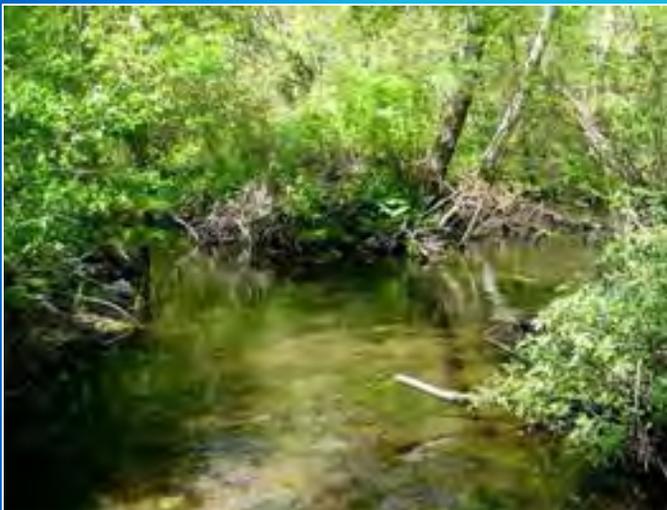


# Town of Islip

## GREEN'S CREEK AND BROWN'S RIVER WATERSHED MANAGEMENT PLAN



*January 2007*



PHIL NOLAN  
Supervisor

JOSEPH A. DeVINCENT  
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OFFICE OF THE SUPERVISOR

January 2007

Dear Interested Party:

The Town Board is pleased to present the Green's Creek/Brown's River Watershed Management Plan. The document was prepared for the New York State Department of State Division of Coastal Resources with funds provided under Title II of the Environmental Protection Fund. This study analyzed the various sources of pollutants that affect the water quality of these watersheds. The plan recommends that the Town of Islip enter into a collaborative effort with the Federal, State and County agencies to address the problems that have been identified. This long term program also relies on the commitment of the local residents who will benefit from the improvements to the environment.

It is hoped that the techniques that will be employed along the stream corridors will ultimately make a difference in the health and vitality of the Great South Bay. The South Shore Estuary Reserve Comprehensive Management Plan has established goals to improve the ecology of the bay and the Watershed Management Plans are an important component of this larger objective.

The tasks that are outlined in the plan are quite formidable and ambitious, but necessary, in order to preserve the quality of life that is valued by all Town of Islip residents.

Very truly yours,

PHIL NOLAN  
Supervisor

**FINAL**

**Town of Islip**

**GREEN'S CREEK AND  
BROWN'S RIVER  
WATERSHED MANAGEMENT PLAN**

Submitted to:  
**THE TOWN OF ISLIP**

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**January 2007**

This report was prepared for the New York State Department of State Division of Coastal Resources with funds provided under Title 11 of the Environmental Protection Fund.

## **Acknowledgements**

The Green's Creek and Brown's River Watershed Management Plan was prepared by the diligent efforts of the following government officials, agencies, community advisors and consultants.

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## **EXECUTIVE SUMMARY**

This Watershed Management Plan (WMP) focuses on Green's Creek and Brown's River in the Town of Islip, Suffolk County, New York. Green's Creek and Brown's River are tributaries to the Great South Bay portion of the South Shore Estuary Reserve (SSER). The WMP characterizes the natural resources, habitats, and environment of the watersheds, identifies water quality and living resource impairments, recommends actions to protect the watersheds from further degradation, and develops a strategy to restore the watersheds. The plan also forms a framework to guide future decisions and provides a point of reference by which progress can be measured.

The overall goal of this WMP is the protection, restoration, and enhancement of water quality and living resources in Green's Creek and Brown's River.

