	090130		B				7.5	9.6	25.7											
3/2/2010	10:11	090130				11.0	5.0	4.1	10.3	23.6		7.8	< 20	< 20	< 0.02			0.067			
3/2/2010	10:12	090130		B				3.6	10.3	23.8											
3/25/2010	10:36	090130				8.0	5.0	10.3	9.1	25.0		8.1	< 20	< 20	< 0.02			0.025			
3/25/2010	10:37	090130		B				10.4	8.9	25.2											
4/14/2010	10:56	090130				8.0	5.5	13.4	10.0	22.5		8.3	< 20	< 20	< 0.02			0.032			
4/14/2010	10:57	090130		B				13.6	11.4	23.5											
5/13/2010	11:03	090130				8.0	4.0	12.6	8.6	24.0		8.1	40	20	< 0.02			0.024			
5/13/2010	11:04	090130		B				12.4	8.2	24.6											
5/27/2010	9:31	090130				7.0	3.0	21.6	7.2	23.2		8.1									
5/27/2010	9:32	090130		B				21.5	7.2	23.2											
6/4/2010	10:46	090130				8.0	2.0	24.6	8.6	22.6		8.1									
6/4/2010	10:47	090130		B				23.5	5.2	23.5											
6/16/2010	10:35	090130				9.0	2.5	22.5	6.9	23.5		8.3	20	< 20	< 0.02			< 0.005			
6/16/2010	10:38	090130		B				22.2	6.4	23.2											
7/2/2010	10:10	090130				7.5	1.0	23.6	6.9	23.5		8.2									
7/2/2010	10:12	090130		B				23.4	6.6	23.6											
7/8/2010	10:43	090130				8.5	1.5	28.1	6.4	25.1		8.3	< 20	< 20	0.037			< 0.005			
7/8/2010	10:44	090130		B				27.7	5.6	25.1											

SCDHS Sample Station 090130 Results

Date	Time	BayStatior	Diurnal	Location	Replicate	Depth (ft)	Secchi (ft)	Temp (C)	D.O. (mg/l)	Sal (psu)	Cond (uS/cm)	pH	T. Coliform (MPN/100 ml)	F. Coliform (MPN/100 ml)	NH3 (mg/l)	NO2 (mg/l)	NO3 (mg/l)	NOx (mg/l)	Urea (mg/l)	TKN (mg/l)	DKN (mg/l)
8/11/2010	11:28	090130				8.5	1.5	27.1	6.9	26.4		8.1	20	< 20	0.037			< 0.005			
8/11/2010	11:29	090130		B				26.8	4.2	27.0											
9/9/2010	10:37	090130				8.5	2.0	21.9	6.5	27.4		7.9	>16000	< 20	0.042			< 0.005			
9/9/2010	10:38	090130		B				21.8	6.4	27.3											
9/23/2010	11:17	090130				8.5	1.5	21.0	7.8	26.8		8.2	80	< 20	< 0.02			0.005			
9/23/2010	11:18	090130		B				20.8	6.4	27.3											
10/20/2010	12:25	090130				9.0	3.0	13.9	9.4	26.4		8.2	20	< 20	< 0.02			0.020			
10/20/2010	12:28	090130		B				13.6	7.8	28.0											
11/10/2010	10:24	090130				10.0	3.5	8.0	9.1	27.3		8.0	40	20	0.028			0.025			
11/10/2010	10:28	090130		B				8.0	9.1	27.3											
12/9/2010	10:46	090130				8.5	2.0	0.4	11.4	28.4		8.1	< 20	< 20	< 0.02			0.027			
12/9/2010	10:47	090130		B				0.3	11.4	28.5											
2/17/2011	11:10	090130				8.5	2.5	1.4	12.3	26.1		8.3	20	20	0.072			0.008			
2/17/2011	11:11	090130		B				1.7	12.4	26.2											
3/15/2011	10:59	090130				8.0	4.0	6.3	9.8	26.4		7.9	< 20	< 20	< 0.02			0.037			
3/15/2011	11:00	090130		B				6.2	9.9	26.4											
4/7/2011	10:58	090130				9.0	8.0	8.1	10.0	25.6		8.1	< 20	< 20	0.049			0.123			
4/7/2011	11:00	090130		B				8.2	9.9	26.2											
5/6/2011	9:38	090130				10.0	6.5	14.5				8.5									
5/6/2011	9:40	090130		B				14.4													
5/19/2011	9:40	090130				9.5	3.5	16.6	8.2	25.3		8.4	< 20	< 20	< 0.02			< 0.005			
5/19/2011	9:41	090130		B				16.6	7.7	25.4											
6/23/2011	10:29	090130				10.5	9.5	24.2	5.9	23.9		7.7	< 20	< 20	0.110			0.048			
6/23/2011	10:30	090130		B				24.3	5.9	23.9											
7/27/2011	10:40	090130				12.0	2.5	26.7	7.2	25.2		8.0	170	< 20	< 0.02			< 0.005			
7/27/2011	10:42	090130		B				26.7	5.4	25.8											
8/11/2011	10:54	090130				10.0	3.5	25.7	5.9	25.2		7.9	< 20	< 20	0.077			0.022			
8/11/2011	10:55	090130		B				25.6	5.7	25.3											
8/31/2011	10:36	090130				9.0	7.5	22.3	8.7	24.8		7.8									
8/31/2011	10:37	090130		B				22.4	6.2	25.2											
9/14/2011	11:03	090130				10.0	5.0	22.9	6.2	25.6		7.6	< 20	< 20	0.156			0.058			
9/14/2011	11:04	090130		B				22.9	6.2	25.6											
10/18/2011	10:15	090130				9.5	1.5	15.2	8.5	24.7		8.1	40	20	< 0.02			< 0.005			
10/18/2011	10:16	090130		B				15.0	8.2	24.8											
10/26/2011	10:01	090130				9.5	1.5	13.0	9.5	24.7		8.1	20	< 20	< 0.02			0.008			
10/26/2011	10:02	090130		B				13.0	8.9	24.7											
11/9/2011	10:11	090130				9.5	2.0	10.6	12.1	23.5		8.2									
11/9/2011	10:12	090130		B				9.9	10.0	24.2											
11/16/2011	10:49	090130				9.0	1.5	10.9	9.8	24.1		8.2	< 20	< 20	< 0.02			0.044			
11/16/2011	10:50	090130		B				10.7	8.0	25.5											
11/30/2011	11:55	090130				10.5	1.0	10.8	8.9	24.0		8.0									
11/30/2011	11:56	090130		B				10.8	8.9	24.0		7.9									
12/14/2011	10:47	090130				9.5	2.5	6.1	10.9	24.1		8.1	80	< 20	0.115			0.227			
12/14/2011	10:48	090130		B				6.1	10.6	24.9		8.1									
1/25/2012	10:34	090130				9.0	3.5	2.0	11.9	25.0		8.1	< 20	< 20	< 0.02			0.134			
1/25/2012	10:36	090130		B				2.0	12.0	25.0		8.2									
2/22/2012	10:21	090130				10.5	6.0	4.3	11.4	27.1		8.4	40	20	0.051			0.076			
2/22/2012	10:25	090130		B				4.3	11.2	27.1		8.4									
3/7/2012	11:22	090130				9.0	5.0	5.0	11.4	27.0		8.4	< 20	< 20	< 0.02			0.038			
3/7/2012	11:23	090130		B				5.0	11.4	27.0		8.5									
4/18/2012	11:09	090130				9.0	6.5	15.9	8.6	28.1		8.1	100	< 20	< 0.02			< 0.005			

SCDHS Sample Station 090130 Results

Date	Time	BayStatior	Diurnal	Location	Replicate	Depth (ft)	Secchi (ft)	Temp (C)	D.O. (mg/l)	Sal (psu)	Cond (uS/cm)	pH	T. Coliform (MPN/100 ml)	F. Coliform (MPN/100 ml)	NH3 (mg/l)	NO2 (mg/l)	NO3 (mg/l)	NOx (mg/l)	Urea (mg/l)	TKN (mg/l)	DKN (mg/l)
4/18/2012	11:10	090130		B				15.5	8.6	28.4		8.2									
5/23/2012	11:16	090130				9.5	4.5	19.3	7.5	27.1		8.4	< 20	< 20	< 0.02			< 0.005			
5/23/2012	11:17	090130		B				19.1	7.5	27.4											
6/21/2012	10:51	090130				9.0	5.5	25.2	8.2	24.4		8.3	130	< 20	< 0.02			0.016			
6/21/2012	10:53	090130		B				23.7	7.7	26.0		8.2									
7/18/2012	10:58	090130					2.0	27.5	6.5	25.7		8.3	< 20	< 20	< 0.02			< 0.005			
7/18/2012	10:59	090130		B				27.4	6.4	25.7		8.3									
8/2/2012	10:32	090130				10.0	3.0	26.3	9.2	25.2		8.4	20	< 20	< 0.02			< 0.005			
8/2/2012	10:34	090130		B				25.4	7.2	25.9		8.2									
9/20/2012	10:59	090130					1.0	20.2	7.9	25.1		8.0	20	< 20	< 0.02			< 0.005			
9/20/2012	11:00	090130		B				20.2	7.9	25.0		8.0									
10/17/2012	10:34	090130					2.0	14.2	9.8	25.9		8.1	< 20	< 20	< 0.02			< 0.005			
10/17/2012	10:35	090130		B				14.4	9.0	26.1		8.0									
11/15/2012	12:37	090130				8.0	3.5	7.4	10.5	27.9		7.9	20	< 20	0.053			0.041			
11/15/2012	12:38	090130		B				7.4	10.6	28.0		7.9									
12/19/2012	11:22	090130				8.5	2.0	6.8	9.8	27.4		7.5	20	20	< 0.02			0.016			
12/19/2012	11:23	090130		B				6.8	9.7	27.4		7.6									
1/10/2013	10:33	090130				8.0	2.0	2.3	12.5	26.9		7.1	< 20	< 20	0.051			0.056			
1/10/2013	10:34	090130		B				2.2	12.4	26.9		7.1									
3/13/2013	11:06	090130				9.5	3.0	6.2	10.8	30.2		7.8	20	< 20	< 0.02			0.011			
3/13/2013	11:07	090130		B				6.3	10.6	31.4		7.7									
3/28/2013	10:42	090130				10.0	6.5	5.5	10.4	29.3		8.2	< 20	< 20	< 0.02			0.032			
3/28/2013	10:44	090130		B				5.4	10.0	29.3		8.1									
4/10/2013	10:26	090130				9.0	6.0	12.8	9.8	27.8		8.1	< 20	< 20	< 0.02			0.092			
4/10/2013	10:27	090130		B				11.8	10.1	28.8		8.0									
4/25/2013	11:40	090130				8.5	3.0	11.8	9.5	28.8		8.1	< 20	< 20	< 0.02			< 0.005			
4/25/2013	11:41	090130		B				11.4	9.4	29.5		8.0									
5/14/2013	10:48	090130				7.5	4.5	15.3	8.9	29.4		7.3	< 20	< 20	< 0.02			< 0.005			
5/14/2013	10:49	090130		B				15.2	8.9	29.3		7.3									
5/29/2013	10:29	090130				7.5	3.5	16.8	7.3	28.0		7.5	< 20	< 20	< 0.02			0.007			
5/29/2013	10:30	090130		B				16.1	7.1	28.6		7.4									
6/11/2013	11:14	090130				9.0	2.5	20.9	7.3	26.7		7.4	< 20	< 20	< 0.02			< 0.005			
6/11/2013	11:15	090130		B				20.9	7.2	26.7		7.4									
6/26/2013	11:04	090130				8.5	2.5	25.8	6.3	26.6		7.5	< 20	< 20	< 0.02			0.007			
6/26/2013	11:05	090130		B				25.7	6.4	26.6		7.5									
7/10/2013	11:53	090130				9.0	2.0	27.5	5.9	26.6		7.8	40	20	< 0.02			< 0.005			
7/10/2013	11:54	090130		B				27.4	5.9	26.6		7.8									
7/23/2013	10:03	090130				10.0	2.5	28.1	5.9	27.2		7.6	< 20	< 20	< 0.02			< 0.005			
7/23/2013	10:04	090130		B				28.2	5.8	27.3		7.6									
8/22/2013	11:01	090130				9.0	2.0	24.6	6.2	28.0		8.2			< 0.02			< 0.005			
8/22/2013	11:02	090130		B				24.5	5.9	28.1		8.2									
9/5/2013	9:20	090130				8.5	2.0	23.3	6.9	24.5		7.9	80	20	< 0.02			< 0.005			
9/5/2013	9:22	090130		B				23.3	6.7	24.5		8.0									
9/19/2013	11:29	090130				9.0	1.5	18.6	7.8	28.3		8.3	< 20	< 20	< 0.02			< 0.005			
9/19/2013	11:30	090130		B				18.0	7.4	28.6		8.3									
10/9/2013	9:30	090130				8.5	2.0	18.5	7.3	28.7	44,250	8.1	70	40	0.063			0.006			
10/9/2013	9:31	090130		B				18.5	7.2	28.7											
10/22/2013	10:44	090130				8.5	1.5	15.5	7.7	29.5		8.2	< 20	< 20	< 0.02			< 0.005			
10/22/2013	10:45	090130		B				15.4	7.7	29.5		8.2									
11/6/2013	10:54	090130				9.0	2.0	10.5	10.3	29.7		8.1	< 20	< 20	< 0.02			0.006			
11/6/2013	10:55	090130		B				10.3	9.6	29.9		8.0									

SCDHS Sample Station 090130 Results

Date	Time	BayStatior	Diurnal	Location	Replicate	Depth (ft)	Secchi (ft)	Temp (C)	D.O. (mg/l)	Sal (psu)	Cond (uS/cm)	pH	T. Coliform (MPN/100 ml)	F. Coliform (MPN/100 ml)	NH3 (mg/l)	NO2 (mg/l)	NO3 (mg/l)	NOx (mg/l)	Urea (mg/l)	TKN (mg/l)	DKN (mg/l)
11/21/2013	10:04	090130				8.0	2.5	5.5	9.5	29.9		8.2	20	20	0.075			0.011			
11/21/2013	10:05	090130		B				5.7	9.3	30.0		8.2									
12/4/2013	10:38	090130				9.5	5.0	3.7	10.9	29.1		8.4	< 20	< 20	0.149			0.089			
12/4/2013	10:39	090130		B				3.9	10.2	30.1		8.1									
12/19/2013	12:06	090130				19.0	3.5	0.1	13.9	28.8		8.3	< 20	< 20	0.026			0.061			
12/19/2013	12:07	090130		B				0.1	13.8	28.8		8.3									

SCDHS Sample Station 090130 Results

Date	TN (mg/l)	DN (mg/l)	TPO4 (mg/l)	DPO4 (mg/l)	TP (mg/l)	DP (mg/l)	o-PO4 (mg/l)	TOC (mg/l)	DOC (mg/l)	SiO3 (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	TSS (mg/l)	T. Chl-a (ug/l)	F. Chl-a (ug/l)	Aureo (cells/ml)	Flowinst (MGD)	Flow24 (MGD)
9/14/1976			0.22	0.06										19.0				
9/17/1976			0.21	0.08										27.2				
9/18/1976																		
9/18/1976			0.21	0.07										32.6				
9/19/1976																		
9/21/1976																		
9/23/1976			0.15	0.04										35.0				
3/7/1977			0.05	0.01			0.02											
4/13/1977			0.07	0.02			0.02											
4/25/1977			0.08	0.03			0.02											
6/27/1977							0.02											
7/11/1977							0.03											
7/27/1977			0.20	0.06			0.04											
8/9/1977			0.16	0.04			0.02											
8/23/1977			0.14	0.13			0.04											
9/7/1977			0.11	0.05			0.03											
9/19/1977			0.12	0.04			0.03											
10/4/1977			0.12	0.03			0.02											
10/24/1977			0.08	0.03			0.01											
11/9/1977			0.09	0.03			0.02											
11/21/1977			0.06	0.02			0.02											
12/15/1977			0.06	0.01			0.01											
3/29/1978			0.04	0.01			0.01											
4/10/1978			0.03	0.01			0.01											
4/24/1978			0.05	0.02			0.02											
5/22/1978			0.05	0.02			0.01											
6/6/1978			0.04	0.02			0.02											
6/21/1978			0.05	0.04			0.02											
7/5/1978			0.07	0.02			0.02											
7/17/1978			0.10	0.03			0.02											
8/1/1978			0.10	0.04			0.03											
8/14/1978			0.10	0.04			0.02											
8/31/1978			0.12	0.04			0.03											
10/12/1978			0.11	0.03			0.03											
11/15/1978			0.07	0.02			0.02											
4/18/1979			0.04				0.02											
5/2/1979			0.06	0.02			0.02											
5/16/1979			0.04	0.02			0.01											
5/28/1979			0.10	0.02			0.04											
6/21/1979			0.07	0.02			0.03											
7/11/1979			0.12	0.03			0.03											
8/1/1979			0.11	0.04			0.04											
8/22/1979			0.07				0.01											
9/18/1979			0.09	0.04			0.02											
9/25/1979			0.08	0.03			0.01											
10/31/1979			0.03	0.02			0.01											
11/14/1979			0.03	0.02			0.02											
6/4/1980			0.04	0.01			0.03											
6/18/1980			0.04	0.04			0.01											
3/9/1981			0.01	0.01			0.01											
4/1/1981							0.01											

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Date	TN (mg/l)	DN (mg/l)	TPO4 (mg/l)	DPO4 (mg/l)	TP (mg/l)	DP (mg/l)	o-PO4 (mg/l)	TOC (mg/l)	DOC (mg/l)	SiO3 (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	TSS (mg/l)	T. Chl-a (ug/l)	F. Chl-a (ug/l)	Aureo (cells/ml)	Flowinst (MGD)	Flow24 (MGD)
4/8/1981			0.03	0.03			0.00											
4/22/1981			0.01				0.01											
5/6/1981							0.01											
7/6/1981			0.04	0.00			0.01											
8/12/1981			0.09	0.03			0.01											
9/14/1981			0.09	0.04			0.01											
9/28/1981			0.07	0.08			0.01											
2/23/1982			0.02	0.01			0.00											
3/30/1982			0.04	0.00			0.00											
8/15/1983			0.08	0.05			0.01											
6/19/1984			0.05	0.02			0.00											
6/26/1984			0.07	0.02			< 0.002											
7/3/1984			0.10	0.02			0.00											
8/14/1984			0.09	0.03			0.01											
9/24/1984			0.11	0.06			0.01											
10/9/1984							0.00											
11/27/1984			0.05				0.01											
5/6/1985							0.00											
6/19/1985			0.13	0.04			0.01									1,134,880		
8/13/1985			0.13				0.01											
9/3/1985			0.13				0.01									1,025,890		
11/13/1985			0.07	0.03			0.01											
11/19/1985			0.08	0.02			0.01											
12/9/1985			0.06	0.03			0.01											
12/10/1985			0.08	0.03			0.01											
7/9/1986			0.15	0.04			0.01									147,050		
3/25/1987			0.04	0.01			0.01											
6/23/1988			0.18	0.07			0.01			1.35				29.3	26.2	294,100		
6/28/1988			0.14	0.10			0.01			1.59				31.1	27.6	202,987		
7/7/1988			0.16	0.07			0.01			1.73				20.3	23.4	265,123		
7/25/1988														29.1	27.1	6,747		
8/1/1988														18.3	17.8	346		
8/10/1988														21.4	22.7			
9/7/1988														14.8	11.9			
9/14/1988														22.9	18.1	346		
9/21/1988							0.01			0.88				22.1	15.7			
10/5/1988														18.8	18.3			
11/9/1988							0.01	5.00	4.50	0.20				8.1	7.3			
12/1/1988							0.01	4.20	2.70	< 0.028				16.3	6.2	2,941		
1/30/1989			0.06	0.06			0.01	2.50	0.90	0.03				9.3	6.0			
4/10/1989			0.07	0.04			< 0.005	3.60	1.50	0.41						897		
5/3/1989			0.11	0.04			0.01	6.50		0.33				43.0	10.3	363		
5/22/1989			0.04	0.04			< 0.005	4.28	3.67	0.49				6.0	4.3	104		
6/12/1989			0.05	< 0.01			0.01	4.60	3.71	0.59				8.2	6.0			
7/10/1989			0.10	0.04			0.01							28.0	24.0	829		
7/24/1989			0.07	< 0.01			< 0.005			1.83				26.0	25.0	1,352		
8/8/1989			0.11	0.04			0.01							32.0	28.0	933		
8/31/1989			0.08	0.05			0.01			1.59				19.0	19.0	1,141		
9/12/1989			0.10	0.07			0.01			1.79				22.0	17.0	2,592		
9/27/1989			0.09	0.05			0.01							33.0	28.0	2,800		
10/12/1989			0.12	0.10			0.01			2.03				26.0	23.0			

SCDHS Sample Station 090130 Results

Date	TN (mg/l)	DN (mg/l)	TPO4 (mg/l)	DPO4 (mg/l)	TP (mg/l)	DP (mg/l)	o-PO4 (mg/l)	TOC (mg/l)	DOC (mg/l)	SiO3 (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	TSS (mg/l)	T. Chl-a (ug/l)	F. Chl-a (ug/l)	Aureo (cells/ml)	Flowinst (MGD)	Flow24 (MGD)
11/8/1989			0.05	< 0.01			0.01	6.40	4.10	1.60				24.5	22.0	207		
11/27/1989			0.07	0.04			< 0.005	5.10	3.30	1.29				11.0	10.0			
3/19/1990			0.07	0.06			< 0.005	3.30	2.60	0.28				8.3	7.0			
4/9/1990			0.06	0.04			0.01	3.50	2.80	0.17				11.0	10.0			
5/1/1990			0.08	0.04			< 0.005	4.30	3.50	0.09				14.5	10.5	207		
5/15/1990			0.06	< 0.01			0.01			0.56								
6/13/1990			0.05	< 0.01			< 0.005			0.72						415		
7/18/1990			0.08	< 0.01			0.01			3.22						3,108		
8/8/1990			0.10	0.05			0.01			3.38						1,589		
10/11/1990			0.07	< 0.01			0.01			2.09						454		
12/12/1990			0.05	0.04			< 0.005			0.41				14.5	13.5	6,583		
1/15/1991			0.05	0.03			< 0.005			0.47				10.7	8.7	5,221		
3/18/1991			0.04	< 0.01			< 0.005			0.35				8.5	7.7	227		
4/8/1991			0.05	< 0.01			< 0.005			0.32				7.0	7.2	57		
5/8/1991			0.04	< 0.01			< 0.005			0.26				7.5	6.7			
6/11/1991			0.11	< 0.01			0.01			1.85				5.2	5.0			
7/10/1991																454		
7/16/1991																726		
8/14/1991																1,961		
10/2/1991																227		
12/10/1991			0.05	< 0.01			< 0.005	5.00	3.70	0.83						5,181		
4/8/1992			< 0.01	< 0.01			< 0.005	4.40	3.20	0.25				9.2	8.7	54,066		
5/11/1992			0.07	0.04			< 0.005	5.30	4.10	0.16				11.0	10.0	67,403		
6/17/1992			0.05	< 0.01			0.01			0.25				15.5	16.0	344,956		
6/25/1992																410,134		
6/30/1992			0.09	< 0.01			< 0.005			0.60				21.0	21.0	326,800		
7/17/1992																66,350		
7/30/1992			0.11	0.03			0.01	11.40	6.90	2.19				47.9	32.9	52,424		
8/12/1992			0.06	< 0.01			0.02	11.50	8.00	2.84				28.0	26.8	5,767		
8/19/1992			0.09	0.03			0.01	10.80	7.00	2.34				30.7	31.4	33,540		
8/26/1992			0.10	0.03			0.01	11.70	7.10	2.59				22.5	23.0	5,882		
9/2/1992			0.21	0.05			0.01	10.80	6.80	2.65				25.3	17.3	4,704		
9/10/1992			0.09	0.04			0.01	10.60	7.40	2.59				28.6	26.0	22,978		
10/8/1992			0.11	< 0.01			0.01	10.90	6.30	2.59				18.0	16.0	121,461		
10/15/1992			0.10	0.03			< 0.005	10.80	6.70	2.07				22.6	23.3	90,381		
10/28/1992			0.08	< 0.01			< 0.005	9.90	5.80	1.45				23.0	24.0	155,814		
11/18/1992			0.11	< 0.01			< 0.005	7.20	4.10	1.23				23.0	20.0	207,881		
12/7/1992			0.10	< 0.01			< 0.005	8.20	4.70	0.82				19.0	19.0	105,626		
12/23/1992			0.06	< 0.01			0.01	3.90	2.70	0.73				21.5	15.5	184,506		
1/14/1993			0.05	< 0.01			< 0.005	4.10	2.70	0.73				31.9	32.9	172,932		
3/2/1993			0.07	0.04			< 0.005	2.73	2.34	0.56				6.7	6.7	1,300		
3/16/1993			0.18	< 0.01			< 0.005	4.04	2.17	0.43				13.1	6.6	371		
4/12/1993			< 0.01	< 0.01			< 0.005	2.22	1.86	0.17				6.0	5.3			
5/17/1993			< 0.01	< 0.01			< 0.005	3.53	2.75	0.11				12.6	11.6			
6/14/1993			0.07	0.05			0.01	4.88	4.10	0.36				7.2	6.8			
8/23/1993			0.12	0.06			0.03	7.86	5.29	3.81				30.1	28.7	2,377		
9/16/1993			0.12	0.06			0.01	7.65	5.23	3.60				25.1	26.1	2,918		
10/7/1993			0.16	0.07			0.05	6.90	4.75	2.56				23.1	22.5	67		
10/14/1993			0.11	0.05			0.04	6.42	4.45	2.05				15.7	13.3			
11/10/1993			0.07	0.04			0.03	4.55	3.64	1.15				11.5	9.8	1,176		
12/9/1993			0.03	< 0.01			0.01	3.72	2.73	0.26				14.4	12.6	756		

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Date	TN (mg/l)	DN (mg/l)	TPO4 (mg/l)	DPO4 (mg/l)	TP (mg/l)	DP (mg/l)	o-PO4 (mg/l)	TOC (mg/l)	DOC (mg/l)	SiO3 (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	TSS (mg/l)	T. Chl-a (ug/l)	F. Chl-a (ug/l)	Aureo (cells/ml)	Flowinst (MGD)	Flow24 (MGD)
3/23/1994			0.04	< 0.01			0.13	2.07	1.76	0.30								
4/20/1994			0.04	0.03			< 0.005	3.02	2.44	0.16				6.8	5.6			
5/11/1994			0.07	0.02			0.01	4.19	3.88	0.25				4.2	3.5			
6/2/1994			0.06	< 0.01			0.01	3.77	2.87	0.13				13.6	11.8	1,566		
6/23/1994			0.06	0.04			0.01	6.23	4.59					13.1	13.6	1,226		
7/7/1994																		
7/7/1994			0.10	0.04			< 0.005	6.44	4.54					13.6	13.1	7,906		
7/20/1994																		
7/20/1994			0.10	0.05			0.01	7.51	5.18					18.6	18.1			
8/3/1994			0.09					6.93								545		
8/17/1994																		
8/17/1994			0.07	0.05			0.01	7.31	5.76					17.2	16.3	884		
9/14/1994			0.19	0.03			< 0.005	7.44	5.23					14.9	14.5			
10/26/1994			0.06	< 0.01			0.01	6.93	4.46					11.2	11.9	272		
11/23/1994			0.14	0.03			< 0.005	4.91	2.93					19.8	19.8	25,123		
12/14/1994			0.07	< 0.01			0.01	4.07	2.20					21.3	19.9	258,172		
1/31/1995			0.06	0.03			< 0.005	4.07	2.71					15.2	16.2	138,681		
3/29/1995			0.04	< 0.01			< 0.005	3.86	2.84					4.2	6.3	680		
5/16/1995			0.09	0.06			< 0.005	4.10	3.64					11.3	10.7	17,974		
6/21/1995			0.11	0.05			< 0.005	6.84	4.83					18.1	18.1	170,753		
7/5/1995			0.12	0.07			< 0.005	8.65	4.59					25.5	25.5	313,728		
7/19/1995			0.21	0.16			0.01	7.90	5.72					25.0	26.0	98,857		
8/2/1995			0.20	0.12			0.01	8.60	6.35					21.5	22.8	1,362		
8/16/1995			0.16	0.07			0.01	10.10	6.58					24.2	10.1	817		
8/30/1995			0.20	0.13			0.01	9.49	6.55					18.8	20.1	1,362		
3/19/1996			0.10	0.08			< 0.005	2.94	2.16					16.6	7.5			
3/19/1996																		
5/1/1996			0.05	0.04			0.02	4.02	2.95					28.7	24.3	136		
5/1/1996																		
6/13/1996			0.05	0.03			0.01	4.46	3.30	0.14				12.6	11.9	1,226		
6/13/1996																		
7/2/1996			0.12	0.05			< 0.005	6.48	4.03	0.63				23.2	20.7	16,340		
7/16/1996			0.13	0.06			0.01	6.75	4.48	0.84				33.8	31.4	30,328		
7/16/1996																		
8/8/1996			0.12	0.06			0.01	7.46	4.83	0.93				41.5	37.6	1,496		
8/8/1996																		
8/20/1996			0.06	< 0.010			0.01	8.14	5.56	1.53				41.3	44.2	136		
8/20/1996																		
9/25/1996			0.06	0.01			0.01	7.32	4.58	0.83				61.7	41.2	1,768		
9/25/1996																		
11/19/1996			0.09	0.06			0.01	4.84	3.68	0.79				19.4	19.2	34,544		
11/19/1996																		
12/4/1996			0.05	0.01			< 0.005	4.77	3.03	0.32				54.9	53.9	102,544		
12/4/1996																		
2/6/1997			0.03	0.02			< 0.005	4.00	2.56	< 0.028				19.5	16.4	68		
2/6/1997																		
3/5/1997			0.03	< 0.01			< 0.005	3.46	2.81	< 0.028				9.9	8.8			
3/5/1997																		
3/25/1997			0.04	0.03			< 0.005	2.68	2.31	0.11				8.0	7.7			
3/25/1997																		
5/7/1997			0.05	0.03			0.01	3.83	3.17	< 0.028				29.5	16.4			

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Date	TN (mg/l)	DN (mg/l)	TPO4 (mg/l)	DPO4 (mg/l)	TP (mg/l)	DP (mg/l)	o-PO4 (mg/l)	TOC (mg/l)	DOC (mg/l)	SiO3 (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	TSS (mg/l)	T. Chl-a (ug/l)	F. Chl-a (ug/l)	Aureo (cells/ml)	Flowinst (MGD)	Flow24 (MGD)
5/7/1997																		
6/26/1997			0.05	0.04			< 0.005	4.36	3.84	0.20				7.3	6.5	408		
6/26/1997																		
7/9/1997			0.08	0.05			< 0.005	5.85	3.38	0.76				20.0	20.0	57,190		
7/9/1997																		
8/5/1997			0.06	0.03			0.06	7.03	5.26	16.70				33.6	25.2	1,226		
8/5/1997																		
10/14/1997			0.07	0.05			< 0.005	9.29	6.02	0.49				21.0	18.6	409		
10/14/1997																		
12/4/1997			0.06	0.01			< 0.005	4.56	3.56	0.34				15.8	16.3	38,671		
12/4/1997																		
2/19/1998			0.04	0.02			< 0.005	2.64	2.06	0.17				7.5	7.0	24,510		
2/19/1998																		
3/31/1998			0.04	0.03			< 0.005	3.42	2.72	0.22				9.6	8.1	613		
3/31/1998																		
4/28/1998			0.08	0.08			< 0.005	4.48	3.53	< 0.028				15.1	12.3	4,357		
4/28/1998																		
5/6/1998			0.02	0.02			< 0.005	4.62	3.63	< 0.028				12.7	8.8	5,923		
5/6/1998																		
5/19/1998			0.05	0.02			< 0.005	3.77	3.30	0.06				7.0	5.6	38,263		
5/19/1998																		
6/4/1998			0.04	0.03			< 0.005	5.25	3.91	0.14				15.4	13.1	11,574		
6/4/1998																		
6/16/1998			0.08	0.03			< 0.005	5.14	3.57	0.35				24.0	22.0	28,187		
6/16/1998																		
7/1/1998			0.18	0.05			0.01	7.83	3.31	1.96				28.2	30.0	136		
7/1/1998																		
7/15/1998			0.07	0.05			0.01	9.07	5.01	2.02				32.9	38.6	136		
7/15/1998																		
8/12/1998			0.11	0.05			0.01	10.80	7.05	2.39				40.4	32.2	136		
8/12/1998																		
9/9/1998			0.05	0.04			0.01	10.00	6.96	1.36				33.6	33.6	272		
9/9/1998																		
10/15/1998			0.10	0.05			0.01	8.45	6.14	0.78				18.4	20.6	136		
10/15/1998																		
10/27/1998			0.06	0.03			< 0.005	7.85	5.68	0.58				12.8	12.7			
10/27/1998																		
11/18/1998			0.08	0.05			< 0.005	6.44	5.29	0.37				12.2	10.2	68		
11/18/1998																		
12/16/1998			0.05	0.03			< 0.005	4.95	3.89	0.18				12.5	11.7			
12/16/1998																		
1/20/1999			0.12	0.09			< 0.005	3.29	2.81	0.27				5.9	4.7			
1/20/1999																		
2/9/1999			0.03	0.01			< 0.005	3.68	3.01	0.20				8.6	5.0	68		
2/9/1999																		
3/2/1999			0.06	0.03			< 0.005	3.57	2.44	0.04				6.6	2.8			
3/2/1999																		
3/17/1999			0.05	0.03			0.01	3.21	2.57	0.06				4.8	2.2			
3/17/1999																		
3/31/1999			0.04	0.03			< 0.005	2.94	2.39	< 0.028				5.4	2.1			
3/31/1999																		

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Date	TN (mg/l)	DN (mg/l)	TPO4 (mg/l)	DPO4 (mg/l)	TP (mg/l)	DP (mg/l)	o-PO4 (mg/l)	TOC (mg/l)	DOC (mg/l)	SiO3 (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	TSS (mg/l)	T. Chl-a (ug/l)	F. Chl-a (ug/l)	Aureo (cells/ml)	Flowinst (MGD)	Flow24 (MGD)
4/14/1999			0.03	0.02			< 0.005	3.06	2.62	< 0.028				10.9	5.2	136		
4/28/1999			0.07	0.06			< 0.005	3.59	2.85	0.04				9.8	6.5			
4/28/1999																		
5/10/1999			0.05	0.03			< 0.005	3.41	2.68	< 0.028				5.5	4.4			
5/10/1999																		
5/27/1999			0.04	0.02			< 0.005	3.31	3.18	0.03				3.3	2.1			
5/27/1999																		
6/9/1999			0.04	0.03			< 0.005	3.32	3.15	0.40				2.0	1.9			
6/9/1999																		
6/22/1999			0.03	0.03			0.01	3.34	3.22	0.68				2.2	2.1	749		
6/22/1999																		
7/14/1999			0.04	0.03			< 0.005	3.67	2.96	0.60				2.8	0.4			
7/14/1999																		
7/27/1999			0.04	0.03			< 0.005	4.12	3.72	0.06				6.0	2.4			
7/27/1999																		
8/26/1999			0.05	0.03			0.01	5.37	4.31	1.01				6.9	3.5			
8/26/1999																		
9/9/1999			0.06	0.03			< 0.005	5.32	4.31	0.06				13.2	10.8	68		
9/9/1999																		
9/28/1999			0.05	0.02			< 0.005	4.79	3.73	0.81				11.3	10.4	10,213		
9/28/1999																		
10/27/1999			0.06	0.02			< 0.005	5.99	3.87	0.38				21.4	21.8	130,720		
10/27/1999																		
11/9/1999			0.06	0.03			0.01	5.68	3.99	0.82						152,779		
11/9/1999																		
11/23/1999			0.07	0.04			0.01	4.84	3.73	1.00				16.3	15.5			
11/23/1999																		
12/2/1999			0.12	0.03			0.01	6.03	4.01	1.19						499,732		
12/2/1999																		
12/8/1999			0.08	0.05			0.01	6.31	3.97	0.86				48.7	46.2	275,738		
12/8/1999																		
12/16/1999			0.08	0.05			0.01	4.27	2.65	0.76				32.6	32.4	311,141		
12/16/1999																		
12/21/1999			0.08	0.02			0.01	4.96	3.58	0.89				45.6	46.0	369,284		
12/21/1999																		
12/29/1999			0.09	0.03			0.01	5.35	3.78	1.05						223,313		
12/29/1999																		
1/5/2000			0.10	0.04			< 0.005	4.69	3.36	0.82				10.9	8.1	60,254		
1/5/2000																		
1/13/2000			0.10	0.05			0.01	4.10	3.35	0.76						289,218		
1/13/2000																		
2/17/2000			0.07	0.04			< 0.005	3.44	2.99	0.63						1,257		
2/17/2000																		
2/28/2000			0.07	0.03			< 0.005	3.28	2.85	0.64						2,723		
2/28/2000																		
3/8/2000			0.05	0.02			< 0.005	3.35	3.07	0.23				7.8	5.2	9,967		
3/8/2000																		
4/13/2000			0.08	0.04			< 0.005	3.77	3.14	0.23						60,892		
4/13/2000																		
4/27/2000			0.10	0.03			< 0.005	4.70	3.34	0.36				35.2	32.0	267,976		
4/27/2000																		

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Date	TN (mg/l)	DN (mg/l)	TPO4 (mg/l)	DPO4 (mg/l)	TP (mg/l)	DP (mg/l)	o-PO4 (mg/l)	TOC (mg/l)	DOC (mg/l)	SiO3 (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	TSS (mg/l)	T. Chl-a (ug/l)	F. Chl-a (ug/l)	Aureo (cells/ml)	Flowinst (MGD)	Flow24 (MGD)
5/17/2000																647,764		
5/24/2000			0.10	0.02			< 0.005	6.32	4.44	0.43						296,571		
5/24/2000																		
6/8/2000			0.09	0.01			< 0.005	5.50	3.15	0.27				23.4	19.7	689,344		
6/8/2000																		
6/20/2000			0.08	0.02			< 0.005	6.21	5.08	0.78				38.7	38.4			
6/20/2000																		
6/28/2000																216,304		
6/30/2000																216,304		
7/5/2000			0.09	0.02			< 0.005	9.64	6.48	0.75				16.4	15.4			
7/5/2000																		
7/10/2000																		
7/18/2000			0.13	0.04				10.61	7.12					2.7	4.8			
7/18/2000																		
7/25/2000																		
7/25/2000																		
8/1/2000			0.14	0.03			0.01	10.20	6.43	1.31				14.0	16.1			
8/1/2000																		
8/15/2000			0.14	0.04			0.01	9.86	6.74	1.46				11.5	19.5			
8/15/2000																		
8/29/2000	0.69	0.52			0.11	0.05	< 0.005	10.90	7.70	1.31				17.5	17.6			
8/29/2000																		
9/6/2000																15,495		
9/6/2000																		
9/12/2000	0.77	0.54			0.11	0.05	0.01	9.88	6.46	2.01				14.7	17.3			
9/12/2000																		
9/27/2000	0.76	0.51			0.09	0.03	0.01	8.82	6.07	1.75				33.7	30.9			
9/27/2000																		
11/8/2000	0.72	0.56			0.06	< 0.025	< 0.005	9.13	5.43	1.14				21.0	21.0			
11/8/2000																		
11/21/2000	0.65	0.53			0.06	< 0.025	< 0.005	5.65	4.57	1.03				12.6	11.0			
11/21/2000																		
12/6/2000	0.71	0.67			0.03	< 0.025	0.01	4.95	4.46	0.87				7.6	7.2			
12/6/2000																		
2/1/2001	0.70	0.62			0.03	< 0.025	< 0.005	4.41	3.27	0.37								
2/1/2001																		
2/15/2001	0.60	0.53			0.03	< 0.025	< 0.005	3.59	2.64	0.15				4.5	3.6			
2/15/2001																		
2/26/2001	0.54	0.51			< 0.025	< 0.025	< 0.005	3.53	2.38	0.12				8.6	5.0			
2/26/2001																		
3/13/2001	0.53	0.51			< 0.025	< 0.025	< 0.005	3.27	2.02	0.19								
3/13/2001																		
3/27/2001	0.55	0.47			0.03	< 0.025	< 0.005	3.19	2.13	0.18				5.9		1,089		
3/27/2001																		
4/9/2001																424		
4/23/2001	0.37	0.30			0.04	< 0.025	< 0.005	4.24	3.10	0.64				5.3				
4/23/2001																		
5/8/2001	0.39	0.31			< 0.025	< 0.025	< 0.005	4.55	3.29	0.06				6.3				
5/8/2001																		
5/24/2001	0.41	0.38			< 0.025	< 0.025	< 0.005	3.64	3.19	0.45				4.5				
5/24/2001																		

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Date	TN (mg/l)	DN (mg/l)	TPO4 (mg/l)	DPO4 (mg/l)	TP (mg/l)	DP (mg/l)	o-PO4 (mg/l)	TOC (mg/l)	DOC (mg/l)	SiO3 (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	TSS (mg/l)	T. Chl-a (ug/l)	F. Chl-a (ug/l)	Aureo (cells/ml)	Flowinst (MGD)	Flow24 (MGD)
6/5/2001	0.31	0.29			< 0.025	< 0.025	< 0.005	3.75	2.79	0.51				8.9		8,365		
6/5/2001																		
6/19/2001	0.42	0.39			< 0.025	< 0.025	< 0.005	3.41	3.32	0.68				3.4				
6/19/2001																		
6/27/2001																272		
6/27/2001																		
7/3/2001	0.32	0.28			< 0.025	< 0.025	< 0.005	4.03	3.93	0.97				2.3				
7/3/2001																		
7/11/2001																		
7/11/2001																		
7/17/2001	0.43	0.30			0.03	< 0.025	0.01	6.25	4.12	1.84				11.5		883		
7/17/2001																		
7/31/2001	0.56	0.39			0.07	< 0.025	0.01	7.76	4.88	3.04				21.4		240		
7/31/2001																		
8/14/2001	0.66	0.39			0.09	0.03	0.01	8.09	4.64	2.20				25.2				
8/14/2001																		
8/28/2001	0.77	0.47			0.09	< 0.025	0.01	9.05	5.55	2.26				22.9				
8/28/2001																		
9/12/2001	0.59	0.41			0.09	0.05	0.02	7.40	5.36	3.02				15.3				
9/12/2001																		
10/4/2001	0.43	0.32			0.04	0.03	0.01	5.15	4.41	1.37				7.9		3,870		
10/4/2001																		
10/16/2001	0.44	0.35			0.07	0.05	0.01	5.66	4.21	1.38				10.4				
10/16/2001																		
10/31/2001	0.38	0.30			0.06	< 0.025	0.01	4.36	3.10	1.16				6.5				
10/31/2001																		
11/14/2001	0.38	0.31			0.05	0.03	< 0.005	4.64	3.46	0.77				7.1				
11/14/2001																		
11/28/2001	0.36	0.26			0.05	0.04	< 0.005	4.20	2.89	0.64				9.4				
11/28/2001																		
12/13/2001	0.38	0.34			0.04	0.04	< 0.005	4.61	2.92	0.78				16.2				
12/13/2001																		
1/2/2002	0.37	0.34			0.03	< 0.025	< 0.005	3.77	2.54	0.49				11.5				
1/2/2002																		
1/15/2002	0.47	0.40			< 0.025	< 0.025	< 0.005	3.60	2.42	0.84				13.7				
1/15/2002																		
1/29/2002	0.30	0.27			< 0.025	0.03	< 0.005	3.61	2.63	0.50				15.7				
1/29/2002																		
2/13/2002	0.39	0.38			0.04	< 0.025	< 0.005	3.56	2.27	0.52				13.2				
2/13/2002																		
2/27/2002	0.33	0.27			0.03	< 0.025	< 0.005	3.70	2.47	0.75				9.8				
2/27/2002																		
3/12/2002	0.25	0.21			0.03	< 0.025	< 0.005	4.03	2.45	0.46				14.6				
3/12/2002																		
3/27/2002	0.25	0.20			0.04	0.03	< 0.005	3.59	2.58	0.43				14.2				
3/27/2002																		
4/9/2002	0.37	0.24			0.06	< 0.025	< 0.005	3.99	2.80	0.58				5.3				
4/9/2002																		
4/24/2002														6.7				
4/24/2002																		
5/7/2002	0.36	0.28			< 0.025	< 0.025	< 0.005	3.14	2.52	0.53				8.4				

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Date	TN (mg/l)	DN (mg/l)	TPO4 (mg/l)	DPO4 (mg/l)	TP (mg/l)	DP (mg/l)	o-PO4 (mg/l)	TOC (mg/l)	DOC (mg/l)	SiO3 (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	TSS (mg/l)	T. Chl-a (ug/l)	F. Chl-a (ug/l)	Aureo (cells/ml)	Flowinst (MGD)	Flow24 (MGD)
5/7/2002 5/21/2002	0.60	0.57			< 0.025	< 0.025	< 0.005	3.37	3.12	0.61				2.1				
5/21/2002 6/6/2002	0.58	0.49			0.03	0.03	< 0.005	3.18	2.84	0.28				6.1		< 20		
6/6/2002 6/12/2002	0.50	0.43			< 0.025	< 0.025	< 0.005			0.51				4.7		< 20		
6/12/2002 6/20/2002	0.59	0.54			0.03	< 0.025	< 0.005			0.85				2.9				
6/20/2002 7/9/2002	0.78	0.49			0.07	0.04	0.01			1.25				12.0				
7/9/2002 7/23/2002	0.70	0.41			0.09	0.03	0.01			1.13				15.3				
7/23/2002 8/6/2002	0.43	0.26			0.06	< 0.025	0.01			2.10				17.0				
8/6/2002 8/21/2002	0.82	0.49			0.08	0.03	0.01			1.65				18.8				
8/21/2002 9/18/2002	0.83	0.45			0.07	< 0.025	0.01			2.31				33.1				
9/18/2002 10/1/2002	0.46	0.31			0.05	< 0.025	0.01			2.28				27.9				
10/1/2002 10/17/2002	0.65	0.32			0.05	< 0.025	0.01	5.92	3.68	1.69				24.3				
10/17/2002 11/6/2002	0.74	0.37			0.06	< 0.025	< 0.005	5.11	2.98	1.69				18.4				
11/6/2002 11/19/2002	0.55	0.49			0.04	< 0.025	< 0.005	4.47	2.78	1.36				19.3				
11/19/2002 12/9/2002	0.46	0.34			< 0.025	< 0.025	< 0.005			0.88				9.6				
12/9/2002 1/16/2003	0.37	0.25			< 0.025	< 0.025	< 0.005			0.14				11.3				
1/16/2003 3/19/2003	0.41	0.19			0.03	< 0.025	< 0.005			< 0.028				21.6				
3/19/2003 4/16/2003	0.39	0.25			0.03	< 0.025	< 0.005			0.13				10.1				
4/16/2003 5/14/2003	0.21	0.11			< 0.025	< 0.025	< 0.005			0.08				0.3				
5/14/2003 6/12/2003	0.49	0.39			< 0.025	< 0.025	< 0.005							18.7				
6/12/2003 7/29/2003	0.60	0.25			0.07	< 0.025	0.01							36.2				
7/29/2003 8/13/2003	0.53	0.30			0.03	< 0.025	< 0.005							40.6				
8/13/2003 9/11/2003	0.45	0.35			0.03	< 0.025	< 0.005							17.7				
9/11/2003 10/29/2003	0.40	0.41			< 0.025	< 0.025	< 0.005							11.0				
10/29/2003 11/26/2003	0.45	0.34			< 0.025	< 0.025	< 0.005							4.4				
11/26/2003 12/10/2003	0.30	0.58			0.03	0.08	< 0.005							8.2				
12/10/2003																		

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Date	TN (mg/l)	DN (mg/l)	TPO4 (mg/l)	DPO4 (mg/l)	TP (mg/l)	DP (mg/l)	o-PO4 (mg/l)	TOC (mg/l)	DOC (mg/l)	SiO3 (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	TSS (mg/l)	T. Chl-a (ug/l)	F. Chl-a (ug/l)	Aureo (cells/ml)	Flowinst (MGD)	Flow24 (MGD)
1/7/2004	0.23	0.14			0.06	0.04	< 0.005							18.3				
1/7/2004																		
2/26/2004	0.13	< 0.05			0.07	0.06	0.06							10.4				
2/26/2004																		
3/31/2004	0.22	0.13			0.07	0.06	< 0.005							7.2				
3/31/2004																		
4/21/2004	0.25	0.12			0.13	0.05	< 0.005							13.4		305		
4/21/2004																		
7/1/2004	0.66	0.57			0.05	0.06	< 0.005							14.8				
7/1/2004																		
8/3/2004	0.11	< 0.05			0.06	< 0.025	< 0.005							64.0				
8/3/2004																		
9/15/2004	0.66	0.54			0.04	0.03	0.02							10.8		5,073		
9/15/2004																		
11/24/2004	0.22	0.18			< 0.025	< 0.025	< 0.005							2.8				
11/24/2004																		
12/15/2004	0.18	0.12			< 0.025	< 0.025	< 0.005							8.8				
12/15/2004																		
1/13/2005	0.18	0.18			0.04	0.04	< 0.005							21.0				
1/13/2005																		
2/24/2005	1.20	0.75			< 0.025	< 0.025	< 0.005							11.0				
2/24/2005																		
3/10/2005	0.09	0.09			0.05	< 0.025	< 0.005							5.7				
3/10/2005																		
3/24/2005	0.31	0.21			0.04	< 0.025	< 0.005							18.7				
3/24/2005																		
4/7/2005	0.63	0.64			< 0.025	< 0.025	< 0.005							3.9				
4/7/2005																		
4/26/2005	0.39	0.44			0.05	0.04	< 0.005							7.2				
4/26/2005																		
5/10/2005	0.49	0.32			0.03	< 0.025	0.01							7.5				
5/10/2005																		
5/25/2005	0.42	0.30			0.05	< 0.025	< 0.005											
5/25/2005																		
6/8/2005	0.61	0.33			< 0.025	< 0.025	< 0.005							4.1		250		
6/8/2005																		
6/22/2005	0.48	0.25			0.05	< 0.025	0.01							4.7				
6/22/2005																		
7/6/2005	0.43	0.41			< 0.025	< 0.025	< 0.005							3.7				
7/6/2005																		
8/18/2005	0.17	0.18			0.04	< 0.025	0.02							4.3				
8/18/2005																		
9/15/2005	0.63	0.46			0.05	0.03	< 0.005							6.0				
9/15/2005																		
10/6/2005	0.99	1.00			0.07		0.01							18.1				
10/6/2005																		
10/20/2005	1.10	0.98			0.07	0.06	0.03							1.1				
10/20/2005																		
11/2/2005	0.88	0.49			< 0.025	0.03	0.01							5.0				
11/2/2005																		
11/17/2005	0.60	0.42			< 0.025	< 0.025	< 0.005							6.1				

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Date	TN (mg/l)	DN (mg/l)	TPO4 (mg/l)	DPO4 (mg/l)	TP (mg/l)	DP (mg/l)	o-PO4 (mg/l)	TOC (mg/l)	DOC (mg/l)	SiO3 (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	TSS (mg/l)	T. Chl-a (ug/l)	F. Chl-a (ug/l)	Aureo (cells/ml)	Flowinst (MGD)	Flow24 (MGD)
11/17/2005																		
12/1/2005	0.42	0.39			< 0.025	< 0.025	0.01							0.8				
12/1/2005																		
12/29/2005	0.47	0.47			< 0.025	< 0.025	< 0.005							21.8				
12/29/2005																		
1/26/2006	0.64	0.23			< 0.025	< 0.025	< 0.005							29.6				
1/26/2006																		
2/16/2006	0.84	0.52			< 0.025	< 0.025	< 0.005							24.3				
2/16/2006																		
3/30/2006	0.61	0.62			0.03	0.03	< 0.005							4.1				
3/30/2006																		
4/13/2006	0.61	0.58			0.05	0.05	< 0.005							6.6				
4/13/2006																		
4/27/2006	0.43	0.35			0.06	0.05	< 0.005							21.5				
4/27/2006																		
5/17/2006	0.43	0.30			< 0.025	< 0.025	< 0.005							28.2				
5/17/2006																		
6/1/2006	0.56	0.35			0.08	0.03	< 0.005							24.3				
6/1/2006																		
7/26/2006	0.55	0.42			0.06	0.03	< 0.01							24.6				
7/26/2006																		
8/23/2006	0.69	0.54			0.04	0.03	< 0.01							10.2				
8/23/2006																		
9/20/2006	0.67	0.56			0.04	< 0.025	0.03							11.0				
9/20/2006																		
10/25/2006	0.51	0.41			0.05	< 0.025	< 0.01							28.1				
10/25/2006																		
11/21/2006	0.60	0.38			< 0.05	< 0.05	< 0.01							27.8				
11/21/2006																		
12/20/2006	0.61	0.49			< 0.05	< 0.05	< 0.01							11.3				
12/20/2006																		
1/18/2007	0.43	0.26			< 0.05	< 0.05	< 0.01							39.7				
1/18/2007																		
3/27/2007	0.55	0.26			0.07	< 0.05	< 0.01							6.9				
3/27/2007																		
4/13/2007	0.32	0.37			< 0.05	< 0.05	< 0.01							5.9				
4/13/2007																		
6/20/2007	0.65	0.44			< 0.05	< 0.05	< 0.01	6.49	5.01					25.0		839		
6/20/2007																		
7/12/2007																		
7/12/2007																		
7/16/2007	0.87	0.59			< 0.05	< 0.05	< 0.01	6.34	5.11					21.8				
7/16/2007																		
9/13/2007	0.79	0.55			0.08	< 0.05	< 0.01	6.08	4.97					32.0				
9/13/2007																		
10/10/2007	0.67	0.33			0.08	< 0.05	< 0.01	6.91	6.07					7.3		2,190		
10/10/2007																		
11/8/2007	0.63	0.63			0.06	0.07	< 0.01	4.88	4.33					9.7				
11/8/2007																		
11/28/2007	0.50	0.54			0.07	< 0.05	< 0.01	3.92	3.59					15.0				
11/28/2007																		

SCDHS Sample Station 090130 Results

Date	TN (mg/l)	DN (mg/l)	TPO4 (mg/l)	DPO4 (mg/l)	TP (mg/l)	DP (mg/l)	o-PO4 (mg/l)	TOC (mg/l)	DOC (mg/l)	SiO3 (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	TSS (mg/l)	T. Chl-a (ug/l)	F. Chl-a (ug/l)	Aureo (cells/ml)	Flowinst (MGD)	Flow24 (MGD)
12/12/2007	0.69	0.55			< 0.05	< 0.05	< 0.01							19.0				
12/12/2007																		
1/10/2008	0.41	0.24			< 0.05	< 0.05	< 0.01							20.0		23,639		
1/10/2008																		
2/7/2008	0.54	0.35			< 0.05	< 0.05	0.02							8.2				
2/7/2008																		
3/6/2008	0.55	0.50			< 0.05	< 0.05	< 0.01							6.6				
3/6/2008																		
4/10/2008	0.50	0.20			< 0.05	< 0.05	< 0.01							13.1				
4/10/2008																		
5/7/2008	0.36	0.29			< 0.05	< 0.05	< 0.01							10.7				
5/7/2008																		
5/15/2008																410,271		
5/15/2008																		
5/22/2008																244,307		
5/22/2008																		
5/30/2008																380,646		
5/30/2008																		
6/5/2008	0.62	0.43			0.07	< 0.05	< 0.01							40.2		474,790		
6/5/2008																		
6/10/2008	0.44	0.31			< 0.05	< 0.05	< 0.01						22	61.5	59.3	430,225		
6/10/2008																		
6/19/2008	0.73	0.53			< 0.05	< 0.05	< 0.01						9	11.0	11.5	44,756		
6/19/2008																		
6/26/2008																39,491		
6/26/2008																		
7/1/2008	0.59	0.52			< 0.05	< 0.05	< 0.01						12	24.3	25.4	28,532		
7/1/2008																		
7/8/2008																		
7/8/2008																33,567		
7/15/2008	0.61	0.54			0.05	< 0.05	< 0.01						15	25.7	23.4	47,347		
7/15/2008																		
7/30/2008	0.80	0.60			0.07	< 0.05	< 0.01						13	36.5	33.0	7,460		
7/30/2008																		
8/27/2008	0.64	0.40			0.09	< 0.05	< 0.01							30.4		16,283		
8/27/2008																		
9/18/2008	0.68	0.52			0.08	< 0.05	< 0.01							57.4		33,806		
9/18/2008																		
10/7/2008	0.52	0.52			0.06	< 0.05	< 0.01							71.4		319,219		
10/7/2008																		
10/15/2008																363,359		
10/15/2008																		
10/21/2008	0.96	0.57			< 0.05	< 0.05	< 0.01							35.3		272,729		
10/21/2008																		
10/31/2008																203,190		
10/31/2008																		
11/20/2008	0.53	0.35			< 0.05	< 0.05	< 0.01							23.7		266,000		
11/20/2008																		
12/11/2008	0.63	0.49			< 0.05	< 0.05	< 0.01							34.8		271,115		
12/11/2008																		
1/13/2009	0.54	0.31			< 0.05	< 0.05	< 0.01							16.2				

SCDHS Sample Station 090130 Results

Date	TN (mg/l)	DN (mg/l)	TPO4 (mg/l)	DPO4 (mg/l)	TP (mg/l)	DP (mg/l)	o-PO4 (mg/l)	TOC (mg/l)	DOC (mg/l)	SiO3 (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	TSS (mg/l)	T. Chl-a (ug/l)	F. Chl-a (ug/l)	Aureo (cells/ml)	Flowinst (MGD)	Flow24 (MGD)
1/13/2009																		
2/26/2009	0.41	0.34			0.06	< 0.05	< 0.01							8.9				
2/26/2009																		
3/25/2009	0.35	0.30			< 0.05	< 0.05	< 0.01							4.5				
3/25/2009																		
4/9/2009	0.35	0.26			< 0.05	< 0.05	< 0.01							15.2				
4/9/2009																		
4/30/2009	0.47	0.40			< 0.05	< 0.05	< 0.01							7.8				
4/30/2009																		
5/13/2009	0.34	0.23			< 0.05	< 0.05	< 0.01							5.3	3.4	32,530		
5/13/2009																		
5/28/2009	0.47	0.31			< 0.05	< 0.05	< 0.01							9.5		5,618		
5/28/2009																		
6/10/2009																163,805		
6/10/2009																		
6/23/2009	0.55	0.25			< 0.05	< 0.05	< 0.01							37.9	18.9	119,260		
6/23/2009																		
7/8/2009	0.68	0.20			0.06	< 0.05	< 0.01							30.3		118		
7/8/2009																		
7/14/2009																697		
7/14/2009																		
7/29/2009	0.99	0.43			0.08	< 0.05	< 0.01							20.6		717		
7/29/2009																		
8/20/2009	0.52	0.36			< 0.05	< 0.05	< 0.01							22.4		625		
8/20/2009																		
9/15/2009	0.68	0.29			0.05	< 0.05	< 0.01							22.5		2,307		
9/15/2009																		
10/8/2009	0.76	0.36			0.06	< 0.05	< 0.01							19.0		1,611		
10/8/2009																		
11/5/2009	0.55	0.42			< 0.05	< 0.05	< 0.01							22.2				
11/5/2009																		
12/2/2009	0.59	0.50			< 0.05	< 0.05	< 0.01							5.9		1,007		
12/2/2009																		
3/2/2010	0.36	0.23			< 0.05	< 0.05	< 0.01							6.9		166		
3/2/2010																		
3/25/2010	0.26	0.13			< 0.05	< 0.05	< 0.01							4.2		280		
3/25/2010																		
4/14/2010	0.41	0.29			< 0.05	< 0.05	< 0.01							11.9		2,660		
4/14/2010																		
5/13/2010	0.40	0.26			< 0.05	< 0.05	< 0.01							5.8		108		
5/13/2010																		
5/27/2010																439		
5/27/2010																		
6/4/2010																< 106		
6/4/2010																		
6/16/2010	0.55	0.20			< 0.05	< 0.05	< 0.01							20.4		145		
6/16/2010																		
7/2/2010																< 20		
7/2/2010																		
7/8/2010	0.70	0.40			0.06	< 0.05	< 0.01							23.9		355		
7/8/2010																		

SCDHS Sample Station 090130 Results

Date	TN (mg/l)	DN (mg/l)	TPO4 (mg/l)	DPO4 (mg/l)	TP (mg/l)	DP (mg/l)	o-PO4 (mg/l)	TOC (mg/l)	DOC (mg/l)	SiO3 (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	TSS (mg/l)	T. Chl-a (ug/l)	F. Chl-a (ug/l)	Aureo (cells/ml)	Flowinst (MGD)	Flow24 (MGD)
8/11/2010	0.57	0.34			< 0.05	< 0.05	< 0.01							32.1		6,405		
8/11/2010 9/9/2010	0.55	0.20			0.05	< 0.05	0.02							25.9		2,208		
9/9/2010 9/23/2010	0.75	0.53			< 0.05	< 0.05	< 0.01							22.9		349		
9/23/2010 10/20/2010	0.63	0.36			< 0.05	< 0.05	< 0.01							17.0		4,394		
10/20/2010 11/10/2010	0.52	0.41			0.07	< 0.05	< 0.01							12.6		671		
11/10/2010 12/9/2010	0.34	0.28			< 0.05	< 0.05	< 0.01							13.9		5,658		
12/9/2010 2/17/2011	0.32	0.20			< 0.05	< 0.05	< 0.01							20.3		< 20		
2/17/2011 3/15/2011	0.29	0.22			< 0.05	< 0.05	< 0.01							5.9		< 20		
3/15/2011 4/7/2011	0.46	0.27			< 0.05	< 0.05	< 0.01							1.5		< 20		
4/7/2011 5/6/2011																104		
5/6/2011 5/19/2011	0.19	0.18			< 0.05	< 0.05	< 0.01							19.1				
5/19/2011 6/23/2011	0.63	0.60			< 0.05	< 0.05	< 0.01							3.4		< 20		
6/23/2011 7/27/2011	0.65	0.45			0.05	< 0.05	< 0.01							18.1		< 20		
7/27/2011 8/11/2011	0.72	0.39			0.07	< 0.05	< 0.01							8.4		< 20		
8/11/2011 8/31/2011														6.5		< 20		
8/31/2011 9/14/2011	0.75	0.75			< 0.05	< 0.05	< 0.01							3.8		< 20		
9/14/2011 10/18/2011	0.38	0.41			< 0.05	< 0.05	< 0.01							75.5		367,052		
10/18/2011 10/26/2011	0.72	0.48			< 0.05	< 0.05	< 0.01							50.9		192,449		
10/26/2011 11/9/2011																68,677		
11/9/2011 11/16/2011	0.73	0.37			0.06	< 0.05	< 0.01							41.0		65,858		
11/16/2011 11/30/2011																53,389		
11/30/2011 12/14/2011	0.80	0.74			< 0.05	< 0.05	< 0.01							13.9		122,653		
12/14/2011 1/25/2012	0.45	0.29			< 0.05	< 0.05	< 0.01							15.4		12,745	4	1	4
1/25/2012 2/22/2012	0.48	0.41			< 0.05	< 0.05	< 0.01							5.8		1,151	4	2	2
2/22/2012 3/7/2012	0.36	0.26			< 0.05	< 0.05	< 0.01							6.6		742	1	1	6
3/7/2012 4/18/2012	0.37	0.24			< 0.05	< 0.05	< 0.01							7.9		271	1	2	6

SCDHS Sample Station 090130 Results

Date	TN (mg/l)	DN (mg/l)	TPO4 (mg/l)	DPO4 (mg/l)	TP (mg/l)	DP (mg/l)	o-PO4 (mg/l)	TOC (mg/l)	DOC (mg/l)	SiO3 (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	TSS (mg/l)	T. Chl-a (ug/l)	F. Chl-a (ug/l)	Aureo (cells/ml)	Flowinst (MGD)	Flow24 (MGD)			
4/18/2012																					
5/23/2012	0.40	0.29			< 0.05	< 0.05	< 0.01							8.1		< 20			4	2	6
5/23/2012																					
6/21/2012	0.42	0.44			< 0.05	< 0.05	0.01							3.9		465			4	1	5
6/21/2012																					
7/18/2012	0.74	0.45			0.09	< 0.05	< 0.01							14.8		< 20			1	2	6
7/18/2012																					
8/2/2012	0.64	0.46			0.06	< 0.05	< 0.01							13.0		195			1	1	6
8/2/2012																					
9/20/2012	0.80	0.51			0.12	< 0.05	< 0.01							24.8		335			4	2	6
9/20/2012																					
10/17/2012	0.73	0.51			< 0.05	< 0.05	< 0.01							18.7		< 20			4	2	5
10/17/2012																					
11/15/2012	0.58	0.42			< 0.05	< 0.05	< 0.01							17.2		3,560			1	3	6
11/15/2012																					
12/19/2012	0.47	0.32			< 0.05	< 0.05	< 0.01							28.4		18,260			2	1	6
12/19/2012																					
1/10/2013	0.45	0.26			< 0.05	< 0.05	0.01							29.6		4,724			3	2	6
1/10/2013																					
3/13/2013	0.25	0.23			< 0.05	< 0.05	< 0.01							12.3		55			4	2	5
3/13/2013																					
3/28/2013	0.27	0.18			< 0.05	< 0.05	< 0.01							3.6		265			4	2	5
3/28/2013																					
4/10/2013	0.43	0.35			< 0.05	< 0.05	< 0.01							4.8		432			4	2	5
4/10/2013																					
4/25/2013	0.33	0.23			< 0.05	< 0.05	< 0.01							20.2		224			1	1	6
4/25/2013																					
5/14/2013	0.46	0.35			< 0.05	< 0.05	< 0.01							6.6		142			4	1	6
5/14/2013																					
5/29/2013	0.56	0.40			< 0.05	< 0.05	< 0.01							18.9		530			2	3	6
5/29/2013																					
6/11/2013	0.51	0.35			< 0.05	< 0.05	< 0.01							20.8		6,223			4	2	7
6/11/2013																					
6/26/2013	0.55	0.33			< 0.05	< 0.05	< 0.01							15.3		53,371			4	2	6
6/26/2013																					
7/10/2013	0.79	0.51			0.10	< 0.05	< 0.01							37.5		206,139			4	2	6
7/10/2013																					
7/23/2013	0.81	0.52			0.21	0.05	< 0.01							41.5		1,185			4	1	6
7/23/2013																					
8/22/2013	0.80	0.49			0.09	0.05	< 0.01							27.3		3,479			4	3	6
8/22/2013																					
9/5/2013	0.91	0.49			0.11	< 0.05	< 0.01							33.5		55,385			4	2	5
9/5/2013																					
9/19/2013	0.86	0.51			0.11	< 0.05	< 0.01							47.6		486,717			1	1	6
9/19/2013																					
10/9/2013	0.73	0.57			0.07	< 0.05	0.01							78.5		186,825			3	1	5
10/9/2013																					
10/22/2013	0.74	0.42			0.08	< 0.05	< 0.01							28.6		18,999			4	1	6
10/22/2013																					
11/6/2013	0.67	0.36			0.05	< 0.05	< 0.01							21.0		1,007			4	1	5
11/6/2013																					

SCDHS Sample Station 090130 Results

Date	TN (mg/l)	DN (mg/l)	TPO4 (mg/l)	DPO4 (mg/l)	TP (mg/l)	DP (mg/l)	o-PO4 (mg/l)	TOC (mg/l)	DOC (mg/l)	SiO3 (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	TSS (mg/l)	T. Chl-a (ug/l)	F. Chl-a (ug/l)	Aureo (cells/ml)	Flowinst (MGD)	Flow24 (MGD)			
11/21/2013	0.74	0.34			< 0.05	< 0.05	< 0.01							16.0		102			4	2	6
11/21/2013																					
12/4/2013	0.61	0.46			< 0.05	< 0.05	< 0.01							6.3		216			4	2	6
12/4/2013																					
12/19/2013	0.50	0.34			< 0.05	< 0.05	< 0.01						116	23.7		< 20			1	1	4
12/19/2013																					

Inactive USGS Groundwater Station S49604.1

Sample Datetime	Time datum	Time datum reliability code	Sample Medium Code	Agency Collecting Sample, Code	Temperature, water, deg C -10	Agency analyzing sample, code -28	Specif. conductance, wat unf field, uS/cm @ 25 degC -94	Specific conductance, wat unf uS/cm @ 25 degC -95	Hydrogen ion, water, unfltrd calcd, mg/L -191	Dissolved oxygen, mg/L -300	pH, water, unfltrd field, std units -400	pH, water, unfltrd lab, std units -403	Carbon dioxide water, unfltrd mg/L -405	ANC, wat unf fixed end pt, field, mg/L as CaCO3 -410	Ammonia water, unfltrd mg/L as N -610	Nitrite water, unfltrd mg/L as N -615	Ammonia un-ionized calcd, mg/L as N -619	Nitrate water unfltrd mg/L as N -620	Phosphate, water, unfltrd mg/L -650	Hardness, water, mg/L as CaCO3 -900
10/1/1973 13:30	EST	T	WG	NY-SCDEC	26	9821						6.4				0.012	0.25	17.2	0.613	
2/25/1975 11:30	EST	T	WG	NY-SCDEC	8.5	9821		430	0.00253	6.2	5.6		25	5		0.027	3.8	20	6.75	46.1
4/9/1985 11:00	EST	T	WG	NY-SCDH	6	9820	250			5.6				52	0.7	2		9.7		47.3

Inactive USGS Groundwater Station S49604.1

Sample Datetime	Calcium water, fltrd, mg/L -915	Magnesium, water, fltrd, mg/L -925	Sodium, water, fltrd, mg/L -930	Sodium adsorption ratio -931	Sodium fraction of cations percent -932	Potassium, water, fltrd, mg/L -935	Chloride, water, fltrd, mg/L -940	Sulfate water, fltrd, mg/L -945	Copper, water, fltrd, ug/L -1040	Iron, water, fltrd, ug/L -1046	Manganese, water, fltrd, ug/L -1056	Zinc, water, fltrd, ug/L -1090	Depth to water level below LSD, meters -30210	Bromodichloromethane water, unfltrd ug/L -32101	Tetrachloromethane water, unfltrd ug/L -32102	Tribromomethane water, unfltrd ug/L -32104	Dibromochloromethane water, unfltrd ug/L -32105	Trichloromethane water, unfltrd ug/L -32106	Toluene water, unfltrd ug/L -34010	Benzene water, unfltrd ug/L -34030
10/1/1973 13:30							36		230	590	170	< 400								
2/25/1975 11:30	15	2.1	50	3.2	64	12	40	25.5	40	100	200	130	8.78							
4/9/1985 11:00	14	3	39	2.47	58	12	28	19		700	100		8.83	< 3	< 1	< 5	< 2	< 5	< 3	< 3

Inactive USGS Groundwater Station S49604.1

Sample Datetime	Chloro-benzene water, unfltrd ug/L -34301	Ethyl-benzene water, unfltrd ug/L -34371	Tetra-chloro-ethene, water, unfltrd ug/L -34475	1,1,1-Tri-chloro-ethane, water, unfltrd ug/L -34506	1,1,2-Tri-chloro-ethane, water, unfltrd ug/L -34511	1,1,2,2-Tetra-chloro-ethane, water, unfltrd ug/L -34516	1,2-Di-chloro-benzene water, unfltrd ug/L -34536	1,2,4-Tri-chloro-benzene water, unfltrd ug/L -34551	1,3-Di-chloro-benzene water, unfltrd ug/L -34566	MBAS, water, unfltrd mg/L -38260	Tri-chloro-ethene, water, unfltrd ug/L -39180	Dis-solved solids, sum of consti-tuents, mg/L -70301	Dis-solved solids, water, tons/acre-ft -70303	Ortho-phos-phate, water, unfltrd mg/L as P -70507	Ammonia water, unfltrd mg/L -71845	Depth to water level, feet below LSD -72019	p-Xylene, water, unfltrd ug/L -77133	m-Xylene, water, unfltrd ug/L -77134	Specif. conduc-tance, wat unf lab, uS/cm @ 25 degC -90095	ANC, wat unf fixed end pt, lab, mg/L as CaCO3 -90410
10/1/1973 13:30										< 0.10				0.2					478	20
2/25/1975 11:30												148	0.2	2.2		28.79				
4/9/1985 11:00	< 3	< 3	< 2	< 2	< 5	< 3	< 4	< 4	< 4		< 5	147	0.2		0.901	28.96	< 3.00	< 3.00		

Sample Datetime	Tri-halo-meth-anes, wat unf max sum ug/L -90867
10/1/1973 13:30	
2/25/1975 11:30	
4/9/1985 11:00	< 15.0

Inactive USGS Groundwater Sampling Station S36145.1

Sample Datetime	Time datum	Time datum reliability code	Sample Medium Code	Sample accntng number -8	Temperature, water, deg C -10	Flow rate of well, gal/min -58	Specific conductance, wat unf uS/cm @ 25 degC -95	Hydrogen ion, water, unfltrd calcd, mg/L -191	pH, water, unfltrd field, std units -400	Carbon dioxide water, unfltrd mg/L -405	ANC, wat unf fixed end pt, field, mg/L as CaCO3 -410	Bicarbonate, wat unf fixed end pt, field, mg/L -440	Carbonate, wat unf fixed end pt, field, mg/L -445	Loss on ignition of total solids, mg/L -505	Organic nitrogen, water, unfltrd mg/L -605	Ammonia water, unfltrd mg/L as N -610	Nitrite water, unfltrd mg/L as N -615	Nitrate water unfltrd mg/L as N -620	Phosphorus, water, unfltrd mg/L as P -665	Hardness, water, mg/L as CaCO3 -900	Noncarb hardness, wat unf field, mg/L as CaCO3 -902
11/22/1971	EST	T	WG	1620		6	39	0.00064	6.2	7.1	6	7	0	9	0.34	0.02	0	0.3	0.02	10	4

Inactive USGS Groundwater Sampling Station S36145.1

Sample Datetime	Calcium water, fltrd, mg/L -915	Magnes-ium, water, fltrd, mg/L -925	Sodium, water, fltrd, mg/L -930	Sodium adsorp-tion ratio -931	Sodium frac-tion of cations percent -932	Potas-sium, water, fltrd, mg/L -935	Chlor-ide, water, fltrd, mg/L -940	Sulfate water, fltrd, mg/L -945	Fluor-ide, water, fltrd, mg/L -950	Silica, water, fltrd, mg/L as SiO2 -955	Iron, water, unfltrd recover-able, ug/L -1045	Manga-nese, water, unfltrd recover-able, ug/L -1055	MBAS, water, unfltrd mg/L -38260	Dis-solved solids dried @ 180deg C wat flt mg/L -70300	Dis-solved solids, sum of consti-tuents, mg/L -70301	Dis-solved solids, water, tons/ acre-ft -70303	Ammonia water, unfltrd mg/L -71845	Depth to bot sample intrval feet below LSD -72016
11/22/1971	2	1.1	2.7	0.4	37	0.5	3.1	4.9	0	6.4	180	20	0.01	31	24	0.04	0.026	43.2

Inactive USGS Groundwater Sampling Station S60486.1

Sample Datetime	Time datum	Time datum reliability code	Sample Medium Code	Agency Collecting Sample, Code	Agency analyzing sample, code -28	Turbidity, NTU -76	pH, water, unfltrd lab, std units -403	Carbon dioxide water, unfltrd mg/L -405	Ammonia water, unfltrd mg/L as N -610	Nitrite water, unfltrd mg/L as N -615	Nitrate water unfltrd mg/L as N -620	Phosphate, water, unfltrd mg/L -650	Phosphorus, water, unfltrd mg/L as P -665	Hardness, water, mg/L as CaCO3 -900	Calcium water unfltrd recoverable, mg/L -916	Magnesium, water, unfltrd recoverable, mg/L -927	Sodium, water, unfltrd recoverable, mg/L -929	Potassium, water, unfltrd recoverable, mg/L -937	Chloride, water, fltrd, mg/L -940	Sulfate water, fltrd, mg/L -945	Fluoride, water, unfltrd mg/L -951
10/10/1979	EST	T	WG	NY-SCWA	9822	0.15	6.3	13	< 0.010	< 0.010	0.02	0.27	0.27	16	4.1	0.9	3.4	0.7	4.5	4	
3/24/1980	EST	T	WG	NY-SCWA	9822	2	6.4	9.5	< 0.010	< 0.010	0.01	0.23	0.23	12	4.2	0.9	3.6	0.6	4	4.8	
7/13/1980	EST	T	WG	NY-SCWA	9822	0.22	6.2	16	< 0.010	< 0.010	< 0.01	0.27	0.27	16	4.1	0.9	3.6	0.7	5.5	4.3	< 0.1
11/6/1983	EST	T	WG	NY-SCWA	9822	0.43	6.1	23	< 0.010	< 0.010	< 0.05	< 0.031	0.27	15	4	0.9	3.8	0.7	4.5	4.7	
4/12/1984	EST	T	WG	NY-SCWA	9822		5.8		< 0.010	< 0.010	< 0.05	2.24	0.88	19	4.4	1	3.7	0.7	3	4.2	
8/9/1984	EST	T	WG	NY-SCWA	9822	2	6	35	< 0.010	< 0.010	< 0.05	0.736	0.24	25	4	1	3.6	0.7	3	5.2	< 0.1
4/23/1985	EST	T	WG	NY-SCWA	9822	1.3	6.1	24	< 0.010	< 0.010	< 0.05	0.491	0.19	27	4.4	1	3.7	0.7	3	5.3	< 0.1
8/30/1985	EST	T	WG	NY-SCWA	9822	0.48	6.1	23	< 0.010	< 0.010	< 0.05	7.33	3.66	16	4.2	1	6.6	0.6	2.5	5.3	< 0.1

Inactive USGS Groundwater Sampling Station S60486.1

Sample Datetime	Arsenic water, unfltrd ug/L -1002	Barium, water, unfltrd recover-able, ug/L -1007	Cadmium water, unfltrd ug/L -1027	Chrom-ium, water, unfltrd recover-able, ug/L -1034	Copper, water, unfltrd recover-able, ug/L -1042	Iron, water, unfltrd recover-able, ug/L -1045	Lead, water, unfltrd recover-able, ug/L -1051	Manga-nese, water, unfltrd recover-able, ug/L -1055	Silver, water, unfltrd recover-able, ug/L -1077	Zinc, water, unfltrd recover-able, ug/L -1092	Selen-ium, water, unfltrd ug/L -1147	Bromo-methane water, unfltrd ug/L -30202	Bromo-di-chloro-methane water, unfltrd ug/L -32101	Tetra-chloro-methane water, unfltrd ug/L -32102	1,2-Di-chloro-ethane, water, unfltrd ug/L -32103	Tri-bromo-methane water, unfltrd ug/L -32104	Di-bromo-chloro-methane water, unfltrd ug/L -32105	Tri-chloro-methane water, unfltrd ug/L -32106	Chloro-benzene water, unfltrd ug/L -34301	Chloro-ethane, water, unfltrd ug/L -34311	Chloro-methane water, unfltrd ug/L -34418
10/10/1979	< 5	< 50			< 10	400		20	< 2.50	< 10											
3/24/1980				< 5	< 10	430		< 10		120	< 2										
7/13/1980			< 0.5		< 10	340	< 5	< 10		< 10											
11/6/1983	< 5	< 50			< 20	390		20	< 2.50	70			< 4	< 1	< 2	< 6	< 3	< 1			
4/12/1984			< 0.5	< 5	< 20	300		< 10		< 20	< 2		< 4	< 1	< 2	< 6	< 3	< 1			
8/9/1984					< 20	350	< 5	< 10		< 20			< 4	< 1	< 2	< 6	< 3	< 1			
4/23/1985					< 20	310	< 5	< 10		< 20		< 3.0	< 4	< 1	< 2	< 6	< 3	< 1	< 3	< 3	< 3
8/30/1985					30	360		< 10		40		< 3.0	< 4	< 1	< 2	< 6	< 3	< 1	< 3	< 3	< 3

Inactive USGS Groundwater Sampling Station S60486.1

Sample Datetime	Di-chloro-methane water, unfltrd ug/L -34423	Tetra-chloro-ethene, water, unfltrd ug/L -34475	Tri-chloro-fluoro-methane water, unfltrd ug/L -34488	1,1-Di-chloro-ethane, water, unfltrd ug/L -34496	1,1-Di-chloro-ethene, water, unfltrd ug/L -34501	1,1,1-Tri-chloro-ethane, water, unfltrd ug/L -34506	1,1,2-Tri-chloro-ethane, water, unfltrd ug/L -34511	1,1,2,2-Tetra-chloro-ethane, water, unfltrd ug/L -34516	1,2-Di-chloro-propane water, unfltrd ug/L -34541	trans-1,2-Di-chloro-ethene, water, unfltrd ug/L -34546	2-Chloro-ethyl vinyl ether, wat unf ug/L -34576	Di-chloro-di-fluoro-methane wat unf ug/L -34668	trans-1,3-Di-chloro-propene water, unfltrd ug/L -34699	cis-1,3-Di-chloro-propene water, unfltrd ug/L -34704	MBAS, water, unfltrd mg/L -38260	Vinyl chlor-ide, water, unfltrd ug/L -39175	Tri-chloro-ethene, water, unfltrd ug/L -39180	Dis-solved solids dried @ 180deg C wat flt mg/L -70300	Dis-solved solids, sum of consti-tuents, mg/L -70301	Dis-solved solids, water, tons/ acre-ft -70303	Ortho-phos-phate, water, unfltrd mg/L as P -70507
10/10/1979															< 0.02						
3/24/1980															< 0.02						
7/13/1980															< 0.02						
11/6/1983	< 3	< 1		< 3	< 3	< 1	< 3	< 3	< 3	< 3					< 0.02		< 1	29	29	0.04	< 0.01
4/12/1984	< 3	< 1		< 3	< 3	< 1	< 3	< 3	< 3	< 3					< 0.02		< 1	37	37	0.05	0.73
8/9/1984	< 3	< 1		< 3	< 3	< 1	< 3	< 3	< 3	< 3					< 0.02		< 1	28	28	0.04	0.24
4/23/1985	< 3	< 1	< 3	< 3	< 3	< 1	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 0.02	< 3	< 1		39	0.05	0.16
8/30/1985	< 3	< 1	< 3	< 3	< 3	< 1	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 0.02	< 3	< 1		40	0.05	2.39

Sample Datetime	Ammonia water, unfltrd mg/L -71845	Mercury water, unfltrd recover-able, ug/L -71900	cis-1,2-Di-chloro-ethene, water, unfltrd ug/L -77093	Specif. conduc-tance, wat unf lab, uS/cm @ 25 degC -90095	ANC, wat unf fixed end pt, lab, mg/L as CaCO3 -90410	Tri-halo-meth-anes, wat unf max sum ug/L -90867
10/10/1979	< 0.013			53	16	
3/24/1980	< 0.013	< 0.2		59	15	
7/13/1980	< 0.013			55	16	
11/6/1983	< 0.013		< 3.0	40	15	< 14.0
4/12/1984	< 0.013		< 3.0	55	18	< 14.0
8/9/1984	< 0.013	< 0.2	< 3.0	51	18	< 14.0
4/23/1985	< 0.013		< 3.0	48	19	< 14.0
8/30/1985	< 0.013		< 3.0	58	18	< 14.0

Inactive USGS Groundwater Sampling Station S59744.1

Sample Datetime	Time datum	Time datum reliability code	Sample Medium Code	Agency Collecting Sample, Code	Temperature, water, deg C -10	Temperature, air, deg C -20	Agency analyzing sample, code -28	Turbidity, NTU -76	Specif. conductance, wat unf field, uS/cm @ 25 degC -94	Specific conductance, wat unf uS/cm @ 25 degC -95	Hydrogen ion, water, unfltrd calcd, mg/L -191	Dissolved oxygen, mg/L -300	pH, water, unfltrd field, std units -400	pH, water, unfltrd lab, std units -403	Carbon dioxide water, unfltrd mg/L -405	ANC, wat unf fixed end pt, field, mg/L as CaCO3 -410	Bicarbonate, wat unf fixed end pt, field, mg/L -440	Carbonate, wat unf fixed end pt, field, mg/L -445	Bicarbonate, wat flt infl pt titr., field, mg/L -453	Total nitrogen, water, unfltrd mg/L -600
10/9/1979	EST	T	WG	NY-SCWA			9822	0.74						5.8						
3/9/1980	EST	T	WG	NY-SCWA			9822	0.74						6.4	7					
7/7/1980	EST	T	WG	NY-SCWA			9822	0.86						6.3	8					
11/6/1983	EST	T	WG	NY-SCWA			9822	0.76						5.9						
4/5/1984	EST	T	WG	NY-SCWA			9822	0.83						5.8						
8/1/1984	EST	T	WG	NY-SCWA			9822	0.26						6.6	4.4					
4/17/1985	EST	T	WG	NY-SCWA			9822	0.3						6.1	15					
8/22/1985	EST	T	WG	NY-SCWA			9822	0.42						6	18					
2/6/1987 12:10	EST	T	WG	USGS-WRD	10.4		80020		62.8		0.00098	< 1.0	6	6.8	16	8	10	0		< 0.90
7/18/2012 11:00	EST	K	WG	USGSNYWC	12	34				546	0.00034	< 1.0	6.5	6.1	6.4				11.7	
7/18/2012 11:05	EST	K	WG	USGSNYWC																

Inactive USGS Groundwater Sampling Station S59744.1

Sample Datetime	Total nitrogen, water, fltrd, mg/L -602	Organic nitrogen, water, unfltrd mg/L -605	Organic nitrogen, water, fltrd, mg/L -607	Ammonia water, fltrd, mg/L as N -608	Ammonia water, unfltrd mg/L as N -610	Nitrite water, fltrd, mg/L as N -613	Nitrite water, unfltrd mg/L as N -615	Nitrate water, fltrd, mg/L as N -618	Nitrate water unfltrd mg/L as N -620	Ammonia + org-N, water, fltrd, mg/L as N -623	Ammonia + org-N, water, unfltrd mg/L as N -625	Nitrate + nitrite water unfltrd mg/L as N -630	Nitrate + nitrite water, fltrd, mg/L as N -631	Phosphate, water, unfltrd mg/L -650	Orthophosphate, water, fltrd, mg/L -660	Phosphorus, water, unfltrd mg/L as P -665	Phosphorus, water, fltrd, mg/L as P -666	Orthophosphate, water, fltrd, mg/L as P -671	Organic carbon, water, fltrd, mg/L -681	Sulfide water, unfltrd mg/L -745
10/9/1979					< 0.010		< 0.010		< 0.01					< 0.100		< 0.100				
3/9/1980					< 0.010		< 0.010		< 0.01					< 0.100		< 0.100				
7/7/1980					< 0.010		< 0.010		< 0.01					< 0.100		< 0.100				
11/6/1983					< 0.010		< 0.010		< 0.05							< 0.100				
4/5/1984					< 0.010		< 0.010		< 0.05							< 0.100				
8/1/1984					< 0.010		< 0.010		< 0.05							< 0.100				
4/17/1985					< 0.010		< 0.010		0.06							< 0.100				
8/22/1985					< 0.010		< 0.010		< 0.05							< 0.100				
2/6/1987 12:10	< 0.61	0.78	0.6	0.003	0.02	0.002	0.001	< 0.008	< 0.099	0.6	0.8	< 0.10	< 0.010	0.015	0.015	0.01	0.004	0.005	0.6	< 0.5
7/18/2012 11:00			< 0.05	< 0.01		< 0.001		< 0.040					< 0.040		0.061			0.02	< 0.23	
7/18/2012 11:05																				

Inactive USGS Groundwater Sampling Station S59744.1

Sample Datetime	Hard-ness, water, mg/L as CaCO3 -900	Noncarb hard-ness, wat unf lab, mg/L as CaCO3 -903	Noncarb hard-ness, wat flt field, mg/L as CaCO3 -904	Calcium water, fltrd, mg/L -915	Calcium water unfltrd recover-able, mg/L -916	Magnes-ium, water, fltrd, mg/L -925	Magnes-ium, water, unfltrd recover-able, mg/L -927	Sodium, water, unfltrd recover-able, mg/L -929	Sodium, water, fltrd, mg/L -930	Sodium adsorp-tion ratio -931	Sodium frac-tion of cations percent -932	Potas-sium, water, fltrd, mg/L -935	Potas-sium, water, unfltrd recover-able, mg/L -937	Chlor-ide, water, fltrd, mg/L -940	Sulfate water, fltrd, mg/L -945	Fluor-ide, water, fltrd, mg/L -950	Fluor-ide, water, unfltrd mg/L -951	Silica, water, fltrd, mg/L as SiO2 -955	Arsenic water, fltrd, ug/L -1000	Arsenic water, unfltrd ug/L -1002
10/9/1979	13				2.6		1.2	3.2					0.4	4	4.9					< 5
3/9/1980	11	1			3		1.2	3.3					0.4	3	5.5					
7/7/1980	11	3			3.7		1	3.8					0.5	4.5	8.2		< 0.1			
11/6/1983	14	3			3		1.3	3.5					0.3	5	6.9					< 5
4/5/1984	19	5			3.7		1.4	4					0.4	5.5	7.3					
8/1/1984	15	5			4		1.4	3.7					0.4	5.5	7.7		< 0.1			
4/17/1985	13	4			3.7		1.6	3.9					0.4	5.5	7.5					
8/22/1985	24	4			3.4		1.5	3.9					0.4	3.5	8.5		< 0.1			
2/6/1987 12:10	25.2			4.3		3.5			4.8	0.42	29	0.46		8.5	8.6	< 0.10		16		
7/18/2012 11:00	35.3		26	7.87		3.79			14.1	1.03	46	0.71		28.5	17.5			16.2	0.32	
7/18/2012 11:05																				

Inactive USGS Groundwater Sampling Station S59744.1

Sample Datetime	Barium, water, fltrd, ug/L -1005	Barium, water, unfltrd recover-able, ug/L -1007	Beryll-ium, water, fltrd, ug/L -1010	Boron, water, fltrd, ug/L -1020	Cadmium water, fltrd, ug/L -1025	Cadmium water, unfltrd ug/L -1027	Chrom-ium, water, fltrd, ug/L -1030	Chrom-ium, water, unfltrd recover-able, ug/L -1034	Cobalt water, fltrd, ug/L -1035	Copper, water, fltrd, ug/L -1040	Copper, water, unfltrd recover-able, ug/L -1042	Iron, water, unfltrd recover-able, ug/L -1045	Iron, water, fltrd, ug/L -1046	Lead, water, fltrd, ug/L -1049	Lead, water, unfltrd recover-able, ug/L -1051	Manga-nese, water, unfltrd recover-able, ug/L -1055	Manga-nese, water, fltrd, ug/L -1056	Thall-ium, water, fltrd, ug/L -1057	Molyb-denum, water, fltrd, ug/L -1060	Nickel, water, fltrd, ug/L -1065
10/9/1979		< 50									30	230				30				
3/9/1980								< 5			20	330				30				
7/7/1980						< 0.5					20	70			< 5	20				
11/6/1983		< 100									30	260				10				
4/5/1984						< 0.5		< 5			< 20	290				20				
8/1/1984											30	300			< 5	20				
4/17/1985						< 0.5		< 5			< 20	260				20				
8/22/1985											< 20	190			< 5	10				
2/6/1987 12:10												280	330			30	20			
7/18/2012 11:00	4.93		0.01	6	< 0.016		0.12		0.552	1.5			644	0.056			33.9	< 0.010	0.035	0.54
7/18/2012 11:05																				

Sample Datetime	Silver, water, fltrd, ug/L -1075	Silver, water, unfltrd recover-able, ug/L -1077	Stron-tium, water, fltrd, ug/L -1080	Vana-dium, water, fltrd, ug/L -1085	Zinc, water, fltrd, ug/L -1090	Zinc, water, unfltrd recover-able, ug/L -1092	Anti-mony, water, fltrd, ug/L -1095	Alum-inum, water, fltrd, ug/L -1106	Lithium water, fltrd, ug/L -1130	Selen-ium, water, fltrd, ug/L -1145	Selen-ium, water, unfltrd ug/L -1147	Ter-buthyl-azine, water, fltrd, ug/L -4022	Hexa-zinone, water, fltrd, ug/L -4025	Sima-zine, water, fltrd, ug/L -4035	Prome-tryn, water, fltrd, ug/L -4036	Prome-ton, water, fltrd, ug/L -4037	CIAT, water, fltrd, ug/L -4040	Cyana-zine, water, fltrd, ug/L -4041	Fonofos water, fltrd, ug/L -4095	Tritium water, unfltrd pCi/L -7000
10/9/1979		< 2.50				< 10														
3/9/1980						< 10					< 2									
7/7/1980						20														
11/6/1983		< 2.50				< 20														
4/5/1984						< 20					< 2									
8/1/1984						30														
4/17/1985						< 20					< 2									
8/22/1985						< 20														
2/6/1987 12:10			10					30												
7/18/2012 11:00	< 0.005		31.7	< 0.08	< 1.4		< 0.027	5.2	3.59	< 0.03		< 0.008	< 0.012	< 0.006	< 0.010	< 0.012	< 0.006	< 0.022	< 0.0048	13.5
7/18/2012 11:05																				

Sample Datetime	Ra-226, water, fltrd, pCi/L -9503	Pb-210 water, fltrd, pCi/L -17503	Po-210, water, fltrd, pCi/L -19503	Uranium natural water, fltrd, ug/L -22703	Bromo-methane water, unfltrd ug/L -30202	Di-bromo-methane water, unfltrd ug/L -30217	Human entero-virus, cp/L -31713	Human noro-virus GIA, cp/L -31714	Total cultur-able virus, MPN/L -31715	Bromo-di-chloro-methane water, unfltrd ug/L -32101	Tetra-chloro-methane water, unfltrd ug/L -32102	1,2-Di-chloro-ethane, water, unfltrd ug/L -32103	Tri-bromo-methane water, unfltrd ug/L -32104	Di-bromo-chloro-methane water, unfltrd ug/L -32105	Tri-chloro-methane water, unfltrd ug/L -32106	Toluene water, unfltrd ug/L -34010	Benzene water, unfltrd ug/L -34030	Acrylo-nitrile water, unfltrd ug/L -34215	Chloro-benzene water, unfltrd ug/L -34301	Chloro-ethane, water, unfltrd ug/L -34311
10/9/1979																				
3/9/1980																				
7/7/1980																				
11/6/1983										< 4	< 1	< 2	< 6	< 3	< 1					
4/5/1984										< 4	< 1	< 2	< 6	< 3	< 1					
8/1/1984																				
4/17/1985					< 3.0					< 4	< 1	< 2	< 6	< 3	< 1				< 3	< 3
8/22/1985																				
2/6/1987 12:10																				
7/18/2012 11:00	R -0.02	R 0.00	0.033	< 0.004		< 0.050	< 0.4	< 0.4	< 0.002	< 0.034	< 0.06	< 0.08	< 0.10	< 0.12	< 0.03	< 0.02	< 0.026	< 0.48	< 0.026	< 0.06
7/18/2012 11:05																				

Inactive USGS Groundwater Sampling Station S59744.1

Sample Datetime	alpha-Endo-sulfan, water, fltrd, ug/L -34362	Ethyl-benzene water, unfltrd ug/L -34371	Hexa-chloro-ethane, water, unfltrd ug/L -34396	Bromo-methane water, unfltrd ug/L -34413	Chloro-methane water, unfltrd ug/L -34418	Di-chloro-methane water, unfltrd ug/L -34423	Tetra-chloro-ethene, water, unfltrd ug/L -34475	Tri-chloro-fluoro-methane water, unfltrd ug/L -34488	1,1-Di-chloro-ethane, water, unfltrd ug/L -34496	1,1-Di-chloro-ethene, water, unfltrd ug/L -34501	1,1,1-Tri-chloro-ethane, water, unfltrd ug/L -34506	1,1,2-Tri-chloro-ethane, water, unfltrd ug/L -34511	1,1,2,2-Tetra-chloro-ethane, water, unfltrd ug/L -34516	1,2-Di-chloro-benzene water, unfltrd ug/L -34536	1,2-Di-chloro-propane water, unfltrd ug/L -34541	trans-1,2-Di-chloro-ethene, water, unfltrd ug/L -34546	1,2,4-Tri-chloro-benzene water, unfltrd ug/L -34551	1,3-Di-chloro-benzene water, unfltrd ug/L -34566	1,4-Di-chloro-benzene water, unfltrd ug/L -34571	2-Chloro-ethyl vinyl ether, wat unf ug/L -34576
10/9/1979																				
3/9/1980																				
7/7/1980																				
11/6/1983						< 3	< 1		< 3	< 3	< 1	< 3	< 3		< 3	< 3				
4/5/1984						< 3	< 1		< 3	< 3	< 1	< 3	< 3		< 3	< 3				
8/1/1984																				
4/17/1985					< 3	< 3	< 1	< 3	< 3	< 3	< 1	< 3	< 3		< 3	< 3				< 3
8/22/1985																				
2/6/1987 12:10																				
7/18/2012 11:00	< 0.006	< 0.036	< 0.10	< 0.2	< 0.1	< 0.04	< 0.026	< 0.06	< 0.044	< 0.022	0.02	< 0.046	< 0.14	< 0.028	< 0.0260	< 0.018	< 0.08	< 0.024	< 0.026	
7/18/2012 11:05																				

Sample Datetime	Di-chloro-di-fluoro-methane wat unf ug/L -34668	Naphth-alene, water, unfltrd ug/L -34696	trans-1,3-Di-chloro-propene water, unfltrd ug/L -34699	cis-1,3-Di-chloro-propene water, unfltrd ug/L -34704	MBAS, water, unfltrd mg/L -38260	Dicro-tophos, water, fltrd, ug/L -38454	Di-chlor-vos, water, fltrd, ug/L -38775	Chlor-pyrifos water, fltrd, ug/L -38933	Alka-linity, wat flt inf tit field, mg/L as CaCO3 -39086	Vinyl chlor-ide, water, unfltrd ug/L -39175	Tri-chloro-ethene, water, unfltrd ug/L -39180	Diel-drin, water, fltrd, ug/L -39381	Metola-chlor, water, fltrd, ug/L -39415	Mala-thion, water, fltrd, ug/L -39532	Diazi-non, water, fltrd, ug/L -39572	Atra-zine, water, fltrd, ug/L -39632	Hexa-chloro-buta-diene, water, unfltrd ug/L -39702	Ala-chlor, water, fltrd, ug/L -46342	Aceto-chlor, water, fltrd, ug/L -49260	1-Naph-thol, water, fltrd 0.7u GF ug/L -49295
10/9/1979					< 0.02															
3/9/1980					< 0.02															
7/7/1980					< 0.02															
11/6/1983					< 0.02						< 1									
4/5/1984					< 0.02						< 1									
8/1/1984					< 0.02															
4/17/1985	< 3		< 3	< 3	< 0.02					< 3	< 1									
8/22/1985					< 0.02															
2/6/1987 12:10																				
7/18/2012 11:00	< 0.10	< 0.18	< 0.14	< 0.10		< 0.08	< 0.04	< 0.0036	9.6	< 0.06	< 0.022	< 0.008	< 0.020	< 0.016	< 0.0060	< 0.008	< 0.08	< 0.008	< 0.010	< 0.0360
7/18/2012 11:05																				

Sample Datetime	C-14, water, fltrd, percent modern -49933	C-14 countng error, water, fltrd, percent modern -49934	Methyl acryl-ate, water, unfltrd ug/L -49991	1,2,3,4 -Tetra-methyl-benzene water, unfltrd ug/L -49999	1,2,3,5 -Tetra-methyl-benzene water, unfltrd ug/L -50000	Bromo-ethene, water, unfltrd ug/L -50002	t-Butyl ethyl ether, water, unfltrd ug/L -50004	Methyl tert-pentyl ether, water, unfltrd ug/L -50005	Site visit purpose code -50280	Caf-feine, water, fltrd, ug/L -50305	E coli, defined substr. test, water, MPN/ 100 mL -50468	Total coli-forms, defined substr. MPN/ 100 mL -50569	Ra-224, water, fltrd, pCi/L -50833	Cyflu-thrin, water, fltrd, ug/L -61585	Cyper-methrin water, fltrd, ug/L -61586	Endo-sulfan sulfate water, fltrd, ug/L -61590	Fenami-phos, water, fltrd, ug/L -61591	Ipro-dione, water, fltrd, ug/L -61593	Isofen-phos, water, fltrd, ug/L -61594	lambda-Cyhalo-thrin, water, fltrd, ug/L -61595
10/9/1979																				
3/9/1980																				
7/7/1980																				
11/6/1983																				
4/5/1984																				
8/1/1984																				
4/17/1985																				
8/22/1985																				
2/6/1987 12:10																				
7/18/2012 11:00	87.17	0.28	< 0.8	< 0.10	< 0.080	< 0.12	< 0.032	< 0.06	2001	< 0.060	< 1	< 1	R 0.00	< 0.016	< 0.020	< 0.016	< 0.030	< 0.014	< 0.008	< 0.010
7/18/2012 11:05							< 0.046	< 0.044	2001											

Inactive USGS Groundwater Sampling Station S59744.1

Sample Datetime	Metalaxyl, water, fltrd, ug/L -61596	Methidathion, water, fltrd, ug/L -61598	Myclobutanil water, fltrd, ug/L -61599	Oxyfluorfen, water, fltrd, ug/L -61600	Phosmet water, fltrd, ug/L -61601	Tefluthrin, water, fltrd, ug/L -61606	Tributos, water, fltrd, ug/L -61610	2Chloro-2',6'-diethylacetanilide wat flt ug/L -61618	2-Ethyl-6-methylaniline wat flt ug/L -61620	3,4-Dichloroaniline water, fltrd, ug/L -61625	3,5-Dichloroaniline water, fltrd, ug/L -61627	4-Chloro-2-methylphenol, wat flt ug/L -61633	Azinphosmethyl oxon, water, fltrd, ug/L -61635	Chlorpyrifos oxon, water, fltrd, ug/L -61636	Disulfoton sulfone water, fltrd, ug/L -61640	Ethion monoxon water, fltrd, ug/L -61644	Fenamiphos sulfone water, fltrd, ug/L -61645	Fenamiphos sulfoxide, water, fltrd, ug/L -61646	Malaoxon, water, fltrd, ug/L -61652	Methyl paraoxon, water, fltrd, ug/L -61664
10/9/1979																				
3/9/1980																				
7/7/1980																				
11/6/1983																				
4/5/1984																				
8/1/1984																				
4/17/1985																				
8/22/1985																				
2/6/1987 12:10																				
7/18/2012 11:00	< 0.014	< 0.012	< 0.010	< 0.010	< 0.080	< 0.014	< 0.018	< 0.010	< 0.010	< 0.0060	< 0.006	< 0.0080	< 0.042	< 0.08	< 0.014	< 0.021	< 0.054	< 0.08	< 0.022	< 0.014
7/18/2012 11:05																				

Inactive USGS Groundwater Sampling Station S59744.1

Sample Datetime	Phorate oxon, water, fltrd, ug/L -61666	Phosmet oxon, water, fltrd, ug/L -61668	Ter-bufos oxon sulfone water, fltrd, ug/L -61674	Acet-amino-phen, water, fltrd, ug/L -62000	Codeine water, fltrd, ug/L -62003	De-hydro-nife-dipine, water, fltrd, ug/L -62004	Cot-inine, water, fltrd, ug/L -62005	Diltia-zem, water, fltrd, ug/L -62008	Albut-erol, water, fltrd, ug/L -62020	Sulfa-methox-azole, water, fltrd, ug/L -62021	Tri-meth-oprim, water, fltrd, ug/L -62023	Warfar-in, water, fltrd, ug/L -62024	1,7-Di-methyl-Xan-thine, water, fltrd, ug/L -62030	Fipro-nil, water, fltrd, ug/L -62166	Fipro-nil sulfide water, fltrd, ug/L -62167	Fipro-nil sulfone water, fltrd, ug/L -62168	Desul-finyl-fipro-nil amide, wat flt ug/L -62169	Desul-finyl-fipro-nil, water, fltrd, ug/L -62170	Gross alpha radioac 72 hr, wat flt Th-230, pCi/L -62636	Gross alpha radioac 30 day, wat flt Th-230, pCi/L -62639
10/9/1979																				
3/9/1980																				
7/7/1980																				
11/6/1983																				
4/5/1984																				
8/1/1984																				
4/17/1985																				
8/22/1985																				
2/6/1987 12:10																				
7/18/2012 11:00	< 0.027	< 0.0511	< 0.045	< 0.120	< 0.046	< 0.080	< 0.038	< 0.060	< 0.080	< 0.091	< 0.034	< 0.080	< 0.100	< 0.018	< 0.012	< 0.024	< 0.029	< 0.012	0.6	R -0.1
7/18/2012 11:05																				

Inactive USGS Groundwater Sampling Station S59744.1

Sample Datetime	Gross beta radioac 72 hr, wat flt Cs-137, pCi/L -62642	Gross beta radioac 30 day, wat flt Cs-137, pCi/L -62645	Carbam-azepine water, fltrd, ug/L -62793	Diphen-hydra-mine, water, fltrd, ug/L -62796	Thiaben dazole, water, fltrd, ug/L -62801	Iso-butyl alcohol -d6, surrog, wat unf % recvy -62835	Total nitro-gen, wat flt by anal ysis, mg/L -62854	Turbdty white light, det ang 90+/-30 corrctd NTRU -63676	Dis-solved solids dried @ 180deg C wat flt mg/L -70300	Dis-solved solids, sum of consti-tuents, mg/L -70301	Dis-solved solids, water, tons/ acre-ft -70303	Ortho-phos-phate, water, unfltrd mg/L as P -70507	Ammonia water, unfltrd mg/L -71845	Ammonia water, fltrd, mg/L -71846	Nitrate water, fltrd, mg/L -71851	Nitrite water, fltrd, mg/L -71856	Bromide water, fltrd, mg/L -71870	Hydro-gen sulfide water, unfltrd mg/L -71875	Total nitro-gen, water, unfltrd mg/L as NO3 -71887	Mercury water, unfltrd recover-able, ug/L -71900
10/9/1979													< 0.013							
3/9/1980													< 0.013							< 0.2
7/7/1980													< 0.013							
11/6/1983									30	30	0.04		< 0.013							
4/5/1984									37	37	0.05		< 0.013							
8/1/1984									38	38	0.05		< 0.013							< 0.2
4/17/1985										39	0.05		< 0.013							
8/22/1985										37	0.05		< 0.013							
2/6/1987 12:10									52	52	0.07	0.005	0.026	0.004	< 0.035	0.007	0.04		< 4.0	
7/18/2012 11:00	0.6	R 0.1	< 0.060	< 0.058	< 0.060		< 0.05	0.4	101	95	0.14			< 0.013	< 0.177	< 0.003	0.038	U		
7/18/2012 11:05						106														

Sample Datetime	Sample purpose code -71999	Depth to top sample intrval feet below LSD -72015	Depth to bot sample intrval feet below LSD -72016	trans-1,4-Di-chloro-2-butene, wat unf ug/L -73547	Ethyl methac-rylate, water, unfltrd ug/L -73570	Methyl acetate water, unfltrd ug/L -77032	tert-Butyl-alcohol water, unfltrd ug/L -77035	Carbon di-sulfide water, unfltrd ug/L -77041	tert-Amyl alcohol water, unfltrd ug/L -77073	cis-1,2-Di-chloro-ethene, water, unfltrd ug/L -77093	Methyl n-butyl ketone, water, unfltrd ug/L -77103	Styrene water, unfltrd ug/L -77128	o-Xylene, water, unfltrd ug/L -77135	1,1-Di-chloro-propene water, unfltrd ug/L -77168	2,2-Di-chloro-propane water, unfltrd ug/L -77170	1,3-Di-chloro-propane water, unfltrd ug/L -77173	2-Ethyl-toluene water, unfltrd ug/L -77220	1,2,3-Tri-methyl-benzene water, unfltrd ug/L -77221	1,2,4-Tri-methyl-benzene water, unfltrd ug/L -77222	Iso-propyl-benzene water, unfltrd ug/L -77223
10/9/1979																				
3/9/1980																				
7/7/1980																				
11/6/1983										< 3.0										
4/5/1984										< 3.0										
8/1/1984																				
4/17/1985										< 3.0										
8/22/1985																				
2/6/1987 12:10		236	296																	
7/18/2012 11:00	15			< 2.0	< 0.20			< 0.1		< 0.022	< 0.4	< 0.042	< 0.032	< 0.040	< 0.06	< 0.06	< 0.032	< 0.060	< 0.032	< 0.042
7/18/2012 11:05	15					< 0.46	< 0.80		< 0.6											

Inactive USGS Groundwater Sampling Station S59744.1

Sample Datetime	n-Propylbenzene water, unfltrd ug/L -77224	1,3,5-Trimethylbenzene water, unfltrd ug/L -77226	2-Chlorotoluene water, unfltrd ug/L -77275	4-Chlorotoluene water, unfltrd ug/L -77277	Bromochloromethane water, unfltrd ug/L -77297	n-Butylbenzene water, unfltrd ug/L -77342	sec-Butylbenzene water, unfltrd ug/L -77350	tert-Butylbenzene water, unfltrd ug/L -77353	4-Isopropyltoluene water, unfltrd ug/L -77356	Iodomethane water, unfltrd ug/L -77424	1,2,3-Trichloropropane water, unfltrd ug/L -77443	1,1,1,2-Tetrachloroethane, water, unfltrd ug/L -77562	1,2,3-Trichlorobenzene water, unfltrd ug/L -77613	1,2-Dibromoethane, water, unfltrd ug/L -77651	CFC-113 water, unfltrd ug/L -77652	Methyl t-butyl ether, water, unfltrd ug/L -78032	3-Chloropropene water, unfltrd ug/L -78109	Isobutyl methyl ketone, water, unfltrd ug/L -78133	cis-Propiconazole, water, fltrd, ug/L -79846	trans-Propiconazole, water, fltrd, ug/L -79847
10/9/1979																				
3/9/1980																				
7/7/1980																				
11/6/1983																				
4/5/1984																				
8/1/1984																				
4/17/1985																				
8/22/1985																				
2/6/1987 12:10																				
7/18/2012 11:00	< 0.036	< 0.032	< 0.028	< 0.042	< 0.06	< 0.08	< 0.034	< 0.060	< 0.06	< 0.26	< 0.120	< 0.040	< 0.06	< 0.028	< 0.022	0.1	< 0.08	< 0.32	< 0.008	< 0.018
7/18/2012 11:05																0.098				

Inactive USGS Groundwater Sampling Station S59744.1

Sample Datetime	Ra-228, water, fltrd, pCi/L -81366	Acetone water, unfltrd ug/L -81552	Bromo-benzene water, unfltrd ug/L -81555	Di-ethyl ether, water, unfltrd ug/L -81576	Diiso-propyl ether, water, unfltrd ug/L -81577	Methyl acrylo-nitrile water, unfltrd ug/L -81593	Ethyl methyl ketone, water, unfltrd ug/L -81595	Methyl methac-rylate, water, unfltrd ug/L -81597	Tetra-hydro-furan, water, unfltrd ug/L -81607	delta C-13, water, unfltrd per mil -82081	Deu-terium/ Protium ratio, water, unfltrd per mil -82082	delta O-18, water, unfltrd per mil -82085	Rn-222, water, unfltrd pCi/L -82303	Ethion, water, fltrd, ug/L -82346	Sam-pling method, code -82398	Dibromo chloro-propane water, unfltrd ug/L -82625	Metri-buzin, water, fltrd, ug/L -82630	2,6-Di-ethyl-aniline water, fltrd 0.7u GF ug/L -82660	Tri-flur-alin, water, fltrd 0.7u GF ug/L -82661	Dimeth-oate, water, fltrd 0.7u GF ug/L -82662
10/9/1979																				
3/9/1980																				
7/7/1980																				
11/6/1983																				
4/5/1984																				
8/1/1984																				
4/17/1985																				
8/22/1985																				
2/6/1987 12:10																				
7/18/2012 11:00	0.29	< 3.4	< 0.022	< 0.1	< 0.06	< 0.26	< 1.6	< 0.22	< 1.4	-21.8	-43.5	-7.16	44	< 0.010	8030	< 0.400	< 0.012	< 0.0060	< 0.018	< 0.0100
7/18/2012 11:05		< 1.6			< 0.044										8030					

Inactive USGS Groundwater Sampling Station S59744.1

Sample Datetime	Phorate water, fltrd 0.7u GF ug/L -82664	Methyl para-thion, water, fltrd 0.7u GF ug/L -82667	EPTC, water, fltrd 0.7u GF ug/L -82668	Tebu-thiuron water, fltrd 0.7u GF ug/L -82670	Moli-nate, water, fltrd 0.7u GF ug/L -82671	Etho-prop, water, fltrd 0.7u GF ug/L -82672	Ben-flur-alin, water, fltrd 0.7u GF ug/L -82673	Carbo-furan, water, fltrd 0.7u GF ug/L -82674	Terbu-fos, water, fltrd 0.7u GF ug/L -82675	Propy-zamide, water, fltrd 0.7u GF ug/L -82676	Disul-foton, water, fltrd 0.7u GF ug/L -82677	Pro-panil, water, fltrd 0.7u GF ug/L -82679	Car-baryl, water, fltrd 0.7u GF ug/L -82680	Thio-bencarb water, fltrd 0.7u GF ug/L -82681	DCPA, water, fltrd 0.7u GF ug/L -82682	Pendi-meth-alin, water, fltrd 0.7u GF ug/L -82683	Propar-gite, water, fltrd 0.7u GF ug/L -82685	Azin-phos-methyl, water, fltrd 0.7u GF ug/L -82686	cis-Per-methrin water fltrd 0.7u GF ug/L -82687	meta- + para-Xylene, water, unfltrd ug/L -85795
10/9/1979																				
3/9/1980																				
7/7/1980																				
11/6/1983																				
4/5/1984																				
8/1/1984																				
4/17/1985																				
8/22/1985																				
2/6/1987 12:10																				
7/18/2012 11:00	< 0.020	< 0.008	< 0.0056	< 0.028	< 0.0040	< 0.016	< 0.014	< 0.060	< 0.018	< 0.0036	< 0.040	< 0.010	< 0.060	< 0.016	< 0.0076	< 0.012	< 0.020	< 0.120	< 0.010	< 0.08
7/18/2012 11:05																				

Sample Datetime	Specif. conduc-tance, wat unf lab, uS/cm @ 25 degC -90095	ANC, wat unf fixed end pt, lab, mg/L as CaCO3 -90410	Carba-maze-pine-d10, surrog, wat flt % recvy -90797	Tri-halo-meth-anes, wat unf max sum ug/L -90867	Colipge som, Ec CN13hst 2-step, pres or absence /L -99332	Colipge F-spec, FAMP, 2-step, pres or absence /L -99335	Ethyl nico-tinate-d4, surrog, wat flt % recvy -99571	Sample volume, pharma-ceuticl method wat flt mL -99572	Entero-cocci, defined substr. test, water, MPN -99601	1,2-Di-chloro-ethane-d4, surrog, wat unf % recvy -99832	Toluene -d8, surrog, Sch2090 wat unf percent recovry -99833	14Bromo fluoro-benzene surrog. VOC Sch wat unf % recvy -99834	Number of TICS from VOC by GCMS number -99871	Sample volume, Sched 2003, mL -99972	Diazi-non-d10 surrog, Sch2003 wat flt percent recovry -99994	alpha-HCH-d6, surrog, Sch2003 wat flt percent recovry -99995
10/9/1979	50	12														
3/9/1980	46	11														
7/7/1980	56	10														
11/6/1983	51	10		< 14.0												
4/5/1984	55	10		< 14.0												
8/1/1984	52	11														
4/17/1985	55	12		< 14.0												
8/22/1985	52	11														
2/6/1987 12:10	69	7														
7/18/2012 11:00	156		102	< 0.3	U	U	94.1	926	< 1	145	82.3	83.2	0	951	96	99.2
7/18/2012 11:05										125	105	105				

Inactive USGS Groundwater Sampling Station S54730.1

Sample Datetime	Time datum	Time datum reliability code	Sample Medium Code	Agency Collecting Sample, Code	Temperature, water, deg C -10	Agency analyzing sample, code -28	Turbidity, NTU -76	Specific conductance, wat unf uS/cm @ 25 degC -95	Hydrogen ion, water, unfltrd calcd, mg/L -191	Dissolved oxygen, mg/L -300	pH, water, unfltrd field, std units -400	pH, water, unfltrd lab, std units -403	Carbon dioxide water, unfltrd mg/L -405	ANC, wat unf infl pt titr., field, mg/L as CaCO3 -419	Ammonia water, fltrd, mg/L as N -608	Ammonia water, unfltrd mg/L as N -610	Nitrite water, fltrd, mg/L as N -613	Nitrite water, unfltrd mg/L as N -615	Nitrate water, fltrd, mg/L as N -618	Nitrate water unfltrd mg/L as N -620	Nitrate + nitrite water, fltrd, mg/L as N -631
10/3/1979	EST	T	WG	NY-SCWA		9822	0.75					6	17			< 0.010		< 0.010		< 0.01	
3/10/1980	EST	T	WG	NY-SCWA		9822	0.4					6.2	10			< 0.010		< 0.010		< 0.01	
7/7/1980	EST	T	WG	NY-SCWA		9822	0.55					6.3	8.8			< 0.010		< 0.010		0.72	
10/7/1982	EST	T	WG	NY-SCWA		9822	0.28					5.9				< 0.010		< 0.010		0.1	
4/11/1983	EST	T	WG	NY-SCWA		9822	0.1					5.8				< 0.010		< 0.010		< 0.05	
11/8/1983	EST	T	WG	NY-SCWA		9822	0.23					5.3				< 0.010		< 0.010		< 0.05	
7/31/1984	EST	T	WG	NY-SCWA		9822	0.23					5.8				< 0.010		< 0.010		< 0.05	
8/19/1985	EST	T	WG	NY-SCWA		9822	0.6					5.8				< 0.010		< 0.010		< 0.05	
7/17/1992 14:00	EST	T	WG	USGS-WRD	11	80020			0.00116	0.8	5.9										
10/19/1999 12:45	EST	T	WG	USGS-WRD	10.8	80020		92	0.00197		5.7	6	39	10	< 0.02		< 0.010		0.245		0.25

Sample Datetime	Phos-phate, water, unfltrd mg/L -650	Ortho-phos-phate, water, fltrd, mg/L -660	Phos-phorus, water, unfltrd mg/L as P -665	Phos-phorus, water, fltrd, mg/L as P -666	Ortho-phos-phate, water, fltrd, mg/L as P -671	Organic carbon, water, unfltrd mg/L -680	Organic carbon, water, fltrd, mg/L -681	Hard-ness, water, mg/L as CaCO3 -900	Noncarb hard-ness, wat unf lab, mg/L as CaCO3 -903	Calcium water, fltrd, mg/L -915	Calcium water unfltrd recover-able, mg/L -916	Magnes-ium, water, fltrd, mg/L -925	Magnes-ium, water, unfltrd recover-able, mg/L -927	Sodium, water, unfltrd recover-able, mg/L -929	Sodium, water, fltrd, mg/L -930	Sodium adsorp-tion ratio -931	Sodium frac-tion of cations percent -932	Potas-sium, water, fltrd, mg/L -935	Potas-sium, water, unfltrd recover-able, mg/L -937	Chlor-ide, water, fltrd, mg/L -940	Sulfate water, fltrd, mg/L -945
10/3/1979	< 0.100		< 0.100					14	1		3.1		1.1	3.4					0.3	4	5.9
3/10/1980	< 0.100		< 0.100					11	2		3		1.2	3.6					0.4	4.5	6.8
7/7/1980	< 0.100		< 0.100					15	6		4.8		1.3	4.6					0.5	5.5	8
10/7/1982			< 0.100					18	3		3.1		1.3	3.8					0.4	5	8.3
4/11/1983			< 0.100					24	6		3.8		1.6	4.1					0.4	8	7.5
11/8/1983			< 0.100					17	6		3.9		1.6	4.3					0.4	8	7.8
7/31/1984			< 0.100					19	7		4.1		1.7	5.2					0.5	9	9.3
8/19/1985			< 0.100					26	6		3.8		1.6	4.7					0.4	5	9.3
7/17/1992 14:00																					
10/19/1999 12:45		0.04	E 0.03	< 0.05	0.013	E 0.2	< 0.3	22.3		5.09		2.33			7.15	0.66	40	0.55		12.1	11.1

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Sample Datetime	Fluoride, water, unfltrd mg/L -951	Silica, water, fltrd, mg/L as SiO2 -955	Arsenic water, unfltrd ug/L -1002	Barium, water, unfltrd recoverable, ug/L -1007	Cadmium water, unfltrd ug/L -1027	Chromium, water, unfltrd recoverable, ug/L -1034	Copper, water, unfltrd recoverable, ug/L -1042	Iron, water, unfltrd recoverable, ug/L -1045	Iron, water, fltrd, ug/L -1046	Lead, water, unfltrd recoverable, ug/L -1051	Manganese, water, unfltrd recoverable, ug/L -1055	Manganese, water, fltrd, ug/L -1056	Silver, water, unfltrd recoverable, ug/L -1077	Zinc, water, unfltrd recoverable, ug/L -1092	Selenium, water, unfltrd ug/L -1147	Bromomethane water, unfltrd ug/L -30202	Bromodichloromethane water, unfltrd ug/L -32101	Tetrachloromethane water, unfltrd ug/L -32102	1,2-Dichloroethane, water, unfltrd ug/L -32103	Tribromomethane water, unfltrd ug/L -32104	Dibromochloromethane water, unfltrd ug/L -32105
10/3/1979			< 5	< 50			30	240			10		< 2.50	10							
3/10/1980						< 5	40	240			30			< 10	< 2						
7/7/1980	< 0.1				< 0.5		20	450		M	30			200							
10/7/1982				< 30			30	200		< 5	20			< 20			< 4	< 1	< 2	< 6	< 3
4/11/1983					< 0.5	< 5	30	240			< 10			< 20	< 2		< 4	< 1	< 2	< 6	< 3
11/8/1983			< 5	< 100			40	220			10		< 2.50	20			< 4	< 1	< 2	< 6	< 3
7/31/1984	< 0.1						< 20	240		< 5	20			50			< 4	< 1	< 2	< 6	< 3
8/19/1985	< 0.1						< 20	170		< 5	10			< 20		< 3.0	< 4	< 1	< 2	< 6	< 3
7/17/1992 14:00		15																			
10/19/1999 12:45		15.6						308	313		14.7	16									

Sample Datetime	Tri-chloro-methane water, unfltrd ug/L -32106	Chloro-benzene water, unfltrd ug/L -34301	Chloro-ethane, water, unfltrd ug/L -34311	Chloro-methane water, unfltrd ug/L -34418	Di-chloro-methane water, unfltrd ug/L -34423	Tetra-chloro-ethene, water, unfltrd ug/L -34475	Tri-chloro-fluoro-methane water, unfltrd ug/L -34488	1,1-Di-chloro-ethane, water, unfltrd ug/L -34496	1,1-Di-chloro-ethene, water, unfltrd ug/L -34501	1,1,1-Tri-chloro-ethane, water, unfltrd ug/L -34506	1,1,2-Tri-chloro-ethane, water, unfltrd ug/L -34511	1,1,2,2-Tetra-chloro-ethane, water, unfltrd ug/L -34516	1,2-Di-chloro-propane water, unfltrd ug/L -34541	trans-1,2-Di-chloro-ethene, water, unfltrd ug/L -34546	2-Chloro-ethyl vinyl ether, wat unf ug/L -34576	Di-chloro-di-fluoro-methane wat unf ug/L -34668	trans-1,3-Di-chloro-propene water, unfltrd ug/L -34699	cis-1,3-Di-chloro-propene water, unfltrd ug/L -34704	MBAS, water, unfltrd mg/L -38260	Vinyl chlor-ide, water, unfltrd ug/L -39175	Tri-chloro-ethene, water, unfltrd ug/L -39180
10/3/1979																			< 0.02		
3/10/1980																			< 0.02		
7/7/1980																			< 0.02		
10/7/1982	< 1				< 3	< 1		< 3	< 3	< 1	< 3		< 3	< 3					< 0.02		< 1
4/11/1983	< 1				< 3	< 1		< 3	< 3	< 1	< 3		< 3	< 3					< 0.02		< 1
11/8/1983	< 1				< 3	< 1		< 3	< 3	< 1	< 3	< 3	< 3	< 3					< 0.02		< 1
7/31/1984	< 1				< 3	< 1		< 3	< 3	< 1	< 3	< 3	< 3	< 3					< 0.02		< 1
8/19/1985	< 1	< 3	< 3	< 3	< 3	< 1	< 3	< 3	< 3	< 1	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 0.02	< 3	< 1
7/17/1992 14:00																					
10/19/1999 12:45																					

Sample Datetime	S34/S32 in sulfate water, fltrd, per mil -49932	Dis-solved solids dried @ 180deg C wat flt mg/L -70300	Dis-solved solids, sum of consti-tuents, mg/L -70301	Dis-solved solids, water, tons/acre-ft -70303	Ammonia water, unfltrd mg/L -71845	Ammonia water, fltrd, mg/L -71846	Nitrate water, fltrd, mg/L -71851	Nitrite water, fltrd, mg/L -71856	Bromide water, fltrd, mg/L -71870	Mercury water, unfltrd recover-able, ug/L -71900	cis-1,2-Di-chloro-ethene, water, unfltrd ug/L -77093	delta C-13, water, unfltrd per mil -82081	Deu-terium/Protium ratio, water, unfltrd per mil -82082	delta O-18, water, unfltrd per mil -82085	Specif. conduc-tance, wat unf lab, uS/cm @ 25 degC -90095	ANC, wat unf fixed end pt, lab, mg/L as CaCO3 -90410	Tri-halo-meth-anes, wat unf max sum ug/L -90867	Set number, lab code 113 -99630	Set number, lab code 114 -99631	Julian date, in-bottle diges-tion, ddd -99870
10/3/1979					< 0.013										49	11				
3/10/1980					< 0.013					< 0.2					49	10				
7/7/1980					< 0.013										67	11				
10/7/1982		37	37	0.05	< 0.013						< 3.0				54	10	< 14.0			
4/11/1983		40	40	0.05	< 0.013						< 3.0				56	10	< 14.0			
11/8/1983		36	36	0.05	< 0.013						< 3.0				58	10	< 14.0			
7/31/1984		45	45	0.06	< 0.013					< 0.2	< 3.0				67	10	< 14.0			
8/19/1985			40	0.05	< 0.013						< 3.0				55	10	< 14.0			
7/17/1992 14:00																				
10/19/1999 12:45	1.3		62	0.08		< 0.026	1.08	< 0.033	0.03			-22.39	-44.7	-7.45	97	11.2		99293	99292.1	298

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Sample Datetime	Time datum	Time datum reliability code	Sample Medium Code	Agency Collecting Sample, Code	Agency analyzing sample, code -28	Turbidity, NTU -76	pH, water, unfltrd lab, std units -403	Carbon dioxide water, unfltrd mg/L -405	Ammonia water, unfltrd mg/L as N -610	Nitrite water, unfltrd mg/L as N -615	Nitrate water unfltrd mg/L as N -620	Phosphate, water, unfltrd mg/L -650	Phosphorus, water, unfltrd mg/L as P -665	Hardness, water, mg/L as CaCO3 -900	Noncarb hardness, wat unf lab, mg/L as CaCO3 -903	Calcium water unfltrd recoverable, mg/L -916	Magnesium, water, unfltrd recoverable, mg/L -927	Sodium, water, unfltrd recoverable, mg/L -929	Potassium, water, unfltrd recoverable, mg/L -937	Chloride, water, fltrd, mg/L -940	Sulfate water, fltrd, mg/L -945
11/7/1983	EST	T	WG	NY-SCWA	9822	0.25	5.9		< 0.010	< 0.010	< 0.05	2.94	1.24	11		3	0.8	3.9	0.4	3	4.6
4/4/1984	EST	T	WG	NY-SCWA	9822	0.35	5.8		< 0.010	< 0.010	< 0.05	1.23	1.12	16	0	3.1	0.8	4	0.4	3	5.3
7/31/1984	EST	T	WG	NY-SCWA	9822	0.3	6	19	< 0.010	< 0.010	< 0.05	1.32	0.43	16	1	3.9	0.9	3.9	0.5	3	4.8
8/12/1985	EST	T	WG	NY-SCWA	9822	0.48	6	21	< 0.010	< 0.010	< 0.05	1.04	0.52	13		3.1	0.9	3.7	0.4	2.5	2.5
4/8/1985	EST	T	WG	NY-SCWA	9822	0.32	6	24	< 0.010	< 0.010	< 0.05	1.66	1.06	14		3.1	0.9	4.1	0.4	3	4.5

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Sample Datetime	Fluoride, water, unfltrd mg/L -951	Arsenic water, unfltrd ug/L -1002	Barium, water, unfltrd recoverable, ug/L -1007	Cadmium water, unfltrd ug/L -1027	Chromium, water, unfltrd recoverable, ug/L -1034	Copper, water, unfltrd recoverable, ug/L -1042	Iron, water, unfltrd recoverable, ug/L -1045	Lead, water, unfltrd recoverable, ug/L -1051	Manganese, water, unfltrd recoverable, ug/L -1055	Silver, water, unfltrd recoverable, ug/L -1077	Zinc, water, unfltrd recoverable, ug/L -1092	Selenium, water, unfltrd ug/L -1147	Bromomethane water, unfltrd ug/L -30202	Bromodichloromethane water, unfltrd ug/L -32101	Tetrachloromethane water, unfltrd ug/L -32102	1,2-Dichloroethane, water, unfltrd ug/L -32103	Tribromomethane water, unfltrd ug/L -32104	Dibromochloromethane water, unfltrd ug/L -32105	Trichloromethane water, unfltrd ug/L -32106	Chlorobenzene water, unfltrd ug/L -34301	Chloroethane, water, unfltrd ug/L -34311
11/7/1983		< 5	< 100			20	670		30	< 2.50	120			< 4	< 1	< 2	< 6	< 3	< 1		
4/4/1984				< 0.5	< 5	< 20	650		20		< 20	< 2		< 4	< 1	< 2	< 6	< 3	< 1		
7/31/1984	< 0.1					< 20	710	< 5	20		60			< 4	< 1	< 2	< 6	< 3	< 1		
8/12/1985	< 0.1					< 20	660	< 5	20		< 20		< 3.0	< 4	< 1	< 2	< 6	< 3	< 1	< 3	< 3
4/8/1985				< 0.5	< 5	< 20	640		20		< 20	< 2	< 3.0	< 4	< 1	< 2	< 6	< 3	< 1	< 3	< 3

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Sample Datetime	Chloro-methane water, unfltrd ug/L -34418	Di-chloro-methane water, unfltrd ug/L -34423	Tetra-chloro-ethene, water, unfltrd ug/L -34475	Tri-chloro-fluoro-methane water, unfltrd ug/L -34488	1,1-Di-chloro-ethane, water, unfltrd ug/L -34496	1,1-Di-chloro-ethene, water, unfltrd ug/L -34501	1,1,1-Tri-chloro-ethane, water, unfltrd ug/L -34506	1,1,2-Tri-chloro-ethane, water, unfltrd ug/L -34511	1,1,2,2-Tetra-chloro-ethane, water, unfltrd ug/L -34516	1,2-Di-chloro-propane water, unfltrd ug/L -34541	trans-1,2-Di-chloro-ethene, water, unfltrd ug/L -34546	2-Chloro-ethyl vinyl ether, wat unf ug/L -34576	Di-chloro-di-fluoro-methane wat unf ug/L -34668	trans-1,3-Di-chloro-propene water, unfltrd ug/L -34699	cis-1,3-Di-chloro-propene water, unfltrd ug/L -34704	MBAS, water, unfltrd mg/L -38260	Vinyl chlor-ide, water, unfltrd ug/L -39175	Tri-chloro-ethene, water, unfltrd ug/L -39180	Dis-solved solids dried @ 180deg C wat flt mg/L -70300	Dis-solved solids, sum of consti-tuents, mg/L -70301	Dis-solved solids, water, tons/ acre-ft -70303
11/7/1983		< 3	< 1		< 3	< 3	< 1	< 3	< 3	< 3	< 3					< 0.02		< 1	26	26	0.04
4/4/1984		< 3	< 1		< 3	< 3	< 1	< 3	< 3	< 3	< 3					< 0.02		< 1	32	32	0.04
7/31/1984		< 3	< 1		< 3	< 3	< 1	< 3	< 3	< 3	< 3					< 0.02		< 1	33	33	0.04
8/12/1985	< 3	< 3	< 1	< 3	< 3	< 3	< 1	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 0.02	< 3	< 1		30	0.04
4/8/1985	< 3	< 3	< 1	< 3	< 3	< 3	< 1	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 0.02	< 3	< 1		34	0.05

Sample Datetime	Ortho-phos-phate, water, unfltrd mg/L as P -70507	Ammonia water, unfltrd mg/L -71845	Mercury water, unfltrd recover-able, ug/L -71900	cis-1,2-Di-chloro-ethene, water, unfltrd ug/L -77093	Specif. conduc-tance, wat unf lab, uS/cm @ 25 degC -90095	ANC, wat unf fixed end pt, lab, mg/L as CaCO3 -90410	Tri-halo-meth-anes, wat unf max sum ug/L -90867
11/7/1983	0.96	< 0.013		< 3.0	41	11	< 14.0
4/4/1984	0.4	< 0.013		< 3.0	45	11	< 14.0
7/31/1984	0.43	< 0.013	< 0.2	< 3.0	43	12	< 14.0
8/12/1985	0.34	< 0.013		< 3.0	40	13	< 14.0
4/8/1985	0.54	< 0.013		< 3.0	42	15	< 14.0

Inactive USGS Groundwater Sampling Station S66184.1

Sample Datetime	Time datum	Time datum reliability code	Sample Medium Code	Agency Collecting Sample, Code	Temperature, water, deg C -10	Agency analyzing sample, code -28	Turbidity, NTU -76	Specific conductance, wat unf uS/cm @ 25 degC -95	Hydrogen ion, water, unfltrd calcd, mg/L -191	Dissolved oxygen, mg/L -300	pH, water, unfltrd field, std units -400	pH, water, unfltrd lab, std units -403	Carbon dioxide water, unfltrd mg/L -405	Ammonia water, unfltrd mg/L as N -610	Nitrite water, unfltrd mg/L as N -615	Nitrate water unfltrd mg/L as N -620	Phosphate, water, unfltrd mg/L -650	Phosphorus, water, unfltrd mg/L as P -665	Hardness, water, mg/L as CaCO3 -900	Noncarb hardness, wat unf lab, mg/L as CaCO3 -903	Calcium water unfltrd recoverable, mg/L -916
11/3/1983	EST	T	WG	NY-SCWA		9822	0.24					5.8		< 0.010	< 0.010	< 0.05	1.9	0.89	14		2.8
4/3/1984	EST	T	WG	NY-SCWA		9822	0.16					6.3	9.6	< 0.010	< 0.010	< 0.05	1.01	0.76	14	0	3.2
7/30/1984	EST	T	WG	NY-SCWA		9822	0.28					6.2	13	< 0.010	< 0.010	< 0.05	1.9	0.62	14	0	3.4
4/15/1985	EST	T	WG	NY-SCWA		9822	0.12					5.9		< 0.010	< 0.010	< 0.05	2.48	1.64	14		3.1
8/19/1985	EST	T	WG	NY-SCWA		9822	0.58					6.2	13	< 0.010	< 0.010	< 0.05	< 0.031	0.27	11		3
12/10/2002 10:40	EST	T	WG	USGS-WRD	10.5	80020		70	0.00118	2.2	5.9										
6/29/2004 8:25	EST	K	WG	USGS-WRD	11.2	80020		75	0.00116		5.9										

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Sample Datetime	Magnes-ium, water, unfltrd recover-able, mg/L -927	Sodium, water, unfltrd recover-able, mg/L -929	Potas-sium, water, unfltrd recover-able, mg/L -937	Chlor-ide, water, fltrd, mg/L -940	Sulfate water, fltrd, mg/L -945	Fluor-ide, water, unfltrd mg/L -951	Arsenic water, unfltrd ug/L -1002	Barium, water, unfltrd recover-able, ug/L -1007	Cadmium water, unfltrd ug/L -1027	Chrom-ium, water, unfltrd recover-able, ug/L -1034	Copper, water, unfltrd recover-able, ug/L -1042	Iron, water, unfltrd recover-able, ug/L -1045	Lead, water, unfltrd recover-able, ug/L -1051	Manga-nese, water, unfltrd recover-able, ug/L -1055	Silver, water, unfltrd recover-able, ug/L -1077	Zinc, water, unfltrd recover-able, ug/L -1092	Selen-ium, water, unfltrd ug/L -1147	Broma-cil, water, fltrd, ug/L -4029	Prome-ton, water, fltrd, ug/L -4037	Bromo-methane water, unfltrd ug/L -30202	Bromo-di-chloro-methane water, unfltrd ug/L -32101
11/3/1983	1.1	4.1	0.5	4	4.6		< 5	< 100			40	300		50	< 2.50	150					< 4
4/3/1984	1.1	3.6	0.4	3.5	3.9				< 0.5	< 5	< 20	350		50		< 20	< 2				< 4
7/30/1984	1.1	3.7	0.4	3	4.4	< 0.1					40	380	< 5	40		100					< 4
4/15/1985	1.1	4.5	0.3	3	4.2				< 0.5	< 5	< 20	430		40		< 20	< 2			< 3.0	< 4
8/19/1985	1.2	3.6	0.3	2.5	5.1	< 0.1					< 20	410	< 5	40		< 20				< 3.0	< 4
12/10/2002 10:40																		< 0.50	< 0.50		
6/29/2004 8:25																		< 0.50	< 0.50		

Inactive USGS Groundwater Sampling Station S66184.1

Sample Datetime	Tetra-chloro-methane water, unfltrd ug/L -32102	1,2-Di-chloro-ethane, water, unfltrd ug/L -32103	Tri-bromo-methane water, unfltrd ug/L -32104	Di-bromo-chloro-methane water, unfltrd ug/L -32105	Tri-chloro-methane water, unfltrd ug/L -32106	Anthra-cene, water, fltrd, ug/L -34221	Benzo-[a]-pyrene, water, fltrd, ug/L -34248	Tri-bromo-methane water, fltrd, ug/L -34288	Chloro-benzene water, unfltrd ug/L -34301	Chloro-ethane, water, unfltrd ug/L -34311	Fluor-anthene water, fltrd, ug/L -34377	Iso-phorone water, fltrd, ug/L -34409	Chloro-methane water, unfltrd ug/L -34418	Di-chloro-methane water, unfltrd ug/L -34423	Naphth-alene, water, fltrd, ug/L -34443	Penta-chloro-phenol, water, fltrd, ug/L -34459	Phenan-threne, water, fltrd, ug/L -34462	Phenol, water, fltrd, ug/L -34466	Pyrene, water, fltrd, ug/L -34470	Tetra-chloro-ethene, water, unfltrd ug/L -34475	Tetra-chloro-ethene, water, fltrd, ug/L -34476
11/3/1983	< 1	< 2	< 6	< 3	< 1									< 3						< 1	
4/3/1984	< 1	< 2	< 6	< 3	< 1									< 3						< 1	
7/30/1984	< 1	< 2	< 6	< 3	< 1									< 3						< 1	
4/15/1985	< 1	< 2	< 6	< 3	< 1				< 3	< 3			< 3	< 3						< 1	
8/19/1985	< 1	< 2	< 6	< 3	< 1				< 3	< 3			< 3	< 3						< 1	
12/10/2002 10:40						< 0.500	< 0.50	< 0.50			< 0.500	< 0.500			< 0.500	< 2	< 0.500	E 0.48	< 0.500		< 0.50
6/29/2004 8:25						< 0.500	< 0.50	< 0.50			< 0.500	< 0.500			< 0.500	< 2	< 0.500	E 0.29	< 0.500		< 0.50

Inactive USGS Groundwater Sampling Station S66184.1

Sample Datetime	Tri-chloro-fluoro-methane water, unfltrd ug/L -34488	1,1-Di-chloro-ethane, water, unfltrd ug/L -34496	1,1-Di-chloro-ethene, water, unfltrd ug/L -34501	1,1,1-Tri-chloro-ethane, water, unfltrd ug/L -34506	1,1,2-Tri-chloro-ethane, water, unfltrd ug/L -34511	1,1,2,2-Tetra-chloro-ethane, water, unfltrd ug/L -34516	1,2-Di-chloro-propane water, unfltrd ug/L -34541	trans-1,2-Di-chloro-ethene, water, unfltrd ug/L -34546	1,4-Di-chloro-benzene water, fltrd, ug/L -34572	2-Chloro-ethyl vinyl ether, wat unf ug/L -34576	Di-chloro-di-fluoro-methane wat unf ug/L -34668	trans-1,3-Di-chloro-propene water, unfltrd ug/L -34699	cis-1,3-Di-chloro-propene water, unfltrd ug/L -34704	MBAS, water, unfltrd mg/L -38260	Di-chlor-vos, water, fltrd, ug/L -38775	Chlor-pyrifos water, fltrd, ug/L -38933	Vinyl chlor-ide, water, unfltrd ug/L -39175	Tri-chloro-ethene, water, unfltrd ug/L -39180	Metola-chlor, water, fltrd, ug/L -39415	Diazi-non, water, fltrd, ug/L -39572	Caf-feine, water, fltrd, ug/L -50305
11/3/1983		< 3	< 3	< 1	< 3	< 3	< 3	< 3						< 0.02				< 1			
4/3/1984		< 3	< 3	< 1	< 3	< 3	< 3	< 3						< 0.02				< 1			
7/30/1984		< 3	< 3	< 1	< 3	< 3	< 3	< 3						< 0.02				< 1			
4/15/1985	< 3	< 3	< 3	< 1	< 3	< 3	< 3	< 3		< 3	< 3	< 3	< 3	< 0.02			< 3	< 1			
8/19/1985	< 3	< 3	< 3	< 1	< 3	< 3	< 3	< 3		< 3	< 3	< 3	< 3	< 0.02			< 3	< 1			
12/10/2002 10:40									< 0.500						< 1.00	< 0.50			< 0.500	< 0.50	< 0.50
6/29/2004 8:25									< 0.500						< 1.00	< 0.50			< 0.500	< 0.50	< 0.50

Inactive USGS Groundwater Sampling Station S66184.1

Sample Datetime	Metalaxyl, water, fltrd, ug/L -50359	4t-Octylphenol diethoxylate, wat flt ug/L -61705	4t-Octylphenol monoethoxylate, wat flt ug/L -61706	Cotinine, water, fltrd, ug/L -62005	1-Methylnaphthalene, water, fltrd, ug/L -62054	2,6-Dimethylnaphthalene, water, fltrd, ug/L -62055	2-Methylnaphthalene, water, fltrd, ug/L -62056	3-beta-Coprostanol, water, fltrd, ug/L -62057	3-Methyl-1H-indole, water, fltrd, ug/L -62058	3-tert-Butyl-4-hydroxyanisole wat flt ug/L -62059	4-Cumylphenol, water, fltrd, ug/L -62060	4-n-Octylphenol, water, fltrd, ug/L -62061	4-tert-Octylphenol, water, fltrd, ug/L -62062	5-Methyl-1H-benzotriazole, wat flt ug/L -62063	Acetophenone water, fltrd, ug/L -62064	AHTN, water, fltrd, ug/L -62065	9,10-Anthraquinone water, fltrd, ug/L -62066	Benzophenone water, fltrd, ug/L -62067	beta-Sitosterol, water, fltrd, ug/L -62068	Bisphenol A, water, fltrd, ug/L -62069	Camphor water, fltrd, ug/L -62070
11/3/1983																					
4/3/1984																					
7/30/1984																					
4/15/1985																					
8/19/1985																					
12/10/2002 10:40	< 0.50	< 1.0	< 1.0	< 1.00	< 0.500	< 0.50	< 0.500	< 2.0	< 1.00	< 5.0	< 1.00	< 1.00	< 1.00	< 2.0	< 0.5	< 0.500	< 0.50	< 0.50	< 2	< 1	< 0.500
6/29/2004 8:25	< 0.50	< 1.0	< 1.0	< 1.00	< 0.500	< 0.50	< 0.500	< 2.0	< 1.00	< 5.0	< 1.00	< 1.00	< 1.00	< 2.0	< 0.5	< 0.500	< 0.50	< 0.50	< 2	< 1	< 0.500

Inactive USGS Groundwater Sampling Station S66184.1

Sample Datetime	Carba-zole, water, fltrd, ug/L -62071	Choles-terol, water, fltrd, ug/L -62072	D-Limo-nene, water, fltrd, ug/L -62073	HHCB, water, fltrd, ug/L -62075	Indole, water, fltrd, ug/L -62076	Isobor-neol, water, fltrd, ug/L -62077	Iso-propyl-benzene water, fltrd, ug/L -62078	Iso-quin-oline, water, fltrd, ug/L -62079	Menthol water, fltrd, ug/L -62080	Methyl salicy-late, water, fltrd, ug/L -62081	N,N-Di-ethyl-m-tolu-amide, water, fltrd, ug/L -62082	4-Nonyl-phenol di-ethox-ylate, wat flt ug/L -62083	p-Cresol, water, fltrd, ug/L -62084	4-Nonyl-phenol, all isomers wat flt ug/L -62085	beta-Stigmas tanol, water, fltrd, ug/L -62086	Tris(2-chloro-ethyl) phos-phate, wat flt ug/L -62087	Tris(di chloro-i-Pr) phos-phate, wat flt ug/L -62088	Tri-butyl phos-phate, water, fltrd, ug/L -62089	Triclo-san, water, fltrd, ug/L -62090	Tri-ethyl citrate water, fltrd, ug/L -62091	Tri-phenyl phos-phate, water, fltrd, ug/L -62092
11/3/1983																					
4/3/1984																					
7/30/1984																					
4/15/1985																					
8/19/1985																					
12/10/2002 10:40	< 0.500	< 2.0	< 0.50	< 0.500	< 0.50	< 0.50	< 0.50	< 0.5	< 0.50	< 0.500	E 0.04	< 5.0	< 1.00	< 5	< 2.0	< 0.50	< 0.50	< 0.50	< 1.00	< 0.50	< 0.50
6/29/2004 8:25	< 0.500	< 2.0	< 0.50	< 0.500	< 0.50	< 0.50	< 0.50	< 0.5	< 0.50	< 0.500	< 0.50	< 5.0	< 1.00	< 5	< 2.0	E 0.08	< 0.50	< 0.50	< 1.00	< 0.50	< 0.50

Inactive USGS Groundwater Sampling Station S66184.1

Sample Datetime	Tris(2-butoxy-ethyl) phos-phate, wat flt ug/L -62093	Dis-solved solids dried @ 180deg C wat flt mg/L -70300	Dis-solved solids, sum of consti-tuents, mg/L -70301	Dis-solved solids, water, tons/ acre-ft -70303	Ortho-phos-phate, water, unfltrd mg/L as P -70507	Ammonia water, unfltrd mg/L -71845	Mercury water, unfltrd recover-able, ug/L -71900	cis-1,2-Di-chloro-ethene, water, unfltrd ug/L -77093	Sam-pling method, code -82398	Car-baryl, water, fltrd 0.7u GF ug/L -82680	Sampler type, code -84164	Specif. conduc-tance, wat unf lab, uS/cm @ 25 degC -90095	ANC, wat unf fixed end pt, lab, mg/L as CaCO3 -90410	Tri-halo-meth-anes, wat unf max sum ug/L -90867	Bisphenol A-d3 sur Sch 2033 & 8033, wat flt % recvy -99583	Caffe-ine-13C sur Sch 2033 & 8033, wat flt % recvy -99584	DecaF-biphenl sur Sch 2033 & 8033, wat flt % recvy -99585	Fluor-anthene -d10, sur Sch 20/8033 wat flt % recvy -99586	Sample volume, waste-water method wat flt mL -99587
11/3/1983		27	27	0.04	0.62	< 0.013		< 3.0				42	12	< 14.0					
4/3/1984		32	32	0.04	0.33	< 0.013		< 3.0				45	12	< 14.0					
7/30/1984		33	33	0.04	0.62	< 0.013	< 0.2	< 3.0				45	13	< 14.0					
4/15/1985			34	0.05	0.81	< 0.013		< 3.0				44	15	< 14.0					
8/19/1985			33	0.04	< 0.01	< 0.013		< 3.0				42	13	< 14.0					
12/10/2002 10:40	< 0.5								8030	< 1.00	8010				44	91.1	44.1	72.2	914
6/29/2004 8:25	< 0.5								8030	< 1.00	8010				102	141	86.4	141	931

Inactive USGS Groundwater Sampling Station S113812.1

Datetime	Time datum	Time datum reliability code	Sample Medium Code	Agency Collecting Sample, Code	Temperature, water, deg C -10	Agency analyzing sample, code -28	Specif. conductance, wat unf field, uS/cm @ 25 degC -94	Specific conductance, wat unf uS/cm @ 25 degC -95	Hydrogen ion, water, unfltrd calcd, mg/L -191	Dissolved oxygen, mg/L -300	pH, water, unfltrd field, std units -400	pH, water, unfltrd lab, std units -403	Carbon dioxide water, unfltrd mg/L -405	ANC, wat unf infl pt titr., field, mg/L as CaCO3 -419	Ammonia water, fltrd, mg/L as N -608	Nitrite water, fltrd, mg/L as N -613	Nitrate water, fltrd, mg/L as N -618	Nitrate + nitrite water, fltrd, mg/L as N -631	Orthophosphate, water, fltrd, mg/L -660	Phosphorus, water, unfltrd mg/L as P -665
2/25/1999 12:00	EST	T	SO	USGS-WRD		80020														
2/26/1999 9:00	EST	T	SO	USGS-WRD		80020														
2/25/1999 11:10	EST	T	SO	USGS-WRD		80020														
2/26/1999 8:00	EST	T	SO	USGS-WRD		80020														
2/25/1999 11:00	EST	T	SO	USGS-WRD		80020														
2/25/1999 10:05	EST	T	SO	USGS-WRD		80020														
2/25/1999 13:00	EST	T	SO	USGS-WRD		80020														
2/26/1999 11:05	EST	T	SO	USGS-WRD		80020														
2/25/1999 15:00	EST	T	SO	USGS-WRD		80020														
2/25/1999 8:10	EST	T	SO	USGS-WRD		80020														
2/25/1999 8:00	EST	T	SO	USGS-WRD		80020														
2/25/1999 11:05	EST	T	SO	USGS-WRD		80020														
2/26/1999 10:30	EST	T	SO	USGS-WRD		80020														
2/26/1999 10:35	EST	T	SO	USGS-WRD		1028														
4/8/1999 12:40	EST	T	WG	USGS-WRD	10.7	80020		61	0.00163	0.2	5.8	6.1	21	7	< 0.02	< 0.010	< 0.050	< 0.05	0.021	< 0.05
4/20/1999 16:00	EST	T	WG	USGS-WRD	10.5	80020	72		0.00103	< 0.1	6	6.8	17	8	0.02	< 0.010	0.088	0.09	0.018	< 0.05
4/22/1999 16:30	EST	T	WG	USGS-WRD	10.6	80020	66		0.00106	0.2	6	6.3	18	9	0.03	< 0.010	0.051	0.05	0.04	< 0.05
10/21/1999 13:00	EST	T	WG	USGS-WRD	10.7	80020		150	0.00016		6.8	6.4	14	44	< 0.02	0.016	0.039	0.06	0.067	< 0.05
5/2/2000 15:00	EST	T	WG	USGS-WRD	10.7	80020	68		0.00242	< 0.1	5.6	6.1	37	8	0.03	< 0.010	0.062	0.06	0.006	< 0.05
7/19/2000 9:00	EST	T	WG	USGS-WRD		80020	70		0.00221		5.7	6	35		< 0.02	< 0.010	0.074	0.07	0.034	< 0.05

Inactive USGS Groundwater Sampling Station S113812.1

Datetime	Phos-phorus, water, fltrd, mg/L as P -666	Ortho-phos-phate, water, fltrd, mg/L as P -671	Organic carbon, water, unfltrd mg/L -680	Organic carbon, water, fltrd, mg/L -681	Hard-ness, water, mg/L as CaCO3 -900	Calcium water, fltrd, mg/L -915	Magnes-ium, water, fltrd, mg/L -925	Sodium, water, fltrd, mg/L -930	Sodium adsorp-tion ratio -931	Sodium frac-tion of cations percent -932	Potas-sium, water, fltrd, mg/L -935	Chlor-ide, water, fltrd, mg/L -940	Sulfate water, fltrd, mg/L -945	Silica, water, fltrd, mg/L as SiO2 -955	Iron, water, unfltrd recover-able, ug/L -1045	Iron, water, fltrd, ug/L -1046	Manga-nese, water, unfltrd recover-able, ug/L -1055	Manga-nese, water, fltrd, ug/L -1056	Inor-ganic carbon, bed sedimnt percent -30241	Organic carbon, bed sedimnt percent -30243
2/25/1999 12:00																			< 0.01	0.06
2/26/1999 9:00																			< 0.01	0.32
2/25/1999 11:10																			< 0.01	0.56
2/26/1999 8:00																			< 0.01	0.84
2/25/1999 11:00																			< 0.01	1
2/25/1999 10:05																			< 0.01	1.4
2/25/1999 13:00																			< 0.01	1.4
2/26/1999 11:05																			< 0.01	1.6
2/25/1999 15:00																			< 0.01	2.2
2/25/1999 8:10																			< 0.01	2.3
2/25/1999 8:00																			< 0.01	2.5
2/25/1999 11:05																			< 0.01	2.6
2/26/1999 10:30																				
2/26/1999 10:35																				
4/8/1999 12:40	< 0.05	0.007	0.1	0.2	15.8	3.79	1.55	4.29	0.47	36	0.56	5.91	10.2	15.2	296	269	16	16.5		
4/20/1999 16:00	< 0.05	0.006	0.3	0.2	17.3	4.03	1.76	4.7	0.49	36	0.5	6.79	10.2	15.3	190	195	21.6	21.8		
4/22/1999 16:30	< 0.05	0.013	0.1	0.1	15.5	3.54	1.62	4.38	0.48	37	0.43	6.04	10.3	14.7	352	358	17.9	17.7		
10/21/1999 13:00	< 0.05	0.022	1.5	0.6	31.4	8.01	2.77	9.38	0.73	39	0.87	13.1	7.14	6.78	28800	14100	662	608		
5/2/2000 15:00	< 0.05	0.002	< 0.3	E 0.2	18.3	4.3	1.83	4.46	0.45	34	0.47	6.28	9.93	15.8	30.8	31.5	14.2	17.3		
7/19/2000 9:00	< 0.05	0.011	< 0.3	E 0.2	17.8	4.17	1.78	5.22	0.54	38	0.44	7.54	10.4	15.1	307	323	17.5	17		

Datetime	Sulfur, bed sed <62.5um wet svd field, total, percent -34970	S34/S32 in sulfide in rock per mil -49929	S34/S32 in sulfate water, fltrd, per mil -49932	Dis-solved solids, sum of consti-tuents, mg/L -70301	Dis-solved solids, water, tons/acre-ft -70303	Ammonia water, fltrd, mg/L -71846	Nitrate water, fltrd, mg/L -71851	Nitrite water, fltrd, mg/L -71856	Bromide water, fltrd, mg/L -71870	Depth to top sample intrval feet below LSD -72015	delta C-13, water, unfltrd per mil -82081	Deu-terium/Protium ratio, water, unfltrd per mil -82082	delta O-18, water, unfltrd per mil -82085	Specif. conduc-tance, wat unf lab, uS/cm @ 25 degC -90095	ANC, wat unf fixed end pt, lab, mg/L as CaCO3 -90410	Set number, lab code 113 -99630	Set number, lab code 114 -99631	Julian date, in-bottle diges-tion, ddd -99870
2/25/1999 12:00	1.5									215								
2/26/1999 9:00	0.13									265								
2/25/1999 11:10	0.09									206								
2/26/1999 8:00	0.07									255								
2/25/1999 11:00	0.1									205								
2/25/1999 10:05	0.21									196								
2/25/1999 13:00	0.41									225								
2/26/1999 11:05	0.12									285.5								
2/25/1999 15:00	0.99									245								
2/25/1999 8:10	0.06									186								
2/25/1999 8:00	0.21									185								
2/25/1999 11:05	0.23									205.5								
2/26/1999 10:30		-41.3								277								
2/26/1999 10:35										277								
4/8/1999 12:40				46	0.06	< 0.026	< 0.221	< 0.033						64	7.7	99099	99098.4	102
4/20/1999 16:00				49	0.07	0.031	0.39	< 0.033						72	8.9	99113	99102.5	116
4/22/1999 16:30			-0.1	47	0.06	0.044	0.226	< 0.033			-19.8			65	8.2	991131	99111.3	116
10/21/1999 13:00				90	0.12	< 0.026	0.173	0.053	0.04		-22.06	-41.2	-7.09	121	28.7	992951	99294.1	298
5/2/2000 15:00				48	0.07	0.036	0.274	< 0.033	0.03			-47.2	-7.66	72	9.4	125.3	126.6	129
7/19/2000 9:00			0.2	50	0.07	< 0.026	0.328	< 0.033	0.03		-21.59	-46.4	-7.51	73	8.1	203.1	197.6	206

Inactive USGS Groundwater Sampling Station S97070.1

Datetime	Time datum	Time datum reliability code	Sample Medium Code	Agency Collecting Sample, Code	Temperature, water, deg C -10	Agency analyzing sample, code -28	Specif. conductance, wat unf field, uS/cm @ 25 degC -94	Specific conductance, wat unf uS/cm @ 25 degC -95	Hydrogen ion, water, unfltrd calcd, mg/L -191	Dissolved oxygen, mg/L -300	pH, water, unfltrd field, std units -400	pH, water, unfltrd lab, std units -403	Carbon dioxide water, unfltrd mg/L -405	ANC, wat unf infl pt titr., field, mg/L as CaCO3 -419	Ammonia water, fltrd, mg/L as N -608	Nitrite water, fltrd, mg/L as N -613	Nitrate water, fltrd, mg/L as N -618	Nitrate + nitrite water, fltrd, mg/L as N -631	Orthophosphate, water, fltrd, mg/L -660	Phosphorus, water, unfltrd mg/L as P -665
4/19/1999 11:45	EST	T	WG	USGS-WRD	11	80020	62		0.00113	< 0.1	6	6.1	14	7	0.02	< 0.010	< 0.050	< 0.05	0.025	< 0.05
4/19/1999 11:46	EST	T	WG	USGS-WRD		80020						5.8		7	0.03	< 0.010	< 0.050	< 0.05	0.025	< 0.05
4/22/1999 10:00	EST	T	WG	USGS-WRD	11	80020	65		0.00116	< 0.1	5.9	6	13	6	0.03	< 0.010	< 0.050	< 0.05	0.067	E 0.04
10/19/1999 12:45	EST	T	WG	USGS-WRD	11.2	80020		60	0.00291		5.5	6.2	41	7	< 0.02	< 0.010	< 0.050	< 0.05	0.043	E 0.05
5/2/2000 11:30	EST	T	WG	USGS-WRD	11.8	80020	72		0.00179	< 0.1	5.8	6.1	33	10	0.02	< 0.010	< 0.050	< 0.05	0.08	E 0.04
7/19/2000 13:00	EST	T	WG	USGS-WRD	11.7	80020	58		0.00073		6.1	5.9	8.5		< 0.02	< 0.010	< 0.050	< 0.05	0.08	E 0.03

Inactive USGS Groundwater Sampling Station S97070.1

Datetime	Phos-phorus, water, fltrd, mg/L as P -666	Ortho-phos-phate, water, fltrd, mg/L as P -671	Organic carbon, water, unfltrd mg/L -680	Organic carbon, water, fltrd, mg/L -681	Hard-ness, water, mg/L as CaCO3 -900	Calcium water, fltrd, mg/L -915	Magnes-ium, water, fltrd, mg/L -925	Sodium, water, fltrd, mg/L -930	Sodium adsorp-tion ratio -931	Sodium frac-tion of cations percent -932	Potas-sium, water, fltrd, mg/L -935	Chlor-ide, water, fltrd, mg/L -940	Sulfate water, fltrd, mg/L -945	Silica, water, fltrd, mg/L as SiO2 -955	Iron, water, unfltrd recover-able, ug/L -1045	Iron, water, fltrd, ug/L -1046	Manga-nese, water, unfltrd recover-able, ug/L -1055	Manga-nese, water, fltrd, ug/L -1056	S34/S32 in sulfate water, fltrd, per mil -49932	Dis-solved solids, sum of consti-tuents, mg/L -70301
4/19/1999 11:45	< 0.05	0.008	0.3	0.3	12.9	3.03	1.29	4.28	0.52	41	0.39	5.01	11	15.2	1600	1690	32.4	31.9	2.4	46
4/19/1999 11:46	< 0.05	0.008	0.2	0.2	13	3.02	1.34	4.32	0.52	41	0.4	5.05	11	15.5	1560	1710	30.8	33.9		46
4/22/1999 10:00	< 0.05	0.022	0.1	< 0.1	13.5	3.2	1.34	4.43	0.52	41	0.42	5.28	12.1	15	1570	1640	28.4	29	3.3	47
10/19/1999 12:45	E 0.04	0.014	E 0.2	< 0.3	13	3.05	1.32	4.05	0.49	39	0.42	4.7	11.4	15.2	1480	1490	25.5	26.4		46
5/2/2000 11:30	< 0.05	0.026	E 0.1	E 0.2	16.7	3.88	1.71	4.4	0.47	36	0.49	6.29	11.9	15.7	1990	1960	33.4	35		52
7/19/2000 13:00	E 0.03	0.026	0.6	E 0.3	11.2	2.74	1.07	3.98	0.52	43	0.37	5.11	8.73	14.2	1230	1250	22.2	21.4	4.5	41

Inactive USGS Groundwater Sampling Station S97070.1

Datetime	Dis-solved solids, water, tons/acre-ft -70303	Ammonia water, fltrd, mg/L -71846	Nitrate water, fltrd, mg/L -71851	Nitrite water, fltrd, mg/L -71856	Bromide water, fltrd, mg/L -71870	delta C-13, water, unfltrd per mil -82081	Deu-terium/Protium ratio, water, unfltrd per mil -82082	delta O-18, water, unfltrd per mil -82085	Specif. conduc-tance, wat unf lab, uS/cm @ 25 degC -90095	ANC, wat unf fixed end pt, lab, mg/L as CaCO3 -90410	Set number, lab code 113 -99630	Set number, lab code 114 -99631	Julian date, in-bottle diges-tion, ddd -99870
4/19/1999 11:45	0.06	0.031	< 0.221	< 0.033					62	7.6	991110	99102	116
4/19/1999 11:46	0.06	0.033	< 0.221	< 0.033					61	7.4	991110	99102	116
4/22/1999 10:00	0.06	0.04	< 0.221	< 0.033					59	5	99116	99111.3	116
10/19/1999 12:45	0.06	< 0.026	< 0.221	< 0.033	0.03	-20.98	-47.3	-7.78	64	7.1	99293	99292.1	298
5/2/2000 11:30	0.07	0.027	< 0.221	< 0.033	0.03		-46.4	-7.76	76	6	125.3	126.6	129
7/19/2000 13:00	0.06	< 0.026	< 0.221	< 0.033	0.02	-20.74	-45.6	-7.62	55	6	203.1	197.6	206

Appendix C

NYSDEC Shellfish Regulations and Data

WestlawNext New York Codes, Rules and Regulations

6 CRR-NY 41.3
NY-CRR

OFFICIAL COMPILATION OF CODES, RULES AND REGULATIONS OF THE STATE OF NEW YORK
TITLE 6. DEPARTMENT OF ENVIRONMENTAL CONSERVATION
CHAPTER I. FISH AND WILDLIFE
SUBCHAPTER F. MARINE FISHERIES
PART 41. SANITARY CONDITION OF SHELLFISH LANDS

6 CRR-NY 41.3
6 CRR-NY 41.3

41.3 Shellfish lands in Suffolk County.

(a) The shellfish lands in Suffolk County, except those listed in subdivision (b) of this section or in section 41.5 of this Part, are in such sanitary condition that shellfish thereon may be taken for use as food, and such lands are designated as certified areas.

(b) The following shellfish lands in Suffolk County are in such sanitary condition that shellfish thereon shall not be taken for use as food, and such lands are designated as uncertified areas:

(1) Town of Babylon.

(i) Great South Bay.

(a) All that area of Great South Bay, including tributaries, creeks and canals, lying north of a line extending southwesterly from the southernmost point of land at Conklin Point (immediately east of the northern end of the twin spans of the Robert Moses Causeway) to light pole number 103 (second aluminum light pole south of the base of the bridge on the west side of the west span, approximately 200 yards south of the base of the bridge and adjacent to the 14th bridge support south of the shoreline on the west span); thence proceeding westerly to the southernmost point of land at Sampawams Point; and, all that area of Great South Bay lying north of a line extending southwesterly from the northern concrete base of the twin spans of the Robert Moses Causeway to a point of intersection located 900 yards southwest of Bergen Point and 900 yards southeast of the mouth of the Neguntatogue Creek; thence proceeding westerly to a point of intersection located 900 yards southeast of Unqua Point (Nassau Shores); thence proceeding westerly to the southeasternmost tip of Goose Island (South Oyster Bay).

(b) During the period December 1st through March 31st, both dates inclusive, all that area of Great South Bay and South Oyster Bay, including tributaries, creeks and canals located west of the east side of the Amityville Cut, lying northerly and westerly of a line extending southwesterly from the northernmost point of land at Sand Island (Helicopter Island, immediately east of the Amityville Cut) to the southernmost point of land at West Island (South Oyster Bay), immediately west of Amityville Channel (Winnehook Channel, local name).

(c) During the period May 15th through September 30th, both dates inclusive, all that area within the Town of Babylon Cedar Beach Marina (local name), and the Town of Babylon Gilgo Beach Marina (local name), including entrance channels to said marinas.

(d) During the period May 15th through September 30th, both dates inclusive, all that area of the marina-boat basin at West Gilgo and all that area of Coast Guard Cove (local name) and Hemlock Cove (local name), including entrance channels, lying south of the State Boat Channel.

(e) During the period May 15th through September 30th, both dates inclusive, all that area of Great South Bay, including the Oak Island Channel, the State Boat Channel, and the "Lead" (local names), lying southerly and easterly of Oak Island and southerly of a line extending westerly from the westernmost point of land at Seganus Thatch at the former site of the State Channel Marina (local name), to the northernmost point of the bulkhead protecting the residence at number 58 Oak Island (said residence is a yellow, two-story house), continuing southeasterly around the northeast facing shoreline of Oak Island to its easternmost tip and continuing southwesterly to a point located immediately opposite the residence at number 8 Oak Island; and all that area lying easterly of a line extending southerly from the chimney at the western corner of the residence at number 8 Oak Island (said residence is a one-story wood shingle house with a green roof), proceeding southerly across the “Lead” (local name), to utility pole number 468 on the north side of Ocean Parkway, Jones Beach Island; and all that area lying northerly of a line extending easterly from utility pole number 468 to utility pole number 478 on the north side of Ocean Parkway, Jones Beach Island; and all that area lying westerly of a line extending northeasterly across the State Boat Channel to the southernmost point of land at Seganus Thatch, thence proceeding northwesterly along the shoreline to the westernmost point of land at Seganus Thatch.

(ii) Atlantic Ocean. All that area within one-half nautical mile distance from any portion of the sewer outfall pipe serving the water pollution control plant of the Suffolk County Sewer District No. 3, Southwest. The location of said pipe is identified as beginning at a point, 40 37′ 57.5″ N and 73 20′ 57.5″ W, on Cedar Island Beach and extending southwesterly on a bearing 184 28′ 41″ for approximately 4,940 yards to a point, 40 35′ 31.5″ N and 73 21′ 12.5″ W; and thence extending southwesterly on a bearing 219 28′ 22.6″ for approximately 1,160 yards to a point, 40 35′ 05″ N and 73 21′ 41.2″ W.

Note:

All reference points, except local names or local landmarks, are taken from N.O.A.A. Nautical Chart No. 12352, 20th edition, dated November 27, 1982.

(2) Town of Islip.

(i) Great South Bay.

(a) All that area of Great South Bay, including tributaries, creeks and canals, lying north of a line extending southwesterly from the southernmost point of land at Conklin Point (immediately east of the northern end of the twin spans of the Robert Moses Causeway) to light pole number 103 (second aluminum light pole south of the base of the bridge on the west side of the west span, approximately 200 yards south of the base of the bridge and adjacent to the 14th bridge support south of the shoreline on the west span); thence proceeding westerly to the southernmost point of land at Sampawams Point; and, all that area of Great South Bay lying north of a line extending southwesterly from the northern concrete base of the twin spans of the Robert Moses Causeway to a point of intersection located 900 yards southwest of Bergen Point and 900 yards southeast of the mouth of the Neguntatogue Creek; thence proceeding westerly to a point of intersection located 900 yards southeast of Unqua Point (Nassau Shores); thence proceeding westerly to the southeasternmost tip of Goose Island (South Oyster Bay).

(b) All that area of Great South Bay, including tributaries, creeks, and canals, lying easterly of a line extending southerly from the northernmost point of land at the base of the eastern span of the Robert Moses Causeway to light pole number 60 (sixth aluminum light pole south of the base of the bridge on the east side of the east span); and all that area lying northerly of a line extending easterly from light pole number 60 on the eastern span of Robert Moses Causeway to the southwesternmost corner of the bath house serving the west bathing area at Heckscher State Park (located east of the entrance to the boat basin at Heckscher State Park).

(c) All that area of Nicoll Bay, Connetquot River, Brickiln Creek (local name) and all tributaries, creeks and canals lying north of a line extending northeasterly between Nicoll Point at the southernmost point of land at Heckscher State Park and a point lying 1830 yards south of the southwestern corner of the town dock at Blue Point Avenue.

(d) During the period May 15th through September 30th, both dates inclusive, all that area lying 500 feet easterly and westerly of the bulkheads forming the entrance to the harbor serving Fire Island Pines and extending 1,000 feet northerly of the entrance to said harbor.

(e)

(1) All that area adjacent to the shore of Fire Island at Ocean Beach south of a line extending northeasterly from the northeastern corner of the building housing Maguires Restaurant on Bungalow Walk at Ocean Beach (local landmark) to Channel Buoy C “15” and continuing southeasterly to Channel Buoy C “17,” and thence southerly to the water tank at Sea View.

(2) During the period May 15th through September 30th, both dates inclusive, all that area of Great South Bay adjacent to Atlantique, Ocean Beach and Ocean Bay Park lying east of a line extending northerly from the western side of the entrance of the boat basin at Atlantique to the easternmost point of land at East Fire Island; south of a line extending easterly from the easternmost point of land at East Fire Island to Buoy GC “1” (Range Channel); and west of a line extending southeasterly from Buoy GC “1” to the east side of the entrance to the boat basin at Ocean Bay Park.

(f) During the period May 15th through September 30th, both dates inclusive, all that area adjacent to Sailors Haven lying within an area extending 1,000 feet northerly of the entrance to the boat basin at Sailors Haven and extending 500 feet easterly and westerly of the entrance to said boat basin.

(g) During the period May 15th through September 30th, both dates inclusive, all that area adjacent to Barrett Beach lying within an area extending 1,000 feet northerly of the entrance to the boat basin at Barrett Beach and extending 500 feet easterly and westerly of the entrance to said boat basin.

Note:

All reference points in the Town of Islip and adjacent areas taken from N.O.A.A. Nautical Chart 12352, 14th edition, dated December 1976, except as indicated as “local landmark” or “local name.”

(h) During the period May 15th through September 30th, both dates inclusive, all that area adjacent to Cherry Grove within the boundaries of a line extending northeasterly from the westernmost end of the wooden bulkhead protecting the shoreline at Cherry Grove (local landmark) to Channel Buoy R“4” Fl R 4 sec and then continuing southeasterly to the easternmost end of the wooden bulkhead protecting the shoreline at Cherry Grove (local landmark).

(i) During the period May 15th through September 30th, both dates inclusive, all that area within the Town of Islip Marina-Boat Basin (local name), Flynn's Marina-Boat Basin (local name), the Saltaire Marina - Boat Basin (local name), and the Kismet Inn Marina- Boat Basin (local name). Said marina-boat basins are tributaries of Great South Bay along the shoreline of Fire Island.

(j) During the period May 15th through September 30th, both dates inclusive, all that area of Clam Pond (local name) in and adjacent to the Village of Saltaire, lying southerly of a line extending southeasterly from the northernmost corner of the bulkhead protecting the property and residence located at the easternmost end of East Bay Promenade, Saltaire, to the northwesternmost corner of the eastern ferry dock at Fair Harbor; thence proceeding southerly along the eastern side of the dock to the shoreline at Fair Harbor.

(k) All that area of the marina boat basin, including entrance canal, at Captree State Park.

Note:

All reference points, except local names or local landmarks, are taken from N.O.A.A. Nautical Chart No. 12352, 20th Edition, dated November 27, 1982.

(ii) Patchogue Bay.

(a) All that area of Great South Bay, Patchogue Bay and tributaries lying northerly of a line extending easterly from the southeast corner of the wooden bulkhead located at the foot of Blue Point Avenue, Blue Point, to the southeastern corner of the southeasternmost residence on Rod Street, approximately 100 yards southeast of the foot of Dunton Avenue, West Bellport (said residence is a two-story house, white brick and light grey shingle with light grey roof).

(b) During the period May 1st through September 30th, both dates inclusive, all that area of Great South Bay, Patchogue Bay and tributaries lying north of a line extending westerly from the southernmost tip of land at Howells Point (local landmark) to the southernmost tip of the fixed dock at the entrance to the boat basin at Sayville Yacht Club (local landmark).

(3) Town of Brookhaven (South Shore).

(i) Great South Bay.

(a) All that area of Nicoll Bay, Connetquot River, Brickiln Creek (local name) and all tributaries, creeks and canals lying northerly of a line extending northeasterly between Nicoll Point at the southernmost point of land at Heckscher State Park and a point lying 1,830 yards due south of the southwestern corner of the town dock at Blue Point Avenue.

(b) During the period May 15th through September 30th, both dates inclusive, all that area lying 500 feet easterly and westerly of the bulkheads forming the entrance to the harbor serving Fire Island Pines and extending 1,000 feet northerly of the entrance to said harbor.

(c) During the period May 15th through September 30th, both dates inclusive, all that area adjacent to Sailors Haven lying within an area extending 1,000 feet northerly of the entrance to the boat basin at Sailors Haven and extending 500 feet easterly and westerly of the entrance to said boat basin.

(d) During the period May 15th through September 30th, both dates inclusive, all that area adjacent to Barrett Beach lying within an area extending 1,000 feet northerly of the entrance to the boat basin at Barrett Beach and extending 500 feet easterly and westerly of the entrance to said boat basin.

(e) During the period May 15th through September 30th, both dates inclusive, all that area adjacent to Davis Park lying within an area extending 1,000 feet northerly of the entrance to the harbor serving Davis Park and extending 500 feet easterly and westerly of the entrance to said harbor.

(f) During the period May 15th through September 30th, both dates inclusive, all that area adjacent to Watch Hill lying within an area extending 1,000 feet northerly of the entrance to the harbor serving Watch Hill and extending 500 feet easterly and westerly of the entrance to said harbor.

(g) During the period May 15th through September 30th, both dates inclusive, all that area adjacent to Cherry Grove within the boundaries of a line extending northeasterly from the westernmost end of the wooden bulkhead protecting the shoreline at Cherry Grove (local landmark) to Channel Buoy R “4” Fl R 4 sec and then continuing southeasterly to the easternmost end of the wooden bulkhead protecting the shoreline at Cherry Grove (local landmark).

(h) During the period May 15th through September 30th, both dates inclusive, all that area within the Town of Islip Marina-Boat Basin (local name), Flynn's Marina-Boat Basin (local name), the Saltaire Marina - Boat Basin (local name), and the Kismet Inn Marina- Boat Basin (local name). Said marina-boat basins are tributaries of Great South Bay located along the shoreline of Fire Island.

(i) During the period May 15th through September 30th, both dates inclusive, all that area of Clam Pond (local name) in and adjacent to the Village of Saltaire, lying southerly of a line extending southeasterly from the northernmost corner of the bulkhead protecting the property and residence located at the easternmost end of East Bay Promenade, Saltaire, to the northwesternmost corner of the eastern ferry dock at Fair Harbor; thence proceeding southerly along the eastern side of the dock to the shoreline at Fair Harbor.

(ii) Patchogue Bay.

(a) All that area of Great South Bay, Patchogue Bay and its tributaries lying northerly of a line extending easterly from the southeast corner of the wooden bulkhead located at the foot of Blue Point Avenue, Blue Point, to the southeastern corner of the southeasternmost residence on Rod Street, approximately 100 yards southeast of the foot of Dunton Avenue, West Bellport (said residence is a two-story house, white brick and light grey shingle, with light grey roof).

(b) During the period May 1st through September 30th, both dates inclusive, all that area of Great South Bay, Patchogue Bay and tributaries lying north of a line extending westerly from the southernmost tip of land at Howells Point (local landmark) to the southernmost tip of the fixed dock at the entrance to the boat basin at Sayville Yacht Club (local landmark).

(iii) Bellport Bay.

(a) All that area of Bellport Bay, including tributaries, lying northerly of a line extending northeasterly from the flagstaff serving the Bellport Yacht Club, located at the foot of Bellport Lane in Bellport, to utility pole No. “43BBL,” located at the foot of Bay Avenue (Bay Road) at Fireplace Neck (local landmark).

(b) All that area of Bellport Bay within a 500-foot radius of the flagstaff serving the Bellport Yacht Club located at the foot of Bellport Lane in Bellport.

(c) During the period May 15th through December 31st, both dates inclusive, all that area of Bellport Bay, lying north and east of a line extending southeast from the flagstaff serving the Bellport Yacht Club, located at the foot of Bellport Lane in Bellport, to the westernmost point of John Boyle Island and continuing southerly to the northernmost point of land east of the dock at Old Inlet and west of Hospital Island.

(d) All that area of Bellport Bay, Carmans River and tributaries lying northerly of a line extending southeasterly from the foot of Mott Lane (Gorman Lane), at Fireplace Neck, to the residence at 146 Grandview Drive in Shirley (local landmark, such residence is the southernmost house on the west side of Smith Point).

(e) All that area of Bellport Bay, including Shirley Basin, the entrance to Narrow Bay and tributaries, lying easterly of a line extending due south (magnetic) from the southernmost point of land at Smith Point to the opposite shoreline of the barrier beach.

(f) During the period May 15th through September 30th, both dates inclusive, all that area of Bellport Bay within 100 yards in any direction from the marina area docks at Bellport Beach and Old Inlet.

(iv) Narrow Bay.

(a) During the period January 1st through December 31st, both dates inclusive, all creeks, canals, coves and tributaries, including Shirley Basin, Unchachogue Creek, Johns Neck Creek, Sheeppen Creek (Section 5 Marina), Pattersquash Creek, and Mastic Beach Yacht Club Canal (Section 1 Marina), located along the shoreline between Smith Point and Floyd Point (local names, local landmarks).

(b) During the period January 1st through December 31st, both dates inclusive, all that area of Narrow Bay and its tributaries lying westerly of a line extending southerly from the westernmost point of the landward side of the public fishing dock located at the foot of Cranberry Drive, Mastic Beach (local name, local landmark) to an orange painted wood marker located on the opposite southern shoreline (local landmark).

(c) During the period January 1st through December 31st, both dates inclusive, all that area of Narrow Bay lying northerly of a line extending easterly from the northeastern corner of the residence at 542 Riviera Drive, Mastic Beach (said residence is a two-story structure painted dark green with a tan-colored turret) to the northwestern corner of the residence at 205 Riviera Drive, Mastic Beach (said residence is a pink two-story structure located at the intersection with Locust Drive; local names, local landmarks).

(d) During the period April 15th to December 31st, both dates inclusive, all that area of Narrow Bay and its tributaries lying easterly of a line extending southerly from the westernmost point of the landward side of the public fishing dock located at the foot of Cranberry Drive, Mastic Beach (local landmark) to an orange painted wood marker located on the opposite southern shoreline (local landmark); and westerly of a line extending southerly from the tip of the gable of the residence at 39 Washington Drive (said residence is located on the western side of the southern foot of Washington Drive, Mastic Beach; local names, local landmarks) to an orange painted wood marker located on the opposite southern shoreline (local landmark).

(v) Moriches Bay.

(a) All that area, including Home Creek, Forge River, Old Neck Creek, Mud Creek, Areskonk Creek, Orchard Neck Creek and all other creeks, canals, rivers and coves, north of a line extending northeasterly from the monument located near the shoreline at the southeastern tip of Forge Point (said monument is a wooden pole painted orange, located approximately 1,000 yards south of the entrance to Home Creek, local landmark) to the foot of Belleview Avenue, Center Moriches (local name).

(b) All that area of Moriches Bay within 500 feet of the Terrell River mouth and all of the Terrell River.

(c) All that area of Tuthill Cove and tributaries north of a line extending northeasterly from the easternmost tip of Tuthill Point to the cupola located on the roof of the Moriches Coast Guard Station (local landmark).

(d) During the period May 15th through September 30th, both dates inclusive, all that area of Moriches Bay lying within a 600 foot radius in all directions from the southernmost point of land on the rock jetty at the boat basin formerly known as Cerullo Brothers Fishing Station, East Moriches (local name), including all that area of the former Cerullo Brothers Fishing Station, and the boat basin at Tadsen's Fishing Station and Marina (local name) lying approximately 450 feet east of said marina.

(e) During the period May 15th to September 30th, both dates inclusive, all that area lying within 500 feet from any portion of the bulkheading and fixed or floating dock structures at the Town of Brookhaven, Great Gun Beach (local name), and all the adjacent unnamed cove lying approximately 300 yards southwest of the westernmost end of the bulkheading at Great Gun Beach.

(f) During the period January 1st through December 31st, both dates inclusive, all that area, including Hart Cove, Seatuck Cove and all other creeks, canals, rivers and coves, lying north of a line extending northeasterly from the northeastern corner of the residence at 73 Moriches Island Road (said residence is located approximately 100 yards north of the foot of Moriches Island Road, East Moriches, Town of Brookhaven) to the southernmost point of land at Havens Point and thence continuing to the flagpole located at the residence at 39 Basketneck Lane (local landmark; said residence is located approximately 100 yards southeast of the entrance to Fish Creek on the eastern shoreline of Seatuck Cove, Town of Southampton).

(g) During the period May 1st through November 30th, both dates inclusive, all that area of Moriches Bay lying north of a line extending northeasterly from the cupola located on the roof of the Moriches Coast Guard Station (located within the Town of Brookhaven) to the foot of Rodgers Lane, Remsenburg (local name, local landmark).

(4) Town of Southampton.

(i) Moriches Bay.

(a) During the period January 1st through December 31st, both dates inclusive, all that area, including Hart Cove, Seatuck Cove and all other creeks, canals, rivers and coves, lying north of a line extending northeasterly from the northeastern corner of the residence at 73 Moriches Island Road (said residence is located approximately 100 yards north of the foot of Moriches Island Road, East Moriches, Town of Brookhaven) to the southernmost point of land at Havens Point and thence continuing to the flagpole located at the residence at 39 Basketneck Lane (local landmark; said residence is located approximately 100 yards southeast of the entrance to Fish Creek on the eastern shoreline of Seatuck Cove, Town of Southampton).

(b) During the period May 1st through November 30th, both dates inclusive, all that area of Moriches Bay lying north of a line extending northeasterly from the cupola located on the roof of the Moriches Coast Guard Station (located within the Town of Brookhaven) to the foot of Rodgers Lane, Remsenburg (local name, local landmark).

(c) All that area of Moriches Bay within a 500 foot radius of the southernmost point of the westernmost breakwater protecting the entrance canal serving the "Westhampton Yacht Squadron," Remsenburg (local name, local landmark).

(d) All other creeks, canals and rivers located along the shoreline between the foot of Remsen Lane, Remsenburg, and the Bascule Bridge at Potunk Point (local names, local landmark).

(e) During the period May 1st through November 30th, both dates inclusive, all that area of Moriches Bay north of a line extending easterly from the southeasternmost tip of Speonk Point to the easternmost chimney of the residence located at 285 Fiske Avenue, Westhampton Beach (said residence is a white two-story house with a red tiled roof and two large chimneys), (local name, local landmark).

(f) All that area of Speonk Cove, Speonk River and other tributaries north of a line extending northeasterly from the southeasternmost tip of Speonk Point to the gazebo located near the shoreline at the foot of Jagger Lane, Tanner Neck (local name, local landmark).

(g) All that area, including tributaries, north of a line extending easterly from the southernmost tip of land at Tanners Neck to the easternmost chimney of the residence located at 285 Fiske Avenue, Westhampton Beach (said residence is a white two story house with a red tile roof and two large chimneys, local name, local landmark).

(h) During the period May 1st through November 30th, both dates inclusive, all that area of Moriches Bay lying east of a line extending south from the easternmost chimney of the residence located at 285 Fiske Avenue, Westhampton Beach (said residence is a white two-story house with a red tiled roof and two large chimneys) to the top of the conical shaped building of the "Le Ronde Beach Club," 297 Dune Road, Westhampton Beach (local names, local landmarks).

(ii) Quantuck Bay.

(a) During the period April 1st through December 14th (both dates inclusive), all that area, including tributaries, of Moneybogue Bay (local name), Quantuck Canal, Quantuck Bay and Quogue Canal lying easterly of the bascule bridge located at the southern foot of Jessup Lane (local name), Westhampton Beach and westerly of the bascule bridge located at the southern foot of Post Lane (local name), Quogue.

(b) During the period December 15th through March 31st (both dates inclusive), all that area, including tributaries, of Quantuck Creek lying northerly of Montauk Highway; Aspatuck Creek (local name) lying northerly of Main Street (local name), Westhampton Beach; the boat basin at Westhampton Beach, including the canal leading to it from Moneybogue Bay (local name), lying northerly of a line extending due east and west (magnetic) across the canal and passing through buoy F1 R "6;" the creeks and canals at Westhampton Beach, Quiogue and Quogue lying easterly of the northern foot of the bascule bridge located at the southern foot of Jessup Lane (local name) and westerly of the western entrance to Penniman Creek, except Quantuck Canal, Quogue Canal, Quantuck Bay and the certified portions of Quantuck Creek and Aspatuck Creek (local name).

(iii) Shinnecock Bay.

(a) Except as otherwise described in this subparagraph, all creeks and canals located along the shoreline of Shinnecock Bay and Tiana Bay at Quogue, East Quogue, Pine Neck, West Tiana, Tiana, Springville and Ponquogue.

(b) All that area of Penniman Creek and tributaries lying northerly and westerly of a line extending northeasterly from the southeastern end of the dock serving the Shinnecock Yacht Club to the southwestern end of the dock located on the opposite eastern shoreline and serving the Brennan residence (1985) (local landmarks and local names).

(c) All that area of Stone Creek and tributaries lying northerly and westerly of a line extending northerly from the eastern end of the dock located on the southern shoreline at the mouth of Stone Creek and serving the residence, known locally as the "Anchorage" (1993) at 25 Bay Road, to the flagpole located at the residence, 19 Stone Lane (1993), located on the northern shoreline (local names and local landmarks).

(d) All that area of Phillips Creek and tributaries lying northerly and westerly of a line extending northeasterly from the flagpole located at 27 Old Point Road (1993) on the southern shoreline, to the flagpole at 28 Sunset Avenue located on the opposite northern shoreline (local names and local landmarks) (1993).

(e) All that area of Weesuck Creek and its tributaries lying northerly of a line extending northeasterly from the northeasternmost corner of the bulkheaded town pier and ramp at the foot of Bay Avenue, in East Quogue (local names and local landmarks) to the unnamed point of land on the western shore of Pine Neck, on a bearing 60 degrees magnetic (46 degrees true).

(f) All that area of Tiana Bay and tributaries lying northerly of a line extending easterly from the southernmost end of the bulkhead protecting the shoreline at the Siclari and Messina residence (1985), 39 West Tiana Road to the westernmost end of the sandspit extending from the opposite eastern shoreline (local names and local landmark).

(1) All that area of Tiana Bay within a 250 yard radius of the inlet to Carter Creek. The inlet to Carter Creek is located approximately 1,300 yards north of Pine Neck Point.

(g) All that area of Smith Creek and tributaries lying northerly of a line extending easterly from the northeastern end of the white painted dock (located on the western shoreline of Smith Creek and serving the Bucci residence [1985] 21 East Point Lane) to the southern end of the Gilgan residence (1985) located on the opposite eastern shoreline on Oak Lane (local names and local landmarks).

(h) During the period May 1st through November 30th (both dates inclusive) all that area, including tributaries of Heady Creek, lying north of a line extending due west from the southernmost tip of land on the eastern side of Heady Creek directly across to the opposite shoreline.

(i) During the period May 1st through November 30th (both dates inclusive) all that area including tributaries of Taylor Creek lying northeast of a line extending southeasterly from the southernmost tip of land on the eastern side of Heady Creek, to a white brick chimney on a grey shingled, one story residence at 501 Meadow Lane, in the Village of Southampton.

(j) During the period May 15th through October 15th (both dates inclusive), all that area of Old Fort Pond lying southwest of a line extending southeasterly from the northern side of the bulkheaded boat ramp at the Southampton Yacht Club (local name) to the easternmost end of the fixed marina dock, thence continuing southwesterly to the southernmost end of the bulkhead serving said marina.

(k) During the period May 15th through October 15th (both dates inclusive), all that area of Old Fort Pond lying south of a line extending easterly from the wooden jetty at the residence located at 64 Little Neck Road, to a point 100 feet east of the northern fixed T- dock at Sherry and Joe Corr's, Best Boat Works (local name, local landmark), extending southerly to a point 100 feet east of the southern fixed T-dock and thence continuing westerly to the end of the wooden bulkhead serving said marina.

(l) During the period May 15th through October 15th (both dates inclusive), all that area of Old Fort Pond lying northwesterly of a line extending southwesterly from the eastern end of a bulkheaded pier just north of the "Club on the Bay" Condominiums (local name), on Little Neck Road, to the southernmost end of the bulkhead serving said condominium complex.

(m) All that area of Shinnecock Bay lying southeast of a line extending northeasterly from the rock pile on the western end of the Shinnecock Bay Commercial Fishing Station (local name, local landmark), to the U.S. Coast Guard Channel Buoy "4" R, continuing northeast to the Shinnecock Inlet Buoy "2" Fl R 4 sec and extending southwesterly to the northern end of the western jetty of Shinnecock Inlet.

(n) All that area of Daves Creek (East Quogue), lying within a 700 foot radius in all directions from the easternmost point of the fixed dock located at the residence at 69 Little Pine Lane (said residence is two-stories, half brick-half painted, with ornate white railings); and, all that area lying west of a line extending northerly from the easternmost point of land at Hampton Point (local name) to the foot of Walker Avenue, north of the inlet to Daves Creek.

(iv) Shinnecock Canal.

(a) All that area, including boat basins, marinas and all other tributaries, lying southerly of a line extending northeasterly from the tip of the rock jetty located at the western entrance to the Shinnecock Canal in Great Peconic Bay to the tip of the rock jetty (located at the eastern entrance to the Shinnecock Canal in Great Peconic Bay); and all that area including boat basins and marinas and all other tributaries lying northerly of a line extending easterly from the southeastern end of the fuel dock serving Corr's Mariner's Cove to the southernmost end of the bulkhead protecting the shoreline at Jackson's Marina (local names and local landmarks).

(v) Mecox Bay.

(a) During the period December 1st through April 30th, both dates inclusive, all that area of Mecox Bay, including tributaries, lying north and west of a line extending northeasterly from the southeasternmost corner of the residence at 97 Cobb Isle (said residence is a two-story, white painted house with two, second-story, circular windows and two closely-spaced chimney flue pipes) to the southeastern end of Bay Avenue, on the opposite, eastern shoreline; and all that area of Sams Creek and Swan Creek, lying easterly of a line extending northerly from the northwest corner of the residence at 168 Dune Road (said residence is a two-story, flat roofed, white house with large ornamental, circular openings) to an orange marker located at the western entrance to Swan Creek; and all that area of Burnett Creek, Channel Pond, and the unnamed creeks between Bay Avenue and Swan Creek, along the northeastern shoreline of Mecox Bay.

(b) During the period May 1st through November 30th, both dates inclusive, all of Mecox Bay and its tributaries.

(vi) Sebonac Creek Complex. During the period May 1st through November 30th (both dates inclusive), all that area of the Sebonac Creek Complex including Bullhead Bay, Little Sebonac Creek, West Cove Creek, Scallop Pond and its tributaries.

(vii) Sag Harbor.

(a) All that area, including tributaries, lying westerly of a line extending northwesterly along the breakwater located at the entrance to Sag Harbor (local landmark) and thence continuing northerly from the northern end of the breakwater to the northeasternmost extremity of the timber bulkhead protecting the shoreline adjacent to 28 East Harbor Drive, North Haven (local landmark); and easterly of the westernmost portions of the fixed bridge connecting North Haven Peninsula and Sag Harbor (local landmark).

(b) During the period May 15th through October 31st (both dates inclusive), all that area of Sag Harbor, Sag Harbor Cove and the Redwood Canal (local name), including tributaries, lying northerly of Redwood Road and southerly of a line extending easterly from the "wooden pole jetty" protecting the eastern side of the Redwood Boat Basin boat launching ramp to the northwestern end of the easternmost floating dock of the Ship- Ashore Marina (local names and local landmarks).

(c) During the period May 15th through October 31st (both dates inclusive) all that area of Sag Harbor Cove, including tributaries lying easterly of a line extending northeasterly from the eastern end of the Villas at Sag Harbor condominiums (local name and local landmark) to the southwestern end of the dock serving the P. Sutphen residence. (The Sutphen residence is a white painted house [1985] and is the first house on the west side of Ferry Road, North Haven, northerly of the fixed bridge connecting North Haven Peninsula and Sag Harbor, local names and local landmarks.)

(d) All that area of Paynes Creek, including tributaries, lying westerly of a line extending northerly from utility pole NYT 11 (said utility pole is the northernmost utility pole on the eastern side of Whitney Road, local name and local landmarks) to a wooden pole painted orange (located on the opposite northern shoreline, local landmark).

(e) All that area of Upper Sag Harbor Cove including tributaries lying south of a line extending easterly from the easternmost point of land at Bluff Point to the western end of the fixed wooden dock of the residence at 15 Greene Street, a one-story natural wood shingled home, located at the foot of and on the south side of Greene Street (local names, local landmarks).

Note:

All reference points in Sag Harbor in the Town of Southampton taken from N.O.A.A. Nautical Chart No. 12358 dated December 1, 1984, except as indicated as "local names" and "local landmarks".

(viii) Peconic River.

(a) All waters of the Peconic River and its tributaries within the Town of Southampton.

(ix) Flanders Bay.

(a) All that area of Reeves Bay, including tributaries.

(b) All that area of Flanders Bay, including tributaries, lying westerly and northerly of a line extending northeasterly from the northernmost tip of Goose Creek Point exposed at mean high water to the southernmost tip of Simmons Point exposed at mean high water.

(c) All that area, including tributaries of Goose Creek, Birch Creek and Mill Creek.

(d) During the period May 1st through November 30th, both dates inclusive, all that area of Hubbard Creek including tributaries.

(e) All creeks, canals and other tributaries located along the northern shoreline of Flanders Bay between Simmons Point and Miamogue Point.

Note:

All reference points, except local landmarks and local names, in the Peconic River, Reeves Bay, Flanders Bay, Great Peconic Bay and tributaries are taken from N.O.A.A. Nautical Chart No. 12358, 14th Ed., dated July 10, 1982.

(x) North Sea Harbor.

(a) During the period from January 1st through December 31st (both dates inclusive):

(1) All that area of Alewife Creek (local name) and North Sea Harbor lying south and west of a line extending southeasterly from the northeasternmost point of land at Conscience Point, to the easternmost end of the bulkhead located at 319 Noyack Road, a two-story, wood shingled residence with three flag poles and a gambrel roof on an unnamed point of land, west of the entrance to Fish Cove (local names, local landmarks) and, all that area of North Sea Harbor lying east of a line extending northerly from the easternmost end of the bulkhead located at 319 Noyack Road to the southernmost point of land located at the residence of 102 Towd Point Road, on the opposite shoreline. The residence is two-story and light in color, with a stand of trees between the shoreline and the residence.

(2) All that area of Turtle Cove (local name) lying east of a line extending southerly from a monument on the northern shore of Davis Creek (local name), immediately west of Turtle Cove, to a monument on the southern shore of Davis Creek.

(3) All that area of Fish Cove (local name) and tributaries, including the unnamed creek connecting North Sea Harbor and Fish Cove.

(4) All that area of Davis Creek (local name) lying east of a line extending southeasterly, from the westernmost footbridge that provides foot access to Little Peconic Bay (located in the vicinity of the residence at 40D Cedar Crest Road), and all that area lying west of line extending southerly from a monument located on the northern shore of Davis Creek, immediately west of Turtle Cove (local name), to a monument located on the southern shore of Davis Creek.

(b) During the period May 1st through November 30th (both dates inclusive):

(1) All that area of Davis Creek (local name) lying west of a line extending southeasterly, at the westernmost footbridge that provides foot access to Little Peconic Bay (located in the vicinity of the residence at 40D Cedar Crest Road) and continuing towards the Towd Point Road Bridge, including the entrance of said creek.

Note:

All reference points in North Sea Harbor in the Town of Southampton taken from N.O.A.A. Nautical Chart No. 12358 dated December 1, 1984, except as indicated as "local names" and "local landmarks."

(xi) Wooley Pond. During the period May 1st through November 30th (both dates inclusive) all that area of Wooley Pond and its tributaries.

(xii) Fresh Pond. All that area of Fresh Pond and its tributaries and all that area of Little Peconic Bay within 600 feet of the mouth of Fresh Pond.

(xiii) Mill Creek. During the period April 1st through December 14th (both dates inclusive) all that area of Mill Creek. *Special note:* Mill Creek is a tributary of Noyack Bay.

(xiv) Noyac Creek. During the period May 1st through November 30th (both dates inclusive) all that area of Noyac Creek lying southerly of a line extending southwesterly from the southwesternmost point of land on Clam Island to the opposite shoreline located at Morton National Wildlife Refuge in Noyack.

(xv) Cold Spring Pond.

(a) During the period May 15th through October 15th (both dates inclusive), all that area of Cold Spring Pond within the Lobster Inn Boat Basin (local names, local landmark), lying northwest of a line extending northeasterly along the fixed wooden dock of the Lobster Inn Restaurant to the opposite shoreline, and all that area lying southeast of a line extending southwesterly from the northwesternmost point of land on the unnamed peninsula bordering the northeastern side of the cove, continuing southwesterly to the opposite shoreline (adjacent to the Lobster Inn Restaurant).

(b) During the period January 1st through December 31st (both dates inclusive), all that area of the Lobster Inn Boat Basin lying southeast of a line extending northeasterly along the fixed wooden dock of the Lobster Inn Restaurant to the opposite shoreline.

(c) During the period May 1st through November 30th, both dates inclusive, all that area of Cold Spring Pond lying northeast of a line extending southeasterly from an orange marker located on the northern shoreline in the northeastern corner of the pond to another orange marker located on the eastern shoreline adjacent to Shrubland Road.

(xvi) All that area of Sagaponack Pond, a brackish embayment and its tributaries, including any inlet when open to the Atlantic Ocean.

(5) Town of East Hampton.

(i) Sag Harbor.

(a) All that area, including tributaries, lying westerly of a line extending northwesterly along the breakwater located at the entrance to Sag Harbor (local landmark) and thence continuing northerly from the northern end of the breakwater to the northeasternmost extremity of the timber bulkhead protecting the shoreline adjacent to 28 East Harbor Drive, North Haven (local landmark); and easterly of the westernmost portions of the fixed bridge connecting North Haven Peninsula and Sag Harbor (local landmark).

Note:

All reference points in Sag Harbor in the Town of East Hampton taken from N.O.A.A. Nautical Chart No. 12358 dated July 9, 2011, except as indicated as "local landmarks." N.O.A.A. charts are available from N.O.A.A.

(ii) Montauk Lake (Montauk Harbor).

(a) All that area lying south of a line extending easterly from the flashing red light on the jetty on the western side of the entrance to Montauk Harbor (Lake Montauk) to the flashing green light on the jetty on the eastern side of the entrance to said harbor; and all that area, including tributaries, northerly of the causeway to Star Island and a line extending easterly from the flag tower at the U.S. Coast Guard Station on Star Island to the southernmost extremity of the dock serving Deep Water Seafood, Inc. (local landmark) and located on the eastern shore of Montauk Harbor (Lake Montauk).

(b) During the period April 1st through December 14th (both dates inclusive), all that area of Montauk Lake and tributaries lying southerly of a line extending easterly from the highest point of the stone chimney (serving the Rispoli residence, 80 Old West Lake Drive) to the northwestern end of northernmost wooden jetty extending from the shoreline at Bridgeford Colony (local landmarks, local names).

(c) During the period May 15th through October 15th (both dates inclusive), all that area of Montauk Harbor (Montauk Lake) lying south of a line extending easterly from the flag tower at the U.S. Coast Guard Station on Star Island to the southernmost extremity of the dock serving Deep Water Seafood, Inc. (local name, local landmark), on the western shore and northwest of a line extending northeasterly from the white flagpole located on the shoreline of the P. Kalikow residence (local name), off Star Island Drive, to a white flagpole at 395 East Lake Drive on the opposite shoreline (local landmark).

(d) During the period May 15th through October 15th (both dates inclusive), all that area of Montauk Harbor (Montauk Lake) at the Montauk Lake Marina & Club (local name, local landmark) lying east of a line extending southeasterly from a point 100 yards northwesterly of the main fixed dock to the southwesternmost end of that same fixed dock, continuing southeasterly along the fixed T-dock to its southeasternmost end and continuing in an easterly direction, 100 yards southeast of the innermost end of the floating T-dock.

(iii) Oyster Pond. All that area of Oyster Pond and tributaries.

Note:

All reference points, except local landmarks and local names, in Montauk Lake (Montauk Harbor) in the Town of East Hampton are taken from National Oceanic Atmospheric Administration Nautical Chart No. 13205, 25th Ed., dated January 12, 1980.

(iv) Three Mile Harbor.

(a) During the period May 1st through November 30th (both dates inclusive), all that area of Three Mile Harbor within a 500 foot radius in all directions of the entrance to the East Hampton Point Marina (located on the eastern shoreline at 295 Three Mile Harbor Road) and extending across the entrance into the Maidstone Harbor/Maidstone Marina Boat Basin, locally known as Duck Creek, located approximately 50 feet north of the East Hampton Point Marina.

(b) All that area of the Maidstone Harbor/Maidstone Marina Boat Basin, locally known as Duck Creek, lying east of a line extending northerly from the landward end of the northern wave break wall of the East Hampton Point Marina, including the entrance leading into the harbor.

(c) During the period from May 1st through November 30th (both dates inclusive), all that area of Three Mile Harbor within a 500 foot radius in all directions of the entrance to Shagwong Marina (local name), located on the eastern shoreline of Three Mile Harbor Road.

(d) During the period from May 1st through November 30th (both dates inclusive), all that area of Three Mile Harbor and tributaries lying southeast of a line extending northeasterly from the northeasternmost point of land on the peninsula located at the western side of the entrance into "Head of the Harbor" (local name), at the southern end of Three Mile Harbor and continuing to the western terminus of Breeze Hill Road, and lying north of a line extending northeasterly from the northernmost corner of the residence located at 5 South Pond Road on the western shoreline, to the northern side of the entrance of an unnamed creek on the opposite eastern shoreline (the entrance to this creek is located approximately 350 feet northwest of the entrance to Gardiner's Marina).

(e) All that area of "Head of the Harbor" (local name) at the southern end of Three Mile Harbor, lying south of a line extending northeasterly from the northernmost corner of the residence located at 5 South Pond Road on the western shoreline, to the northern side of entrance of an unnamed creek on the opposite eastern shoreline (the entrance to this creek is located approximately 350 feet northwest of the entrance to Gardiner's Marina).

(f) All that area of Hands Creek, including tributaries, lying west of a line extending northerly from an orange marker located on the southern side of the Hands Creek entrance channel to the opposite shoreline; and, during the period May 1st through November 30th, both dates inclusive, all that area within a 500 foot radius in all directions of the entrance to Hands Creek.

(g) During the period May 15th through October 15th (both dates inclusive), all that area of Three Mile Harbor lying southeast of a line extending southwesterly from the northeasternmost point of land at the entrance of the cove harboring the Sunset Cove Marina (local name) to the opposite shoreline serving the inlet.

(h) During the period May 15th through October 15th (both dates inclusive), all that area of Three Mile Harbor lying southerly of a line extending westerly from Harborview Lane (local name) and continuing to the opposite shoreline on Sedge Island (local name, local landmark) and easterly of a line extending northerly from the northwesternmost point of the bulkhead serving the Town of East Hampton, Town Dock (local name) and parking area, to the southernmost end of Sedge Island on the opposite shoreline.

(v) Hog Creek.

(a) During the period May 1st through November 30th (both dates inclusive), all that area of Hog Creek, including tributaries, lying easterly of a line extending southeasterly from the flagpole (located near the east side of the entrance to Hog Creek) on the property of the Clearwater Beach Property Owners Association, Inc. (local landmarks, local name) to the western end of the dock serving the residence at No. 152 Water Hole Road (local landmark, local name).

(b) During the period May 15th through October 15th (both dates inclusive), all that area of Hog Creek lying within the perimeter of the Lionhead Beach Association marina and within 35 feet of the bulkhead along the shoreline of the Lionhead Beach Association property. Said property is located at the easterly end of Bay Inlet Road (local names, local landmarks).

(c) All that area of Hog Creek lying south of a line extending easterly from the highest point of the white center peak of the residence located at 59 Isle of Wight Road to the red brick chimney on the north facing side of the residence located at 50 Fenmarsh Road on the opposite shoreline.

(d) During the period May 1st through November 30th (both dates inclusive), all that area of Hog Creek lying north of a line extending easterly from the highest point of the white center peak of the residence located at 59 Isle of Wight Road to the red brick chimney on the north facing side of the residence located at 50 Fenmarsh Road on the opposite shoreline, and lying south of a line extending easterly from the highest point of the center peak of the grey residence located at 99 Isle of Wight Road to the northerly corner of the whitish-grey, hexagon shaped residence located at 120 Fenmarsh Road on the opposite shoreline.

(vi) Fresh Pond. All that area of Fresh Pond, including tributaries and the entrance "canal." *Special Note:* Fresh Pond is a tributary of Napeague Bay.

(vii) During the period May 15th through October 15th (both dates inclusive), all that area of the Devon Yacht Club Boat Basin (local name), located on the southern side of Napeague Bay.

(viii) Northwest Harbor.

(a) All that area of Alewife Pond, including entrance channel and all that area of Northwest Harbor, within 50 yards in all directions from the inlet of Alewife Pond.

(b) During the period May 1st through December 14th, both dates inclusive, all that area of Northwest Harbor within a 200 yard radius from the western point of the spit of land on the southerly side of the entrance to the old Mile Hill Marina (local name), including the old Mile Hill Marina and the unnamed creek located immediately south of the old marina, which are all located southerly of Mile Hill Road.

(ix) Northwest Creek.

(a) During the period January 1st through December 31st, both dates inclusive, all that area of Northwest Creek and its tributaries lying south of a line extending between two orange markers located approximately 750 yards south of the inlet into Northwest Creek.

(b) During the period May 1st through December 14th, both dates inclusive, all that area of Northwest Creek lying south of a line extending east from the northernmost tip of land, exposed at mean high water, on the western side of the inlet connecting the creek into Northwest Harbor to the opposite shoreline, and northerly of the line described in clause (*a*), of this subparagraph.

(c) In the absence of the painted markers, all of Northwest Creek is uncertified.

(x) Acabonac Harbor.

(a) All that area of East Harbor (located in the southernmost portion of Acabonac Harbor) lying south of a line extending northwesterly from the southernmost point of the southernmost bulkhead located on the property at 73 Louse Point Road, to an orange marker on the opposite western shoreline.

(b) During the period May 1st through November 30th (both dates inclusive) all that area of Acabonac Harbor and East Harbor lying south of a line extending easterly from the northeasternmost point of land at the Merrill Lake Sanctuary to the westernmost point of land at Sage Island (local name) and continuing southeasterly along the northern shoreline of Sage Island (an orange marker is located at the northernmost point of said island) to its easternmost point, heading easterly to the foot of the dirt launch area at Gerard Point (local landmark) and all the area west of a line extending southerly from the southernmost point of land at Gerard Point (located at the northern side of the entrance of Acabonac Harbor) to the northernmost point of land at Louse Point (located at the southern side of the entrance to Acabonac Harbor).

(c) All that area of Acabonac Harbor, Pussy's Pond and an unnamed cove, including tributaries, lying west of a line heading north from an orange marker on the southern shore to an orange marker on the opposite northern shoreline. Said unnamed cove lies southerly of the Merrill Lake Sanctuary and northerly of Harbor Lane and Shipyard Lane (local landmarks in Springs).

(d) During the period January 1st through December 31st, all that area of the northernmost portion of Acabonac Harbor, including tributaries, lying north of a line extending westerly from the westernmost point of land of the property at 128 Gerard Drive to an orange marker on the opposite western shoreline.

(e) During the period May 1st through November 30th, both dates inclusive, all that area of Acabonac Harbor lying west of a line extending southwesterly from the westernmost point of land of the property at 128 Gerard Drive to an orange marker located on the opposite western shoreline, and south of the line described in clause (*c*) of this subparagraph.

(xi) All that area of Georgica Pond, a brackish embayment and its tributaries, including any inlet when open to the Atlantic Ocean.

(6) Town of Shelter Island.

(i) Shelter Island Sound and Dering Harbor. All that area of Shelter Island Sound and Dering Harbor south and east of a line extending southwesterly from the westernmost point of land at Dering Point, Shelter Island to the southernmost point of land at Fanning Point, Southold and continuing southeasterly to the westernmost corner of the ferry dock at Shelter Island; and all that area of Shelter Island Sound extending seaward 1,000 feet from mean high water from the ferry dock to a line extending westerly from the yellow house at 34 Prospect Avenue, Shelter Island to the foot of Island View Lane, Southold (local names, local landmarks).

(ii) Coecles Harbor. During the period May 15th through October 31st, both dates inclusive, all that area of Coecles Harbor lying south of a line extending easterly from the eastern end of Hudson Avenue (local name, local landmark) to the northeasternmost corner of the fueling dock at the Coecles Harbor Marina and Boatyard (local name, local landmark) and west of a line extending southerly along the easternmost side of said fueling dock and thence continuing to the southeasternmost corner of the southernmost floating dock at said marina and north of a line extending westerly along the southernmost side of said floating dock to the shoreline.

(iii) Menantic Creek. During the period May 15th through October 31st, both dates inclusive, all that area of Menantic Creek lying south of a line extending southeasterly from the northernmost corner of the shingled poolhouse immediately adjacent to the swimming pool located at the Island Boatyard Marina (local name, local landmark) to the western end of Tarkettle Road, which terminates in a town boat launching ramp (local name, local landmark), and north of a line extending southeasterly from the southernmost point of the Island Boatyard Marina fuel dock to the southwesternmost point of the wooden bulkhead on the eastern side of the mouth of Menantic Creek. *Special Note:* Menantic Creek is a tributary of West Neck Harbor.

Note:

All reference points, except local names or local landmarks, in the Town of Shelter Island are taken from N.O.A.A. Nautical Chart Number 12358, 16th Ed., dated May 12, 1990.

(7) Town of Southold.

(i) Long Island Sound. All that area lying within a one-half mile radius of the sewer outfall located at Lat. 41° 6′ 30″ N. and Long. 72° 23′ 9″ W. and serving the Greenport Sewage Treatment Plant. Such outfall is located 500 feet offshore of the westernmost rock jetty on the Village of Greenport property southwest of Inlet Point and approximately 500 feet easterly of the shoal marked "Parker Rock" on N.O.A.A. Nautical Chart No. 12358.

(ii) Greenport Harbor.

(a) All that area, including tributaries, lying northerly and westerly of a line extending northeasterly from the northeasternmost corner of the Long Island Rail Road Dock (located at the Greenport railroad station, local names, local landmarks) to the southwestern end of the large dock serving the Greenport Yacht and Ship Building Company (located at the southern foot of Carpenter Street, local names, local landmarks).

(b) All that area, including tributaries, lying northerly and westerly of a line extending northeasterly from the white painted flagpole (located at the eastern foot of Central Avenue on the property of the Stirling Cove Condominiums, local names, local landmarks) to the northwesternmost end of the wooden bulkhead protecting the shoreline at the eastern entrance of Stirling Basin off of Sandy Beach Lane, local names, local landmarks.

(iii) Cutchogue Harbor.

(a) Schoolhouse Creek. All that area of Schoolhouse Creek including all that area of Cutchogue Harbor within 100 yards in all directions of the easternmost point of the bulkheading on the south side of the entrance to Schoolhouse Creek.

(b) East Creek, Mud Creek, Haywater Cove, and Broadwater Cove.

(1) Broadwater Cove. During the period May 15th through October 31st, all that area of Broadwater Cove lying west of a line extending southerly from the southeast corner of the house located at 8000 Skunk Lane (local name) to the opposite shore.

(2) East Creek and Mud Creek. During the period January 1st through December 31st, both dates inclusive, all that area of East Creek and Mud Creek west and north of a line extending northerly from the southernmost dock on East Creek to an Osprey nest platform on the opposite shoreline and continuing northeasterly to the southernmost end of the boat ramp at the western end of Mason Drive.

(3) East Creek, Mud Creek and Haywater Cove. During the period of May 1st through November 30th, both dates inclusive, all that area of East Creek, Mud Creek and Haywater Cove southerly of a line extending northerly from the southernmost dock on East Creek to an Osprey nest platform on the opposite shoreline continuing northeasterly to the southernmost end of the boat ramp at the western end of Mason Drive and then proceeding southerly to the intersection of Haywaters Road and Landing Road (local names).

(4) Cutchogue Harbor. During the period of May 1st through November 30th, all that area of Cutchogue Harbor within 500 feet in all directions of the mouth of the East Creek, Mud Creek, Haywater Cove and Broadwater Cove Complex (local names).

(c) Wickham Creek.

(1) All that area northwest of a line extending westerly from an orange marker on the north shore (approximately 750 feet west of the marina) to an orange marker on the opposite shoreline.

(2) During the period May 15th through October 31st, both dates inclusive, all that area of lying southeast of a line extending westerly from an orange marker on the north shore (approximately 750 feet west of the marina) to an orange marker on the opposite shoreline.

(3) In the absence of the orange markers all of Wickham Creek is uncertified.

(d) New Suffolk. During the period January 1st through December 31st, both dates inclusive, all that area of the marina, located at the eastern end of New Suffolk Avenue (Main Street, New Suffolk), within the confines of the stone breakwater protecting said marina, and all that area lying easterly of the stone breakwater within 150 feet of the southernmost point of the breakwater on the northern side of the marina basin entrance.

(iv) Mattituck Inlet and Mattituck Creek.

(a) During the period April 16th through January 14th, both dates inclusive all that area north of a line extending easterly from an orange marker near the red shack on the south side of the entrance to Howards Creek (local landmark), to an orange marker near the flagpole serving the residence at 1085 West View Drive (local landmark), and the area of Howards Creek lying easterly of a line extending northwesterly from an orange marker near the dock serving the residence at 1175 Point Pleasant Road to an orange marker near the dock serving the residence located on Fox Hollow Road on the opposite shore.

(b) All that area south of a line extending easterly from an orange marker near the red shack on the south side of the entrance to Howards Creek (local landmark), to an orange marker near the flagpole serving the residence at 1085 West View Drive (local landmark), and the area of Howards Creek lying west of a line extending northwesterly from an orange marker near the dock serving the residence at 1175 Point Pleasant Road to an orange marker near the dock serving the residence located on Fox Hollow Road on the opposite shore.

(v) Shelter Island Sound.

(a) All that area of Shelter Island Sound and Dering Harbor south and east of a line extending southwesterly from the westernmost point of land at Dering Point, Shelter Island to the southernmost point of land at Fanning Point, Southold and continuing southeasterly to the westernmost corner of the ferry dock at Shelter Island; and all that area of Shelter

Island Sound extending seaward 1,000 feet from mean high water from the ferry dock to a line extending westerly from the yellow house at 34 Prospect Avenue, Shelter Island to the foot of Island View Lane, Southold (local names, local landmarks).

(b) Sage Pond. During the period May 15th through October 31st, all that area within Sage Pond (local name) and all tributaries.

(c) Budds Pond. During the period May 15th through October 31st, both dates inclusive, all that area of Budds Pond (local name) including all tributaries.

(d) During the period May 15th through October 31st, both dates inclusive, all that area within the Goldsmith Boat Shop boat basin and all that area within the Mill Creek Inn Restaurant and Marina boat basin (local names, local landmarks).

(vi) Fishers Island Sound.

(a) Outer West Harbor. During the period May 15th through September 30th, both dates inclusive, all that area of West Harbor lying south of a line extending southeasterly from the easternmost point of land at Hawks Nest Point to a flagpole located on the eastern shore of West Harbor on the property of the Grey Gulls Estate, also known as the DuPont House (local name, local landmark). Said flagpole is situated between the shoreline and the residence.

(b) West Harbor and Pirates Cove. All that area of West Harbor lying south of a line extending east from the northeasternmost corner of the natural shingled house located at the northern end of Hedges Street, said house is located on Murphy's Beach, to the northernmost corner of the two-storied brown wood shingle house with a large antenna located on Peninsula Avenue (local names, local landmarks).

(c) Island Pond. All that area of Island Pond and tributaries.

Note:

All reference points, except local names and local landmarks, on Fishers Island in the Town of Southold are taken from N.O.A.A. Nautical Chart No. 13214, 23rd Ed., dated February 3, 1990.

(vii) Hashamomuck Pond.

(a) During the period January 1st through December 31st, both dates inclusive, all that area of Hashamomuck Pond and Long Creek lying westerly of a line extending southerly from the orange marker located on the shore at the Terrace Garden Colony Cottages to the opposite shoreline; and lying southerly of the line extending easterly from the orange marker located on the shoreline of the residence at 1645 Mill Creek Drive to the orange marker on the opposite shore.

(b) During the period May 1st through November 30th, both dates inclusive, all that area of Hashamomuck Pond and Mill Creek lying northerly and easterly of a line extending westerly from the stack (a brick chimney) near the shoreline of Shelter Island Sound east of the entrance to Mill Creek and south of Goldsmiths' Boat Shop (local landmark) to the most landward point of the fixed dock at “The Old Barge” Restaurant at 750 Old Main Road, Southold (local name, local landmark).

(c) During the period January 1st to December 31st, all that area of the "The Clay Pit" and its tributaries lying east of a marker approximately 540 feet east of the LIRR trestle over Mill Creek (local names, local landmarks).

(viii) Goldsmith Inlet. All that area of Goldsmith Inlet and tributaries.

(ix) Gull Pond.

(a) All that area of Gull Pond lying northwest of a line extending southerly from the southernmost point of the bulkhead located at 706 Wiggins Lane, to the opposite shoreline (1625 Gull Pond Lane).

(b) During the period April 1st through December 14th, both dates inclusive, all that area of Gull Pond, including tributaries lying north and northwest of a line extending northeasterly from the southeastern end of the wood bulkheaded jetty protecting the southwestern side of the entrance to Gull Pond to the southeastern end of the wood bulkheaded jetty protecting the northeastern side of the entrance to Gull Pond (local landmarks).

(x) Plum Island.

(a) Plum Gut. All that area of Plum Gut, Plum Gut Harbor and tributaries lying northerly and easterly of a line extending westerly from the southernmost point of land exposed at mean high water at Pine Point to buoy GR “MS” (said buoy is located near Midway Shoal) and thence continuing northerly to F12.5 sec 5M PA.

(b) Long Island Sound. All that area of Long Island Sound within 500 yards of the most seaward portion of the shoreline exposed at mean high water, from the westernmost point of land on Plum Island to the easternmost point of land on Plum Island.

(c) Gardiners Bay. All that area of Gardiners Bay adjacent to the southern shore of Plum Island, including tributaries, within 500 yards of the most seaward portion of shoreline exposed at mean high water, from the westernmost point of land on Plum Island to the easternmost point of land on Plum Island.

(xi) Great Peconic Bay.

(a) All that area of Brushs Creek, including tributaries and the entrance canal, and all that area of Great Peconic Bay within a 1,000-yard radius of the southwesternmost corner of the bulkheading protecting the northern shoreline of the entrance to Brushs Creek.

(b) During the period May 1st through November 30th, both dates inclusive, all that area of James Creek, including tributaries and the entrance canal.

(c) During the period May 1st through November 30th, both dates inclusive, all the area of Deep Hole Creek, and all that area of Great Peconic Bay within 500 yards in all directions of the northernmost tip of Marratooka Point (local name).

(d) During the period May 1st through November 30th, both dates inclusive, all that area of Halls Creek, including tributaries.

(e) West Creek. During the period of May 1st through November 30th, all that area of West Creek including all that area of Great Peconic Bay within 750 feet in all directions of the southernmost point of the jetty on the east side of the mouth of West Creek.

(xii) Southold Bay.

(a) Boat basins.

(1) During the period May 15th through October 31st, both dates inclusive, all that area of the Paradise Point Boat Basin and all that area of the combined Reydon Shores and the Plock property boat basin (local names).

(2) All that area of the boat basin north and west of Harbor Lights Drive and all that area of Southold Bay within 250 feet of the mouth the boat basin.

(b) Jockey Creek and Town Creek.

(1) During the period January 1st to December 31st, both dates inclusive, all that area of Jockey Creek lying westerly of a line extending southerly from the highest point of the chimney on the residence at 3415 Wells Avenue to the white flagpole with the sailboat ornament, between the shoreline and the residence at 405 Pine Creek Road (local names, local landmarks).

(2) During the period April 15th to December 31st, both dates inclusive, all that area of Jockey Creek, Town Creek and tributaries lying west of a line extending southerly from the south end of Terry Road directly to the opposite shore.

(c) Petty's Pond. All that area of Petty's Pond (also known as Beixedon Creek) and all that area of Southold Bay within 500 feet of the mouth of Petty's Pond (local names).

(d) Goose Creek. During the period April 15th through December 31st, both dates inclusive, all that area of Goose Creek lying south and west of the Goose Creek Bridge (local landmarks).

(xiii) Orient Harbor.

(a) During the period May 15th through October 31st, both dates inclusive, all that area of Orient Harbor lying east of a line extending northerly from the tip of the northwesternmost dock of the Orient Yacht Club to the northernmost corner of the bulkhead at the shoreline at the foot of the Harbor River Road.

(b) Narrow River. All that area of Narrow River and tributaries lying north of a line extending east from the southern end of the seawall located on the western shore of Narrow River near the junction of Narrow River Road and King Street (local names) to a pole with an osprey nesting platform on top located on the southern tip of Barnsfield Point.

(c) Hallock Bay. During the period May 1st through October 31st, both dates inclusive, all that area of the canal lying north of a line extending northeast from a pole with an osprey nesting platform on top located on the tip of Barnsfield Point to a pole with an orange marker located on the opposite shore.

(d) Little Bay. During the period May 1st through October 31st, both dates inclusive, all that area of Little Bay and tributaries lying north and east of a line extending southeast from a pole with an orange marker located on the tidal wetlands on the north shore of Little Bay to a pole with an orange marker located on the opposite shore in Orient Beach State Park.

(e) Spring Pond. During the period January 1st through December 31st, both dates inclusive, all that area of Spring Pond including tributaries.

(f) During the period January 1st through December 31st, both dates inclusive, all that area in Orient Harbor within 500 feet in all directions of the southeastern end of the easternmost bulkhead at the entrance to Spring Pond.

(xiv) Gardiners Bay. During the period May 15th through October 31st, both dates inclusive, all that area of Gardiners Bay within the Orient by the Sea Marina boat basin.

Note:

All reference points, except local names or local landmarks, in the Town of Southold, with the exception of Fishers Island Sound, are taken from N.O.A.A. Nautical Chart No. 12358, 16th Ed., dated May 12, 1990.

(xv) Little Peconic Bay. Richmond Creek. During the period April 1st through October 31st, both dates inclusive, all that area of Richmond Creek and tributaries lying west of a line extending north from the easternmost point of land at the southern side of the mouth of Richmond Creek to the opposite shore.

Note:

All reference points, except local names or local landmarks, in the Town of Southold, with the exception of Fishers Island Sound, are taken from N.O.A.A. Nautical Chart No. 12358, 16th Ed., dated May 12, 1990.

(xvi) Pipes Cove. All that area of the unnamed creek northwest of Fanning Point and east of Silvermere Road, Southold, and all that area of Pipes Cove within 100 feet of the southernmost point of the eastern bulkhead within the mouth of the unnamed creek.

(8) Town of Riverhead.

(i) Flanders Bay.

(a) All that area of Reeves Bay, including tributaries.

(b) All that area of Flanders Bay, including tributaries, lying westerly and northerly of a line extending northeasterly from the northernmost tip of Goose Creek Point exposed at mean high water to the southernmost tip of Simmons Point exposed at mean high water.

(c) All that area, including tributaries, of Goose Creek, Birch Creek and Mill Creek.

(d) During the period May 1st through November 30th, both dates inclusive, all that area of Hubbard Creek including tributaries

(e) All creeks, canals and other tributaries located along the northern shoreline of Flanders Bay between Simmons Point and Miamogue Point.

(ii) Peconic River. All waters of the Peconic River and its tributaries within the Town of Riverhead.

(iii) Great Peconic Bay.

(a) East Creek. All that area of the East Creek boat basin and its tributaries.

(b) All that area of Brushs Creek, including tributaries and the entrance canal, and all that area of Great Peconic Bay within a 1,000-yard radius of the southwesternmost corner of the bulkheading protecting the northern shoreline of the entrance to Brushs Creek.

(iv) All that area of Long Island Sound within 500 yards of the shoreline, beginning at a point 200 yards west of the westernmost point of the west jetty at the Shoreham Canal to the westernmost point of the paved parking lot at Wading River Beach located on Creek Road (Hamlet of Wading River).

(v) Wading River Creek. All that area of Wading River Creek and its tributaries.

(vi) All that area of Baiting Hollow Creek and all that area of Long Island Sound within a 100-yard radius of the entrance to Baiting Hollow Creek.

(9) Town of Brookhaven (North Shore).

(i) Port Jefferson Harbor, Setauket Harbor and Conscience Bay.

(a) During the period January 1st through December 31st, both dates inclusive, all that area of Port Jefferson Harbor, including tributaries, lying east and south of a line extending northerly from the flagpole located at the foot of Washington Street, Poquott, to the channel marker buoy G “5” Fl G 4s BELL, and thence continuing northeasterly to the landwardmost point of the rock ruins located at the foot of Anchorage Road, Belle Terre (local names, local landmarks).

(b) During the period January 1st through December 31st, both dates inclusive, all that area of Conscience Bay, including tributaries, lying south of a line extending northeasterly from utility pole "NYT 183" (with transformer), located across Old Field Road from the residence located at #92 Old Field Road (local landmark), to the top of the white chimney of the residence located at 22 Conscience Circle, Strong's Neck (local landmark, said residence is a gray, two-story house).

(c) During the period May 1st through October 31st, both dates inclusive all that area of Port Jefferson Harbor and Setauket Harbor, including tributaries, lying southerly and westerly of a line extending easterly from the northernmost chimney of the residence at 10 Preston Lane, Strong's Neck, (said residence is a two story house protected by a

seawall) to channel marker buoy G “5” FI G 4s BELL and thence continuing southeasterly to the flagpole located at the foot of Washington Street (Village of Poquott).

(d) During the period May 1st through October 31st, both dates inclusive, all that area of Port Jefferson Harbor, the Narrows and Conscience Bay, including tributaries, lying westerly of a line extending due north from the northeasternmost corner of the gray slate chimney located on the residence at #11 Indian Field Road, Strong's Neck (said residence is a red brick and gray slate structure located on property that is protected by a stone seawall) to a point on the harbor side of the Old Field Beach peninsula (local names, local landmarks).

(e) During the period January 1st through December 31st, both dates inclusive: all that area of Setauket Harbor, including Little Bay and all other tributaries, lying south and west of a line extending westerly from utility pole “NYT #29,” located near the shoreline adjacent to Van Brunt Manor Road at Poquott, to the highest point of the turret of the residence at 18 John's Road at Strong's Neck, on the opposite shoreline.

(ii) During the period January 1st through December 31st, both dates inclusive, all that area of Flax Pond, including tributaries, lying southerly of a line extending easterly from the northernmost point of the western jetty to the northernmost point of the eastern jetty at the inlet.

(iii) Mount Sinai Harbor.

(a) During the period May 1st through October 31st, both dates inclusive, all that area of Mount Sinai Harbor, including tributaries, lying southerly of a line extending easterly from the northernmost point of the west jetty at the harbor entrance to the northernmost point of the east jetty at the harbor entrance.

(b) During the period January 1st through December 31st, both dates inclusive, all that area of Mount Sinai Harbor, including tributaries lying south of a line extending westerly from the northernmost point of the bulkhead at the Town of Brookhaven access point known locally as Satterly Landing (located on the northern side of Shore Road and west of the residence at 182 Shore Road, local landmarks) to the northernmost end of the small white building known locally as “Adee’s Boathouse” (local landmark), located on the opposite western shoreline.

(iv) Stony Brook Harbor and Smithtown Bay.

(a) During the period of May 1st through October 31st, both dates inclusive, all that area of Smithtown Bay located within 1,000 yards of the landward end of the northernmost rock jetty on the eastern side of the entrance to Stony Brook Harbor.

(b) During the period May 1st through October 31st, both dates inclusive, all that area of the entrance to Stony Brook Harbor and the Stony Brook Boat Channel lying south of a line extending westerly from the landward end of the northernmost rock jetty on the eastern shore of the entrance to Stony Brook Harbor to the northeasternmost point of land on Long Beach on the western shore of the entrance to Stony Brook Harbor; and east of a line extending southerly from the northeasternmost point of land on Long Beach to the northeastern tip of the dredge spoil island known as Youngs Island (local name) separating the Stony Brook Boat Channel and Porpoise Channel; and continuing along the high tide line of the southern shore of Youngs Island to the orange marker located northwest of the entrance to Stony Brook Creek and extending southeasterly to the southwestern corner of the two-story residence located at 15 Emmet Drive located on the opposite shore in the incorporated Village of Head of the Harbor, west of Stony Brook Creek.

(c) All that area of Stony Brook Creek (local name) and tributaries lying south and east of a line extending northerly from the northwesternmost corner of the two story residence at 15 Emmet Drive (said residence is a beige, two-story house with five large brick chimneys) to the landwardmost end of the southernmost fixed dock at Stony Brook Boat Works (located on the western side of Shore Road, Stony Brook, local landmarks).

(d) All that area of Stony Brook Harbor and tributaries lying south of a line extending southeasterly from an orange marker located near the shoreline below the residence at 25 Spring Hollow Road (Village of Nissequogue) to an orange marker located at the northwestern end of the unpaved road known locally as Hitherbrook Extension (local names and local landmarks).

(e) During the period May 1st through December 31st, both dates inclusive, all that area of Stony Brook Harbor and tributaries lying south of a line extending southeasterly from the southernmost red brick chimney on the Knox School located at 541 Long Beach Road in the incorporated Village of Nissequogue (said school is a three-story red brick building, local landmark) to the southernmost chimney on the residence at 121 Harbor Road in the incorporated Village of Head of the Harbor (said residence is a white three-story structure with dark shutters and three chimneys and is located on the Thatch Meadow Farm property, local landmark).

(f) All that area of West Meadow Creek and tributaries lying north of a line extending easterly from the southernmost tip of West Meadow Beach exposed at mean high water to the southernmost corner of the wooden bulkhead along the shoreline of West Meadow Creek and on the property at 21 Shore Oaks Drive, Stony Brook (local landmarks).

(g) During the period May 15th through October 31st, both dates inclusive, all that area of the Town of Smithtown Marina (local name) or boat basin and the entrance channel, which serves to connect said marina with Porpoise Channel (local name).

(h) All that area of the unnamed tidal pond and creek located on the western shore of Stony Brook Harbor at the Nissequogue Golf Club, and all that area of Stony Brook Harbor within a 100 yard radius of the inlet to said tidal pond and creek.

(i) All that area of the unnamed tidal inlet located on the eastern shore of Stony Brook Harbor between Piper Lane and Arbor Lane and all that area of Stony Brook Harbor within a 150 yard radius of the entrance to said inlet.

(v) Wading River Creek. All that area of Wading River Creek and its tributaries.

(vi) All that area of Long Island Sound within 500 yards of the shoreline, beginning at a point 200 yards west of the westernmost point of the west jetty at the Shoreham Canal to the westernmost point of the paved parking lot at Wading River Beach located on Creek Road (Hamlet of Wading River).

(vii) All that area of the canal serving the former Long Island Lighting Company facility at Shoreham lying south of a line drawn between the northernmost tips of the two rock jetties serving said canal (local landmarks).

(10) Town of Smith Town.

(i) Smithtown Bay.

(a) All that area of Smithtown Bay, including the Nissequogue River and its tributaries and Sunken Meadow Creek, lying south of a line extending northeasterly from the flagpole at the East Bath House at Sunken Meadow State Park (local landmark) to buoy BW "NR," located approximately one mile north of the mouth of the Nissequogue River, thence southeasterly to the flagpole located at the town of Smith Town beach at Short Beach (local landmark).

(b) All that area within a one-half mile radius of buoy BW "NR," located approximately one mile north of the mouth of the Nissequogue River.

(c) All tributary creeks, streams, canals and boat basins of Smithtown Bay and Long Island Sound along the shoreline between the western entrance to Nissequogue River and Eatons Neck Point.

(d) All that area of Smithtown Bay located within 500 feet of the northernmost point of the rock jetty along the western bank of the mouth of Crab Meadow Creek.

(e) During the period of May 1st through October 31st, both dates inclusive, all that area of Smithtown Bay located within 1,000 yards of the landward end of the northernmost rock jetty on the eastern side of the entrance to Stony Brook Harbor.

(ii) Stony Brook Harbor.

(a) During the period May 1st through October 31st, both dates inclusive, all that area of the entrance to Stony Brook Harbor and the Stony Brook Boat Channel lying south of a line extending westerly from the landward end of the northernmost rock jetty on the eastern shore of the entrance to Stony Brook Harbor to the northeasternmost point of land on Long Beach on the western shore of the entrance to Stony Brook Harbor; and east of a line extending southerly from the northeasternmost point of land on Long Beach to the northern tip of the dredge spoil island known as Youngs Island (local name) separating the Stony Brook Boat Channel and Porpoise Channel; and continuing along the high tide line of the southern shore of Youngs Island to the orange marker located northwest of the entrance to Stony Brook Creek; and extending southeasterly to the southwestern corner of the two story residence located at 15 Emmet Drive located on the opposite shore in the incorporated Village of Head of the Harbor, west of Stony Brook Creek.

(b) All that area of Stony Brook Creek (local name) and tributaries lying south and east of a line extending northerly from the northwesternmost corner of the two story residence at 15 Emmet Drive (said residence is a beige two story house with five large brick chimneys) to the landwardmost end of the southernmost fixed dock at Stony Brook Boat Works (located on the western side of Shore Road, Stony Brook, local landmarks).

(c) All that area of Stony Brook Harbor and tributaries lying southerly of a line extending southeasterly from an orange marker located near the shoreline below the residence at 25 Spring Hollow Road (Village of Nissequogue) to an orange marker located at the northwestern end of the unpaved road known locally as Hitherbrook Extension (local names and local landmarks).

(d) During the period May 1st through December 31st, both dates inclusive, all that area of Stony Brook Harbor and tributaries lying south of a line extending southeasterly from the southernmost red brick chimney on the Knox School located at 541 Long Beach Road in the incorporated Village of Nissequogue (said school is a three-story red brick building, local landmark) to the southernmost chimney on the residence at 121 Harbor Road in the incorporated Village of Head of the Harbor (said residence is a white three- story structure with dark shutters and three chimneys and is located on the Thatch Meadow Farm property, local landmark).

(e) All that area of West Meadow Creek and tributaries lying north of a line extending easterly from the southernmost tip of West Meadow Beach exposed at mean high water to the southernmost corner of the wooden bulkhead along the shoreline of West Meadow Creek on the property at 21 Shore Oaks Drive, Stony Brook (local landmark).

(f) During the period May 15th through October 31st, both dates inclusive, all that area of the Town of Smithtown Marina (local name) or boat basin and the entrance channel, which serves to connect said marina with Porpoise Channel (local name).

Note:

All reference points in the Town of Smith Town are taken from N.O.A.A. Nautical Chart No. 12364, 22nd Edition, dated November 13, 1982; except the southern portion of Stony Brook Harbor and where indicated as local name or local landmark.

(g) All that area of the unnamed tidal pond and creek located on the western shore of Stony Brook Harbor at the Nissequogue Golf Club and all that area of Stony Brook Harbor within a 100 yard radius of the inlet to said tidal pond and creek.

(h) All that area of the unnamed tidal inlet located on the eastern shore of Stony Brook Harbor between Piper Lane and Arbor Lane and all that area of Stony Brook Harbor within a 150 yard radius of the entrance to said inlet.

(11) Town of Huntington.

(i) Northport Bay and Northport Harbor.

(a) All that area of Northport Bay, Northport Harbor and tributaries lying southerly of a line extending northeasterly from the highest point of the green domed cupola of the residence located at 24 Mariner Court, Centerport, on the northeastern shore of Little Neck Point, to the highest point of the gazebo located between the shoreline and the residence at 8 Hawkins Drive, Northport (local names, local landmarks), located near the eastern shore of Northport Bay.

(b) During the period May 1st through October 31st, both dates inclusive, all that area of Price Bend (local name) lying northerly of a line extending easterly from the easternmost end of the chain link fence, located adjacent to the southern end of the paved parking area at the Town of Huntington Hobart Beach (local names, local landmarks), to the northwesternmost corner of the concrete seawall adjacent to the shoreline and protecting the property and residence (with vertical wooden siding) at 120 Winkle Point Road, Eatons Neck (local names, local landmarks).

(ii) Centerport Harbor.

(a) During the period January 1st through December 31st, both dates inclusive, all that area of Centerport Harbor, including tributaries, lying southerly of a line extending northeasterly from the easternmost point of the fixed dock serving the Huntington Beach Community Association (HBCA) to the southwesternmost corner of the barn-like structure known as the Windsurfing Center at the Town of Huntington Centerport Beach (local names, local landmarks). The HBCA dock is located on the western shore of the harbor, approximately 85 feet northerly of the boat launching ramp at the foot of Adams Street, Centerport.

(b) During the period May 1st through October 31st, both dates inclusive, all that area of Centerport Harbor, including tributaries, lying southerly of a line extending easterly from the southernmost end of the white-painted garage with red-colored shingled roof (located near the western shoreline of Centerport Harbor on the property at 76 Knollwood Road, local names and local landmarks) to the gazebo with sailboat weather vane (located on the hillside near the eastern shoreline of Centerport Harbor on the property at 247 Little Neck Road, local names and local landmarks) and northerly of the line described in clause (*a*) of this subparagraph.

(iii) Huntington Harbor. All that area, including tributaries, lying southerly, westerly and easterly of a line extending easterly from the northeasternmost end of the sea wall protecting the western entrance to Huntington Harbor to the northernmost end of the rock and concrete rubble bulkhead-jetty protecting the eastern entrance to Huntington Harbor, local landmark.

(iv) Cold Spring Harbor.

(a) During the period January 1st through December 31st, both dates inclusive, all that area including tributaries south and east of a line extending southerly from the seaward end of the dock serving the Cold Spring Harbor Beach Club (local landmark) to the western extremity of the white house (known as the Gale House) located on the shoreline immediately west of Cold Spring Beach (local landmark), on the campus of Cold Spring Harbor Laboratory.

(b) During the period May 1st through October 15th, both dates inclusive, all that area including tributaries south and east of a line extending westerly from the seaward end of the dock serving the Cold Spring Harbor Beach Club (local landmark) to the flag pole situated near the village hall of the Village of Laurel Hollow, 1492 Laurel Hollow Road (local landmark).

(c) During the period May 1st through October 31st, both dates inclusive, all that area of Eel Creek (local name) located at the Sagamore Hill National Historic Site and all that area within 250 yards in any direction of the southeastern corner of the bulkheading surrounding the stand of trees on the northern side of the entrance to the boat basin located immediately south of the Sagamore Hill National Historic Site.

(v) Smithtown Bay.

(a) All tributary creeks, streams, canals and boat basins of Smithtown Bay and Long Island Sound along the shoreline between the western entrance to the Nissequogue River and Eatons Neck Point.

(b) All that area of Smithtown Bay located within 500 feet of the northernmost point of the rock jetty along the western bank of the mouth of Crab Meadow Creek.

(vi) Lloyd Harbor and Huntington Bay.

(a) All that area of Lloyd Harbor and Huntington Bay lying south and within the boundaries of a line extending northeasterly from the northernmost point of the concrete seawall protecting the shoreline of the property at One Lighthouse Point, Village of Lloyd Harbor (the residence on said property is a large, two-story brick structure with four twin-vented chimneys and is the second residence lying east of the northern terminus of Southdown Road; local names and local landmarks), to the highest point of the Lloyd Harbor Horn and continuing southeasterly to the western side of the blue, three story residence located at One Salty Way on the southern shoreline of Huntington Bay, approximately 200 yards east of the entrance to Huntington Harbor.

(b) During the period May 1st through October 31st, both dates inclusive, all that area of Lloyd Harbor lying west of a line extending southerly from the southernmost point of land, lying south of Lloyd Harbor Road and west of the intersection of Lloyd Harbor Road and Fiddlers Green Drive on the Lloyd Neck shoreline, to the western side of the Mill Pond Association paved parking area located at the end of School Lane on the opposite shore on West Neck (local names, local landmarks).

(vii) Steers Canal (local name). All that area of Steers Canal (local name) and tributaries. *Special note:* Steers Canal is a tributary of Northport Bay and is located at the southern shore of said bay approximately 350 yards easterly of the eastern entrance to Northport Harbor.

Note:

All reference points, except local landmarks or local names in the Town of Huntington are taken from N.O.A.A. Nautical Chart No. 12364, 25th Ed., dated January 10, 1987 and/or No. 12365, 19th Ed., dated March 10, 1984.

6 CRR-NY 41.3
Current through October 15, 2015

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SHELLFISH LAND # 6

GREAT SOUTH BAY - PATCHOGUE

BLUE POINT TO HOWELLS POINT

TRIENNIAL REVIEW OF BACTERIOLOGICAL WATER QUALITY

JUNE 2009

STATE OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
205 NORTH BELLE MEAD ROAD
EAST SETAUKET, NEW YORK 11733-3400

by: GINA FANELLI
Biologist 1 (Marine)
Shellfisheries Section

INTRODUCTION

It is the intent of this report to review the sanitary survey data for Shellfish Land # 6, Great South Bay-Patchogue. Bacteriological water quality data are evaluated to determine whether the area is properly classified in relation to the criteria of 6 NYCRR 47, Certification of Shellfish Lands and the guidelines of the National Shellfish Sanitation Program Model Ordinance. See charts for current classification and sampling stations.

REVIEW OF POLLUTION SOURCES

Shellfish Land #6 - Great South Bay - Patchogue Bay is located on the south shore of Long Island, and extends from Blue Point in the west, to Howells Point, in the east, then southward to the barrier beach of the Fire Island National Seashore. **Stations 24, 23.1, and 23, south of Blue Point, share a common boundary with Shellfish Land #5 - Great South Bay - Nicoll/Sayville**. Stations 1, 2, and 3 share a common boundary with Shellfish Land #7 - Bellport Bay. There is a seasonal circular closure on the north side of the bay, in the vicinity of Hedges Creek/Dunton Avenue of West Bellport. There are also two seasonal closure areas at the marinas on the south side of the bay, at Watch Hill and Davis Park.

The last shoreline survey report was prepared in August 2001. There are no significant changes to the pollution sources to the area. Indirect impacts from stormwater runoff of the developed northern shoreline of the bay are the major causes of water quality problems. The closed safety zones surrounding the seasonal marina areas at Davis Park and Watch Hill on the south side of the bay are sufficient to contain and dilute potential discharges.

In February 2007, the Village of Patchogue STP was issued a modified SPDES permit, to reflect proposed upgrades to their facility. The STP will be switching to UV disinfection of its effluent.

Based on the observations/data of the Biologist and her field staff, despite the lack of changes in pollution sources affecting the area, three additional sampling stations shall be added at the mouths of three creeks in the northern portion of the bay, Corey Creek, Tuthill Creek, and Patchogue River. These three stations will aid in monitoring the pollution sources and water quality of the bay.

REVIEW OF BACTERIOLOGICAL WATER QUALITY

The last Triennial Review of Water Quality was performed in January 2006. The last Annual Review of Water Quality was performed in December 2007.

Criteria

Water quality at a station is acceptable when one of the following is met:

Total Coliform. Median (APC) or Geometric Mean (SRS) total coliform MPN/100ml

of **70 or less**; **and** no more than 10% of the samples in excess of an MPN/100ml of **330** (APC), or 90th percentile not to exceed **330** MPN/100mL (SRS).

Fecal Coliform. Median (APC) or Geometric Mean (SRS) fecal coliform MPN/100ml of **14 or less**; **and** no more than 10% of the samples in excess of an MPN/100ml of **49** (APC), **or** 90th percentile not to exceed **14** MPN/100mL (SRS).

(Stations denoted "borderline pass" have a geometric mean or median fecal coliform MPN/100mL of ≥ 12, and/or a 90th percentile or no more than10% of samples> 39, to indicate that, although they meet criteria, they are close to failing).

Water quality is evaluated on a seasonal and a year-round basis. Excess **precipitation (> 3.00 ") or extreme conditions associated with storm events are excluded from this evaluation.** Emergency closure sampling occurred eight times in 2006 - 2008, on 4/26/06, 6/28/06, 8/30/06, 10/13/06,10/15/06, 3/9/08, 9/7/08, 12/12/08.

APC (Adverse Pollution Conditions) means samples were collected 0 - 96 hours following 0.25" of precipitation or greater, on an outgoing tide.

Systematic Random Sampling (SRS) means that samples are collected on an outgoing tide, and that sample scheduling is done sufficiently far in advance to support the premise that collection is random with respect to environmental conditions such as rainfall, wind, etc. This growing area is affected by randomly occurring, intermittent events (stormwater runoff after rainfall) and is not impacted by discharges from sewage treatment facilities or combined sewer overflows. Therefore, Systematic Random Sampling (SRS) can be used for the area. A minimum of six (6) sets of samples per station must be collected each year under the SRS method, and data analysis must be performed using a minimum of the last thirty (30) sets of water quality data. At least fifteen (15) sets of SRS data must be included in the analysis, combined with no more than fifteen (15) sets of the most recently collected sets of APC water quality data. During the transition period of changing from APC to SRS sampling, the oldest APC data will be removed from the data set being evaluated as new SRS sampling data are added. SRS sampling of Great South Bay - Patchogue began in January 1997. In most cases, data are analyzed using SRS data.

The entire bay was sample thirty nine (39) times from January 2006 through December 2008 and eleven (11) times in 2008. This meets NSSP requirements of sampling the area a minimum of six times per year, under SRS conditions.

The north side seasonal area around Station U ans Station 24 which are open December 15 - April 30, were also sampled nine (9) times and seven (7) times respectively, in 2008 during the open season. This meets NSSP requirements of

sampling the area a minimum of once per month when it is open for harvesting.

The marina areas on the south side of the bay, which are open October 1 - May 14, were sampled six (6) times in 2008 during the open season. This exceeds NSSP requirements of sampling the area a minimum of three times per year, when it is open for harvesting.

The 2005 - 2006 Conditional Harvesting Program ran from January 17 through March 31, 2006, during periods of no more than 0.25 inches of rainfall within the previous 24 hours. It was open for 44 out of a possible 74 days (59%). The area was sampled five (5) times from January through March, 2006. This exceeds NSSP requirements of sampling the area once per month when it is open for harvesting.

The 2006 - 2007 Conditional Harvesting program ran from January 17 through March 31, 2007, in the same area, and under the same rainfall conditions as the 2005 - 2006 program. It was open for 30 out of a possible 74 days (41%). The area was sampled three (3) times from January through March, 2007. This meets NSSP requirements of sampling the area once per month when it is open for harvesting. The conditional program for 2008 was suspended by the Town of Brookhaven in February and the DEC has not run any conditional programs since April 2008.

Total coliform has, in the past, been chosen as the primary criteria for evaluating bacteriological water quality in Shellfish Land #6. However, the NYS DEC microbiology lab began performing fecal coliform assays exclusively, via the M-A1 method, as of February 2003. **Therefore, this and all future evaluations must be made using fecal coliform as the primary criteria for evaluations of bacteriological water quality.** Also, in January, 2006, the lab began analyzing samples for fecal coliform bacteria, using the MA-1 method on Thursdays, Fridays, and weekends, but using the LST/EC method on Mondays, Tuesdays, and Wednesdays. As of April 2007, the lab began analyzing water samples using the M-A1 method, exclusively. It should also be noted that, due to staffing shortages, the lab was not performing fecal coliform examinations from June 1998 through January 2001, and was only performing total coliform examinations, so there may be gaps in the fecal coliform database.

CHARTS AND TABLES

The following tables summarize bacteriological water quality at stations located in Shellfish Land # 6.

- Great South Bay - Patchogue Bay. Water Sampling Stations and Classification (2 Charts).
- Year Round SRS Fecal Coliform Evaluation of all Stations, Raw Data, and Chart.
- Year Round SRS Fecal Coliform Evaluation of the last 30 Sets of Data From Station 24, Including data from Great South Bay - Nicoll Bay.
- December - May SRS Fecal Coliform Evaluation of the North Side

Seasonal Area, and Raw Data.

- September - May SRS Fecal Coliform Evaluation of South Side Marina Areas, and Raw Data.
- Rainfall Data for this Analysis

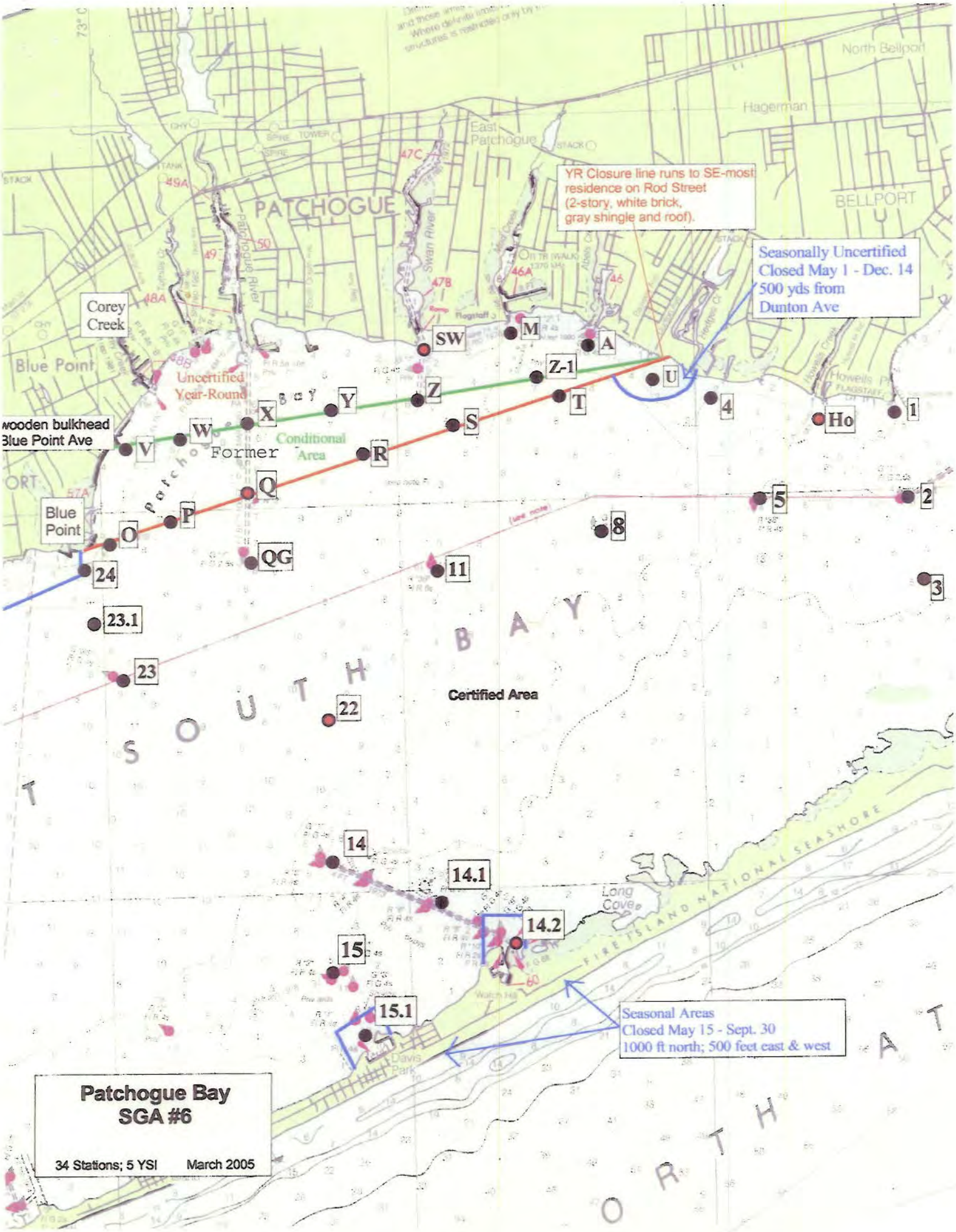
CONCLUSIONS AND RECOMMENDATIONS

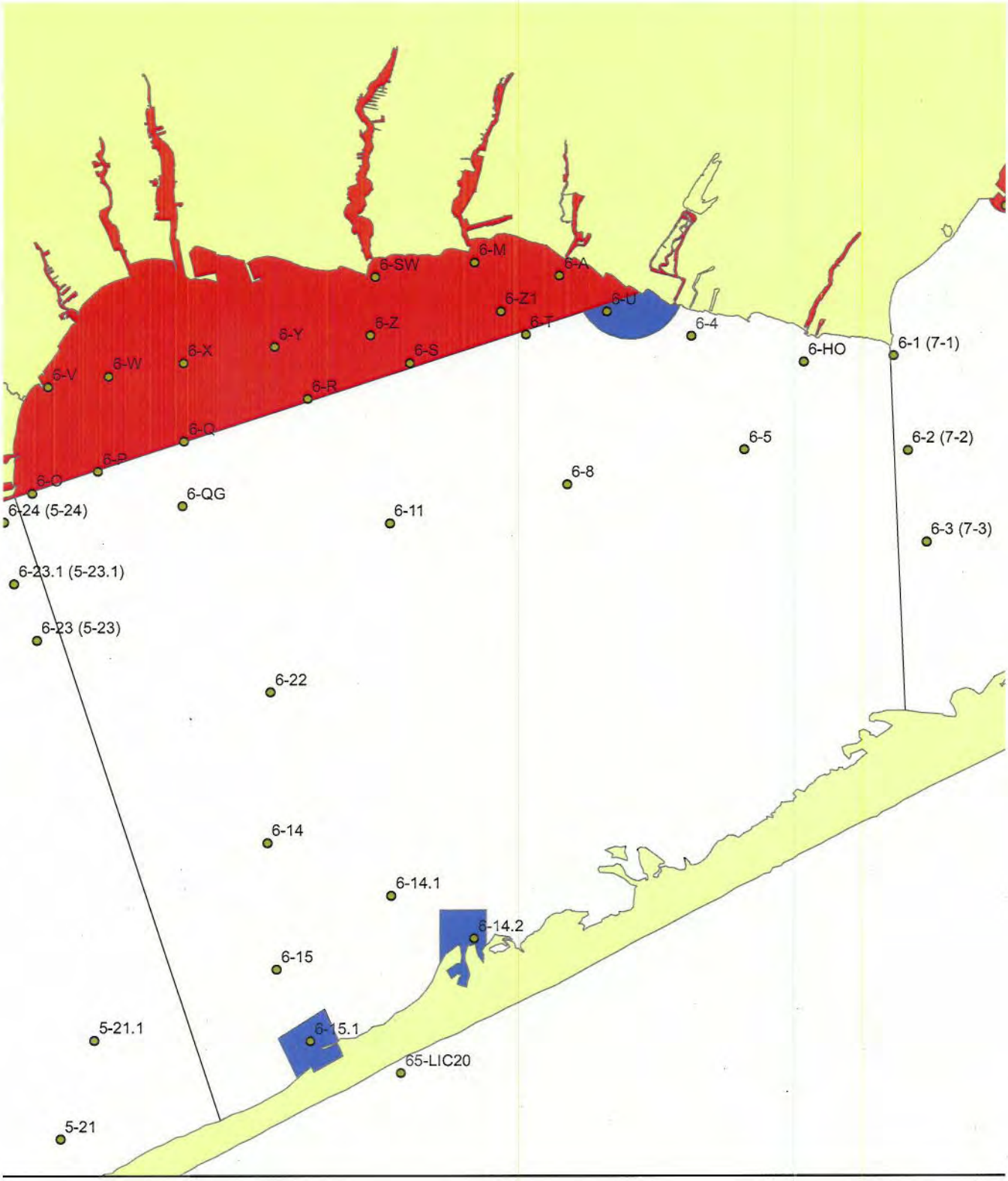
Year Round Certified Areas. Most stations in the certified portion of Shellfish Land #6 - Great South Bay - Patchogue meet fecal coliform criteria year round with the exception of Station 1. This area is shared by Shellfish Land #7, Bellport Bay and meets fecal coliform criteria in this area on a borderline level. These areas are correctly classified and no changes are recommended at this time, however Station 1 needs to be monitored.

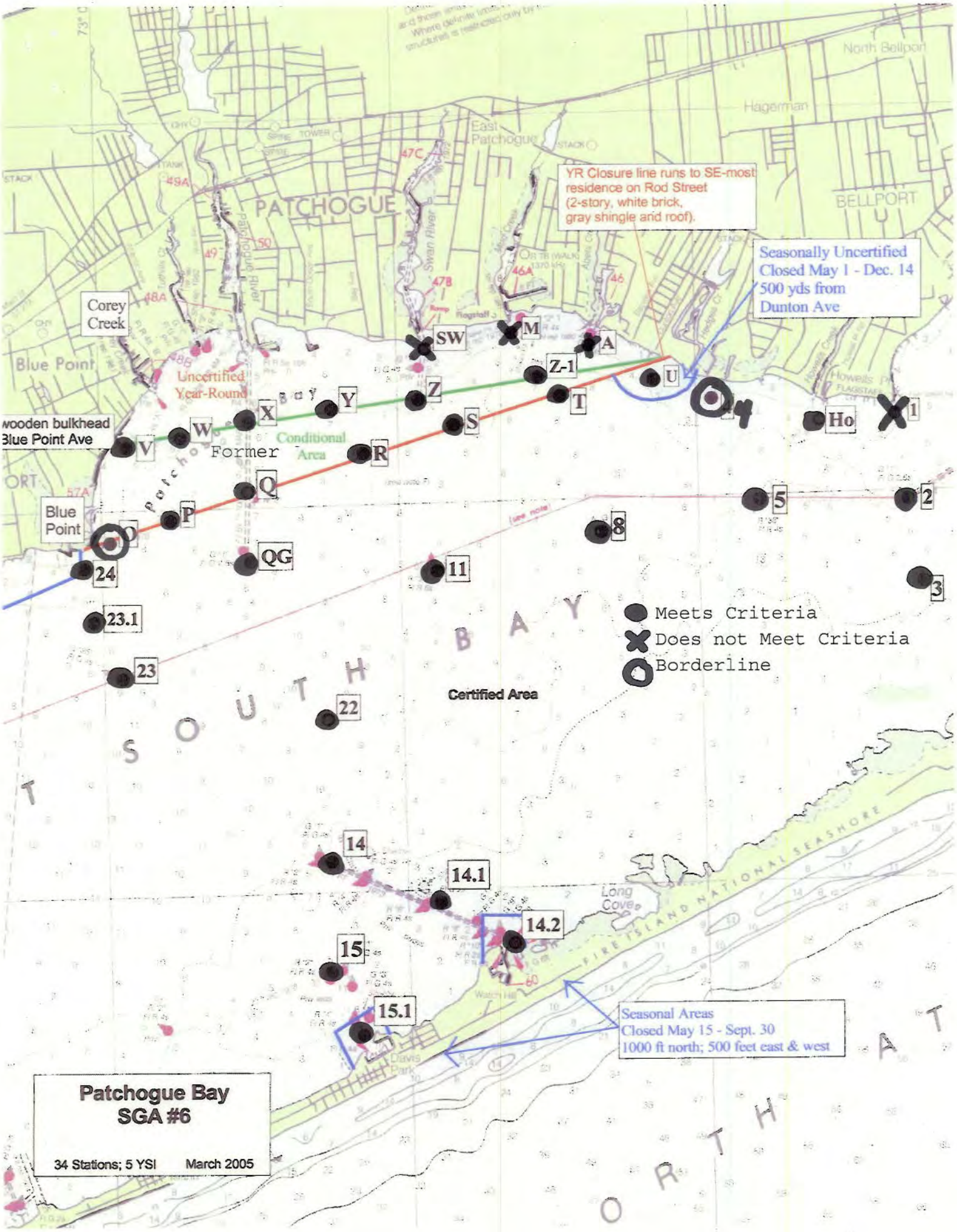
North Side Seasonally Certified Area. Station U is open for harvesting December 15 through April 30. It meets fecal coliform criteria from December through mid-May. It also meets fecal coliform criteria year-round. However, five out of the last sampling runs (71%) collected in 2007 were performed under conditions of < 0.25 inches of rain within the previous 0-96 hours (i.e., relative drought conditions). It may be possible to open this area year-round, if it continues to meet fecal coliform criteria under APC conditions. Station 24, on the border of the seasonally certified area of Nicoll Bay, nearly fails to meet criteria when only using data from Patchogue sampling runs. The area is correctly classified, and no changes in classification are recommended at this time, however this station needs to be monitored.

Seasonal Marina Areas. The seasonal marina areas on the south side of the bay, which are open October 1 through May 14, meet fecal coliform criteria from mid-September through mid-May. The area is correctly classified, and no changes are recommended at this time.

Uncertified Areas. Stations O, P, Q, R, S &T meets fecal coliform criteria for certification year round. Stations V, W, X, Y, Z & Z-1 also meet fecal coliform criteria year round. Therefore, it is recommended that the closure line be relocated to the border of the former conditional area located along a line following stations V, W, X, Y, Z & Z-1. Three new stations are recommended to be located at Corey Creek, Tuthill Creek, and Patchogue River to ensure that water quality data is effectively monitored.


Patchogue Bay
SGA #6
34 Stations; 5 YSI March 2005
YR Closure line runs to SE-most residence on Rod Street (2-story, white brick, gray shingle and roof).
Seasonally Uncertified Closed May 1 - Dec. 14 500 yds from Dunton Ave
Seasonal Areas Closed May 15 - Sept. 30 1000 ft north; 500 feet east & west
Certified Area
Conditional Area
Uncertified Year-Round
Former
wooden bulkhead Blue Point Ave
Corey Creek
Blue Point
PATCHOGUE
East Patchogue
Hagerman
North Bellport
BELLPORT
Swan River
Patchogue River
Patchogue Bay
SOUTH BAY
NORTH
Long Cove
Davis Park
FIRE ISLAND NATIONAL SEASHORE
SW
M
A
Z-1
U
Z
Y
X
W
V
T
S
R
Q
P
O
QG
4
Ho
1
5
2
8
11
3
24
23.1
23
22
14
14.1
14.2
15
15.1


6-SW
6-M
6-A
6-Z1
6-U
6-T
6-4
6-HO
6-1 (7-1)
6-Y
6-Z
6-X
6-S
6-W
6-V
6-R
6-Q
6-P
6-O
6-5
6-2 (7-2)
6-8
6-QG
6-24 (5-24)
6-11
6-3 (7-3)
6-23.1 (5-23.1)
6-23 (5-23)
6-22
6-14
6-14.1
6-14.2
6-15
5-21.1
6-15.1
65-LIC20
5-21


Patchogue Bay
SGA #6
34 Stations; 5 YSI March 2005
PATCHOGUE
BELLPORT
Hagerman
North Bellport
East Patchogue
Blue Point
Corey Creek
Patchogue River
Swan River
Howells Pt
Long Cove
Davis Park
FIRE ISLAND NATIONAL SEASHORE
SOUTH BAY
NORTH
Patchogue Bay
Certified Area
Conditional Area
Former
Uncertified Year-Round
YR Closure line runs to SE-most residence on Rod Street (2-story, white brick, gray shingle and roof).
Seasonally Uncertified Closed May 1 - Dec. 14 500 yds from Dunton Ave
Seasonal Areas Closed May 15 - Sept. 30 1000 ft north; 500 feet east & west
wooden bulkhead Blue Point Ave
Blue Point
Meets Criteria
Does not Meet Criteria
Borderline
SW
M
A
Z-1
U
Z
Y
X
W
V
T
S
R
Q
QG
P
O
24
23.1
23
22
11
8
5
2
3
1
Ho
14
14.1
14.2
15
15.1

Seasonal Analysis 2 - Area 6 - Patchogue

DATE	FC_14_2	FC_15_1
3/14/2003	9.0	4.0
3/26/2003	2.9	4.0
4/10/2003	2.9	4.0
4/28/2003	2.9	2.9
9/25/2003	2.9	4.0
11/10/2003	23.0	4.0
3/1/2004	2.9	2.9
4/12/2004	2.9	2.9
5/6/2004	2.9	2.9
5/17/2004	2.9	4.0
9/14/2004	2.9	9.1
3/7/2005		2.9
5/6/2005	2.9	9.1
5/17/2005	7.3	2.9
10/18/2005	9.1	3.6
11/28/2005	2.9	2.9
1/25/2006	2.9	2.9
3/28/2006	2.9	2.9
4/27/2006	2.9	2.9
11/29/2006	2.9	3.6
12/19/2006	3.6	3.6
1/4/2007	3.6	2.9
4/25/2007	7.2	3.0
9/6/2007	93.0	3.6
9/24/2007	3.6	9.1
10/25/2007	93.0	240.0
11/20/2007	3.6	2.9
12/20/2007	3.6	2.9
2/21/2008	2.9	2.9
3/18/2008	2.9	2.9
4/15/2008	2.9	3.6
5/15/2008	3.6	2.9
9/11/2008	3.6	2.9
11/7/2008	23.0	23.0
1/6/2009	2.9	2.9
4/1/2009	2.9	2.9

DATE	FC_14_2	FC_15_1
N	35.0	36.0
Geo Mean	4.7	4.2
90%	18.2	14.2
Status	S:5/15-9/3(	S:5/15-9/30

Seasonal Analysis 1 - Area 6 - Patchogue

DATE	FC_U	FC_24
3/14/2003	9.0	7.0
3/26/2003	2.9	
4/10/2003	9.0	
4/28/2003	2.9	2.9
12/2/2003	3.0	
1/6/2004	9.0	
3/1/2004	2.9	2.9
4/12/2004	2.9	2.9
4/14/2004	2.9	
4/16/2004	2.9	2.9
5/6/2004	4.0	
12/13/2004	23.0	43.0
2/24/2005	2.9	
3/7/2005	2.9	
4/21/2005	3.0	
5/6/2005	2.9	2.9
5/17/2005	2.9	2.9
12/27/2005	23.0	
1/25/2006	2.9	3.6
2/23/2006	2.9	
3/1/2006	2.9	
3/13/2006	2.9	
3/28/2006	2.9	2.9
4/27/2006	2.9	9.1
12/4/2006	23.0	
12/19/2006	2.9	2.9
1/4/2007	2.9	15.0
3/14/2007	3.6	
3/29/2007	2.9	
4/25/2007	2.9	2.9
12/20/2007	2.9	15.0
1/6/2008	3.6	11.0
2/21/2008	2.9	2.9
3/18/2008	2.9	2.9
4/15/2008	2.9	3.6
5/15/2008	9.1	43.0
12/16/2008	15.0	
1/6/2009	2.9	3.6
4/1/2009	2.9	3.6
4/8/2009	2.9	

DATE	FC_U	FC_24
N	39.0	22.0
Geo Mean	4.0	5.2
90%	11.4	20.0
Status	S:5/1-1:	S:5/1-12/14

ENV DATA - Area 6 - Patchogue

DATE	R0_24	R24_4	R48_7	R72_9	TIDE	APC
3/13/2003	0.00	0.00	0.00	0.00	ME	N
3/14/2003	0.00	0.00	0.00	0.00	ME	n
3/26/2003	0.00	0.00	0.00	0.00	LE	n
4/10/2003	0.48	0.01	0.00	0.00	ME	y
4/28/2003	0.00	0.78	0.34	0.00	HE	y
6/3/2003	0.00	0.20	3.28	0.00	LF	xs
6/5/2003	0.88	1.64	0.00	0.20	LE-LF	xs
6/7/2003	0.00	0.00	0.88	1.64	LE	xs
6/26/2003	0.00	0.00	0.00	0.10	HME	n
8/12/2003	0.00	0.02	0.26	0.06	HE	y
9/25/2003	0.00	0.87	0.00	0.00	HE	y
11/10/2003	0.00	0.00	0.00	0.34	HE	y
12/2/2003	0.00	0.00	0.00	0.11	ME	n
1/6/2004	0.33	0.30	0.00	0.00	HME	y
3/1/2004	0.00	0.00	0.00	0.00	ME	y
4/12/2004	0.09	0.00	0.00	0.13	ME	n
4/14/2004	2.26	1.84	0.09	0.00	ME	xs
4/16/2004	0.06	0.13	2.26	1.84	HE	xs
5/6/2004	0.00	0.00	0.72	0.09	HE	y
5/11/2004	0.65	0.00	0.00	0.00	ME	y
5/17/2004	0.00	0.03	0.00	0.01	ME	n
7/8/2004	0.00	0.03	0.00	0.01	ME	n
7/13/2004	1.10	0.00	0.00	0.00	HME	y
8/26/2004	0.00	0.00	0.00	0.00	ME	n
9/14/2004	0.00	0.00	0.00	0.00	HME	n
10/1/2004	0.00	0.10	3.91	0.00	L	xs
10/4/2004	0.00	0.10	0.00	0.00	LE	xs
10/7/2004	0.00	0.00	0.00	0.00	ME	n
11/19/2004	0.00	0.00	0.00	0.00	ME	n
12/13/2004	0.00	0.02	0.32	0.53	HME	y
2/24/2005	0.00	0.00	0.11	0.00	HE	n
3/7/2005	0.00	0.00	0.00	0.00	ME	n
3/8/2005	0.10	0.00	0.00	0.00	ME	n
4/21/2005	0.00	0.00	0.00	0.00	ME	n
5/6/2005	0.00	0.00	0.00	0.10	HME	n
5/17/2005	0.00	0.00	0.01	0.00	ME	n
6/14/2005	0.00	0.00	0.00	0.00	MLE	n
8/29/2005	0.00	0.00	0.00	0.00	ME	n
10/18/2005	0.00	0.00	0.04	10.04	FLOOI	xs
10/20/2005	0.00	0.00	0.00	0.00	FLOOI	n
11/28/2005	0.00	0.00	0.00	0.03	ME	n
12/8/2005	0.00	0.00	0.00	0.19	LE	n
12/27/2005	0.06	0.63	0.00	0.00	ME	y
1/25/2006	0.11	0.25	0.52	0.00	ME	y
2/23/2006	0.04	0.00	0.00	0.00	ME	n
3/1/2006	0.00	0.00	0.00	0.00	HE	n
3/13/2006	0.44	0.01	0.00	0.00	ME	y
3/28/2006	0.00	0.01	0.01	0.00	ME	y
4/26/2006	0.04	0.03	2.28	3.12	E	xs
4/27/2006	0.00	0.04	0.03	2.28	E	xs
6/22/2006	0.00	0.00	0.00	0.00	E	n
6/28/2006	0.16	0.00	0.26	1.00	R	y
7/20/2006	0.00	0.86	0.00	0.00	E	y
7/26/2006	0.00	0.00	0.00	0.07	ME	n
8/30/2006	0.63	0.19	2.69	0.05	LF	xs
9/7/2006	0.00	0.47	0.00	0.00	ME	n
10/13/2006	0.00	1.70	0.00	0.00	ME	y
10/15/2006	0.00	0.00	0.00	1.70	ME	y
11/29/2006	0.00	0.00	0.03	0.00	LE	n
12/4/2006	0.05	0.00	0.08	0.13	ME	n
12/19/2006	0.00	0.00	0.00	0.00	ME	n
1/4/2007	0.00	0.00	0.81	0.57	ME	y
3/14/2007	0.00	0.00	0.00	0.18	ME	n
3/29/2007	0.00	0.00	0.01	0.00	ME	n
4/25/2007	0.00	0.00	0.00	0.00	ME	n
5/14/2007	0.00	0.08	0.07	0.07	ME	n
7/24/2007	1.08	0.01	0.00	0.00	ME	y
9/6/2007	0.00	0.00	0.00	0.00	ME	n
9/24/2007	0.00	0.00	0.00	0.00	MR	n
10/25/2007	0.25	0.03	0.00	0.00	ME	n
11/20/2007	0.01	0.00	0.00	0.00	ME	n
12/20/2007	0.09	0.00	0.00	0.39	ME	n
1/16/2008	0.00	0.02	0.36	0.00	LE	y
2/21/2008	0.00	0.00	0.24	0.18	ME	n
3/10/2008	0.00	0.68	2.76	0.00	HE	xs
3/18/2008	0.00	0.00	0.00	0.29	ME	y
4/15/2008	0.00	0.00	0.01	0.43	ME	y
5/15/2008	0.00	0.00	0.10	0.00	ME	n
6/13/2008	0.00	0.00	0.00	0.00	LE	n
7/15/2008		0.00	0.00	0.00	HE	n
9/11/2008	0.43	0.00	0.00	0.00	ME	y
11/7/2008	0.06	0.31	0.00	0.00	ME	y
12/16/2008	0.10	0.52	0.00	0.00	FLOOI	y
1/6/2009	0.00	0.75	0.96	0.00	E	y
2/25/2009	0.00	0.00	0.00	0.21	E	n
3/31/2009	0.00	0.22	0.67	0.09	LE	y
4/1/2009	0.00	0.00	0.22	0.67	LE	y

Bureau of Marine Resources
Shellfish Growing Area
Classification Unit

Sanitary Survey
SGA 6 – Patchogue Bay
2009-2011

Gina Fanelli
Biologist 1 (Marine)
Month Year

New York State Department of Environmental Conservation
Division of Fish, Wildlife & Marine Resources
Shellfisheries – Growing Area Classification Unit
205 North Belle Meade Rd, Suite 1
East Setauket, New York 11733
Phone: (631) 444-0479 FAX: (631) 444-0472
Website: www.dec.state.ny.us

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Introduction

The NSSP Model Ordinance requires that the sanitary survey of each growing area that is not classified as prohibited be updated periodically. Every three years the growing area classification and the supporting data must be re-evaluated to adjust for and reflect any changes in the sanitary condition of the growing area.

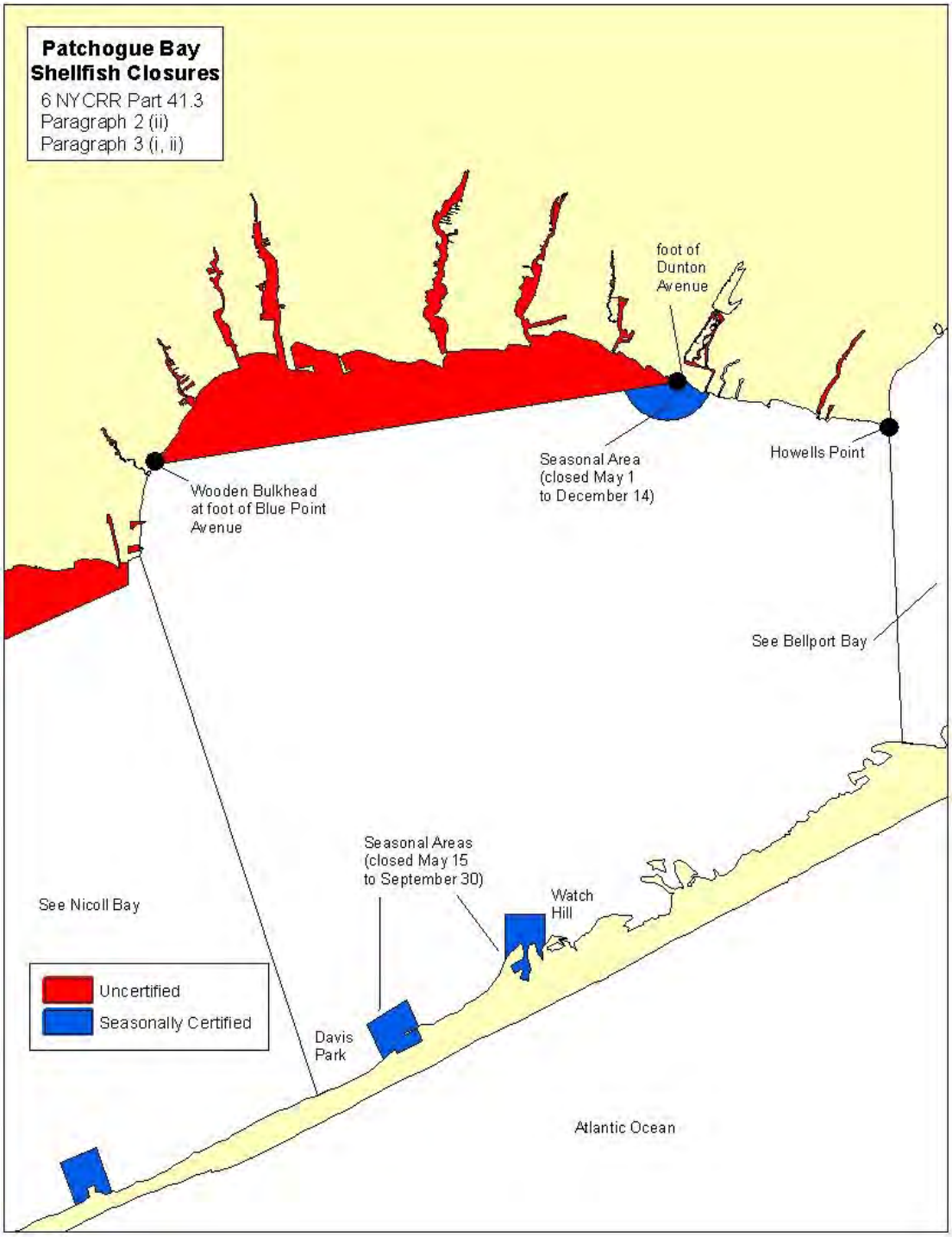
The triennial evaluation must include:

- a review of water quality samples
- documentation of any new pollution sources and an evaluation of their effect on the growing area
- a re-evaluation of all pollution sources, including sources previously identified
- a comprehensive report and analysis of sanitary survey data with a determination of whether or not the existing growing area classifications are correct or need revision.

This triennial evaluation provides a review of the data and information collected from 2009 to 2011 in Patchogue Bay (SGA #6) in compliance with the NSSP triennial evaluation requirements.

Shoreline Survey January 1, 2013

Area Description



Patchogue Bay is located on the south shore of Long Island and is a natural cove of Great South Bay between Blue Point to the west and Howells Point to the east. All of Patchogue Bay is located within the Township of Brookhaven in Suffolk County; the Town has management authority over the shellfish

resource within the area. The total area of Patchogue Bay is approximately 10087 acres of which 983 acres are closed to shellfish harvesting year-round. This growing area is affected by semi-diurnal tides with a range of approximately one foot. Water sampling stations have been established near potential pollution sources (e.g. tributary creeks) and throughout Patchogue Bay for routine water quality monitoring purposes. The shoreline frontage along Patchogue Bay is approximately 15 miles long, 90% of which now supports or is zoned for single family dwellings while approximately 10% is currently being utilized for commercial purposes, marinas or restaurants, or for multifamily housing such as condominiums and town houses. Smaller areas of tidal wetlands are scattered along the northern shoreline of the Bay. The barrier island portion of the Patchogue Bay growing area is comprised primarily of sandy beach and tidal wetlands with the exception of the marina areas at Davis Park and Watch Hill. Tidal wetlands provide refuge for populations of domestic and migratory waterfowl and other wildlife. Stormwater drains and inclined road ends are located intermittently along the shoreline and in tributaries of Patchogue Bay. There are 11 streams tributary to Patchogue Bay. Each of these streams can be considered a "point source" of non-point source runoff to Patchogue Bay. This area is low lying and gently sloping, with most residences and buildings <100' from the shoreline. The shoreline elevations are between 0 and 5' (reference: Bay Shore East, NY USGS, 1967). This indicates that storm water runoff will gradually reach the bay, in absence of impervious surfaces and storm drains.

The NYSDEC Division of Water, Atlantic Ocean Waterbody Inventory and Priority Waterbodies List, identifies this section of the Great South Bay as an impacted segment, impaired for shellfish and stressed for fish consumption, public bathing and recreation due to pathogens, PCB's, urban runoff and other possible sources including the Patchogue WWTP. This list includes East Great South Bay, Patchogue Bay, tributaries, Mud Creek, Swan River, and the Patchogue River. (See Appendix A)

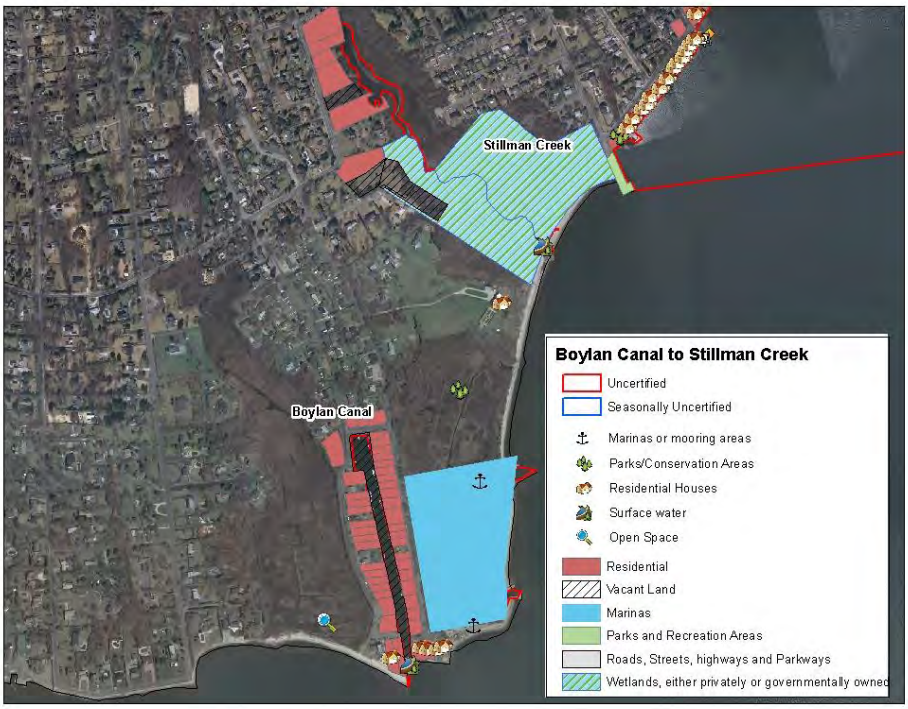
This area has also been classified a Significant Coastal Wildlife Habitat (SCFWH). To designate a SCFWH, the New York State Department of Environmental Conservation (DEC) evaluates the significance of coastal fish and wildlife habitat areas, and following a recommendation from the DEC, the Department of State designates and maps specific areas. This area of Great South Bay is designated HU:

"Human Use (HU) – the conduct of significant, demonstrable, commercial, recreational, or educational wildlife-related human uses, either consumptive or non-consumptive, in the area or directly dependent upon the area.

HU assessment: Commercial hard clam industry of statewide significance; sportfishing of statewide significance; waterfowl hunting of county-wide significance." (See Appendix B)

The lack of point source pollution allows NYSDEC to use the SRS strategy to evaluate bacteriological water quality in this area. There are 37 sampling stations in Patchogue Bay. Three of which are shared with neighboring SGA 7 – Bellport Bay. The sampling stations are situated to assess the effects of the most significant actual and potential pollution sources along the shoreline. Other mid-bay stations are used to monitor water quality farther away from the shoreline and to assess the impacts of dilution.

Boylan Canal to Stillman Creek

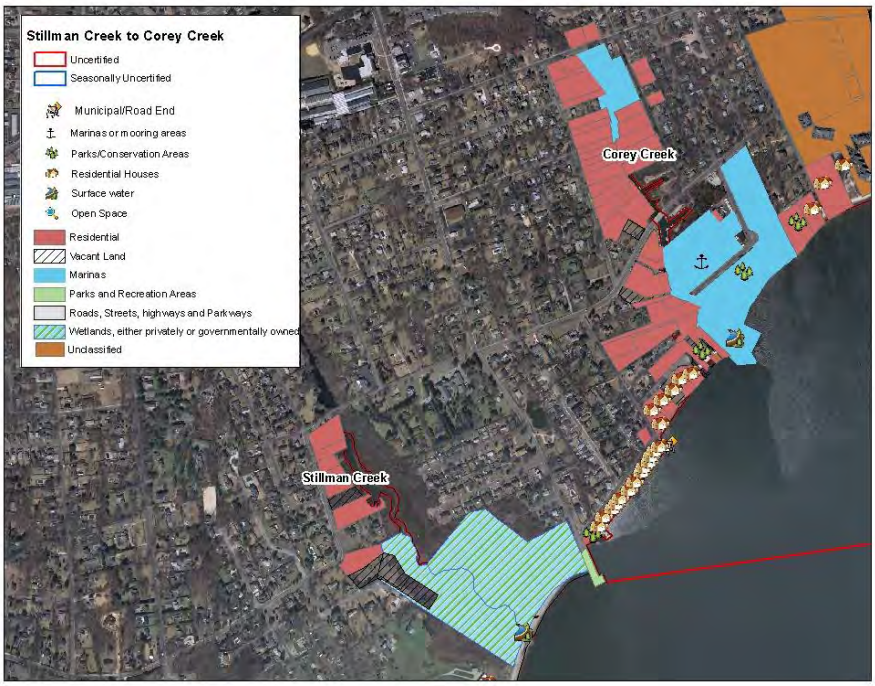


The shoreline contains relatively few residential structures with all but one being located just east of Boylan canal. Their sanitary systems are <50' from the shoreline. Boylan Canal is bulkheaded along its entire length and receives non-point source runoff from adjacent residential areas along with boat ramp parking areas. Two drainage pipes discharge into the canal through the bulkhead. Sampling stations 24 and 23.1monitor the water quality in this location. There are two marinas, Tabats (top left) and Sayville Yacht Club (below left).

Seven pipes receive overflow from Tabat's parking lot and boat storage area and discharge into their marine basin. Sampling stations O and 24 moniter the water quality in this location. East of the Sayville Yacht Club the shoreline is sandy beach with a recreational pier. Two large wetland areas exist behind the beach.

Behind Stillman Creek (left) are state-owned wetlands that extend north beyond Middle Road and drain into Patchogue Bay during flood events. There are numerous drains and outfalls that drain into Stillman Creek. The shoreline of the creek is largely vegetated.

Stillman Creek to Corey Creek



The eastern side of Stillman Creek to the Blue Point Ave. pier is a state conservation area consisting of both fresh and tidal wetlands. There is sandy beach and vegetated dune areas. There is a town park at the end of Blue Point Ave. on the bay. It has a bulkheaded paved parking lot and restrooms at the beach (left). There are two pipes through the bulkhead that drain the parking area.

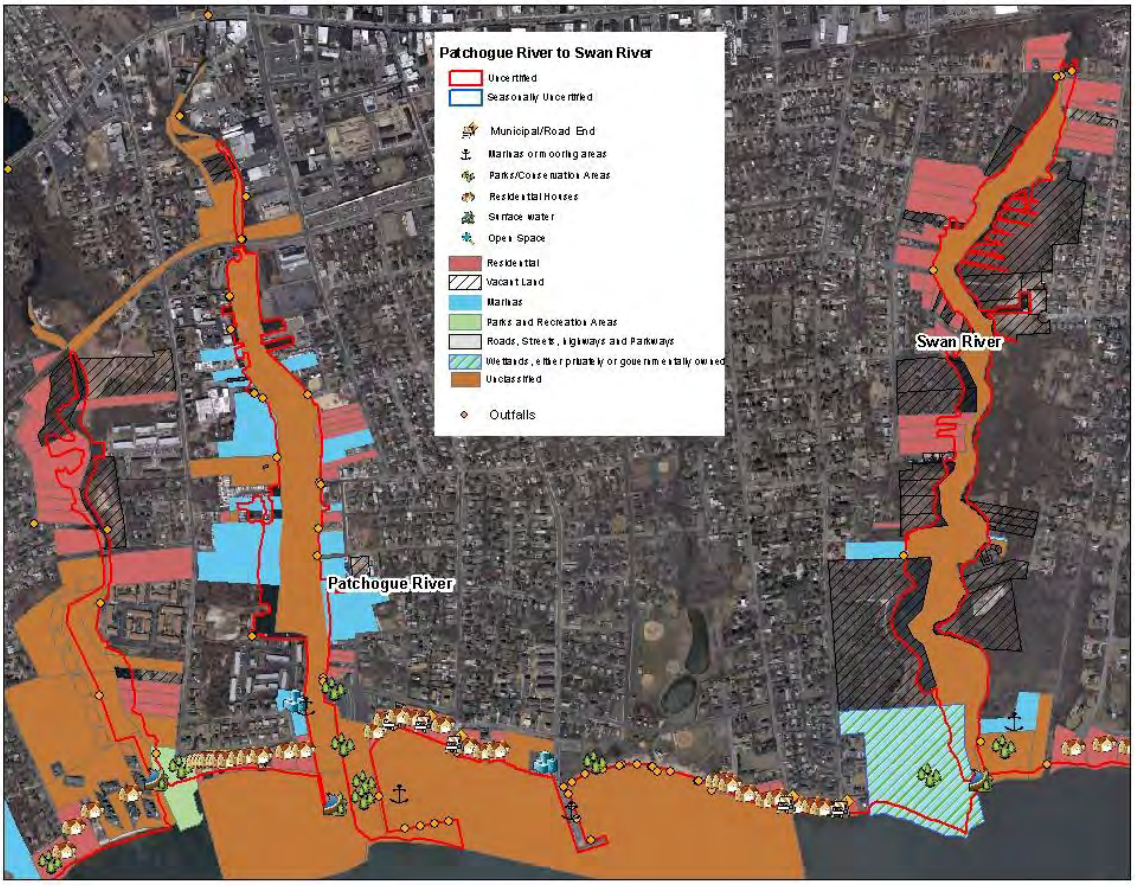
Along the shoreline to the east is a residential area, bulkheaded with two outfalls that drain the road runoff from Grandview Ave. To the north of Grandview Ave. is a small freshwater wetland area that drains through a culvert into the bay. Sampling station V is used to monitor this area.

Corey Creek to Patchogue River

In this section there are three major tributaries that are all uncertified to the harvest of shellfish year round. Stations D and C were created to monitor the water quality of the mouths of these creeks due to the recent reclassification of the former conditional area. Stations W and X are on the border of the certified area.

The shoreline of this area is relatively natural between Corey and Tuthills Creek with Corey beach (left), Sandspit Town Park. Sandspit Town Park has a beach, marina, concession stands, restaurant, restrooms and parking areas. To the east is a condominium complex on the west side of Tuthills Creek. Between Tuthills and the Patchogue river are a few residential homes and some vacant lots. All three creeks are a mixture of bulkheading and vegetation and have several pipes that discharge into them.

Patchogue River to Swan River



This area is a mixture of residential and commercial structures. There are 25 storm drain pipes that discharge into the bay. During the survey it was observed that many of the catch basins in this area were plugged and full of water after several storm events. There is a village pool and beach of the water and two marinas.

There is a shorefront park (below) with ballfields and restrooms. The bulkhead here has several weepholes and is in need of repair. There is a sewage treatment plant that discharges into the Patchogue River. (SPDES NY-0023922) is located on Hammond Street. It's outfall discharges 325000 gpd into the river. There is second smaller STP located at Fairfield on the Bay that discharges 17000 gpd. NYSDEC and the Suffolk County Health Department monitor the discharges from these STP's. The west side of the Swan river is a large open area with a sandy lot and some wetland vegetation.

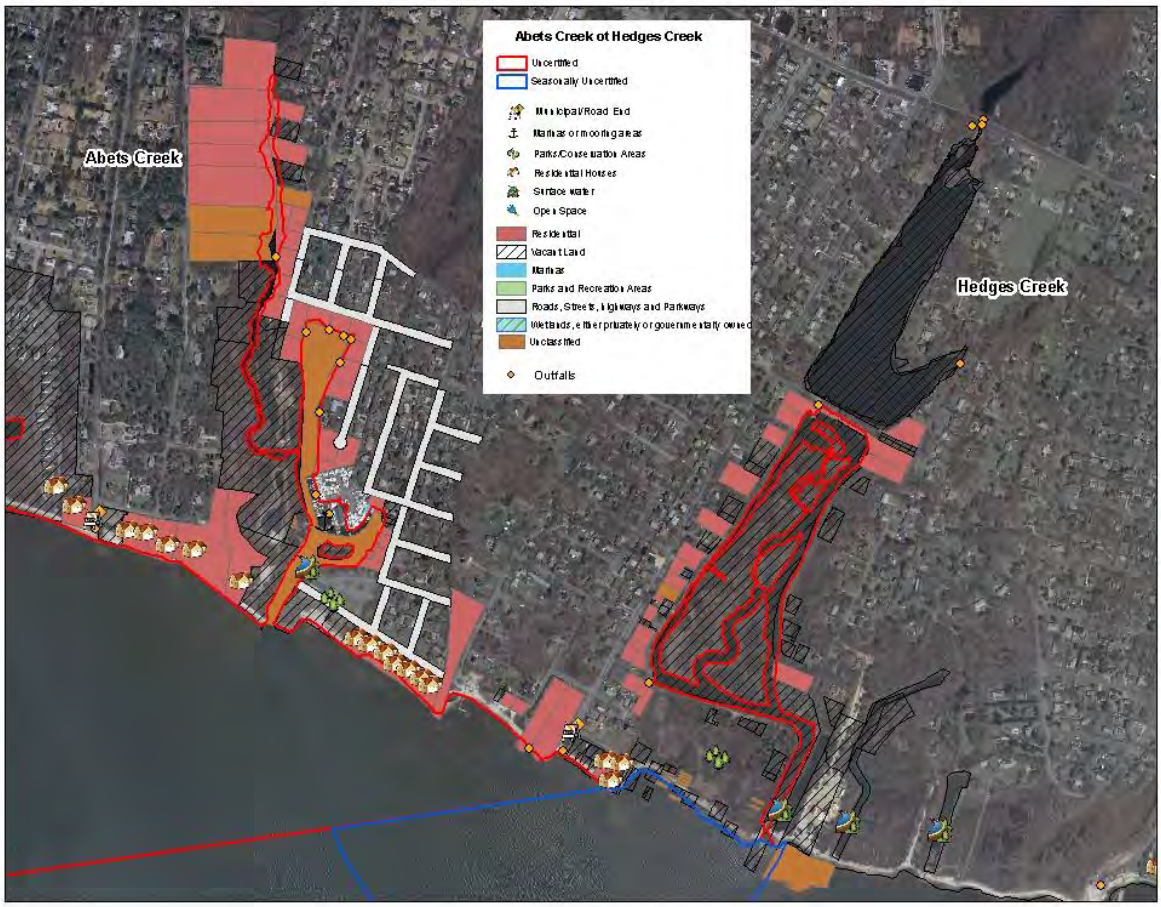
Swan River to Abets Creek

The shoreline around these three creeks (Swan (left), Mud, Abets) is largely residential, and relatively natural with surrounding wetlands. There are many outfalls that discharge stormwater into the creeks. Stations SW, B, M and A monitor the water quality for these three tributaries. There is a town marina, homes, and a yacht club between Swan River and Mud Creek. There is one outfall in this stretch of shoreline. The shoreline of these creeks is largely vegetated wetland.

Mud Creek's east side (left) has a large marina recreation area called Aquamarina Sunset Harbor. This facility has a service department, store, pool, tiki bar, lounge, restrooms with showers, playground, picnic area and parking lot. There are three outfalls that discharge into mud creek at this location. Moving east to Abets Creek are a few more residential structures and another outfall at the road end on Salt Meadow Rd. All three tributaries extend inland a considerable distance and are likely to receiver stormwater runoff, have wildlife populations and have sanitary systems in close proximity to the waterway.

Abets Creek to Hedges Creek

Both Abets Creek and Hedges Creek are closed to shellfishing year round. Abets Creek is a mix of



natural and bulkheaded shoreline, with wetland vegetation and sandy beaches. The sparse amount of residential structures has cesspool sanitary systems. There are two storm drains that empty out into Patchogue Bay at the end of Clinton Ave. A 500' radial seasonal closure area was created around the

end of Dunton Ave., because water quality at this location is good during colder months only. Sampling Stations U and 24 were created to monitor the water quality in this location.

Hedges Creek to Howells Creek/Howells Point

The shoreline of Hedges Creek is heavily vegetated on the east side (NYS Conservation Area/Suffolk County land) and is not accessible by motorized vessel. Therefore it is less of a potential pollution source to the bay, although it is uncertified for the harvest of shellfish. There are few residential structures on the largely natural shoreline between the two creeks and one outfall at the end of Bay Rd. Along Howells Creek is the Bellport Country Club. (left) The close proximity of the country club to the Bay may result in nitrogen runoff due to fertilizers and possible coliform contamination due to waterfowl. The shoreline East of Howells Creek is almost entirely bulkheaded with private residences>50' from the shoreline. No pipes were located in this area but there are two road ends which could contribute to runoff in this area. Stations Ho and 1 were created to monitor the water quality in this area.

Fire Island National Seashore

The Barrier Island is a part of Fire Island National Seashore and is largely natural with sandy beach, dunes, wetlands and Pine Barrens. There are two seasonal villages on the seashore with marinas. Davis Park has a large ferry terminal along with shops, restaurants and seasonal residences along the shoreline of the bay. No pipes were visible in this area and none reported by the town/county. The Seasonal closure around the marina is between May 15 and September 30. Watch Hill also has a small marina and Ferry terminal, but there are no residences along the shoreline.

Pollution Source Summary

1. ***Residential*** – Populated **residential** area are potential indirect/direct sources of pollution.

   Domestic Wastes: The entire area is unsewered and served by sub-surface septic systems (cesspools) which can cause pollution to the groundwater which may eventually discharge into the bay. (potential/direct) Also, during storm events and extreme high tides these systems my flood and enter the bay through storm drains. (potential/direct) Waterfront **residential** properties may have boats which are potential direct sources of pollution if they have bathroom facilities on board. Approximately 100 residential structures were identified as potential pollution sources to Patchogue Bay.

   Stormwater: **Residential** areas also have homes, and impervious accessory structures including but not limited to driveways, patio, decks, pools and bulkheads all of which may prevent absorption and filtration of runoff before entering the bay. (potential/indirect)

2. ***Municipal*** - **Municipal** facilities are actual and potential, direct and indirect sources of pollution into the bay

   Stormwater carries non-point source pollution. The major source is on the north side of the bay from streets, road ends (potential/direct) and storm drains (actual/direct). Approximately 30 storm drains were located during this survey.

   The **municipal** facilities can have large parking areas or storage areas for trucks (potential/ indirect) and other materials such as salt, mulch and a variety of chemicals. But there were no large **municipal** storage facilities observed on the bay (potential/direct).

   There are two sewage treatment plants that discharge into the bay. (actual/direct pollution sources) Fairfield on the Bay STP and Patchogue Village STP discharge treated effluent (UV) directly into the Patchogue River.

3. ***Commercial*** – **Commercial** areas are potential indirect sources of pollution.

   Commercial areas have the same *Domestic Waste* and *Stormwater* impacts as **residential** areas during open hours of operation. They have much higher traffic during these hours, and buildings and accessory structures tend to be much larger depending on the size of the business. Many of the waterfront businesses have decks and dining areas over the water which contributes to pollution. Boat yards on the north side of the bay may be a direct source of *Industrial Wastes* to the uncertified areas.

4. ***Marinas and Mooring Areas*** – These are potential direct sources of pollution to the bay.

Most marinas are **commercial** or **municipal** and therefore have similar *Domestic Waste* and *Stormwater* impacts. Many marinas in Nicoll Bay have overnight boating and although many also have pumpout facilities, there is a potential for direct pollution from people pumping their boats out directly into the bay. (see Marina Information section) Also, many marinas in this area also do boat painting and repair which have potential/indirect pollution from chemicals. Six marinas were identified in this survey.

5. ***Surface Water*** is an actual/direct source of *stormwater* to Patchogue Bay. It is also a potential/direct source of *domestic waste* in the event of flooding.

   14 identified tributaries (two wetland drains) are actual direct sources of pollution to the bay. There are also two manmade canals that contribute to the potential and actual pollution impacts.

6. ***Parks/Golf Courses*** – Parks are a potential/indirect source of pollution from large population of wildlife including ducks, geese, shorebirds and deer to Patchogue Bay on the north and south sides. There is also a golf course that may have potential indirect impacts form fertilizer and pesticides. Many parks and golf courses have potential/indirect *stormwater and domestic waste* impacts from facilities, buildings and accessory structures, restrooms and parking areas.

7. ***Other*** – Other potential sources of pollution to Patchogue Bay include marsh and wetland areas that drain into the creeks and the bay. They are a potential/direct source of *stormwater and domestic waste* similar to surface water and also *wildlife.*

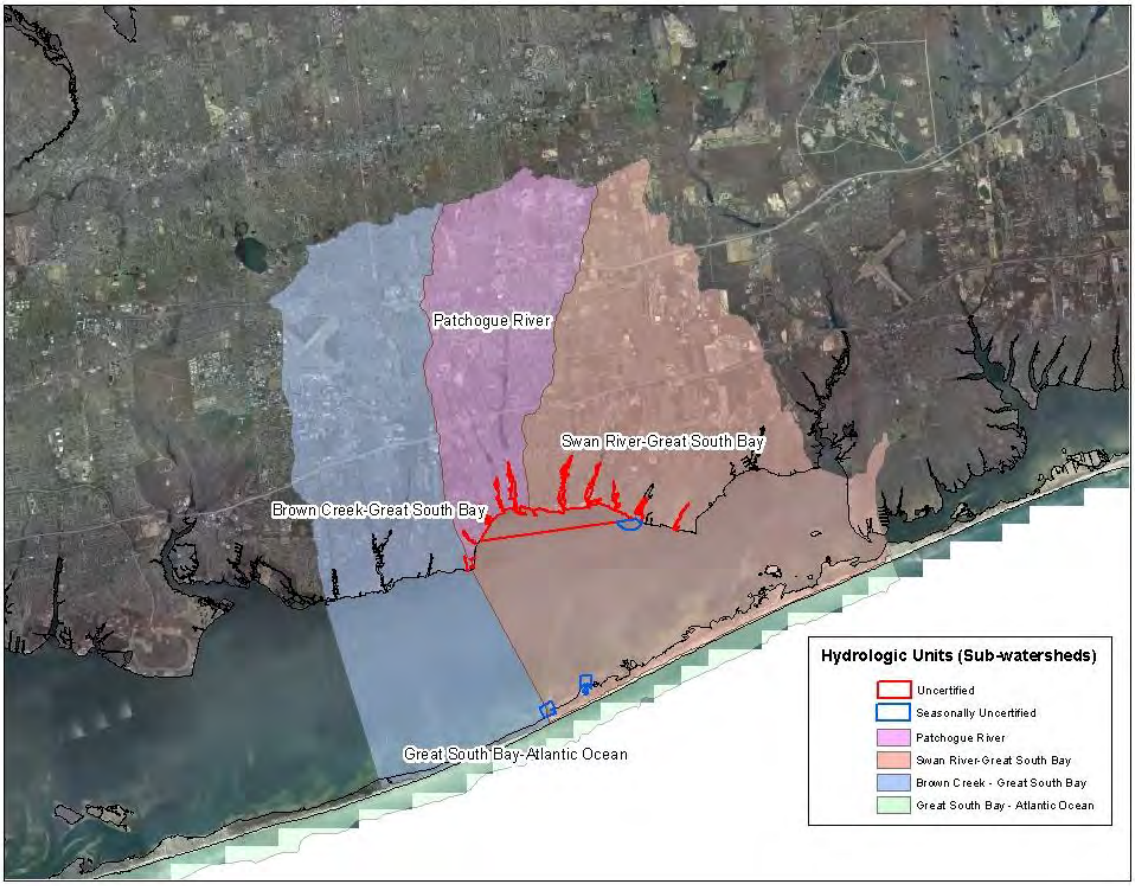
Note: The DEC in conjunction with the EPA have implemented a Municipal Stormwater (MS4) Phase 2 regulatory plan requiring all municipalities to implement stormwater management plans. The most current plans for Patchogue Village and Brookhaven Town are available online.

Hydrographic and Metrologic Characteristics

Tides – Semi-diurnal, and range from 0 - .80 feet. Excessive high tides may trigger an Emergency Closure, due to an increased potential for flooding of streets and cesspools.
Rainfall – Rainfall averages close to 45 inches per year, and is generally unseasonal in nature. (see table below) Rainfall in excess 3 inches triggers an Emergency Closure, which typically occurs 0-3 x per year.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Avg. High	35°	37°	45°	57°	67°	75°	80°	80°	72°	64°	52°	41°	(degrees Fahrenheit)
Avg. Low	21°	21°	30°	38°	48°	58°	65°	65°	60°	45°	35°	26°	
Mean	28°	30°	38°	48°	58°	67°	74°	74°	67°	55°	44°	34°	
Avg. Precip.	3.7	3.5	4.1	4.3	3.9	3.8	3.5	4.0	3.5	3.6	4.3	4.1	(inches)

Winds – are generally from the SW in the summer and NW in the winter. Strong northeast storms can generate excess high tides and precipitation which can potentially trigger an Emergency Closure.
The extent of the sub-watersheds impacting this area are shown below.



Seasonal Area Management Plan (as required by ISSC and FDA)

There are three seasonally certified harvest areas within SGA #6. Davis Park and Watch Hill are administrative marina closures and will be addressed in the Marina closure area calculation sections of this sanitary survey.

Description: The Dunton Ave. 500' radial closure is located in the northeastern portion of Patchogue Bay at the foot of the road end. This area is closed May 1st - December 14th annually.

Description of factors determining the SGA's suitability for seasonal classification: Water quality data evaluations demonstrate that water quality meets NSSP SRS fecal coliform criteria during the open months.

Description of predictable pollution events that may result in a closure : See above hydrographic and Meterologic characteristics.

Implementation of a closure:

- The seasonal area descriptions are in Part 41 of Title 6 of the Official Compilation of Rules and Regulations of the State of NY and are given to each harvester that receives a NYS diggers permit.
- In the event of an emergency closure diggers are notified via www.dec.ny.gov . They can also call the Shellfish Emergency Closure Information line at 631-444-0480. Local and DEC law enforcement is notified by the Shellfisheries Growing Area Classification Unit via phone, email and fax.

Criteria necessary for reopening after a potential pollution event ends: Shellfish GACU begins testing the area as quickly as possible after an event. An event typically will result in a closure of seven days unless water quality testing results indicate that the area can be reopened, or must remain closed.

Synopsis of effectiveness of closure procedures and inter-agency cooperation:

All other elements of a seasonal area management plan as required by the ISSC and FDA are non-applicable to this shellfish growing area. As mandated in Part 41, the seasonal area on the north side of Patchogue Bay closes on May 1 and reopens December 15 and the south side administrative closures close on May 15 and reopen October 1, annually.

Emergency closure procedures have been found to be effective and adequate for managing potential storm and other pollution events.

NYSDEC Law Enforcement, Town of Brookhaven Bay Constables and Suffolk Marine Police work cooperatively in patrolling the seasonal areas.

Marina Information

Marina	Specific Water Body	Classification
Shellfish Growing Area #6	*Great South Bay - Patchogue Bay*	
1. Bay Point Marine (fka Tabat's)	Patchogue Bay	CA
2. Sayville Yacht Club	Patchogue Bay	CA
3. Watch Hill Marina	Great South Bay	CA
4. Davis Park Marina	Great South Bay	CA
5. On the Waterfront Restaurant	Patchogue River	P
6. Town of Brookhaven Sandspit Marina	Patchogue River	P
7. Pier East	Patchogue River	P
8. Sun-Dek Marina	Patchogue River	P
9. Harbor Crab Co. (fka Steamers)	Patchogue River	P
10. Thomas Marine	Patchogue River	P
11. Frank M. Weeks Yacht Club	Patchogue River	P
12. Leeward Cove North Marina	Patchogue River	P
13. Leeward Cove South Marina	Patchogue River	P
14. Island View Marina	Patchogue River	P
15. Al's Marine Service	Patchogue River	P

10 Riverfront St.		
16. Patchogue River Marina	Patchogue River	P
17. American Boatworks, Inc.	Patchogue River	P
18. Patchogue Shores Marina	Abets Creek	P
19. White Water Marine Service, Inc.	Swan River	P
20. Morgan's Swan River Marina	Swan River	P
21. Dockside Marina 500	Mud Creek	P
22. Village of Patchogue Mascot Dock/Shorefront Park	Patchogue Bay	P
23. Brookhaven Town Dock	Corey Creek/Patch B.	P
24. Blue Point Marine, Inc.	Corey Creek	P
25. Corey Creek Park (Davis R, S. of Madison Ave)	Corey Creek	P

A = Approved (i.e., Certified)
CA = Conditionally Approved (i.e., Seasonal or Conditional)
R = Restricted (i.e., Uncertified with Transplant)
P = Prohibited (i.e., Uncertified)

Marina Closure Area Calculations

Assumptions in marina dilution calculations:

1) Basic:
   a) No more than 50% of all boats will be occupied in any given day.
   b) 75 % of all people will use shore side facilities if available.
   c) 80% of all boats with heads will have a type 3 MSD.
      i) 20% of all boats with heads will have a type 1 MSD.
   d) 25% of all boats with type 3 MSDs will use pump out facilities if available.
   e) Average of 2 people per boat.
   f) 2x10^9 fecal coliforms per person per day.

2) More:
   a) Properly operating type 1 MSD release significantly reduced FC. 1x10^3 FC/person/day.
   b) 25% of all type 1 MSDs fail on any given day, 2x10^9 FC/person/day.
   c) Marinas exposed to currents receive dilution during periods of ebb and flood tides. Conservative estimates of flow is 1/20 knot.

Davis Park Marina Closure = 11.5 Acres

number of slips with boats > 26'		256		1.)	occupancy	128	
occupancy (%)		50		2.)	MSD 3,1	102.4	25.6
within No Discharge Zone (Y, N)		Y		3.)	NDZ and		
aware and obedience NDZ (%)		25			pump outs	0	19.2
type 3 MSD (%)		80		4.)	shoreside	0	4.8
pump outs (Y, N)		Y		5.)	people	0	9.6
pump out use (%)		25					
shore side facilities (Y, N)		Y					
exposed to current (Y, N)		Y					
width of closure (meters)		152.4					
max current (knots)		0.1185					
depth of closure (feet)		3					
total coliforms discharged per day		4.8E+09					
acres needed		8.049					

The % of the greater value of NDZ % or pump out use % =

25	look up table	
lookup sum	10	0.75
1	11	0.75
10	20	1
11	21	0.75

dilution:

# hours of flow =	1.152031	
# hours per dilution		
avg flow =	36.00098	ft/hour
# hours of flow =	16	hours
# hours per dilution =	13.88851	hours

2E+09	
1E+05	

Y	N

Total coliforms:	
T3 MSD	0
T1 MSD	4.8E+09
sum	4.8E+09

acres needed	
without dilution	**9.2722**
with dilution	**8.048565**

****** Marina Closure Area Exceeds Acres Necessary**

Watch Hill Marina Closure = 11.5 Acres

number of slips with boats > 26'	188
occupancy (%)	75
within No Discharge Zone (Y, N)	Y
aware and obedience NDZ (%)	25
type 3 MSD (%)	80
pump outs (Y, N)	Y
pump out use (%)	25
shore side facilities (Y, N)	Y
exposed to current (Y, N)	Y
width of closure (meters)	152.4
max current (knots)	0.1185
depth of closure (feet)	3
total coliforms discharged per day	5.29E+09
acres needed	8.866

1.)	occupancy	141	
2.)	MSD 3,1	112.8	28.2
3.)	NDZ and		
	pump outs	0	21.15
4.)	shoreside	0	5.2875
5.)	people	0	10.575

The % of the greater value of NDZ % or pump out use % =

25 look up table

lookup		
sum	10	0.75
1	11	0.75
10	20	1
11	21	0.75

dilution:		
# hours of flow =	1.152031	
# hours per dilution		
avg flow		
=	36.00098	ft/hour
# hours of flow =	16	hours
# hours per dilution =	13.88851	hours

2E+09	
1E+05	

Y	N

Total coliforms:	
T3 MSD	0
T1 MSD	5.29E+09
sum	5.29E+09

acres needed	
without dilution	10.21391
with dilution	8.865998

****** Marina Closure Area Exceeds Acres Necessary**

Bacteriological Water Quality Sampling Method and Criteria

Sampling Method

Water quality is evaluated on a seasonal and year-round basis. Adverse Pollution Conditions (APC) mean that samples are collected on an outgoing tide following precipitation of 0.25 - 3.00 inches within 0 - 96 hours of sampling. **Excess precipitation (> 3.00 ") or extreme conditions associated with storm events are excluded from this evaluation.**

SRS sampling of Great South Bay – Patchogue Bay began in January 1997. Systematic Random Sampling (SRS) means that samples are collected on an outgoing tide, and that sample scheduling is done sufficiently far in advance to support the premise that collection is random with respect to environmental conditions such as rainfall, wind, etc. A minimum of six (6) sets of samples per station must be collected each year under the SRS method, and data analysis must be performed using a minimum of the last thirty (30) sets of water quality data. At least fifteen (15) sets of SRS data must be included in the analysis, combined with no more than fifteen (15) sets of the most recently collected sets of APC water quality data. In this SGA, data are analyzed using SRS data.

Total coliform has, in the past, been chosen as the primary criteria for the evaluation of bacteriological water quality in Shellfish Land # 5. However, the NYS DEC began measuring only fecal coliform bacteria, using the A-1 method, starting in February, 2003, due to anticipated budget cuts and

staffing shortages in the microbiology laboratory. Therefore, evaluations must be made using fecal coliform as the primary criteria, due to the absence of total coliform data. In addition, the DEC measured only total coliform bacteria from June 1998 to January 2001, so there may be gaps in the fecal coliform data.

Fecal Coliform Criteria

Median (APC) or Geometric Mean (SRS) fecal coliform MPN/100L of **14 or less**; no more than 10% of the samples at a station exceed an MPN/100mL of **49** (APC), or 90th percentile does not exceed an MPN/100mL of **49** (SRS). Stations denoted "borderline pass" have a geometric mean or median fecal coliform MPN/100mL of $\geq$ 12, and/or a 90th percentile or $\geq$ 10% of samples> 39, to indicate that, although they meet criteria, they are close to failing.

Triennial Evaluation of Bacteriological Water Quality February 2012

Summary

The last shoreline survey report was completed in August 2001 and is in progress for 2013 (Nearly complete, precedes this triennial). There were relatively few changes to the pollution sources in the area, most of the few were improvements and additions to the Patchogue Sewer District. The last triennial report was prepared in 2009 and annual reports in February 2010 and May 2011.

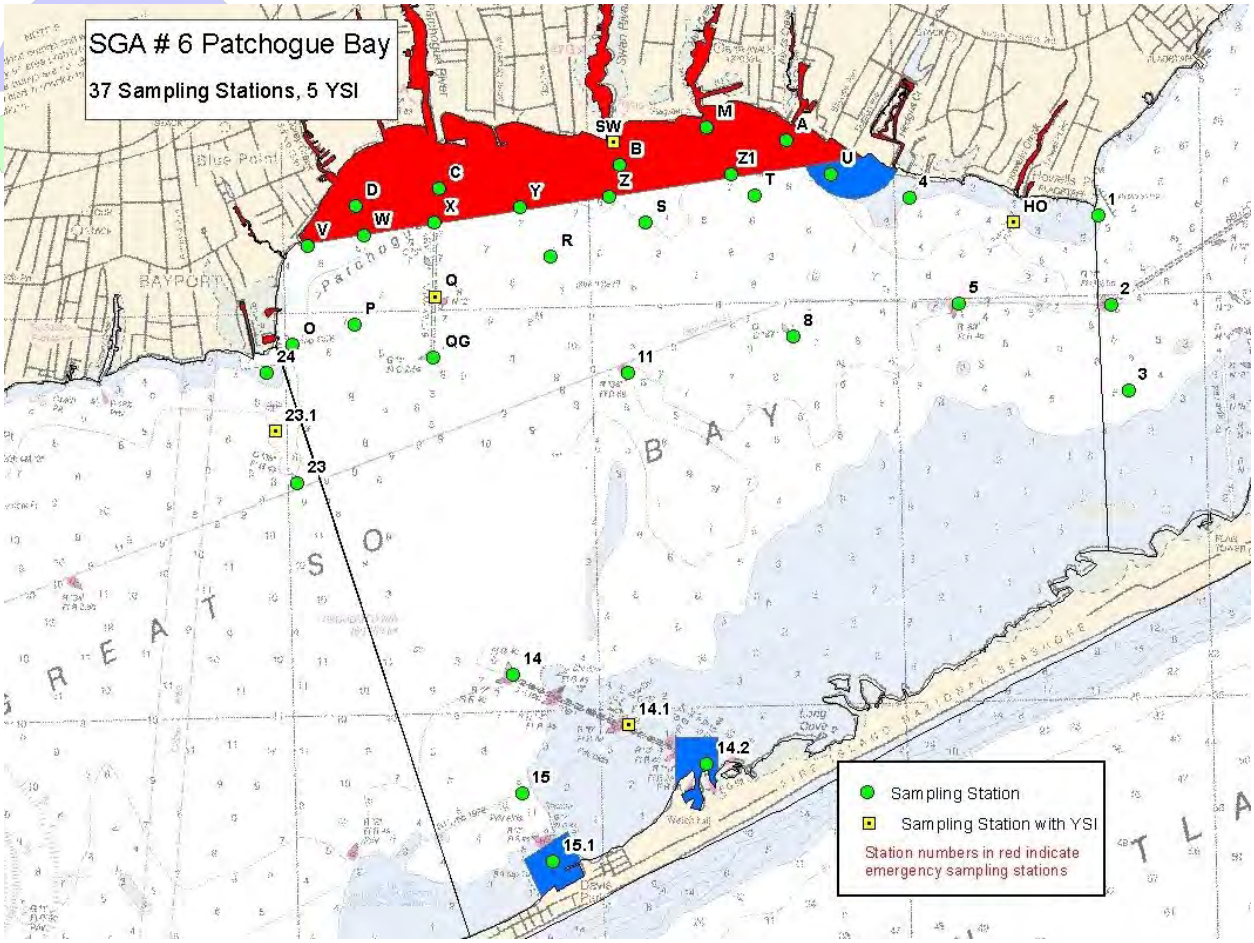
The area was sampled eleven (11) times in 2009, nine (9) times in 2010 and seven (7) times in 2011. This exceeds the Model Ordinance requirements of collecting a minimum of six samples per station, per year, for SRS evaluations.

The south side marina areas which are closed administratively from 5/15 through 9/30 due to seasonal boating were sampled seven (7) times in 2009, seven (7) times in 2010 and six (6) times in 2011. This also exceeds the NSSP requirement of collecting a minimum of three (3) samples during the time the area is open for harvesting.

The north side seasonal area which is monitored by station U is closed from 5/1 through December 14. During the open months, it was sampled five (5) times in 2009, four times in 2010 and six times in 2011. This meets the NSSP requirement that the area be sampled at least five times per year during the open months. Please note that this station now passes the year round, summer and winter analyses.

Analysis

There are 37 sampling stations in Patchogue Bay.



Year-Round Analysis

The results are based on an analysis of the sampling data from January 2008 through December 2011.

Station	A	HO	M	O	P	Q
N	30	30	30	34	33	35
N>49	5	0	12	3	0	1
AVERAGE LOGS	1.22	0.64	1.44	0.78	0.60	0.70
STDEV LOGS	0.75	0.33	0.81	0.52	0.28	0.42
GEOMEAN	16.6	4.4	27.5	6.1	4.0	5.0
ESTIMATED 90%	202.7	14.1	450.4	33.5	11.0	20.9
CLASSIFICATION	U	C	U	C	C	C
STATUS	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED

Station	QG	R	S	SW	T	U
N	30	33	35	32	35	33
N>49	0	0	4	13	0	1
AVERAGE LOGS	0.56	0.63	0.82	1.60	0.65	0.74
STDEV LOGS	0.18	0.29	0.59	0.93	0.29	0.41
GEOMEAN	3.6	4.2	6.6	39.9	4.4	5.4
ESTIMATED 90%	7.8	12.3	42.8	952.4	13.2	22.4
CLASSIFICATION	C	C	C	U	C	S:5/1-12/14

STATUS	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED	PASSES YEAR ROUND

Station	**V**	**W**	**X**	**Y**	**Z**	**Z1**
N	34	33	33	33	33	33
N>49	1	2	0	1	4	0
AVERAGE LOGS	0.80	0.75	0.63	0.73	0.83	0.76
STDEV LOGS	0.44	0.50	0.27	0.42	0.55	0.43
GEOMEAN	6.3	5.7	4.3	5.4	6.7	5.7
ESTIMATED 90%	28.7	28.9	12.0	22.7	40.3	25.3
CLASSIFICATION	U BORDERLINE	U BORDERLINE	U BORDERLINE	U BORDERLINE	U BORDERLINE	U BORDERLINE
STATUS	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED

Station	**1**	**2**	**3**	**4**	**5**	**8**
N	31	31	29	31	32	30
N>49	1	1	0	1	0	0
AVERAGE LOGS	0.62	0.60	0.49	0.70	0.60	0.53
STDEV LOGS	0.46	0.37	0.13	0.36	0.29	0.15
GEOMEAN	4.2	4.0	3.1	5.0	3.9	3.4
ESTIMATED 90%	18.1	13.7	5.8	18.2	11.2	6.9
CLASSIFICATION	C	C	C	C	C	C
STATUS	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED
	BELLPORT	BELLPORT	BELLPORT			

Station	**11**	**22**	**23**	**23.1**	**24**	**14**
N	31	30	29	31	29	29
N>49	0	1	1	0	1	0
AVERAGE LOGS	0.53	0.55	0.54	0.64	0.88	0.47
STDEV LOGS	0.17	0.29	0.27	0.36	0.48	0.02
GEOMEAN	3.4	3.6	3.5	4.3	7.6	2.9
ESTIMATED 90%	7.1	9.9	9.3	14.9	40.0	4.2
CLASSIFICATION	C	C	C	C	U BORDERLINE	C
STATUS	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED
					NICOLL	

Station	**14.1**	**15**	**14.2**	**15.1**
N	29	29	32	32

N>49	0	0	0	0
AVERAGE LOGS	0.50	0.49	0.78	0.68
STDEV LOGS	0.12	0.09	0.40	0.38
GEOMEAN	3.1	3.1	6.0	4.8
ESTIMATED 90%	5.7	5.3	25.1	18.2
CLASSIFICATION	C	C	S:5/15-9/30	S:5/15-9/30
STATUS	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED
			ADMINISTRATIVE	ADMINISTRATIVE

The three new stations were evaluated, but you should note that there are only 13 existing data points.

Station	**B**	**C**	**D**
N	13	13	13
N>49	2	1	1
AVERAGE LOGS	1.03	0.65	1.01
STDEV LOGS	0.61	0.47	0.55
GEOMEAN	10.7	4.4	10.3
ESTIMATED 90%	83.8	20.0	70.1
CLASSIFICATION	U	U	U
STATUS	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED

Seasonal Analysis

The south side stations are closed from May 15 through September 30. Station U on the north side is closed from May 1 – December 14.

Station	**U**	**14.2**	**15.1**
N	45	36	37
N>49	2	1	1
AVERAGE LOGS	0.65	0.69	0.64
STDEV LOGS	0.45	0.39	0.40
GEOMEAN	4.5	4.9	4.4
ESTIMATED 90%	19.1	18.8	16.6
CLASSIFICATION	S:5/1-12/14	S:5/15-9/30	S:5/15-9/30
STATUS	PASSES YEAR ROUND	CORRECTLY CLASSIFIED	CORRECTLY CLASSIFIED
		ADMINISTRATIVE	ADMINISTRATIVE

Station U passes this analysis and the analysis I ran during the months of April – October.

Station	**U**
N	44
N>49	3
AVERAGE LOGS	0.81
STDEV LOGS	0.53
GEOMEAN	6.5
ESTIMATED 90%	36.8

CLASSIFICATION	S:5/1-12/14
STATUS	PASSES YEAR ROUND

Here is the rainfall information collected for the period of the analysis.

DATE	R0_24	R24_48	R48_72	R72_96	TIDE	REMARKS
1/6/2004	0.33	0.3	0	0	HME	APC
3/1/2004	0	0	0	0	ME	CO
4/12/2004	0.09	0	0	0.13	ME	FC
4/14/2004	2.26	1.84	0.09	0	ME	xs
4/16/2004	0.06	0.13	2.26	1.84	HE	xs
5/6/2004	0	0	0.72	0.09	HE	APC
5/11/2004	0.65	0	0	0	ME	BELLPORT
5/17/2004	0	0.03	0	0.01	ME	FC
7/8/2004	0	0.03	0	0.01	ME	FC
7/13/2004	1.1	0	0	0	HME	APC
8/26/2004	0	0	0	0	ME	FC
9/14/2004	0	0	0	0	HME	FC-CERT
10/1/2004	0	0.1	3.91	0	L	xs
10/4/2004	0	0.1	0	0	LE	xs
10/7/2004	0	0	0	0	ME	BELLPORT
11/19/2004	0	0	0	0	ME	BELLPORT
12/13/2004	0	0.02	0.32	0.53	HME	PARTIAL APC
2/24/2005	0	0	0.11	0	HE	CO
3/7/2005	0	0	0	0	ME	CO
3/8/2005	0.1	0	0	0	ME	BELLPORT
4/21/2005	0	0	0	0	ME	D
5/6/2005	0	0	0	0.1	HME	D
5/17/2005	0	0	0.01	0	ME	D
6/14/2005	0	0	0	0	MLE	D
8/29/2005	0	0	0	0	ME	D
10/18/2005	0	0	0.04	10.04	FLOOD	xs
10/20/2005	0	0	0	0	FLOOD	xs
11/28/2005	0	0	0	0.03	ME	D
12/8/2005	0	0	0	0.19	LE	BELLPORT
12/27/2005	0.06	0.63	0	0	ME	APC
1/25/2006	0.11	0.25	0.52	0	ME	APC
2/23/2006	0.04	0	0	0	ME	D
3/1/2006	0	0	0	0	HE	D
3/13/2006	0.44	0.01	0	0	ME	APC
3/28/2006	0	0.01	0.01	0	ME	D
4/26/2006	0.04	0.03	2.28	3.12	E	xs

4/27/2006	0	0.04	0.03	2.28	E	xs
6/22/2006	0	0	0	0	E	D
6/28/2006	0.16	0	0.26	1	R	APC
7/20/2006	0	0.86	0	0	E	APC
7/26/2006	0	0	0	0.07	ME	D
8/30/2006	0.63	0.19	2.69	0.05	LF	xs
9/7/2006	0	0.47	0	0	ME	APC
10/13/2006	0	1.7	0	0	ME	APC
10/15/2006	0	0	0	1.7	ME	APC
11/29/2006	0	0	0.03	0	LE	D
12/4/2006	0.05	0	0.08	0.13	ME	CO
12/19/2006	0	0	0	0	ME	D
1/4/2007	0	0	0.81	0.57	ME	APC
3/14/2007	0	0	0	0.18	ME	D
3/29/2007	0	0	0.01	0	ME	D
4/25/2007	0	0	0	0	ME	D
5/14/2007	0	0.08	0.07	0.07	ME	D
7/24/2007	1.08	0.01	0	0	ME	APC
9/6/2007	0	0	0	0	ME	D
9/24/2007	0	0	0	0	MR	D
10/25/2007	0.25	0.03	0	0	ME	APC
11/20/2007	0.01	0	0	0	ME	D
12/20/2007	0.09	0	0	0.39	ME	APC
1/16/2008	0	0.02	0.36	0	LE	APC
2/21/2008	0	0	0.24	0.18	ME	APC
3/10/2008	0	0.68	2.76	0	HE	XS
3/18/2008	0	0	0	0.29	ME	APC
4/15/2008	0	0	0.01	0.43	ME	APC
5/15/2008	0	0	0.1	0	ME	D
6/13/2008	0	0	0	0	LE	D
7/15/2008		0	0	0	HE	D
9/11/2008	0.43	0	0	0	ME	9/7 1.44 APC
11/7/2008	0.06	0.31	0	0	ME	APC
12/16/2008	0.1	0.52	0	0	FLOOD	XS CO
1/6/2009	0	0.75	0.96	0	E	APC
2/25/2009	0	0	0	0.21	E	INVALID
3/31/2009	0	0.22	0.67	0.09	LE	CO
4/1/2009	0	0	0.22	0.67	LE	APC
6/16/2009	0	0	0	0	E	D
7/17/2009	0	0	0	0	E	D
8/17/2009	0	0	0	0	E	D

9/15/2009	0	0	0.41	0.39	E	APC
12/2/2009	0	0.46	0	0	E	APC
4/7/2010	0	0	0	0	E	Dry
4/8/2010	0	0	0	0	E	Dry
4/23/2010	0	0	0	0	E	Dry
5/5/2010	0	0.39	0.04	0	E	APC
5/21/2010	0	0	1.5	0.09	E	APC
6/22/2010	0	0	0	0	e	dry
7/21/2010	0	0.29	0	0	E	APC
10/6/2010	0.33	0.13	0	0.59	E	APC
11/1/2010	0	0	0	0.23	E	D
2/16/2011	0	0	0	0	E	D
3/28/2011	0	0	0	0	E	D
4/14/2011	0.13	0.26	0	0	E	APC
5/2/2011	0	0	0	0	E	D
6/27/2011	0	0	0.49	0.52	E	APC
12/6/2011	0.03	0	0	0	E	Dry
12/22/2011	0.15	0	0	0	E	Dry
N>.5"	5	7	11	11		
N>1"	3	2	6	5		

Discussion

All stations in Patchogue Bay are correctly classified. The seasonal area around station U could potentially be eliminated however not enough rainfall event data exists at this point to justify an upgrade.

Recommendations

No changes are recommended at this time.

Patchogue River, Upper, and tribs (1701-0099) — Impacted Seg

Waterbody Location Information

Revised: 05/03/02

Water Index No: (MW7.5) AO-GSB-185
Drain Basin: Atlantic-Long Island Sound Southern Long Island
Hydro Unit Code: 02030202/100 **Str Class:** C(TS)
Waterbody Type: River
Reg/County: 1/Suffolk Co. (52)
Waterbody Size: 4.0 MilesLow
Quad Map: SAYVILLE (S-28-2)
Seg Description: stream and tribs above LIRR (freshwater)

Water Quality Problem/Issue Information

(CAPS indicate MAJOR Use Impacts/Pollutants/Sources)

Use(s) Impacted	Severity	Problem Documentation
Aquatic Life	Stressed	Known

Type of Pollutant(s)
Known: - - -
Suspected: NUTRIENTS, SILT/SEDIMENT
Possible: - - -

Source(s) of Pollutant(s)
Known: URBAN RUNOFF
Suspected: STORM SEWERS
Possible: Failing On-Site Syst

Resolution/Management Information

Issue Resolvability: 1 (Needs Verification/Study (see STATUS))
Verification Status: 4 (Source Identified, Strategy Needed)
Lead Agency/Office: ext/WQCC
Resolution Potential: Medium
TMDL/303d Status: (TMDL Not Required (No Impairment))

Further Details

Aquatic life support in Patchogue River is impacted, based on biological sampling. The suspected sources of impacts are stormwater and urban nonpoint runoff. Impacts from inadequate and/or failing on-site septic systems are also a potential source of pollutants in this high density residential and commercial area. Regional Fisheries staff has reports wild brook trout populations in the stream above Canaan Lake.

A biological (macroinvertebrate) assessment of Patchogue River in North Patchogue was conducted in 1998. Sampling results indicated water quality was slightly impacted, but close to the range of moderately impacted. Scuds and black flies dominated the sample, but some mayflies and stoneflies were also present. The Patchogue River was sampled in 1994 at a different site (in Patchogue). This site was likely tidal, and those results may not accurately represent water quality. (DEC/DOW, BWAR/SBU, January 2000)

Stream is Class C from LIRR to Great Patchogue Lake and includes trib -2 (Palace Brook), and Class C(TS) above Great Patchogue Lake.

Appendix A

Great South Bay, East (1701-0039) — Impacted Seg

Waterbody Location Information

Revised: 05/03/02

Water Index No: (MW7.3) AO-GSB (portion 1)
Hydro Unit Code: 02030202/120 **Str Class:** SA
Waterbody Type: Estuary
Waterbody Size: 10360.0 Acres
Seg Description: portion of bay, as described below

Drain Basin: Atlantic-Long Island Sound
Southern Long Island
Reg/County: 1/Suffolk Co. (52)
Quad Map: BELLPORT (R-29-4) ...

Water Quality Problem/Issue Information

(CAPS indicate MAJOR Use Impacts/Pollutants/Sources)

Use(s) Impacted	Severity	Problem Documentation
Shellfishing	Stressed	Known
Fish Consumption	Stressed	Known
Aquatic Life	Threatened	Suspected

Type of Pollutant(s)
Known: PRIORITY ORGANICS (PCBs/migratory fish), Pathogens
Suspected: Nutrients
Possible: - - -

Source(s) of Pollutant(s)
Known: URBAN RUNOFF
Suspected: OTHER SOURCE (migratory fish species), Other Source (boat pollution)
Possible: Municipal (Patchogue STP), Failing On-Site Syst

Resolution/Management Information

Issue Resolvability: 1 (Needs Verification/Study (see STATUS))
Verification Status: 4 (Source Identified, Strategy Needed)
Lead Agency/Office: ext/SSER
TMDL/303d Status: del* ()
Resolution Potential: Medium

Further Details

Fish consumption in Great South Bay is limited by a NYS DOH health advisory that recommends eating no more than one meal per week of striped bass from south shore waters due to PCB contamination. A general advisory is also in effect limiting consumption of bluefish and American eel from certain marine waters to one meal per week. However these restrictions are not significantly different than the general (statewide) advisory for fish consumption and, therefore, result in the water being listed as stressed. (2000-01 NYS DOH Health Advisories).

Shellfishing restrictions are in place for several coves/tribs of the bay. However many of these restrictions apply to Class SA, SC waters which are listed separately. The remaining areas within the segment boundaries where shellfishing is restricted are limited by seasonal restrictions adjacent to Fire Island communities and boat basins and are small relative to the bay. As a result of these considerations, shellfishing use in the bay is listed as stressed. (DEC/FWMR, Region 1, October 2000)

Aquatic life support in the bay is considered to be threatened based on the findings of NOAA estuary studies. NOAA's

National Estuarine Eutrophication Assessment indicates that "eutrophic conditions and trends" in the bay are "high" with high levels of chlorophyll and moderate levels of submerged aquatic vegetation and nuisance/toxic blooms occurring periodically and/or over extensive areas. The reports also notes elevated nutrient levels and periodic anoxic/hypoxic events. (National Estuarine Eutrophication Assessment, NOAA, 1999)

Stormwater and urban nonpoint runoff and recreational boating impacts are considered the more significant sources. Impacts from wildlife/waterfowl and on-site septic systems are also concerns. (DEC/DOW, Region 1, 1998)

The bay is also included within the South Shore Estuary Reserve. The SSER encompasses the tidal waters and watershed between the Nassau-Queens County line and the eastern boundary of Shinnecock Bay. The goals of the SSER Program outlined in the draft Comprehensive Management Plan (CMP) include improvement and maintenance of water quality, protection and restoration of living resources, expansion of public use and enjoyment, sustaining and of the estuary-related economy, and increasing education, outreach and stewardship. Program activities focus on point and nonpoint source pollution reduction, protection and restoration of water quality and coastal habitat, increasing shellfish harvesting, open space preservation and enhancing other public uses of the estuary. (DEC/DOW, Region 1, March 2000)

This segment includes bay waters between Blue Point and the Smith Point bridge; excluding Bellport and Patchogue Bay waters.

Patchogue Bay (1701-0326) — Impacted Seg

Waterbody Location Information

Revised: 05/03/02

Water Index No: (MW7.3) AO-GSB (portion 5)
Hydro Unit Code: 02030202/120 **Str Class:** SA
Waterbody Type: Estuary
Waterbody Size: 3200.0 Acres (50% impacted)
Seg Description: entire bay, as described below

Drain Basin: Atlantic-Long Island Sound
Southern Long Island
Reg/County: 1/Suffolk Co. (52)
Quad Map: SAYVILLE (S-28-2) ...

Water Quality Problem/Issue Information

(CAPS indicate MAJOR Use Impacts/Pollutants/Sources)

Use(s) Impacted	Severity	Problem Documentation
SHELLFISHING	Impaired	Known
Public Bathing	Stressed	Known
Fish Consumption	Stressed	Known
Recreation	Stressed	Known

Type of Pollutant(s)
Known: PATHOGENS, Priority Organics (PCBs/migratory fish)
Suspected: - - -
Possible: - - -

Source(s) of Pollutant(s)
Known: OTHER SOURCE (boat pollution), URBAN RUNOFF
Suspected: STORM SEWERS, Other Source (migratory fish species)
Possible: Municipal (Patchogue WWTP)

Resolution/Management Information

Issue Resolvability: 1 (Needs Verification/Study (see STATUS))
Verification Status: 4 (Source Identified, Strategy Needed)
Lead Agency/Office: ext/SSER
TMDL/303d Status: 2c (Multiple Segment/Categorical Water, Shellfishing)
Resolution Potential: Medium

Further Details

Shellfishing, public bathing and recreational uses of Patchogue Bay are affected by stormwater and urban runoff and recreational boating impacts.

Shellfishing in the bay is restricted due to year-round designations of portions of the area as uncertified for the taking of shellfish for use as food due to pathogens. Year-round restrictions apply to the portion of the bay north of a line from Blue Point to the foot of Duton Avenue in Bellport (west of Howell Point). Pathogens related to stormwater and other urban nonpoint runoff and recreational boating are the primary sources. The Patchogue WWTP discharge also results in shellfishing restrictions (administrative) in portions of the bay. (DEC/FWMR, Region 1, October 2000)

Fish consumption in Patchogue Bay is limited by a NYS DOH health advisory that recommends eating no more than one meal per week of striped bass from south shore waters from south shore waters due to PCB contamination. A general advisory is also in effect limiting consumption of bluefish and American eel from certain marine waters to one meal per

week. However these restrictions are not significantly different than the general (statewide) advisory for fish consumption and, therefore, result in the water being listed as stressed. (2000-01 NYS DOH Health Advisories).

The bay is also included within the South Shore Estuary Reserve. The SSER encompasses the tidal waters and watershed between the Nassau-Queens County line and the eastern boundary of Shinnecock Bay. The goals of the SSER Program outlined in the draft Comprehensive Management Plan (CMP) include improvement and maintenance of water quality, protection and restoration of living resources, expansion of public use and enjoyment, sustaining and of the estuary-related economy, and increasing education, outreach and stewardship. Program activities focus on point and nonpoint source pollution reduction, protection and restoration of water quality and coastal habitat, increasing shellfish harvesting, open space preservation and enhancing other public uses of the estuary. (DEC/DOW, Region 1, March 2000)

This segment includes the Class SA waters north of a line from Blue Point to Howell Point. Beaverdam (-178) and Motts Brook (-179) are listed separately.

Tidal Tribs to Patchogue Bay (1701-0327) — Impacted Seg

Waterbody Location Information

Revised: 05/03/02

Water Index No: (MW7.5) AO-GSB-180 thru 188 (sel.)
Hydro Unit Code: 02030202/100 **Str Class:** SC
Waterbody Type: Estuary
Waterbody Size: 500.0 Acres
Seg Description: total area of selected tidal tribs to bay

Drain Basin: Atlantic-Long Island Sound
Southern Long Island
Reg/County: 1/Suffolk Co. (52)
Quad Map: PATCHOGUE (R-28-3) ...

Water Quality Problem/Issue Information

(CAPS indicate MAJOR Use Impacts/Pollutants/Sources)

Use(s) Impacted	Severity	Problem Documentation
Aquatic Life	Stressed	Known
Recreation	Stressed	Known

Type of Pollutant(s)
Known: D.O./OXYGEN DEMAND, PATHOGENS
Suspected: Nutrients
Possible: - - -

Source(s) of Pollutant(s)
Known: OTHER SOURCE (boat pollution), URBAN RUNOFF
Suspected: STORM SEWERS
Possible: Failing On-Site Syst

Resolution/Management Information

Issue Resolvability: 1 (Needs Verification/Study (see STATUS))
Verification Status: 4 (Source Identified, Strategy Needed)
Lead Agency/Office: ext/WQCC
TMDL/303d Status: (TMDL Not Required (No Impairment))
Resolution Potential: Medium

Further Details

Year-round shellfishing restrictions apply to most of these tribs to Patchogue Bay due to pathogens from surrounding stormwater and urban runoff and recreational boating/marinas. Because these are Class SC,SB waters, they are not assessed for support of shellfishing use. However, based on the shellfishing restrictions, other recreational uses are considered to be stressed. (DEC/FWMR, Region 1, October 2000)

Aquatic life support is considered to be stressed in these waters as well. Low dissolved oxygen levels have been documented in Patchogue River (-185). Sampling at various points on the creek was conducted between 1997 and 2000 by researchers from Dowling College for a report to the Village of Patchogue. Similar conditions are expected in the other tidal tribs to the bay. (Patchogue CDA and Zaikowski, Dowling College, July 2001)

This segment includes the tidal portions of tribs Howell Creek (-180), Hedges Creek (-181), Dunton Lake (-181-P881), Mud Creek (-183), Swan Creek (-184), Little Creek (184a), Patchogue River (-185), Tuthill Creek (-186) and Stillman Creek (-187). These waters are primarily Class SC; Howell Creek is Class SB.

Mud Creek, Upper, and tribs (1701-0101) NoKnownImpct

Waterbody Location Information

Revised: 03/23/01

Water Index No: (MW7.5) AO-GSB-183
Drain Basin: Atlantic-Long Island Sound
Hydro Unit Code: 02030202/100 **Str Class:** C(TS)
Southern Long Island
Waterbody Type: River
Reg/County: 1/Suffolk Co. (52)
Waterbody Size: 4.0 Miles
Quad Map: BELLPORT (R-29-4)
Seg Description: stream and tribs above tidal waters (freshwater)

Water Quality Problem/Issue Information

(CAPS indicate MAJOR Use Impacts/Pollutants/Sources)

Use(s) Impacted	Severity	Problem Documentation
NO USE IMPAIRMNT		

Type of Pollutant(s)
Known: - - -
Suspected: - - -
Possible: - - -

Source(s) of Pollutant(s)
Known: - - -
Suspected: - - -
Possible: - - -

Resolution/Management Information

Issue Resolvability: 8 (No Known Use Impairment)
Verification Status: (Not Applicable for Selected RESOLVABILITY)
Lead Agency/Office: n/a
Resolution Potential:
TMDL/303d Status: (TMDL Not Required (No Impairment))

Further Details

A biological (macroinvertebrate) assessment of Mud Creek in East Patchogue at the Montauk Highway bridge was conducted in 1998. Sampling results indicated slightly impacted water quality conditions. Sowbugs and scuds dominated the sample, but Clean-water stoneflies were also found. Young brook trout were previously collected here. No major water quality problems are indicated. (DEC/DOW, BWAR/SBU, January 2000)

Stream is Class C from tidal waters to Robinson Pond, and Class C(TS) above Robinson Pond.

Swan River, Upper, and tribs (1701-0100) — Impacted Seg

Waterbody Location Information

Revised: 03/01/02

Water Index No: (MW7.5) AO-GSB-184
Drain Basin: Atlantic-Long Island Sound Southern Long Island
Hydro Unit Code: 02030202/100
Str Class: C(TS)
Waterbody Type: River
Reg/County: 1/Suffolk Co. (52)
Waterbody Size: 4.0 Miles
Quad Map: BELLPORT (R-29-4)
Seg Description: stream and tribs above Swan Lake (freshwater)

Water Quality Problem/Issue Information

(CAPS indicate MAJOR Use Impacts/Pollutants/Sources)

Use(s) Impacted	Severity	Problem Documentation
AQUATIC LIFE	Impaired	Known

Type of Pollutant(s)
Known: - - -
Suspected: NUTRIENTS, D.O./Oxygen Demand, Silt/Sediment
Possible: - - -

Source(s) of Pollutant(s)
Known: - - -
Suspected: STORM SEWERS, URBAN RUNOFF
Possible: - - -

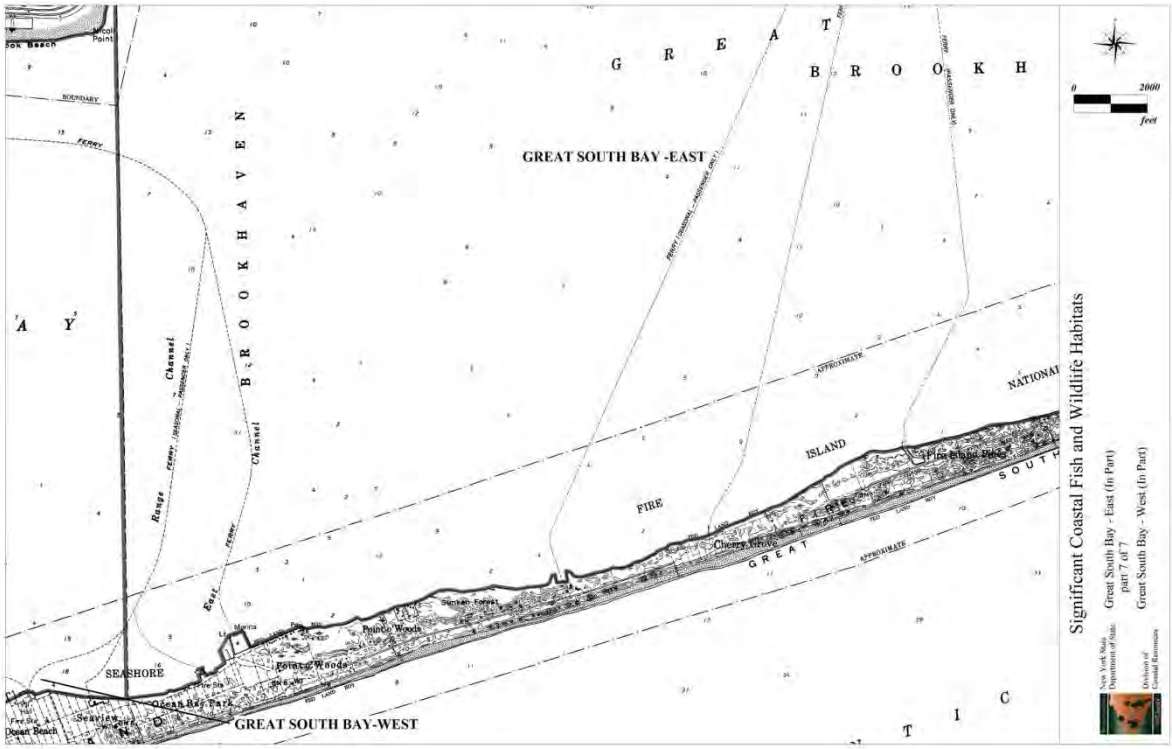
Resolution/Management Information

Issue Resolvability: 1 (Needs Verification/Study (see STATUS))
Verification Status: 2 (Problem Verified, Cause Unknown)
Lead Agency/Office: ext/WQCC
Resolution Potential: Medium
TMDL/303d Status: 5 (Water with Insufficient Data/Information, Not Listed)

Further Details

Aquatic life support in Swan River is impacted, based on biological sampling. The suspected sources of impacts are stormwater and urban nonpoint runoff. Regional Fisheries staff has reported support of wild brook trout populations in the stream above Swan Lake.

A biological (macroinvertebrate) assessment of Swan River in East Patchogue (at Route 27) was conducted in 1998. Sampling results indicated moderately impacted water quality conditions. Mayflies, stoneflies, and caddisflies were absent, and the fauna was dominated by scuds and worms. This appears to represent a decline from 1994 sampling, when four species of mayflies were found, and water quality was assessed as only slightly impacted. This possible trend should be documented by continued monitoring at this site. (DEC/DOW, BWAR/SBU, January 2000)


Significant Coastal Fish and Wildlife Habitats
Great South Bay - East (In Part)
part 7 of 7
Great South Bay - West (In Part)
New York State Department of State
Division of Coastal Resources
0
2000
feet
GREAT SOUTH BAY -EAST
GREAT SOUTH BAY-WEST
GREAT BROOKHAVEN
FIRE ISLAND
NATIONAL
SEASHORE
Cherry Grove
Fire Island Pines
Point o' Woods
Ocean Bay Park
Seaview
Davis Beach
Marina
Channel
Range
East
FERRY
BOUNDARY
APPROXIMATE

Attachment B:

COASTAL FISH & WILDLIFE HABITAT ASSESSMENT FORM

Name of Area:	**Great South Bay-East**
Designated:	**March 15, 1987**
Updated:	**December 15, 2008**
County:	**Suffolk**
Town(s):	**Brookhaven**
7½' Quadrangle(s):	**Bay Shore East, NY; Bellport, NY; Howells Point, NY; Sayville, NY**

Assessment Criteria		Score
Ecosystem Rarity (ER)–the uniqueness of the plant and animal community in the area and the physical, structural, and chemical feature supporting this community.		
ER assessment:	The largest protected, shallow, coastal bay in New York State.	**64**
Species Vulnerability (SV) – the degree of vulnerability throughout its range in New York State of a species residing in the ecosystem or utilizing the ecosystem for its survival. (E = Endangered, T = Threatened, SC = Special concern)		
SV assessment:	Piping plover (E, T-Fed), least tern (T), and common tern (T) nesting and feeding areas. Additive division: 36 + 25/2 + 25/4 = 54.75	**54.75**
Human Use (HU) – the conduct of significant, demonstrable, commercial, recreational, or educational wildlife-related human uses, either consumptive or non-consumptive, in the area or directly dependent upon the area.		
HU assessment:	Commercial hard clam industry of statewide significance; sportfishing of statewide significance; waterfowl hunting of county-wide significance. Additive division: 16+16/2 = 24.	**24**
Population Level (PL) – the concentration of a species in the area during its normal, recurring period of occurrence, regardless of the length of that period of occurrence.		
PL assessment:	This area supports one of the largest concentrations of wintering waterfowl in New York State, and population levels of diving ducks are unusual in the northeastern U.S.	**25**
Replaceability (R) – ability to replace the area, either on or off site, with an equivalent replacement for the same fish and wildlife and uses of those same fish and wildlife, for the same users of those fish and wildlife.		
R assessment:	Irreplaceable.	**1.2**

Habitat Index: (ER + SV + HU + PL) = 167.75 **Significance: (HI x R) = 201.3**

NEW YORK STATE
SIGNIFICANT COASTAL FISH AND WILDLIFE HABITAT
NARRATIVE

GREAT SOUTH BAY - EAST

LOCATION AND DESCRIPTION OF HABITAT:

Great South Bay-East is located along the south shore of Long Island, north of Fire Island, in the Town of Brookhaven, Suffolk County (7.5' Quadrangles: Bay Shore East, N.Y.; Sayville, N.Y.; Howells Point, N.Y.; and Bellport, N.Y.). The fish and wildlife habitat is approximately 33,580 acres, and is generally defined by the mean high water elevation on the north and south sides, by the Brookhaven town line to the west, and by the Smith Point Bridge over Narrow Bay to the east. Great South Bay-East includes many locally recognized bay areas, including Nicoll Bay, Patchogue Bay, and Bellport Bay. The Great South Bay-East significant habitat includes the wetlands along Fire Island National Seashore, including along Long Cove, Robinson Cove, Whalehouse Point, Molasses Point, and Goose Point. The bay is bordered on the north and east by dense residential and commercial development, including extensive marina and harbor facilities. Many of the remaining wetland areas along the north shore of Great South Bay-East are owned by the NYSDEC to protect their natural values. Elsewhere, the bay is bordered by federally owned wetlands (Wertheim National Wildlife Refuge), open water, and low density residential development on Fire Island.

A number of benthic habitats make up the bay bottom. Benthic habitat in Great South Bay can be classified as muddy sandflat and sandflat habitats. Much of the bay is shallow open water habitat with salt marshes lining the bay where tidal creeks and rivers feed into the bay from the mainland. Cordgrasses (*Spartina alterniflora* and *S. patens*) dominate the low and high salt marsh, respectively. The bottom substrate of Great South Bay-East is comprised primarily of sand with interspersed estuarine mud patches. These patches extend on the north side of Great South Bay-East from east of Nicoll Bay to Patchogue Bay and are also prominent in Bellport Bay. Submerged aquatic vegetation beds are also present in Great South Bay-East, and are most prevalent along the south shore of the bay along Fire Island and along the north shore in Bellport Bay. The nature of the habitat is highly influenced by three fundamental conditions: freshwater input from ground water, salt water input from the ocean through the Great South Bay inlets, and protection provided by the barrier island.

The bay encompasses a vast area of relatively shallow open water less than 12 feet deep at mean low water. Tidal fluctuations in the bay average approximately 0.7 feet. Great South Bay-East is connected to the ocean by Fire Island Inlet and Narrow Bay. Great South Bay is the only bay on Long Island's south shore that has major riverine input (from the Carmans and Connetquot Rivers). In addition, the bay is unique because it receives possibly as much as 11% of freshwater input directly through its floor.

FISH AND WILDLIFE VALUES:

Great South Bay-East comprises approximately one-half of the largest protected, shallow, coastal bay area in New York State. Two-hundred and ten species, including 43 fish species, and 101 bird species were identified during an intensive survey of Great South Bay in 1997. This broad expanse of open

water is highly productive, and supports a tremendous diversity of fish and wildlife species. Shorebird survey results of Great South Bay-East indicate that an average of 6 breeding pairs (14 in peak year) of piping plover (E, T-Fed) nesting along the bay shores annually from 1993 to 2005. During the same period, least tern (T) and common tern (T) have averaged 23 and 90 breeding pairs, respectively, each year (110 and 540 in respective peak years). Common (T) and least tern (T) nest in large colonies located in sand, gravel, shells, and seaweed above the high tide mark. Piping plovers nest well above the high tide mark in generally grassless sand beaches. The salt marshes, intertidal flats, and shallows in this area provide valuable feeding areas for birds throughout the year, including species nesting in the area and large concentrations of shorebirds during migration. These include green-backed heron, black-crowned night heron, snowy egret, American bittern, Canada goose, mallard, American black duck, gadwall, northern harrier (T), osprey (SC), piping plover (E, T-Fed), least tern (T), common tern (T), herring gull, willet, horned lark, fish crow, marsh wren, red-winged blackbird, sharp-tailed sparrow, and seaside sparrow.

Great South Bay-East is also one of the most important waterfowl wintering areas (November - March) on Long Island, especially for diving ducks, which feed on eelgrass, invertebrates, and small fish. The ten-year period from 1975-1984 indicate average concentrations of over 10,700 birds in the bay each year. Mid-winter aerial surveys of waterfowl abundance from 1986 to 1998 (excluding 1997) for all of Great South Bay indicate average concentrations of over 7,000 birds in the bay each year (18,008 in peak year), including 4,085 greater and/or lesser scaup (15,405 in peak year), 583 American black duck (1,255 in peak year), 417 (common, hooded, and/or red-breasted) merganser (1,025 in peak year), 648 brant (2,260 in peak year), 691 Canada goose (1,285 in peak year), and 314 common goldeneye (990 in peak year), along with lesser numbers of bufflehead, mallard, canvasback, long-tail duck, and American coot. Ground surveys conducted along the shores of Great South Bay-East from 2000-2004 reported an average of 123 hooded merganser (213 in peak year) in the bay, with lesser numbers of red-throated loon, horned grebe, bald pate, green-winged teal, northern shoveller, northern pintail, red-breasted merganser, redhead, canvasback, common goldeneye, Eurasian wigeon, bufflehead, long-tailed duck, ring-necked duck, ruddy shelduck, scoter, Canada goose, and American coot. Dominant concentrations of waterfowl for the aforementioned period included scaup, red-breasted merganser, American black duck, brant, common goldeneye, and Canada goose. Based on these surveys, it appears that Great South Bay-East supports the largest wintering waterfowl concentrations in New York State, and is probably one of the most important areas for diving ducks in the northeastern United States. Waterfowl use of the bay during winter is influenced in part by the extent of ice cover each year. Concentrations of waterfowl also occur in the area during spring and fall migrations (March - April and October - November, respectively). Nearly all of Great South Bay-East is open to the public for waterfowl hunting, but due to the limited amount of emergent wetlands within the bay, hunting pressure is of county-wide significance.

In addition to having significant bird concentrations, Great South Bay-East is an extremely productive area for marine finfish, shellfish, and other wildlife. Much of this productivity is directly attributable to the salt marshes and tidal flats found throughout Great South Bay. Great South Bay-East and its connected freshwater tributaries serve as a major spawning, nursery, migratory, and foraging area (April - November, generally) for winter flounder, northern kingfish, bluefish, blue crab, and forage fish species, such as Atlantic silverside (abundant throughout the bay), striped killifish, mummichog, northern pipefish, weakfish, striped bass, sticklebacks, American eel, and other diadromous fishes. Harbor and grey seals frequently use the bay in the winter. Additionally, 2 loggerhead sea turtles (T, T-Fed) were found stranded in Great South Bay East in 1991.

As a result of the abundant fisheries resources in this area, Great South Bay-East receives heavy recreational fishing pressure, of statewide significance. Winter flounder historically predominated the

sportfishery catch in Great South Bay-East, but in recent years the dominant sportfishery in the bay has been for summer flounder. Portions of the habitat are regarded as "hot spots" for weakfish, scup, and summer flounder. A commercial fishery for Atlantic silverside, killifish, and white perch has been established in the Bellport Bay area. The entire Great South Bay-East area is inhabited by concentrations of hard clams along with local concentrations of American oyster.

In the early and late seventies Great South Bay accounted for approximately 50% of the nation's total hard clam production. After 1979 harvests began to fall and by 1984 it is estimated hard clam landings amounted to 50% of historical peak values. Today, most of the bay waters are certified for shellfishing, with approximately 2,130 acres of permanently closed and 2,300 acres of seasonally closed waters, resulting in a commercial and recreational harvest of statewide significance. Shellfishing in Great South Bay-East is only open to Brookhaven residents. Landings data from the New York State Department of Environmental Conservation for the 11 year period from 1993-2003 indicate an average harvest of 26,960 bushels of hard clams, 33 bushels of soft clams, and 286 bushels of oysters from the bay each year. Landings of mussels, conchs, and razor clams were also reported, but in minimal numbers. An approximately 13,000 acre portion of the bay extending from Nicoll Point to Blue Point and across to Fire Island is privately owned by The Nature Conservancy. Spawning sanctuaries have been established in the bay waters under the ownership of The Nature Conservancy in an effort to restore the once prolific hard clam to the area.

Great South Bay-East encompasses 3,713 acres of submerged rooted aquatic vegetation beds. These beds account for approximately 11% of the entire habitat area. These beds are dominated primarily by eelgrass (*Zostera marina*) with some wigeon grass (*Ruppia maritima*). Submerged aquatic vegetation beds provide spawning and foraging habitat for an array of mollusks, crustaceans, and juvenile fish, as well as diving ducks. The distribution and abundance of benthic species in the bay's eelgrass community is likely controlled by a number of factors that include eelgrass stem density, water temperature and salinity, sediment type, predation, food supply, and human harvest.

IMPACT ASSESSMENT:

Any activities that would degrade water quality, increase turbidity, increase sedimentation, or alter flows, temperature, or water depths would affect the biological productivity of this area. All species would be adversely affected by water pollution, such as chemical contamination (including food chain effects resulting from bioaccumulation), oil spills, excessive turbidity or sediment loading, non-point source run-off, waste disposal (including vessel wastes), and stormwater runoff. Efforts should be made to improve water quality in the bay, including the reduction or elimination of discharges from vessels and upland sources, effective oil and toxic chemical spill prevention and control programs, upgrading of wastewater treatment plants, enactment of pet waste ordinances to reduce coliform contributions to the bay, and the implementation of erosion control and stormwater pollution prevention best management practices. Vegetated upland buffer zones (e.g. wetlands, dunes, and forested areas) should be protected or established to reduce non-point source pollution and sedimentation from upland sources.

Alteration of tidal patterns in Great South Bay-East (e.g., sediment removal by dredging, channelization, bulkheading) would have negative impacts on the biotic communities present. No new navigation channels should be excavated within the area. Dredging to maintain existing boat channels in the bay should be scheduled in between September 15 and December 15 to minimize adverse effects on aquatic organisms. Unregulated dredged material placement in this area would be detrimental to the habitat, but such activities may be designed to maintain or improve the habitat for certain species of wildlife.

Construction of shoreline structures, such as docks, piers, bulkheads, or revetments, in areas not previously disturbed by development (e.g., natural salt marsh, tidal flats, or shallows), would result in the loss of productive areas which support the fish and wildlife resources of Great South Bay-East. Elimination of salt marsh and intertidal areas, through loss of intertidal connection, ditching, excavation, or filling, would result in a direct loss of a valuable habitat. Restoration of previously connected portions of the habitat, including the removal of structures (e.g. bulkheads, groins, jetties) which disrupt natural sedimentation and deposition patterns and physically alter the habitat may be beneficial. Construction of new and maintenance of existing erosion control structures which interfere with natural coastal process should be carefully evaluated for need and where possible, non-structural solutions should be utilized.

Unrestricted use of motorized vessels, including personal watercraft, in shallow waters can have adverse effects on the benthic community, and on fish and wildlife populations through resuspension of seafloor sediments and through shoreline erosion which may reduce water clarity and increase sedimentation. Use of motorized vessels should be controlled (e.g., no wake zone, speed zones, zones of exclusion) in and adjacent to shallow waters and adjacent wetlands. Docks, piers, catwalks, or other structures may be detrimental to submerged aquatic vegetation (SAV) beds through direct or indirect effects from shading, mooring chain scarring, and other associated human uses. Where environmental parameters are appropriate, opportunities for restoration of SAV beds may exist. Any restoration of SAV beds should utilize the best available science and implement proper monitoring protocols.

Thermal discharges, depending on time of year, may have variable effects on use of the area by marine species, such as sea turtles and overwintering waterfowl. Installation and operation of water intakes could have significant impact on juvenile (and adult, in some cases) fish concentrations, through impairment or entrainment. Activities that would enhance migratory, spawning, or nursery fish habitat, particularly where an area is essential to a species' life cycle or helps to restore a historic species population would be beneficial. Where appropriate, hydrological modifications (e.g. dams, dikes, channelization, bulkheading, sedimentation, etc.) should be mitigated or removed, including the rejoining of formerly connected tributaries, and the removal of obstructions or improvements to fish passage.

Nesting birds inhabiting the islands, marshes and barrier beaches of Great South Bay -East are highly vulnerable to disturbance by humans from March 15 through August 15. Significant pedestrian traffic or recreational use (e.g., boat and personal watercraft landing, off-road vehicle use, picnicking) of those areas which contain concentrations of nesting birds could easily eliminate the use of this site as a breeding area and should be minimized during this period. Predation of chicks and destruction of eggs or nests by unleashed pets (e.g., dogs, cats) and natural predators may also occur, and predator control should be implemented where feasible. Fencing and/or annual posting of the bird nesting area should be provided to help protect the nesting bird species.

Activities to protect or restore wetland habitat in Great South Bay -East, consistent with best management practices, (including the restoration of historic tidal regime, planting of native vegetation, control of invasive species, etc.) may enhance habitat values for fish and wildlife species.

HABITAT IMPAIRMENT TEST:

A **habitat impairment test** must be applied to any activity that is subject to consistency review under federal and State laws, or under applicable local laws contained in an approved local waterfront revitalization program. If the proposed action is subject to consistency review, then the habitat protection policy applies, whether the proposed action is to occur within or outside the designated area.

The specific **habitat impairment test** is as follows.

> In order to protect and preserve a significant habitat, land and water uses or development shall not be undertaken if such actions would:
>
> - destroy the habitat; or,
> - significantly impair the viability of a habitat.

Habitat destruction is defined as the loss of fish or wildlife use through direct physical alteration, disturbance, or pollution of a designated area or through the indirect effects of these actions on a designated area. Habitat destruction may be indicated by changes in vegetation, substrate, or hydrology, or increases in runoff, erosion, sedimentation, or pollutants.

Significant impairment is defined as reduction in vital resources (e.g., food, shelter, living space) or change in environmental conditions (e.g., temperature, substrate, salinity) beyond the tolerance range of an organism. Indicators of a significantly impaired habitat focus on ecological alterations and may include but are not limited to reduced carrying capacity, changes in community structure (food chain relationships, species diversity), reduced productivity and/or increased incidence of disease and mortality.

The *tolerance range* of an organism is not defined as the physiological range of conditions beyond which a species will not survive at all, but as the ecological range of conditions that supports the species population or has the potential to support a restored population, where practical. Either the loss of individuals through an increase in emigration or an increase in death rate indicates that the tolerance range of an organism has been exceeded. An abrupt increase in death rate may occur as an environmental factor falls beyond a tolerance limit (a range has both upper and lower limits). Many environmental factors, however, do not have a sharply defined tolerance limit, but produce increasing emigration or death rates with increasing departure from conditions that are optimal for the species.

The range of parameters which should be considered in applying the habitat impairment test include but are not limited to the following:

1. physical parameters such as living space, circulation, flushing rates, tidal amplitude, turbidity, water temperature, depth (including loss of littoral zone), morphology, substrate type, vegetation, structure, erosion and sedimentation rates;

2. biological parameters such as community structure, food chain relationships, species diversity, predator/prey relationships, population size, mortality rates, reproductive rates, meristic features, behavioral patterns and migratory patterns; and,

3. chemical parameters such as dissolved oxygen, carbon dioxide, acidity, dissolved solids, nutrients, organics, salinity, and pollutants (heavy metals, toxics and hazardous materials).

Although not comprehensive, examples of generic activities and impacts which could destroy or significantly impair the habitat are listed in the Impact Assessment section to assist in applying the habitat impairment test to a proposed activity.

KNOWLEDGEABLE CONTACTS:

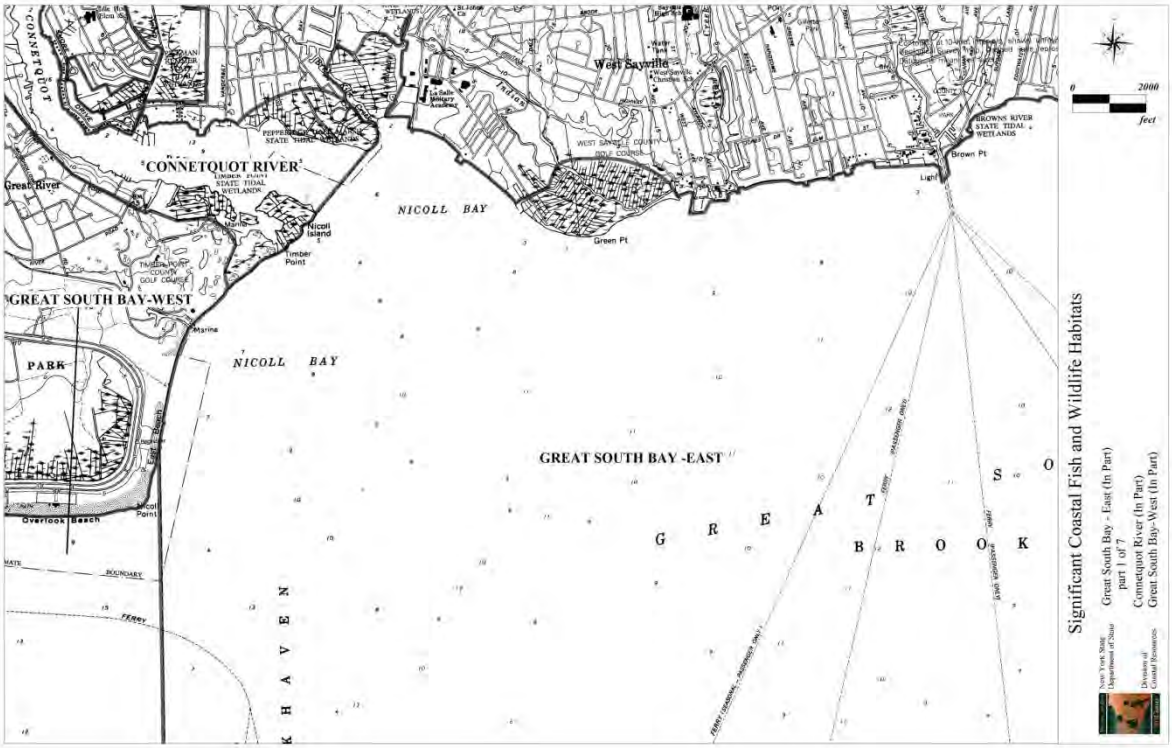
New York State Department of State
Division of Coastal Resources
Habitat Unit
99 Washington Avenue
Albany, NY 12231
Phone: (518) 474-6000

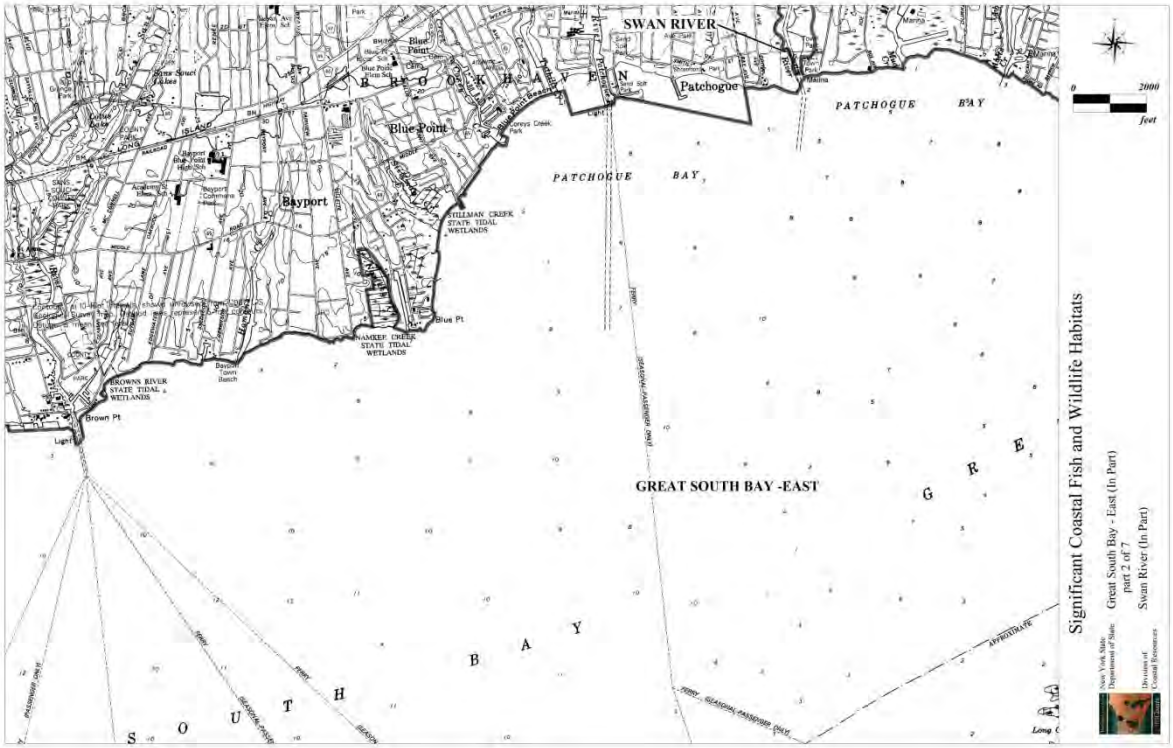
NYSDEC - Region 1
State University of New York, Building 40
Stony Brook, NY 11790
Phone: (631) 444-0204

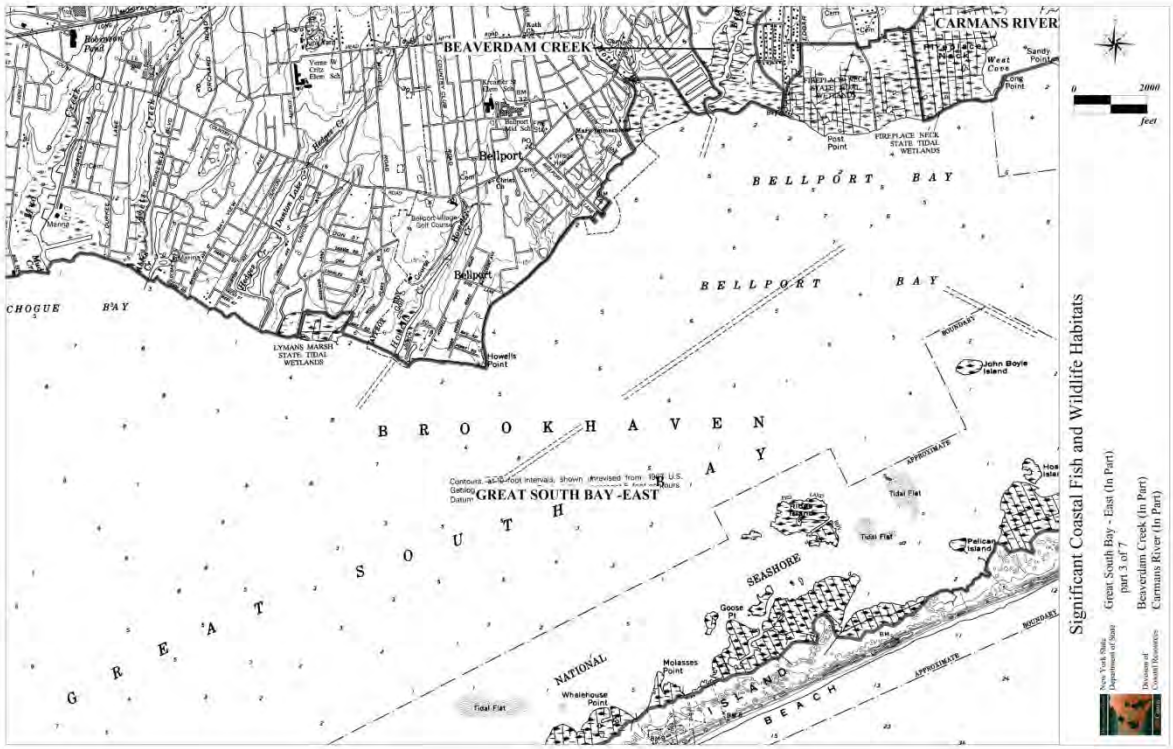
NYSDEC
Bureau of Marine Resources
205 N. Belle Meade Road, Suite # 1
East Setauket, NY 11733
Phone: (631) 444-0430

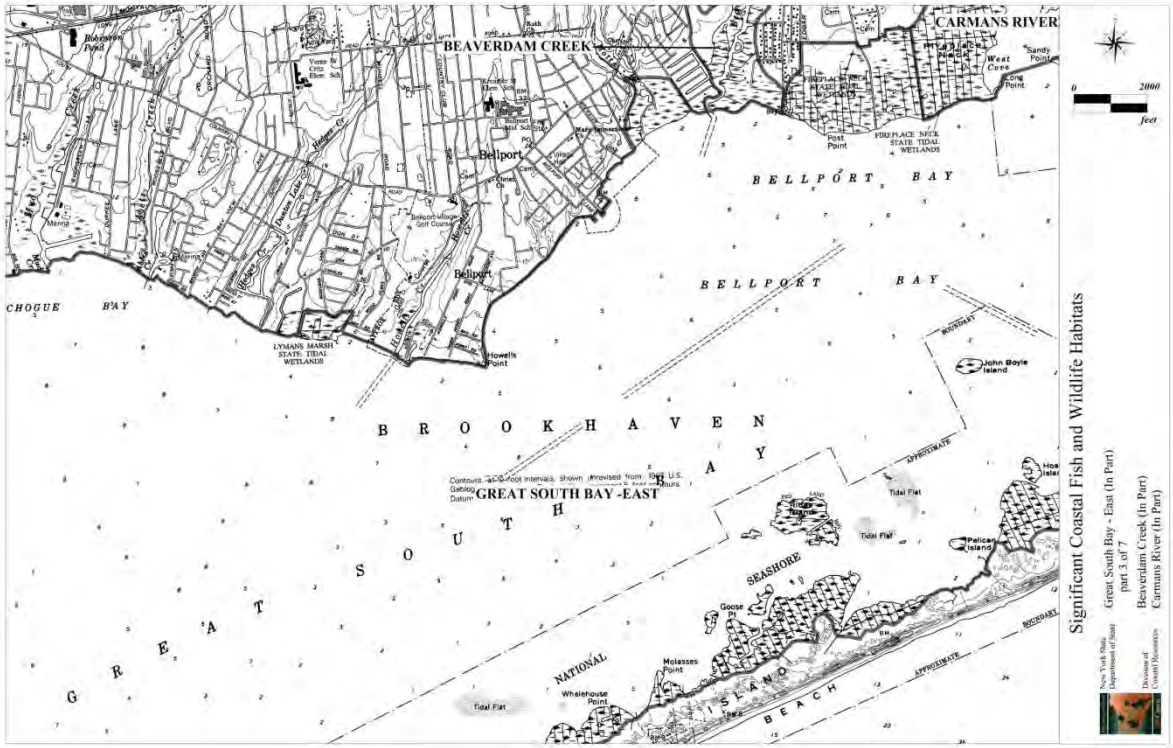
NY Natural Heritage Program
625 Broadway, 5th Floor
Albany, NY 12233
Phone: (518) 402-8935

Department of Planning, Environment and Development
Director, Division of Environmental Protection
Town of Brookhaven
7 Brookhaven Town Offices
3233 Route 112
Medford, NY 11763
Phone: (631) 451-6455


Significant Coastal Fish and Wildlife Habitats
Great South Bay - East (In Part)
part 1 of 7
Connetquot River (In Part)
Great South Bay-West (In Part)
New York State Department of State
Division of Coastal Resources
0
2000
feet
CONNETQUOT
Great River
"CONNETQUOT RIVER"
LIMITED PARK STATE TIDAL WETLANDS
PEPPERMINT POND PARK STATE TIDAL WETLANDS
TIMBER POINT COUNTY GOLF COURSE
Nicoll Island
Timber Point
GREAT SOUTH BAY-WEST
Marina
PARK
Overlook Beach
Nicoll Point
NICOLL BAY
NICOLL BAY
West Sayville
WEST SAYVILLE COUNTY GOLF COURSE
Green Pt
BROWNS RIVER STATE TIDAL WETLANDS
Brown Pt
Light
GREAT SOUTH BAY -EAST
G R E A T S O
B R O O K
H A V E N
STATE BOUNDARY
FERRY
FERRY (SEASONAL - PASSENGERS ONLY)


Significant Coastal Fish and Wildlife Habitats
Great South Bay - East (In Part)
part 2 of 7
Swan River (In Part)
New York State Department of State
Division of Coastal Resources
0
2000
feet
SWAN RIVER
Patchogue
PATCHOGUE BAY
PATCHOGUE BAY
Blue Point
Blue Point Yacht Club
Blue Point Yacht Club
Corneys Creek Park
Bayport
Bayport Blue Point High Sch
Academy of Holy Name
Bayport Community Hall
STILLMAN CREEK STATE TIDAL WETLANDS
NAMKEE CREEK STATE TIDAL WETLANDS
Blue Pt
Bayport Town Beach
BROWNS RIVER STATE TIDAL WETLANDS
Brown Pt
Light
GREAT SOUTH BAY -EAST
G R E
B A Y
S O U T H
FERRY
FERRY (SEASONAL - PASSENGERS ONLY)
APPROXIMATE


BEAVERDAM CREEK
CARMANS RIVER
Bellport
BELLPORT BAY
CHOGUE BAY
LYMANS MARSH STATE TIDAL WETLANDS
Howells Point
John Boyle Island
BROOKHAVEN
GREAT SOUTH BAY-EAST
Contours, at 5-foot intervals, shown, revised from 1967 U.S. Geological Survey maps.
Datum: MEAN SEA LEVEL
Tidal Flat
Pelican Island
Goose Pt
Molasses Point
Whalehouse Point
NATIONAL SEASHORE
FIREPLACE NECK STATE TIDAL WETLANDS
Post Point
West Cove
Long Point
Sandy Point
0
2000
feet
Significant Coastal Fish and Wildlife Habitats
Great South Bay - East (In Part)
part 3 of 7
Beaverdam Creek (In Part)
Carmans River (In Part)
New York State Department of State
Division of Coastal Resources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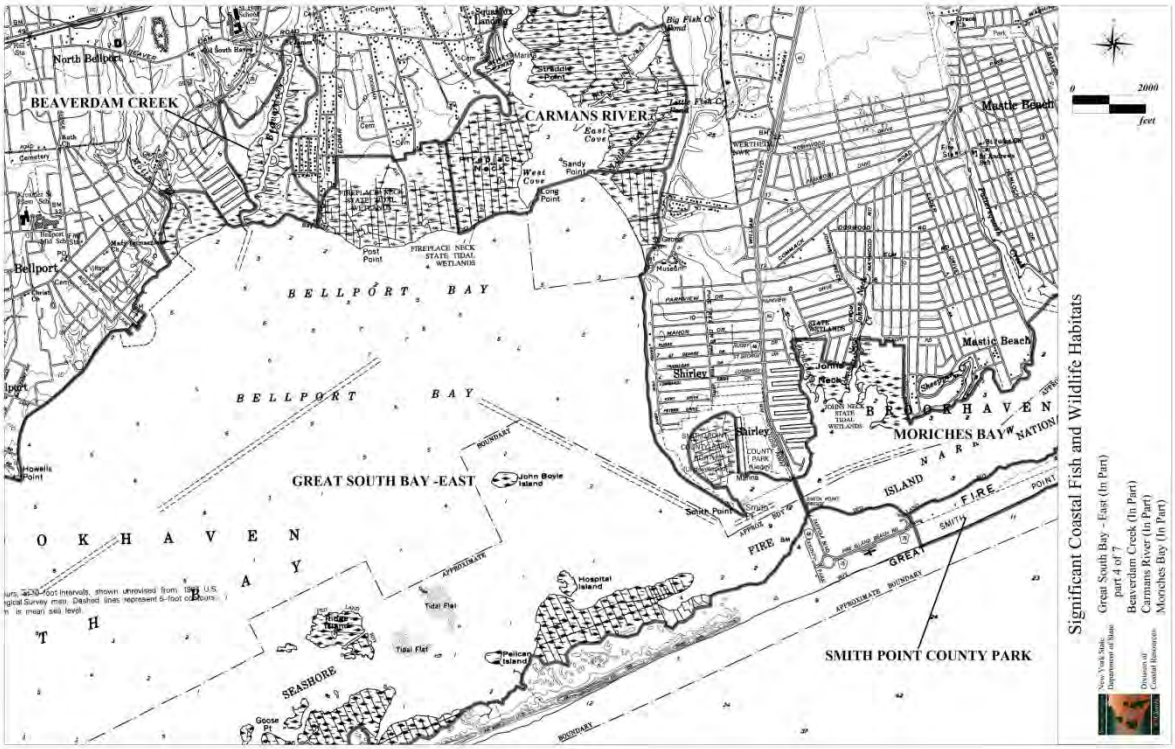
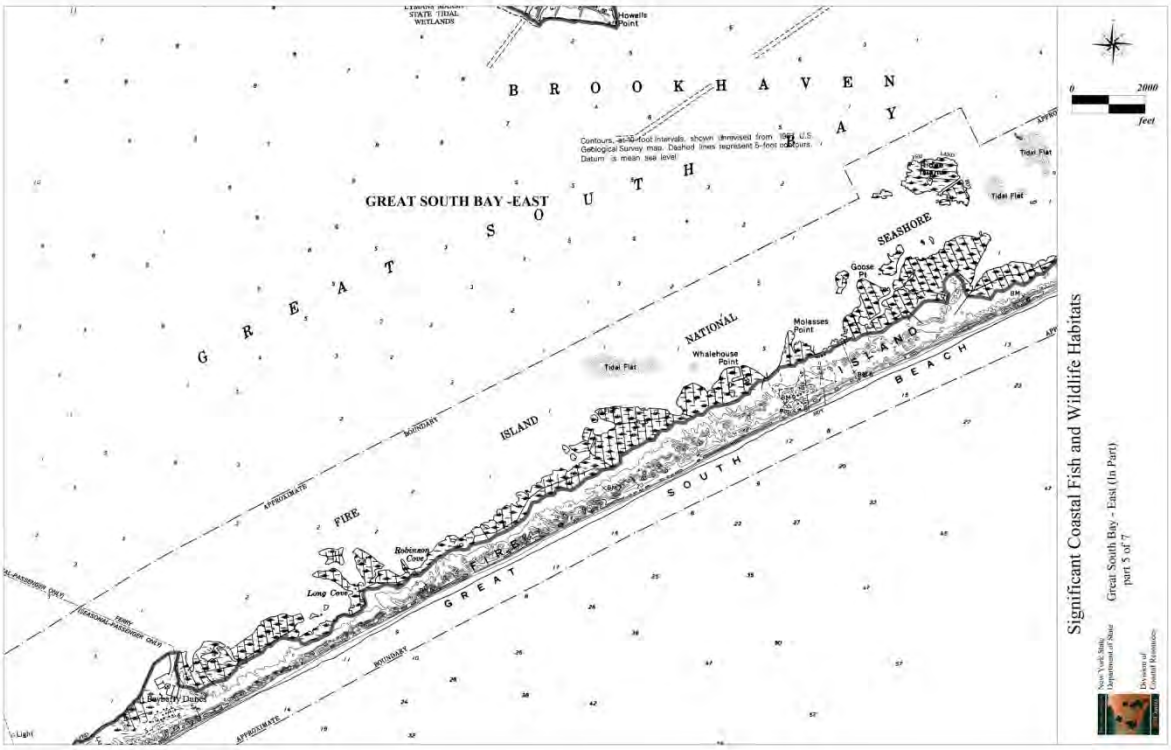
CARMANS RIVER
Bellport
BELLPORT BAY
CHOGUE BAY
LYMANS MARSH STATE TIDAL WETLANDS
Howells Point
John Boyle Island
BROOKHAVEN
GREAT SOUTH BAY-EAST
Contours, at 5-foot intervals, shown, revised from 1967 U.S. Geological Survey maps.
Datum: MEAN SEA LEVEL
Tidal Flat
Pelican Island
Goose Pt
Molasses Point
Whalehouse Point
NATIONAL SEASHORE
FIREPLACE NECK STATE TIDAL WETLANDS
Post Point
West Cove
Long Point
Sandy Point
0
2000
feet
Significant Coastal Fish and Wildlife Habitats
Great South Bay - East (In Part)
part 3 of 7
Beaverdam Creek (In Part)
Carmans River (In Part)
New York State Department of State
Division of Coastal Resources


BEAVERDAM CREEK
North Bellport
Bellport
CARMANS RIVER
Mastic Beach
BELLPORT BAY
BELLPORT BAY
GREAT SOUTH BAY -EAST
John Boyle Island
Shirley
BROOKHAVEN
MORICHES BAY
FIRE ISLAND
SMITH POINT COUNTY PARK
Hospital Island
Pelican Island
Tidal Flat
SEASHORE
0 2000 feet
Significant Coastal Fish and Wildlife Habitats
Great South Bay - East (In Part)
part 4 of 7
Beaverdam Creek (In Part)
Carmans River (In Part)
Moriches Bay (In Part)
New York State Department of State
Division of Coastal Resources


BROOKHAVEN
GREAT SOUTH BAY -EAST
Tidal Flat
SEASHORE
Goose Pt
Molasses Point
Whalehouse Point
NATIONAL
FIRE ISLAND
SOUTH BEACH
Robinson Cove
Long Cove
Bellport Dunes
0 2000 feet
Significant Coastal Fish and Wildlife Habitats
Great South Bay - East (In Part)
part 5 of 7
New York State Department of State
Division of Coastal Resources

Appendix B: Patchogue Bay STP Survey 2012

NYSDEC – Shellfish Growing Area Classification Unit

Shellfish Growing Area: 6 – Patchogue Bay

Sewage Treatment Plant Survey

General Information:

Plant Name:	Patchogue Wastewater Treatment Plant	Telephone:	(631)475-4300, (631)475-2740
Address:	6 Hammond St., Patchogue, NY 11772	Email:	*www.patchogue**village**.org/*
Town:	Village of Patchogue, Brookhaven Town	County:	Suffolk
Application ID	**1-4722-00173/00001**	SPDES #:	**NY- 002 3922**
Licensed Operator:	Lawrence Williams		

Plant Visit:

Date of Visit:	6/8/12	Operator Present?	Yes
DEC Personnel:	Paul Harding		
Other Personnel/Agency:	DeStefano/Village of Patchogue		
Others Interviewed:	None		

Plant Information:

Date Constructed:	2011	Degree of Treatment:	3º
Discharges to (Waterbody):	**Patchogue Creek**	Type of Diffuser:	none
Outfall Location offshore: Lat/Long	40* 46' 11" x 73* 01' 39"	Outfall Exit on Shore: Lat/ Long	40* 46' 11" x 73* 01' 39"
Leak Test Method:	Visual	Leak Test Frequency:	Daily
Recent Leak Test Dates:			
Recent Leak Test Findings:			

Sludge Disposal Information:	Hauled to Bergen Point STP 24,000 gpw
Type of Process	STM Aerotor with sludge membrane thickener

Plant Operation:

Maximum Design Volume: (MGD)	0.8 MGD	Plans for Increase:	No
Is Design Volume Exceeded?	No	How Frequently:	N/A

Typical Daily Volume (MGD) Summer:	Wet:	0.22 mgd	Dry:	0.20 mgd
Typical Daily Volume (MGD) Winter:	Wet:	0.22 mgd	Dry:	0.20 mgd
Typical Hourly Volume (MGD) Summer:	Wet:	0.22 mgd	Dry:	0.20 mgd
Typical Hourly Volume (MGD) Winter:	Wet:	0.22 mgd	Dry:	0.20 mgd
Typical Peak Volumes Occur at:	13:00 hrs		and	22:00 hrs

Electric Power Supplied by:	LIPA									
Standby Power	Diesel	None		Diesel		Gas generator		Gas engine		Other
Is standby power adequate for full plant? operation?	Yes	If not, which unit can operate?								
Auto Start	Yes	Manual Start		Frequency of Testing	1/week	Under Load?	y			
Has Bypassing Occurred?	No	Overflow		Leaking		Other				
Date/Location/Duration:	N/A									
Hours Plant is Staffed Each Day:	07:00 to 15:30 hrs	Shift Length:	8 hrs							
Automatic alerts for:	High Water	X	Power Failure	X	Breakdown	X	Other	y		
Which Units:	All tanks									
Connected to:	DPW	Who is Notified:	Operator							

Collection System:

Describe Area Served:	Village of Patchogue
Are there unsewered areas within area served?	Yes

Are septic tank wastes accepted?	No	Approx. % of daily volume?	
Are industrial wastes accepted?	Yes	Approx. % of daily volume?	20
Industrial Customers / Wastes:	Brewery, resturants		
Industrial Waste Pretreatment & Sampling Information:	Village of Patchogue		
Are Sanitary Wastes & Storm Drains combined?	no	Pump Stations & Lines maintained by:	Village of Patchogue
Supervisor / Affiliation	Joe Dean, Superintendant DPW		
Telephone:	631 -475-4300 x 166	Email:	jdean@patchoguevillage.org
If plant is regional, do local customers maintain their own systems?	y	Are maps of collection system available electronically or in GIS format? Provide contact info	Yes
What estuaries do lines travel under or adjacent to on their way to plant?	GSB		
Collection System Leak Test Method:	None	Leak Test Frequency:	
Recent Leak Test Dates:			
Recent Leak Test Findings:			
Estimated % of influent from groundwater intrusion:	2		
Estimated % increase from rainfall infiltration:	7		
Estimated Amount of rainfall which causes overflows:	0		
Known Points of Infiltration/Intrusion:	Man Hole & Pump Station covers		
Usual Points of Overflow:	Man Hole & Pump Station covers		
Other Causes/Locations of Overflow:			
Total # of Pumping Stations:	3	Can Each Station Handle Peak Hourly Flows?	yes
Names / Locations of Stations or contact for further info:	S Ocean Ave, N of Terry St. E Main St., by Post Office Sephton Ave, at W Ave.		

Electrical Power From:	LIPA			Is Standby Power available at all stations?					no
If not, name stations where standby power is available:	Sephton Ave								
Type of Equipment:		Auto Start		Manual Start		Mobile Generator			
Do stations have automatic alerts for:		High Water		Power Failure		Breakdown		Other	
If not all, which stations:									
Where are pump station alarms connected to:	Light & horn			Who is notified:		Police			
List dates of when bypasses/overflows have occurred:	none								

For Combined Sewer Systems:

Are there abatement procedures?	No		
Location of Regulators		Discharges:	
Remarks:	Pumping stations upgrades are underway		

Effluent Quality:

BOD (mg/L)	25			Suspended Solids:	30
Total Coliform (MPN/100ml)	700			Fecal Coliform (MPN/100ml)	200
Testing Agency:	UV			Testing Frequency:	Weekly sampling
Effluent Disinfection system:	Trojan 3000				
Chlorine backup system?	Chlorine Solid HTH				
Disinfection provided:	Yes	Year-round	or	Seasonally, During:	
Disinfection Proportion to Flow:	Y	Automatically	Y	Manually	
Adequate at Peak Hourly?	yes				
If Chlorine is used, provide procedure to assure that disinfection is not interrupted as each tank is emptied:	2 UV tanks				
# tanks used weekly:	1	Supplier:		Frequency of delivery:	
If hypochlorite is used, does feed tank have 36 hour capacity?					
amount used weekly:		Supplier:		Frequency of delivery:	
Effluent residual (mg/L)		Test Method:		Frequency:	
If UV, how often are sources checked?	CONTINOUS	How often are sources changed?		never	
Alarm Systems (check applicable):		None		Low effluent residual	x	Low UV output
	Malfunction of distribution device	x	Malfunction of effluent residual recorder	x	UV malfunction
	Disinfection Container Depletion		Other:		
If equipment malfunctions, can sewage be disinfected?	HTH	At what location?	UV tanks		
Has disinfection ever been interrupted?	no	When?		Duration?	
Does effluent quality & disinfection (residual) meet permit conditions and regulations?	yes				

Additional Comments:	

Stormwater Discharges:

Who maintains the storm drains and catch basins in the sewer district and vicinity?			Patchogue DPW
Supervisor/Contact:	Joe Dean, Superintendant DPW		
Telephone:	631 -475-4300 x 166	Email:	jdean@patchoguevillage.org
List the location of the stormwater discharge points:	Ground water, GSB and Lake		

Appendix D

Groundwater Quality Data Results

GROUNDWATER QUALITY RESULTS

Well S No.	VOC's	Nitrite	Nitrate	Pesticides
S 36145.1	nondetect	0 mg/L	0.3 mg/l	not analyzed
S 49604.1	nondetect	0.012-2 mg/L	9.7-20 mg/L	not analyzed
S 54730.1	nondetect	nondetect	0.1-0.72 mg/L	not analyzed
S 59744.1	nondetect	0-0.007 mg/L	0-0.06 mg/L	nondetect*
S 60486.1	nondetect	nondetect	0-0.02 mg/L	not analyzed
S 66183.1	nondetect	0.25-0.48 mg/L	5.8-6 mg/L	not analyzed
S 66184.1	nondetect	nondetect	nondetect	not analyzed
S 97070.1	nondetect	nondetect	nondetect	not analyzed
S 113812.1	nondetect	0-0.016 mg/L	0-0.088 mg/L	not analyzed

*-Pesticides analyzed include: Hexazinone, Simazine, Prometryn,, Cyanazine, Fonofos, Malathion, <Metolachlor, Diazinon, Atrazine, Alachlor and Acetchlor.

Appendix E

Coastal Assessment Form

Attachment B:

COASTAL FISH & WILDLIFE HABITAT ASSESSMENT FORM

Name of Area:	**Great South Bay-East**
Designated:	**March 15, 1987**
Updated:	**December 15, 2008**
County:	**Suffolk**
Town(s):	**Brookhaven**
7½' Quadrangle(s):	**Bay Shore East, NY; Bellport, NY; Howells Point, NY; Sayville, NY**

Assessment Criteria		**Score**
Ecosystem Rarity (ER)–the uniqueness of the plant and animal community in the area and the physical, structural, and chemical feature supporting this community.		
ER assessment:	The largest protected, shallow, coastal bay in New York State.	**64**
Species Vulnerability (SV) – the degree of vulnerability throughout its range in New York State of a species residing in the ecosystem or utilizing the ecosystem for its survival. (E = Endangered, T = Threatened, SC = Special concern)		
SV assessment:	Piping plover (E, T-Fed), least tern (T), and common tern (T) nesting and feeding areas. Additive division: 36 + 25/2 + 25/4 = 54.75	**54.75**
Human Use (HU) – the conduct of significant, demonstrable, commercial, recreational, or educational wildlife-related human uses, either consumptive or non-consumptive, in the area or directly dependent upon the area.		
HU assessment:	Commercial hard clam industry of statewide significance; sportfishing of statewide significance; waterfowl hunting of county-wide significance. Additive division: 16+16/2 = 24.	**24**
Population Level (PL) – the concentration of a species in the area during its normal, recurring period of occurrence, regardless of the length of that period of occurrence.		
PL assessment:	This area supports one of the largest concentrations of wintering waterfowl in New York State, and population levels of diving ducks are unusual in the northeastern U.S.	**25**
Replaceability (R) – ability to replace the area, either on or off site, with an equivalent replacement for the same fish and wildlife and uses of those same fish and wildlife, for the same users of those fish and wildlife.		
R assessment:	Irreplaceable.	**1.2**

Habitat Index: (ER + SV + HU + PL) = 167.75 **Significance: (HI x R) = 201.3**

NEW YORK STATE
SIGNIFICANT COASTAL FISH AND WILDLIFE HABITAT
NARRATIVE

GREAT SOUTH BAY - EAST

LOCATION AND DESCRIPTION OF HABITAT:

Great South Bay-East is located along the south shore of Long Island, north of Fire Island, in the Town of Brookhaven, Suffolk County (7.5' Quadrangles: Bay Shore East, N.Y.; Sayville, N.Y.; Howells Point, N.Y.; and Bellport, N.Y.). The fish and wildlife habitat is approximately 33,580 acres, and is generally defined by the mean high water elevation on the north and south sides, by the Brookhaven town line to the west, and by the Smith Point Bridge over Narrow Bay to the east. Great South Bay-East includes many locally recognized bay areas, including Nicoll Bay, Patchogue Bay, and Bellport Bay. The Great South Bay-East significant habitat includes the wetlands along Fire Island National Seashore, including along Long Cove, Robinson Cove, Whalehouse Point, Molasses Point, and Goose Point. The bay is bordered on the north and east by dense residential and commercial development, including extensive marina and harbor facilities. Many of the remaining wetland areas along the north shore of Great South Bay-East are owned by the NYSDEC to protect their natural values. Elsewhere, the bay is bordered by federally owned wetlands (Wertheim National Wildlife Refuge), open water, and low density residential development on Fire Island.

A number of benthic habitats make up the bay bottom. Benthic habitat in Great South Bay can be classified as muddy sandflat and sandflat habitats. Much of the bay is shallow open water habitat with salt marshes lining the bay where tidal creeks and rivers feed into the bay from the mainland. Cordgrasses (*Spartina alterniflora* and *S. patens*) dominate the low and high salt marsh, respectively. The bottom substrate of Great South Bay-East is comprised primarily of sand with interspersed estuarine mud patches. These patches extend on the north side of Great South Bay-East from east of Nicoll Bay to Patchogue Bay and are also prominent in Bellport Bay. Submerged aquatic vegetation beds are also present in Great South Bay-East, and are most prevalent along the south shore of the bay along Fire Island and along the north shore in Bellport Bay. The nature of the habitat is highly influenced by three fundamental conditions: freshwater input from ground water, salt water input from the ocean through the Great South Bay inlets, and protection provided by the barrier island.

The bay encompasses a vast area of relatively shallow open water less than 12 feet deep at mean low water. Tidal fluctuations in the bay average approximately 0.7 feet. Great South Bay-East is connected to the ocean by Fire Island Inlet and Narrow Bay. Great South Bay is the only bay on Long Island's south shore that has major riverine input (from the Carmans and Connetquot Rivers). In addition, the bay is unique because it receives possibly as much as 11% of freshwater input directly through its floor.

FISH AND WILDLIFE VALUES:

Great South Bay-East comprises approximately one-half of the largest protected, shallow, coastal bay area in New York State. Two-hundred and ten species, including 43 fish species, and 101 bird species were identified during an intensive survey of Great South Bay in 1997. This broad expanse of open

water is highly productive, and supports a tremendous diversity of fish and wildlife species. Shorebird survey results of Great South Bay-East indicate that an average of 6 breeding pairs (14 in peak year) of piping plover (E, T-Fed) nesting along the bay shores annually from 1993 to 2005. During the same period, least tern (T) and common tern (T) have averaged 23 and 90 breeding pairs, respectively, each year (110 and 540 in respective peak years). Common (T) and least tern (T) nest in large colonies located in sand, gravel, shells, and seaweed above the high tide mark. Piping plovers nest well above the high tide mark in generally grassless sand beaches. The salt marshes, intertidal flats, and shallows in this area provide valuable feeding areas for birds throughout the year, including species nesting in the area and large concentrations of shorebirds during migration. These include green-backed heron, black-crowned night heron, snowy egret, American bittern, Canada goose, mallard, American black duck, gadwall, northern harrier (T), osprey (SC), piping plover (E, T-Fed), least tern (T), common tern (T), herring gull, willet, horned lark, fish crow, marsh wren, red-winged blackbird, sharp-tailed sparrow, and seaside sparrow.

Great South Bay-East is also one of the most important waterfowl wintering areas (November - March) on Long Island, especially for diving ducks, which feed on eelgrass, invertebrates, and small fish. The ten-year period from 1975-1984 indicate average concentrations of over 10,700 birds in the bay each year. Mid-winter aerial surveys of waterfowl abundance from 1986 to 1998 (excluding 1997) for all of Great South Bay indicate average concentrations of over 7,000 birds in the bay each year (18,008 in peak year), including 4,085 greater and/or lesser scaup (15,405 in peak year), 583 American black duck (1,255 in peak year), 417 (common, hooded, and/or red-breasted) merganser (1,025 in peak year), 648 brant (2,260 in peak year), 691 Canada goose (1,285 in peak year), and 314 common goldeneye (990 in peak year), along with lesser numbers of bufflehead, mallard, canvasback, long-tail duck, and American coot. Ground surveys conducted along the shores of Great South Bay-East from 2000-2004 reported an average of 123 hooded merganser (213 in peak year) in the bay, with lesser numbers of red-throated loon, horned grebe, bald pate, green-winged teal, northern shoveller, northern pintail, red-breasted merganser, redhead, canvasback, common goldeneye, Eurasian wigeon, bufflehead, long-tailed duck, ring-necked duck, ruddy shelduck, scoter, Canada goose, and American coot. Dominant concentrations of waterfowl for the aforementioned period included scaup, red-breasted merganser, American black duck, brant, common goldeneye, and Canada goose. Based on these surveys, it appears that Great South Bay-East supports the largest wintering waterfowl concentrations in New York State, and is probably one of the most important areas for diving ducks in the northeastern United States. Waterfowl use of the bay during winter is influenced in part by the extent of ice cover each year. Concentrations of waterfowl also occur in the area during spring and fall migrations (March - April and October - November, respectively). Nearly all of Great South Bay-East is open to the public for waterfowl hunting, but due to the limited amount of emergent wetlands within the bay, hunting pressure is of county-wide significance.

In addition to having significant bird concentrations, Great South Bay-East is an extremely productive area for marine finfish, shellfish, and other wildlife. Much of this productivity is directly attributable to the salt marshes and tidal flats found throughout Great South Bay. Great South Bay-East and its connected freshwater tributaries serve as a major spawning, nursery, migratory, and foraging area (April - November, generally) for winter flounder, northern kingfish, bluefish, blue crab, and forage fish species, such as Atlantic silverside (abundant throughout the bay), striped killifish, mummichog, northern pipefish, weakfish, striped bass, sticklebacks, American eel, and other diadromous fishes. Harbor and grey seals frequently use the bay in the winter. Additionally, 2 loggerhead sea turtles (T, T-Fed) were found stranded in Great South Bay East in 1991.

As a result of the abundant fisheries resources in this area, Great South Bay-East receives heavy recreational fishing pressure, of statewide significance. Winter flounder historically predominated the

sportfishery catch in Great South Bay-East, but in recent years the dominant sportfishery in the bay has been for summer flounder. Portions of the habitat are regarded as "hot spots" for weakfish, scup, and summer flounder. A commercial fishery for Atlantic silverside, killifish, and white perch has been established in the Bellport Bay area. The entire Great South Bay-East area is inhabited by concentrations of hard clams along with local concentrations of American oyster.

In the early and late seventies Great South Bay accounted for approximately 50% of the nation's total hard clam production. After 1979 harvests began to fall and by 1984 it is estimated hard clam landings amounted to 50% of historical peak values. Today, most of the bay waters are certified for shellfishing, with approximately 2,130 acres of permanently closed and 2,300 acres of seasonally closed waters, resulting in a commercial and recreational harvest of statewide significance. Shellfishing in Great South Bay-East is only open to Brookhaven residents. Landings data from the New York State Department of Environmental Conservation for the 11 year period from 1993-2003 indicate an average harvest of 26,960 bushels of hard clams, 33 bushels of soft clams, and 286 bushels of oysters from the bay each year. Landings of mussels, conchs, and razor clams were also reported, but in minimal numbers. An approximately 13,000 acre portion of the bay extending from Nicoll Point to Blue Point and across to Fire Island is privately owned by The Nature Conservancy. Spawning sanctuaries have been established in the bay waters under the ownership of The Nature Conservancy in an effort to restore the once prolific hard clam to the area.

Great South Bay-East encompasses 3,713 acres of submerged rooted aquatic vegetation beds. These beds account for approximately 11% of the entire habitat area. These beds are dominated primarily by eelgrass (*Zostera marina*) with some wigeon grass (*Ruppia maritima*). Submerged aquatic vegetation beds provide spawning and foraging habitat for an array of mollusks, crustaceans, and juvenile fish, as well as diving ducks. The distribution and abundance of benthic species in the bay's eelgrass community is likely controlled by a number of factors that include eelgrass stem density, water temperature and salinity, sediment type, predation, food supply, and human harvest.

IMPACT ASSESSMENT:

Any activities that would degrade water quality, increase turbidity, increase sedimentation, or alter flows, temperature, or water depths would affect the biological productivity of this area. All species would be adversely affected by water pollution, such as chemical contamination (including food chain effects resulting from bioaccumulation), oil spills, excessive turbidity or sediment loading, non-point source run-off, waste disposal (including vessel wastes), and stormwater runoff. Efforts should be made to improve water quality in the bay, including the reduction or elimination of discharges from vessels and upland sources, effective oil and toxic chemical spill prevention and control programs, upgrading of wastewater treatment plants, enactment of pet waste ordinances to reduce coliform contributions to the bay, and the implementation of erosion control and stormwater pollution prevention best management practices. Vegetated upland buffer zones (e.g. wetlands, dunes, and forested areas) should be protected or established to reduce non-point source pollution and sedimentation from upland sources.

Alteration of tidal patterns in Great South Bay-East (e.g., sediment removal by dredging, channelization, bulkheading) would have negative impacts on the biotic communities present. No new navigation channels should be excavated within the area. Dredging to maintain existing boat channels in the bay should be scheduled in between September 15 and December 15 to minimize adverse effects on aquatic organisms. Unregulated dredged material placement in this area would be detrimental to the habitat, but such activities may be designed to maintain or improve the habitat for certain species of wildlife.

Construction of shoreline structures, such as docks, piers, bulkheads, or revetments, in areas not previously disturbed by development (e.g., natural salt marsh, tidal flats, or shallows), would result in the loss of productive areas which support the fish and wildlife resources of Great South Bay-East. Elimination of salt marsh and intertidal areas, through loss of intertidal connection, ditching, excavation, or filling, would result in a direct loss of a valuable habitat. Restoration of previously connected portions of the habitat, including the removal of structures (e.g. bulkheads, groins, jetties) which disrupt natural sedimentation and deposition patterns and physically alter the habitat may be beneficial. Construction of new and maintenance of existing erosion control structures which interfere with natural coastal process should be carefully evaluated for need and where possible, non-structural solutions should be utilized.

Unrestricted use of motorized vessels, including personal watercraft, in shallow waters can have adverse effects on the benthic community, and on fish and wildlife populations through resuspension of seafloor sediments and through shoreline erosion which may reduce water clarity and increase sedimentation. Use of motorized vessels should be controlled (e.g., no wake zone, speed zones, zones of exclusion) in and adjacent to shallow waters and adjacent wetlands. Docks, piers, catwalks, or other structures may be detrimental to submerged aquatic vegetation (SAV) beds through direct or indirect effects from shading, mooring chain scarring, and other associated human uses. Where environmental parameters are appropriate, opportunities for restoration of SAV beds may exist. Any restoration of SAV beds should utilize the best available science and implement proper monitoring protocols.

Thermal discharges, depending on time of year, may have variable effects on use of the area by marine species, such as sea turtles and overwintering waterfowl. Installation and operation of water intakes could have significant impact on juvenile (and adult, in some cases) fish concentrations, through impairment or entrainment. Activities that would enhance migratory, spawning, or nursery fish habitat, particularly where an area is essential to a species' life cycle or helps to restore a historic species population would be beneficial. Where appropriate, hydrological modifications (e.g. dams, dikes, channelization, bulkheading, sedimentation, etc.) should be mitigated or removed, including the rejoining of formerly connected tributaries, and the removal of obstructions or improvements to fish passage.

Nesting birds inhabiting the islands, marshes and barrier beaches of Great South Bay -East are highly vulnerable to disturbance by humans from March 15 through August 15. Significant pedestrian traffic or recreational use (e.g., boat and personal watercraft landing, off-road vehicle use, picnicking) of those areas which contain concentrations of nesting birds could easily eliminate the use of this site as a breeding area and should be minimized during this period. Predation of chicks and destruction of eggs or nests by unleashed pets (e.g., dogs, cats) and natural predators may also occur, and predator control should be implemented where feasible. Fencing and/or annual posting of the bird nesting area should be provided to help protect the nesting bird species.

Activities to protect or restore wetland habitat in Great South Bay -East, consistent with best management practices, (including the restoration of historic tidal regime, planting of native vegetation, control of invasive species, etc.) may enhance habitat values for fish and wildlife species.

HABITAT IMPAIRMENT TEST:

A **habitat impairment test** must be applied to any activity that is subject to consistency review under federal and State laws, or under applicable local laws contained in an approved local waterfront revitalization program. If the proposed action is subject to consistency review, then the habitat protection policy applies, whether the proposed action is to occur within or outside the designated area.

The specific **habitat impairment test** is as follows.

> In order to protect and preserve a significant habitat, land and water uses or development shall not be undertaken if such actions would:
>
> - destroy the habitat; or,
> - significantly impair the viability of a habitat.

Habitat destruction is defined as the loss of fish or wildlife use through direct physical alteration, disturbance, or pollution of a designated area or through the indirect effects of these actions on a designated area. Habitat destruction may be indicated by changes in vegetation, substrate, or hydrology, or increases in runoff, erosion, sedimentation, or pollutants.

Significant impairment is defined as reduction in vital resources (e.g., food, shelter, living space) or change in environmental conditions (e.g., temperature, substrate, salinity) beyond the tolerance range of an organism. Indicators of a significantly impaired habitat focus on ecological alterations and may include but are not limited to reduced carrying capacity, changes in community structure (food chain relationships, species diversity), reduced productivity and/or increased incidence of disease and mortality.

The *tolerance range* of an organism is not defined as the physiological range of conditions beyond which a species will not survive at all, but as the ecological range of conditions that supports the species population or has the potential to support a restored population, where practical. Either the loss of individuals through an increase in emigration or an increase in death rate indicates that the tolerance range of an organism has been exceeded. An abrupt increase in death rate may occur as an environmental factor falls beyond a tolerance limit (a range has both upper and lower limits). Many environmental factors, however, do not have a sharply defined tolerance limit, but produce increasing emigration or death rates with increasing departure from conditions that are optimal for the species.

The range of parameters which should be considered in applying the habitat impairment test include but are not limited to the following:

1. physical parameters such as living space, circulation, flushing rates, tidal amplitude, turbidity, water temperature, depth (including loss of littoral zone), morphology, substrate type, vegetation, structure, erosion and sedimentation rates;

2. biological parameters such as community structure, food chain relationships, species diversity, predator/prey relationships, population size, mortality rates, reproductive rates, meristic features, behavioral patterns and migratory patterns; and,

3. chemical parameters such as dissolved oxygen, carbon dioxide, acidity, dissolved solids, nutrients, organics, salinity, and pollutants (heavy metals, toxics and hazardous materials).

Although not comprehensive, examples of generic activities and impacts which could destroy or significantly impair the habitat are listed in the Impact Assessment section to assist in applying the habitat impairment test to a proposed activity.

KNOWLEDGEABLE CONTACTS:

New York State Department of State
Division of Coastal Resources
Habitat Unit
99 Washington Avenue
Albany, NY 12231
Phone: (518) 474-6000

NYSDEC - Region 1
State University of New York, Building 40
Stony Brook, NY 11790
Phone: (631) 444-0204

NYSDEC
Bureau of Marine Resources
205 N. Belle Meade Road, Suite # 1
East Setauket, NY 11733
Phone: (631) 444-0430

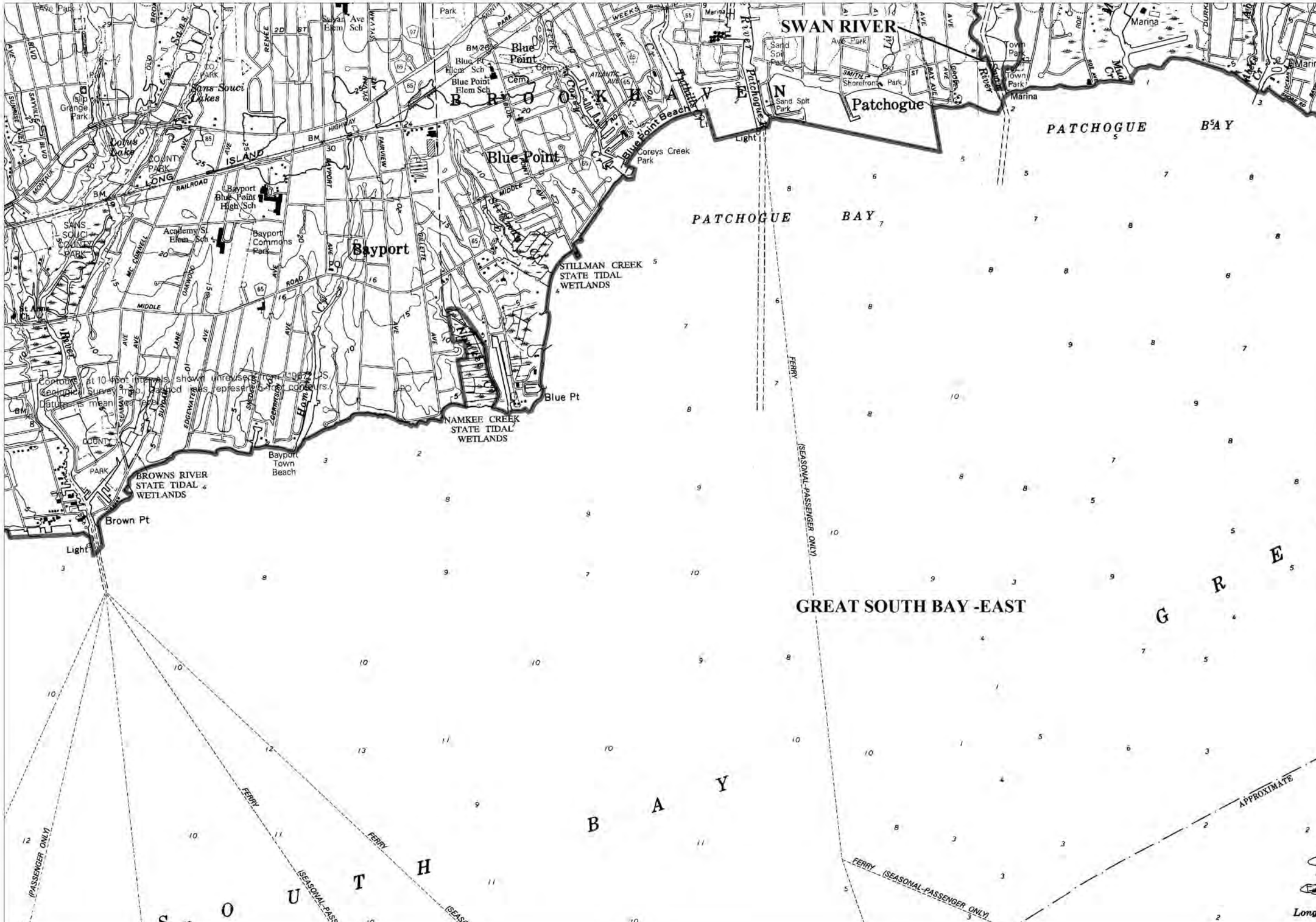
NY Natural Heritage Program
625 Broadway, 5th Floor
Albany, NY 12233
Phone: (518) 402-8935

Department of Planning, Environment and Development
Director, Division of Environmental Protection
Town of Brookhaven
7 Brookhaven Town Offices
3233 Route 112
Medford, NY 11763
Phone: (631) 451-6455

Significant Coastal Fish and Wildlife Habitats

Great South Bay - East (In Part)
part 1 of 7
Connetquot River (In Part)
Great South Bay-West (In Part)

New York State Department of State
Division of Coastal Resources



Significant Coastal Fish and Wildlife Habitats

Great South Bay - East (In Part)
part 2 of 7
Swan River (In Part)

New York State Department of State
Division of Coastal Resources

Significant Coastal Fish and Wildlife Habitats

Great South Bay - East (In Part)
part 3 of 7

Beaverdam Creek (In Part)
Carmans River (In Part)

New York State Department of State

Division of Coastal Resources

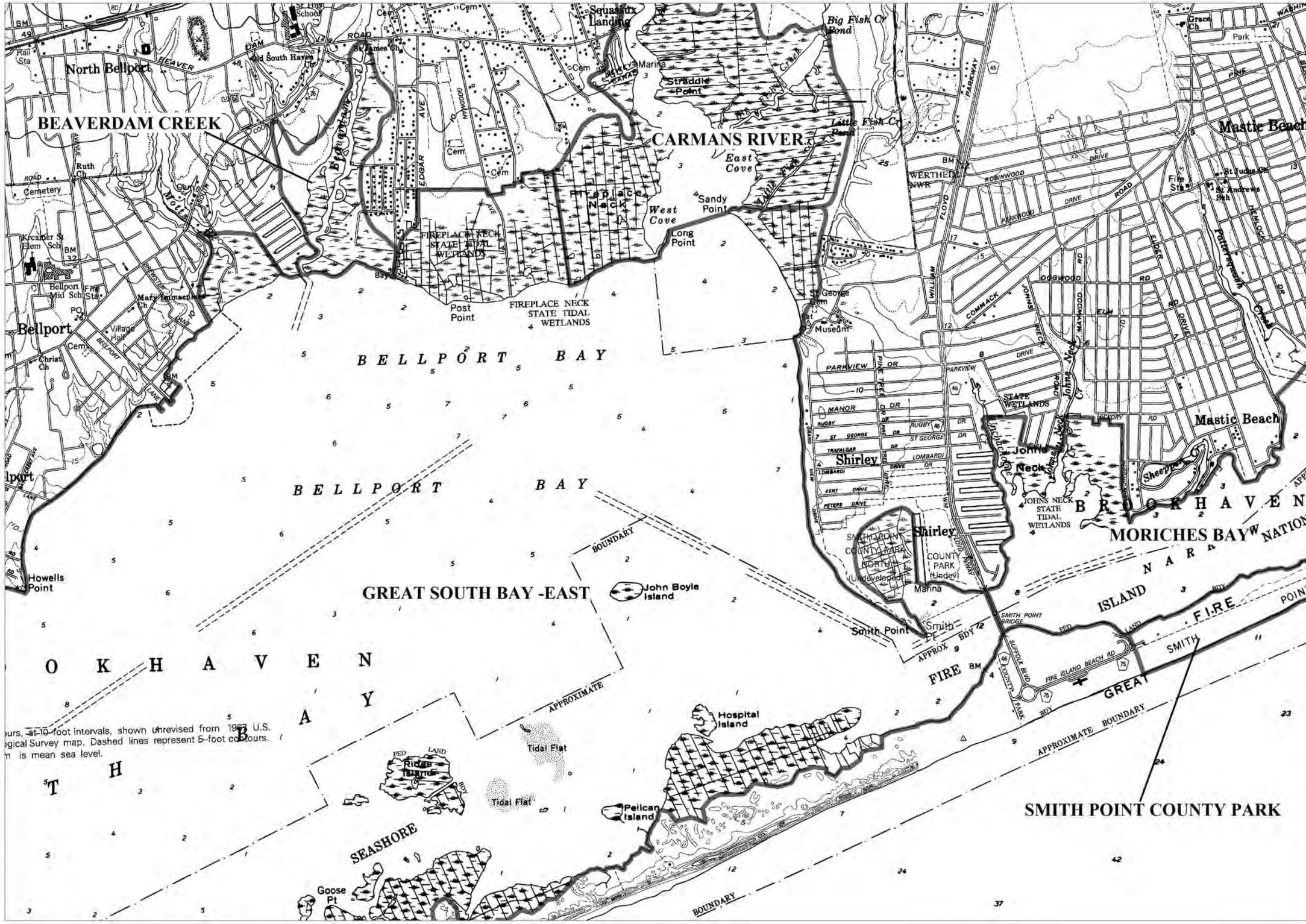
Significant Coastal Fish and Wildlife Habitats

Great South Bay - East (In Part)
part 3 of 7

Beaverdam Creek (In Part)
Carmans River (In Part)

New York State Department of State

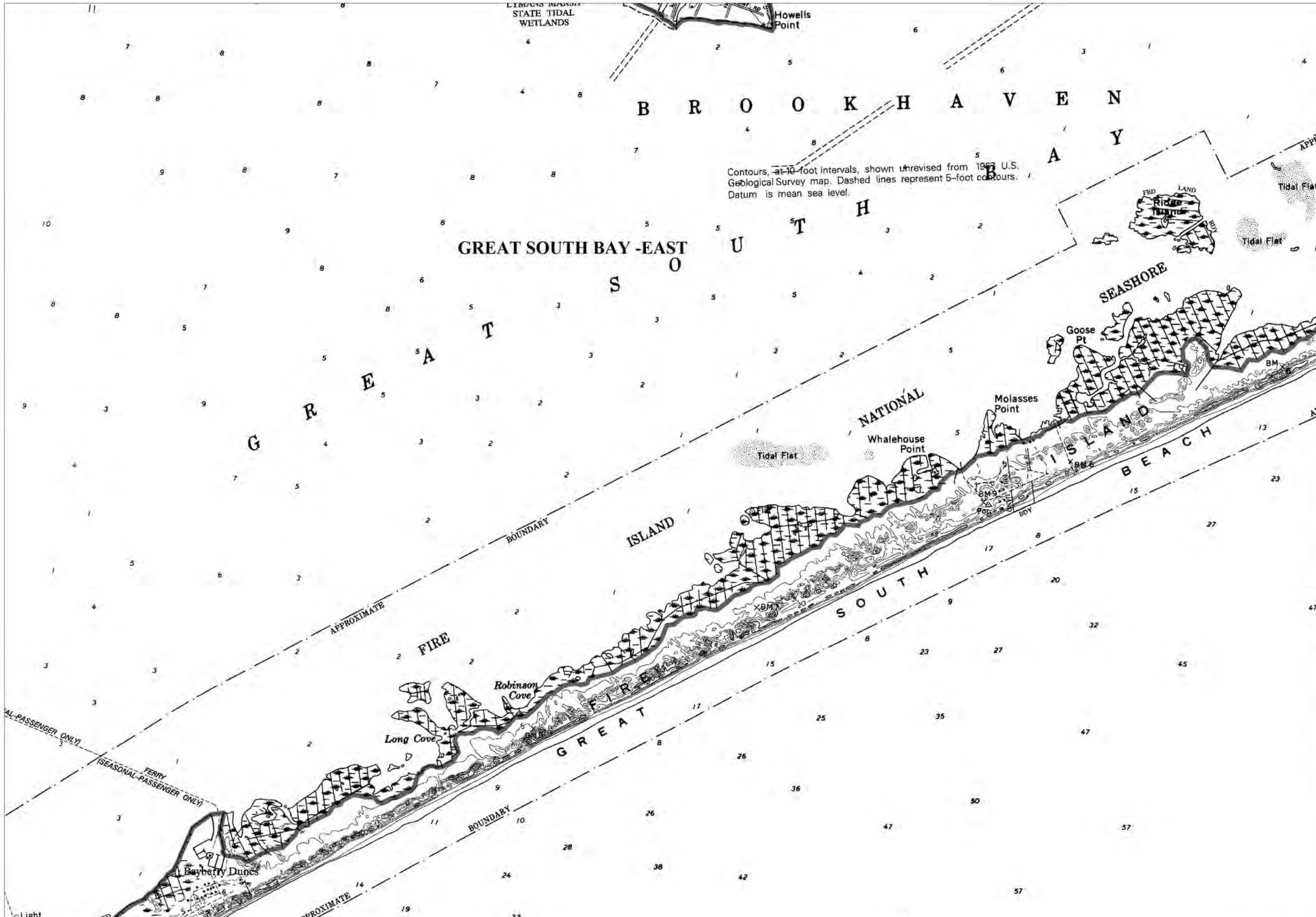
Division of Coastal Resources



Significant Coastal Fish and Wildlife Habitats

Great South Bay - East (In Part)
part 4 of 7
Beaverdam Creek (In Part)
Carmans River (In Part)
Moriches Bay (In Part)

New York State Department of State
Division of Coastal Resources



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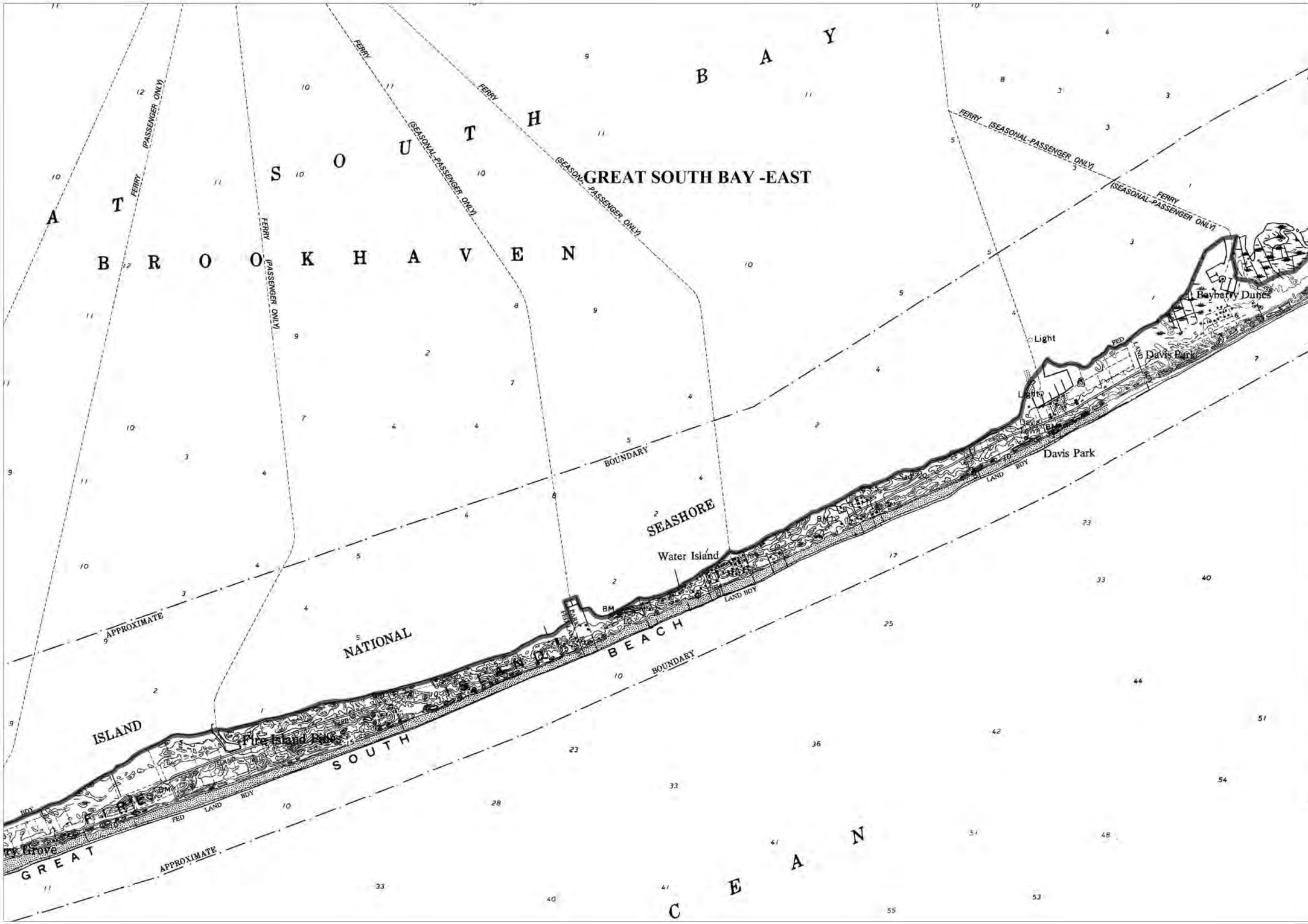
Significant Coastal Fish and Wildlife Habitats

Great South Bay - East (In Part)
part 5 of 7

New York State
Department of State

Division of
Coastal Resources

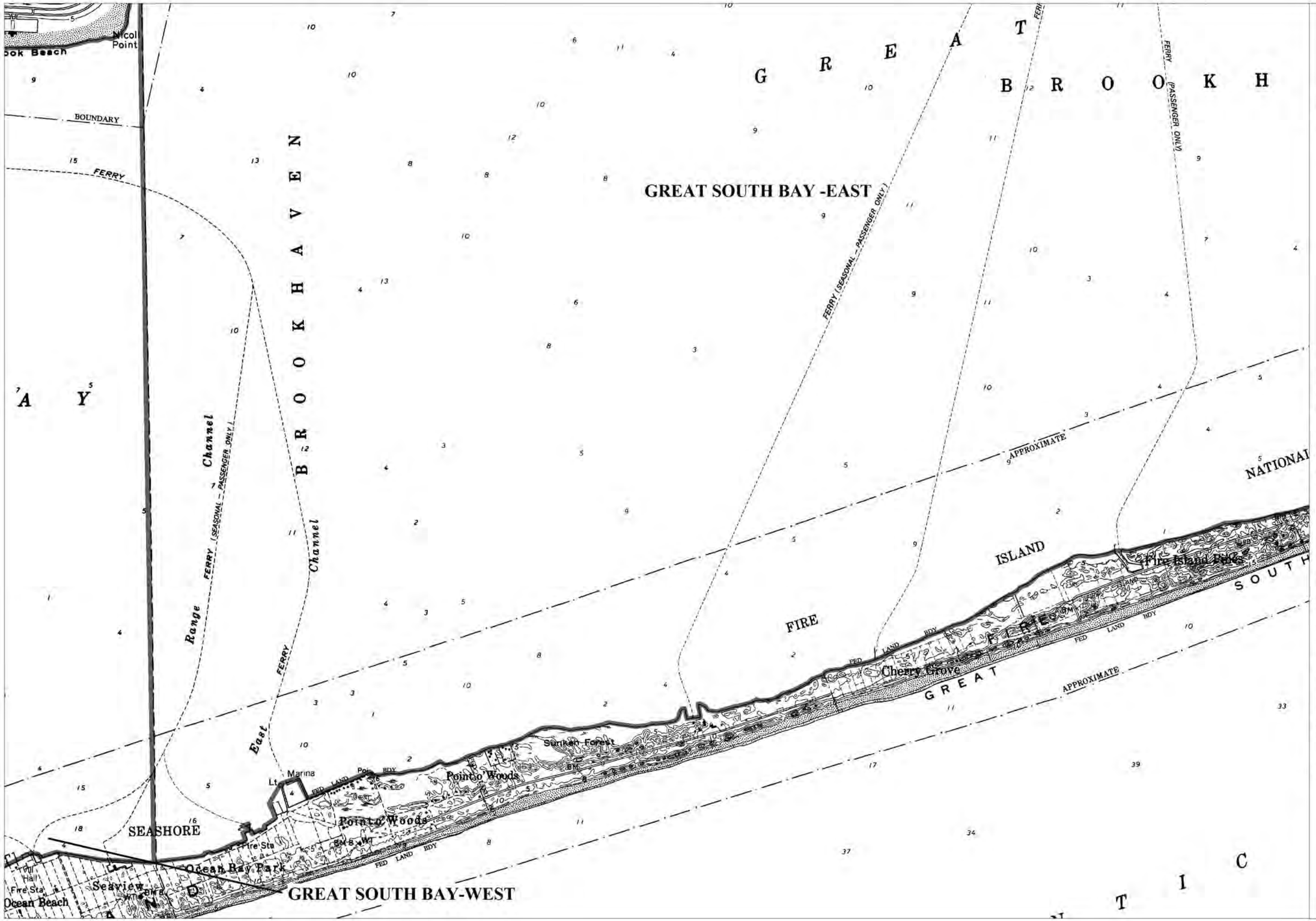


Significant Coastal Fish and Wildlife Habitats

Great South Bay - East (In Part)
part 6 of 7

New York State Department of State

Division of Coastal Resources



Significant Coastal Fish and Wildlife Habitats

Great South Bay - East (In Part)
part 7 of 7
Great South Bay - West (In Part)

New York State Department of State
Division of Coastal Resources

Appendix F

Population Data

ACS Housing Summary

Tuthills Creek Watershed Area
Area: 2.75 square miles

Latitude: 40.77495878
Longitude: -73.0374238

	2008-2012 ACS Estimate	Percent	MOE(±)	Reliability
TOTALS				
Total Population	10,550		590	
Total Households	4,158		191	
Total Housing Units	4,611		222	
OWNER-OCCUPIED HOUSING UNITS BY VALUE				
Total	2,471	100.0%	177	
Less than $10,000	0	0.0%	0	
$10,000 to $14,999	0	0.0%	0	
$15,000 to $19,999	14	0.6%	23	
$20,000 to $24,999	0	0.0%	0	
$25,000 to $29,999	8	0.3%	20	
$30,000 to $34,999	11	0.4%	13	
$35,000 to $39,999	1	0.0%	13	
$40,000 to $49,999	17	0.7%	25	
$50,000 to $59,999	55	2.2%	101	
$60,000 to $69,999	9	0.4%	18	
$70,000 to $79,999	0	0.0%	0	
$80,000 to $89,999	8	0.3%	15	
$90,000 to $99,999	21	0.8%	35	
$100,000 to $124,999	64	2.6%	31	
$125,000 to $149,999	116	4.7%	56	
$150,000 to $174,999	37	1.5%	20	
$175,000 to $199,999	95	3.8%	48	
$200,000 to $249,999	254	10.3%	131	
$250,000 to $299,999	250	10.1%	59	
$300,000 to $399,999	834	33.8%	96	
$400,000 to $499,999	543	22.0%	78	
$500,000 to $749,999	117	4.7%	36	
$750,000 to $999,999	10	0.4%	29	
$1,000,000 or more	6	0.2%	25	
Median Home Value	$332,974		N/A	
Average Home Value	N/A		N/A	
OWNER-OCCUPIED HOUSING UNITS BY MORTGAGE STATUS				
Total	2,471	100.0%	177	
Housing units with a mortgage/contract to purchase/similar debt	1,837	74.3%	156	
Second mortgage only	40	1.6%	21	
Home equity loan only	256	10.4%	64	
Both second mortgage and home equity loan	4	0.2%	20	
No second mortgage and no home equity loan	1,537	62.2%	159	
Housing units without a mortgage	633	25.6%	85	
AVERAGE VALUE BY MORTGAGE STATUS				
Housing units with a mortgage	N/A		N/A	
Housing units without a mortgage	N/A		N/A	

Source: U.S. Census Bureau, 2008-2012 American Community Survey

Reliability: high medium low

January 21, 2015

2014 Esri

ACS Housing Summary

Tuthills Creek Watershed Area
Area: 2.75 square miles

Latitude: 40.77495878
Longitude: -73.0374238

	2008-2012 ACS Estimate	Percent	MOE(±)	Reliability
RENTER-OCCUPIED HOUSING UNITS BY CONTRACT RENT				
Total	1,687	100.0%	164	
With cash rent	1,671	99.1%	164	
Less than $100	0	0.0%	0	
$100 to $149	11	0.7%	20	
$150 to $199	0	0.0%	0	
$200 to $249	14	0.8%	15	
$250 to $299	22	1.3%	36	
$300 to $349	29	1.7%	16	
$350 to $399	11	0.7%	21	
$400 to $449	9	0.5%	15	
$450 to $499	0	0.0%	0	
$500 to $549	17	1.0%	91	
$550 to $599	0	0.0%	0	
$600 to $649	0	0.0%	0	
$650 to $699	0	0.0%	0	
$700 to $749	0	0.0%	0	
$750 to $799	20	1.2%	24	
$800 to $899	93	5.5%	52	
$900 to $999	69	4.1%	47	
$1,000 to $1,249	575	34.1%	111	
$1,250 to $1,499	350	20.7%	74	
$1,500 to $1,999	365	21.6%	75	
$2,000 or more	85	5.0%	80	
No cash rent	17	1.0%	29	
Median Contract Rent	$1,235		N/A	
Average Contract Rent	N/A		N/A	
RENTER-OCCUPIED HOUSING UNITS BY INCLUSION OF UTILITIES IN RENT				
Total	1,687	100.0%	164	
Pay extra for one or more utilities	1,629	96.6%	163	
No extra payment for any utilities	58	3.4%	40	
HOUSING UNITS BY UNITS IN STRUCTURE				
Total	4,611	100.0%	222	
1, detached	2,294	49.8%	156	
1, attached	145	3.1%	31	
2	83	1.8%	51	
3 or 4	304	6.6%	85	
5 to 9	390	8.5%	85	
10 to 19	666	14.4%	99	
20 to 49	461	10.0%	120	
50 or more	268	5.8%	47	
Mobile home	0	0.0%	0	
Boat, RV, van, etc.	0	0.0%	0	

Source: U.S. Census Bureau, 2008-2012 American Community Survey

Reliability: high medium low

January 21, 2015

ACS Housing Summary

Tuthills Creek Watershed Area
Area: 2.75 square miles

Latitude: 40.77495878
Longitude: -73.0374238

	2008-2012 ACS Estimate	Percent	MOE(±)	Reliability
HOUSING UNITS BY YEAR STRUCTURE BUILT				
Total	4,611	100.0%	222	
Built 2010 or later	9	0.2%	13	
Built 2000 to 2009	459	10.0%	95	
Built 1990 to 1999	546	11.8%	84	
Built 1980 to 1989	382	8.3%	65	
Built 1970 to 1979	1,209	26.2%	156	
Built 1960 to 1969	935	20.3%	129	
Built 1950 to 1959	534	11.6%	104	
Built 1940 to 1949	197	4.3%	85	
Built 1939 or earlier	340	7.4%	67	
Median Year Structure Built	1972		N/A	
OCCUPIED HOUSING UNITS BY YEAR HOUSEHOLDER MOVED INTO UNIT				
Total	4,158	100.0%	191	
Owner occupied				
Moved in 2010 or later	53	1.3%	36	
Moved in 2000 to 2009	1,045	25.1%	162	
Moved in 1990 to 1999	611	14.7%	104	
Moved in 1980 to 1989	303	7.3%	48	
Moved in 1970 to 1979	171	4.1%	40	
Moved in 1969 or earlier	288	6.9%	57	
Renter occupied				
Moved in 2010 or later	221	5.3%	41	
Moved in 2000 to 2009	1,252	30.1%	165	
Moved in 1990 to 1999	196	4.7%	45	
Moved in 1980 to 1989	17	0.4%	13	
Moved in 1970 to 1979	2	0.0%	9	
Moved in 1969 or earlier	0	0.0%	0	
Median Year Householder Moved Into Unit	2002		N/A	
OCCUPIED HOUSING UNITS BY HOUSE HEATING FUEL				
Total	4,158	100.0%	191	
Utility gas	1,187	28.5%	121	
Bottled, tank, or LP gas	26	0.6%	21	
Electricity	758	18.2%	97	
Fuel oil, kerosene, etc.	2,163	52.0%	153	
Coal or coke	0	0.0%	0	
Wood	7	0.2%	8	
Solar energy	0	0.0%	0	
Other fuel	12	0.3%	14	
No fuel used	6	0.1%	17	

Source: U.S. Census Bureau, 2008-2012 American Community Survey

Reliability: high medium low

January 21, 2015

ACS Housing Summary

Tuthills Creek Watershed Area
Area: 2.75 square miles

Latitude: 40.77495878
Longitude: -73.0374238

	2008-2012 ACS Estimate	Percent	MOE(±)	Reliability
OCCUPIED HOUSING UNITS BY VEHICLES AVAILABLE				
Total	4,158	100.0%	191	
Owner occupied				
No vehicle available	110	2.6%	45	
1 vehicle available	615	14.8%	131	
2 vehicles available	1,079	25.9%	118	
3 vehicles available	355	8.5%	67	
4 vehicles available	238	5.7%	76	
5 or more vehicles available	73	1.8%	37	
Renter occupied				
No vehicle available	258	6.2%	78	
1 vehicle available	823	19.8%	102	
2 vehicles available	472	11.4%	83	
3 vehicles available	119	2.9%	93	
4 vehicles available	15	0.4%	24	
5 or more vehicles available	0	0.0%	0	
Average Number of Vehicles Available	1.8		0.1	

Data Note: N/A means not available.

2008-2012 ACS Estimate: The American Community Survey (ACS) replaces census sample data. Esri is releasing the 2008-2012 ACS estimates, five-year period data collected monthly from January 1, 2008 through December 31, 2012. Although the ACS includes many of the subjects previously covered by the decennial census sample, there are significant differences between the two surveys including fundamental differences in survey design and residency rules.

Margin of error (MOE): The MOE is a measure of the variability of the estimate due to sampling error. MOEs enable the data user to measure the range of uncertainty for each estimate with 90 percent confidence. The range of uncertainty is called the confidence interval, and it is calculated by taking the estimate +/- the MOE. For example, if the ACS reports an estimate of 100 with an MOE of +/- 20, then you can be 90 percent certain the value for the whole population falls between 80 and 120.

Reliability: These symbols represent threshold values that Esri has established from the Coefficients of Variation (CV) to designate the usability of the estimates. The CV measures the amount of sampling error relative to the size of the estimate, expressed as a percentage.

High Reliability: Small CVs (less than or equal to 12 percent) are flagged green to indicate that the sampling error is small relative to the estimate and the estimate is reasonably reliable.

Medium Reliability: Estimates with CVs between 12 and 40 are flagged yellow—use with caution.

Low Reliability: Large CVs (over 40 percent) are flagged red to indicate that the sampling error is large relative to the estimate. The estimate is considered very unreliable.

Source: U.S. Census Bureau, 2008-2012 American Community Survey

Reliability: high medium low

January 21, 2015

2014 Esri

Appendix G

Open Space Acquisitions

Parcels for Consideration of Acquisition Utilizing Open Space Funds
(Preservation Only)

DISTRICT	SECTION	BLOCK	LOT	ACREAGE
204	300	100	11003	0.47
204	300	100	23000	0.14
204	300	100	8000	0.12
204	300	100	9000	0.02
204	300	100	14000	0.14
204	300	100	32000	1.91
204	300	100	5000	0.43
204	300	100	3000	0.03
204	300	100	6000	0.04
204	300	100	19000	0.27
204	300	100	31000	0.05
204	300	100	16000	0.28
204	800	200	37000	0.34
204	800	200	36004	0.62
204	800	200	58000	0.29
204	800	200	12001	0.42
200	97520	300	35000	0.01
204	800	200	57000	1.48
200	97520	300	49000	0.15
200	97300	100	7025	0.55
200	97520	300	51000	0.02
200	97520	300	54001	0.12
200	97520	300	50000	0.04
200	97520	300	48000	0.28
204	300	100	37000	1.66

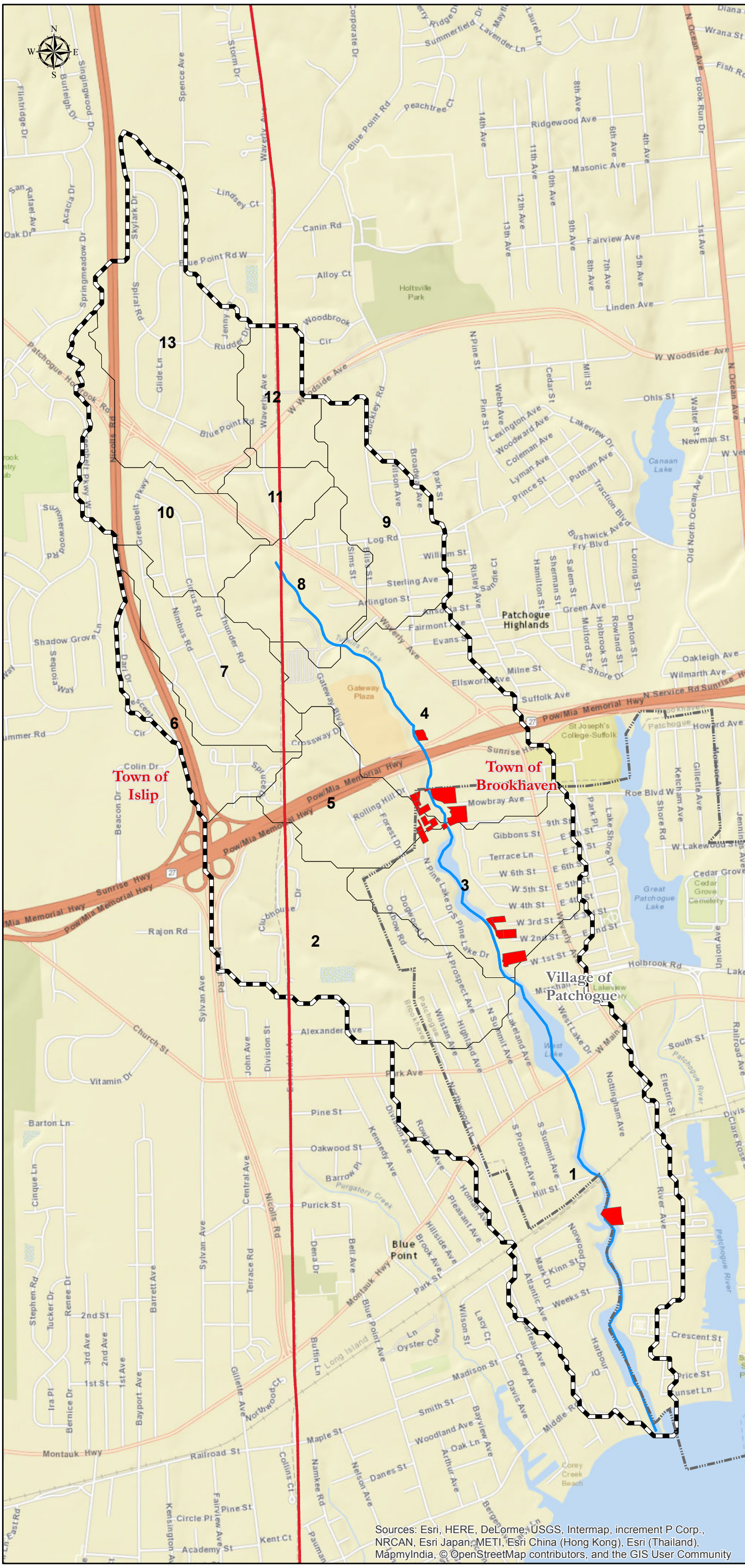
Town of Brookhaven
and
New York Department of State

TUTHILLS CREEK WATERSHED MANAGEMENT PLAN

APPENDIX G

OPEN SPACE AQUISITIONS MAP

SOURCE: Suffolk County Real Property;
ESRI Web Mapping Service
SOURCE DATE: 2014



Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Legend

- Tuthills Creek Watershed
- Tuthills Creek Subwatersheds
- Tuthills Creek
- Town Boundary
- Village Boundary
- Open Space Acquisitions

1 inch = 1,500 feet

0 750 1,500 3,000 Feet

Nelson, Pope & Voorhis, LLC
Environmental Planning & Consulting

Appendix H

Septic System Upgrade Case Studies

ALBEMARLE REGION, NORTH CAROLINA

PROBLEM

Rivers and streams of the Albemarle Region of North Carolina are nutrient-sensitive and require nutrient input controls such as upgrades for wastewater treatment plants and septic systems. Both strategies are being pursued by state and local officials. Much of the area is unsuitable for conventional gravity-flow individual systems due to low-permeability clay soils and high water tables. In past decades, these limitations prompted the extensive use of sand-lined trench leaching systems in the region. A 1991 study found that 30% of those systems were malfunctioning and posing risks to groundwater and surface water quality.

SOLUTION

Local governments authorized a regional management entity to inventory and monitor individual wastewater systems, improve system management, and develop site-specific design criteria for new and replacement systems incorporating advanced treatment technologies.

Albemarle Environmental Health Department
P.O. Box 1899
Elizabeth City, NC 27909

CONTACT
Ralph Hollowell, Director
p: (252) 338-4490
e: rhollowell@arhs-nc.org

OVERVIEW

Individual wastewater system malfunctions, water quality risks, and the explosive growth experienced in the Albemarle Region prompted 11 North Carolina counties to form the Albemarle Septic Management Entity (ASME) in 1993. ASME has instituted a management program that consists of:

- **Routine inspections**
- **Use of advanced treatment system designs for difficult site conditions**
- **Maintenance contract requirements and reminders**
- **Operating permit requirements for advanced units**
- **Alternating drainfields and reserve areas**

MAINTENANCE AND INSPECTION AGREEMENTS

ASME oversees individual and clustered systems in an 11-county area. ASME requires owners of all advanced and innovative systems to enter into inspection and maintenance agreements with the program. In addition, ASME requires that all repaired or replaced systems be included in the system management service area.

ASME works with low-income system owners to identify grant and low-interest loan funding to address repairs and replacements for problem systems using a combination of Community Development Block Grants, the North Carolina Clean Water Trust, and other sources.

ASME inspects systems in its jurisdiction at least annually. The system owner must complete all repair and maintenance activities. If an owner fails to make repairs, ASME is authorized to make the needed repairs and bill the owner and, if needed, place a lien on the property until payment is secured.

OPERATING PERMITS FOR ADVANCED SYSTEMS

ASME allows the use of advanced pressure-dosed systems, which incorporate fixed aerobic film and/or suspended growth pretreatment followed by soil absorption. Advanced systems require an operating permit. The local health department issues operating permits in accordance with state and local rules.

FUNDING SOURCES

The annual budget for the ASME wastewater program is $290,000. The program is sustained through its $300 per home permit fees, annual $50 system inspection fees, and county funds.

RESULTS

Local officials note that the management entity has prevented system malfunctions through more rigorous design, inspection, and operation/maintenance requirements. In the early 1990s, estimates of system malfunctions ranged as high as 30%. During 2007–2008, the program inspected 2,153 of the 4,240 systems under its management purview, and fewer than five of the newly installed systems were found to be malfunctioning.

New system installations and increasing the number of properly functioning systems through inspections will help to reduce nutrient pollution in the Albemarle watershed.

References and Resources

Hollowell, R. 2001. The Public Management Entity Program: Albemarle Regional Health Service. 2001 National Onsite Wastewater Recyclers Association Meeting, Preconference Workshop; Virginia Beach, VA.

Hughes J., and Simonson, A. 2005. Government Financing for Onsite Wastewater Treatment Facilities in North Carolina. **www.sog.unc.edu/pubs/electronicversions/pg/pgfal05/article4.pdf**.

FAIRFAX COUNTY, VIRGINIA

PROBLEM

During the past three decades, the population of Fairfax County has grown to more than one million people. With sanitary sewers at or near capacity, the number of individual wastewater systems began to multiply, eventually rising to more than 24,000. Inappropriately sited, improperly designed, and/or poorly managed individual systems have the potential to contribute to the pollution and degradation of the county's 900 miles of perennial and intermittent streams and a number of freshwater lakes and ponds.

SOLUTION

Fairfax County adopted an ordinance requiring routine pumping of septic tanks every five years and alternating drainfields and drainfield reserve areas to ensure system performance.

Onsite Sewage and Water
Division of Environmental Health
Fairfax County Health Department
10777 Main Street
Fairfax, VA 22030

CONTACT
John Milgrim
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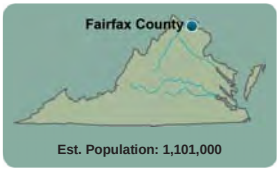
e: hdonsite@fairfaxcounty.gov



OVERVIEW

Fairfax County's decentralized wastewater management program has evolved since the first measures to improve onsite treatment were enacted in 1928. The program now includes:

- **A treatment system inventory and database**
- **Requirements for alternating drainfields and reserve areas**
- **Tank pump-outs at least once every five years, and pump-out manifests provided to the county health department**

ALTERNATING DRAINFIELDS AND RESERVE AREA

The Fairfax County Health Department issues permits and provides inspections and evaluations for new and existing individual wastewater system repairs and expansions. All new and repaired systems are designed with a flow diversion valve to allow portions of the drainfield to dry out; this improves treatment and avoids soil saturation problems. A suitable reserve area is required in the event that the system needs to be repaired or replaced.

FIVE-YEAR PUMP-OUT AND MANIFEST SYSTEM

An ordinance specifies that septic tanks must be pumped every five years. The service provider and the system owner both provide copies of the pump-out manifests to the county health department which tracks maintenance. The information is maintained in a database and is used to track compliance with the local ordinance. The database generates five-year pump-out reminder notices that the Health Department mails to system owners. The health department also offers $200 individual system inspections if required by a mortgage lender at the time of property transfer.

FUNDING SOURCES

Fairfax County sustains its annual $1.5 million onsite program through user fees and dedicated funds. The fees cover approximately 30% of the program costs. The remainder is financed through dedicated state and local funds.

RESULTS

A recent study found that the average malfunction rate for systems in the county was only 2.1% of the 15,401 systems reviewed. In addition, many systems thought to have outlived their life expectancy are still functioning satisfactorily.

The creation of a database for system inventory has allowed the county to track septic tank pump-outs and categorize all systems according to system type, greatly assisting the enforcement of existing codes and regulations. The use of alternating drainfields has increased the average lifespan of sewage disposal systems.

The five-year pump-out requirement has resulted in better maintained systems and the identification of system malfunctions that would otherwise go undetected. As a result of these measures, fewer owners are facing costly major repairs or system replacements.

Through its program, Fairfax County now better understands and manages its many onsite systems even in light of a fast-growing population.

References and Resources

Fairfax County Stream Quality Assessment Program. **www.fairfaxcounty.gov/dpwes/stormwater/streams/assessment.htm**.

Fairfax County, Virginia. 2008. Environmental Improvement Program (EIP) Section E: Fact Sheets. Fiscal Year 2010. **www.fairfaxcounty.gov/living/environment/eip/2010eip/factsheets.pdf.**

Hill, D. 1999. Onsite Waste Management—A Case Study, Fairfax, Virginia. **www.nesc.wvu.edu/nodp/pdf/ffva.pdf**.

The National Onsite Demonstration Program (NODP). Phase 4 Final Report. **www.nesc.wvu.edu/nodp/nodp_index.htm**.

Population data—Census Bureau, State and County QuickFacts, Fairfax County, 2011. **http://quickfacts.census.gov/qfd/states/51/51059.html**

JAMESTOWN, RHODE ISLAND

PROBLEM

Jamestown is a small, island town dependent on private drinking water wells and individual wastewater systems. Poorly maintained onsite wastewater systems on undersized lots with high seasonal water tables were affecting groundwater quality. Studies revealed that 32% of the wastewater treatment systems in the area were contributing to nutrient and pathogen problems in private water wells (Legislative Press and Public Information Bureau, 2006).

SOLUTION

Jamestown adopted an ordinance requiring routine inspections of individual wastewater systems. A High Groundwater Table District also guides future development to protect drinking water quality.

Town of Jamestown
44 Southwest Avenue
Jamestown, RI 02835
www.jamestownri.net

CONTACT
Justin Jobin
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e: justin@justinjobin.com

OVERVIEW

Jamestown is located on a small island situated in the middle of Narragansett Bay in Rhode Island. It is approximately nine miles long and one mile wide. In 2001, Jamestown passed an ordinance to better accommodate growth and manage individual wastewater systems to protect its fresh water supplies. The program consists of:

- **Routine inspections**
- **Maintenance reminders**
- **Web-based system database**
- **Siting and installation rules**
- **Designation of a High Groundwater Table District**

MAINTENANCE INSPECTIONS AND WEB-BASED TRACKING

Jamestown's program provides a framework for the inspection, maintenance, and repair of individual wastewater systems. The town conducted an initial round of inspections in 2003 aimed at identifying and evaluating the condition of 1,608 individual systems. Jamestown then began a routine maintenance inspection program in 2006 under which systems are inspected every three or five years based on size, type of system, and water use. Inspectors record the inspection information in the town's web-based database. The town has the authority to pump tanks at the owner's expense and, if necessary, can place liens on property for failure to reimburse the town for the pump-out.

HIGH GROUNDWATER OVERLAY ZONE AND IMPERVIOUS LAYER DISTRICT

Jamestown adopted a High Groundwater Overlay Zone and Impervious Layer District Ordinance in 2003. The ordinance applies to designated areas in the town that have substandard-sized lots served by private wells. Provisions of the ordinance include a total impervious surface area limit of 15% (calculated for individual lots and excluding wetlands), a requirement to control runoff volume—using low-impact techniques—to maintain predevelopment infiltration for a 25-year storm, and a mandate to use advanced wastewater treatment technologies capable of 50% nitrogen removal.

FUNDING SOURCES

Jamestown's program is funded through an annual user fee of $30 paid by system owners. The fee funds the town's part-time wastewater management specialist.

RESULTS

- **To date, 94% of all septic systems have had an initial maintenance inspection.**
- **Of the systems inspected:**
  - **35 failed (2%)**
  - **85 (5%) were found to be substandard systems (e.g., cesspools, systems with steel tanks)**
  - **1,488 passed (93%)**
- **Since 2003, 50 systems have been subject to repair/replacement actions initiated by the town.**

Property owners are responsible for ensuring that their system is operating properly and that it is maintained in good repair. Systems that do not meet applicable performance requirements can be subject to a repair or replacement order. Addressing malfunctioning systems helps to reduce nitrogen and pathogen pollution that pose threats to Jamestown's drinking water sources.

References and Resources

Jamestown Source Water Assessment and Wastewater Needs Analysis. University of Rhode Island Cooperative Extension. **http://www.uri.edu/ce/wq/RESOURCES/dwater/Assessments/PDFs/James_Chapters%203,4.pdf.** Accessed August 9, 2010.

Legislative Press and Public Information Bureau. 2006. Senate passes Paiva Weed bill stemming from Jamestown well contamination. State of Rhode Island, General Assembly. Providence, RI.

Rhode Island Department of Environmental Management. 2008. Rules Establishing Minimum Standards Relating to Location, Design, Construction, and Maintenance of Onsite Wastewater Treatment Systems. Town of Jamestown. High Groundwater Ordinance. **www.jamestownri.net plan/hgwt.html.** Accessed March 31, 2010.

Population data—Town of Jamestown, Rhode Island. **http://www.jamestownri.net/**

KEUKA LAKE WATERSHED, NEW YORK

PROBLEM

Approximately 20,000 residents in the Keuka Lake watershed rely on groundwater and the lake for their drinking water. Nearly all of the residents in the watershed also depend on individual wastewater systems that are densely positioned and that discharge to the soil for treatment. However, testing revealed that poorly maintained individual onsite systems were contributing excessive levels of bacteria to the lake and contaminating drinking water wells.

SOLUTION

Eight municipalities formed a regional watershed cooperative that implemented a uniform permitting and inspection program to identify and repair or replace malfunctioning treatment systems. As a result, Keuka Lake's water quality ranks among the highest of the water bodies in the Finger Lakes region.

Keuka Watershed Improvement Cooperative
1 Keuka Business Park
Penn Yan, NY 14527
www.keukawatershed.com

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e: bauterp@gmail.com

OVERVIEW

In 1994, eight municipalities—Barrington, Jerusalem, Hammondsport, Milo, Penn Yan, Pulteney, Urbana, and Wayne—bordering Keuka Lake formed the Keuka Watershed Improvement Cooperative (KWIC) to better manage individual and decentralized wastewater systems in the region. KWIC has instituted a management program that consists of:

- **Uniform regional ordinances**
- **System inspection requirements based on health and environmental risk factors**
- **Maintenance contract requirements for mechanized units**
- **Operating permit requirements for new or modified systems**

ROUTINE INSPECTIONS AND MAINTENANCE CONTRACTS

Municipalities participating in the KWIC program must adopt a uniform wastewater management ordinance and hire a coordinator to inspect treatment systems in their communities. All 3,000 wastewater systems within 200 feet of Keuka Lake or its tributaries are inspected at least once every five years. Inspection reports are filed with KWIC. Aerobic and advanced treatment systems are inspected annually, at which time the system owner must show evidence of an active maintenance contract. Systems are also inspected when property is sold.

The regional ordinances require a KWIC operating permit for all new or modified individual wastewater systems. A system that is malfunctioning must be repaired to meet specific performance requirements. Additionally, KWIC could require the system owner to upgrade or replace the malfunctioning system using the best available technology.

KWIC utilizes a computerized database to track inspections and system compliance. KWIC reviews lake water quality information and evaluates the performance of advanced systems. KWIC's enforcement authority includes fines and compliance timetables in addition to corrective actions.

FUNDING SOURCES

The KWIC program is financed by permit fees and dedicated funds from each municipality's budget. The program's annual budget is $70,000.

RESULTS

Water quality monitoring results indicate very good lake conditions, though runoff from stormwater and agricultural sources after storm events can result in high bacteria levels. The relatively clear water in the lake contains low nutrient levels and supports excellent fisheries. Monitoring results from 2005–2009 show lake water quality improving or holding steady for nearly all parameters. The local lake association attributes this progress, in part, to the septic system inspection program.

References and Resources

Keuka Lake Association. 2001. Phase II, Keuka Lake Sewage Study. **www.keukalakeassoc.org**.

Landre, P. 1995. The creation of Keuka Lake's Cooperative Watershed Program. Clearwaters Magazine, Summer 1995, 28-30.

Smith, J.C. 1995. Protecting and Improving the Waters of Keuka Lake. Clearwaters Magazine, Summer 1995, 32-33.

Population data—Keuka Lake Association. **http://www.keukalakeassoc.org/**