For the Green's Creek and Brown's River corridors, the specific goals that will aid in achieving the overall goal are:

- Improve the water quality in the Green's Creek and Brown's River watersheds
- Improve the ecological health in the Green's Creek and Brown's River watersheds
- Enhance the eligibility of the watersheds for funding through participation in partnerships in regional environmental initiatives

Section 2, *Watershed Characterization*, includes review of the geographic setting, examination the water quality classifications, identification of the existing drainage infrastructure and connectivity and an outline of the municipal jurisdictions within the watersheds. Section 3, *Protection and Management Recommendations*, includes recommendations and actions that, if undertaken, can improve watershed habitat, increase community watershed knowledge, and reduce pollutant sources and levels. Section 4, *Pollutant Load Analysis and Restoration Actions*, includes analysis of pollutant loads from surface runoff at each outfall, recommendations for improvements and identification of specific target projects and actions. The final section, *Implementation Strategies*, identifies coordination efforts required, new codes, revisions to existing

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policies and programs, and sources of funding necessary to implement the proposed actions and recommendations.

In order to advance the WMP's goals and objectives, this document recommends that a number of measures be undertaken. These recommendations are summarized as follows:

- *Habitat protection and management recommendations* including wetland and fish habitat restoration measures such as dredge spoils removal, tidal flow improvements, invasive species removal, hydrologic improvements, riparian buffers reestablishment, improvements to fish passage, instream habitat, and shoreline, and trout population research.
- *Educational and outreach recommendations* including increasing knowledge of pollution impacts to homeowners, boaters, and commercial establishments, expanding tributary identification signage and providing interpretive exhibits, and expanding school watershed educational programs.
- *Point and nonpoint source pollution management and control recommendations* including increasing monitoring programs and educational efforts, implementing drainage area-wide structural control of the water quality storm event, and implementing non-structural programs for road maintenance, pest management and sanitary system review to reduce pollution loads generation.
- *Institutional recommendations* including establishing task forces and collaborative efforts with school and stakeholder organizations.

Several priority actions and target projects have been identified as having the greatest potential individual impacts on the water quality in the waterbodies. The priority actions include:

- improvements to infrastructure maintenance programs,
- fertilizer and pesticide use reduction through development of Integrated Pest Management (IPM) plans,
- land acquisition of sensitive parcels whose development would negatively impact the waterbodies; and,
- installation of drainage infrastructure that will capture and recharge or treat and release the water quality storm event (WQSE).

The greatest pollutant mitigation can be realized by focusing target projects on the sub-watersheds identified as contributing the largest loads. The recommended target projects include:

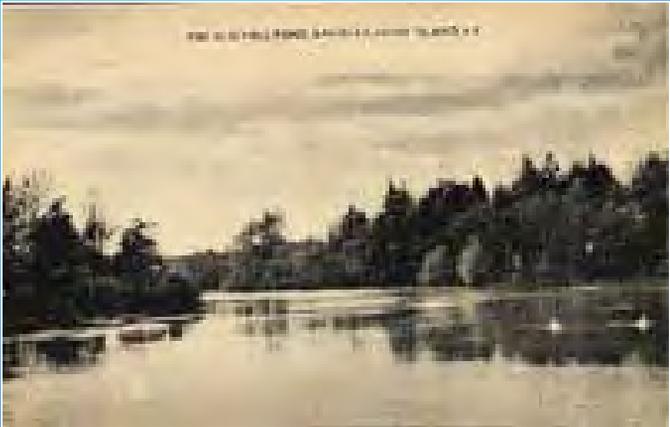
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- six locations under Town jurisdiction (Tariff Street, Jones Drive, and Brook Street on Green's Creek and Astor Drive, Valerie Court, and Amy Street on Brown's River) with a total estimated construction cost for implementing the proposed improvements on \$590,000, and;
- six roadway drainage locations on Montauk Highway and Middle Road that are under Suffolk County jurisdiction and will total \$1,750,000 in estimated construction costs.

Green's Creek and Brown's River were a large part of the local economy starting in the 1930's when mills and millponds were constructed to accommodate the growing wood processing operations. At the same time fishing, clamming, and oystering were the main industries along the lower rivers and bay.

Photo Credit: Sayville Library Collection





The water quality of the creeks and bay has deteriorated as impervious surfaces have increased, in turn increasing surface runoff into the water bodies. Pollutant-laden runoff surface flows into wetlands or is collected into storm drain systems where pipes and headwalls discharge it into the waterbodies. The runoff carries automotive oils, lawn fertilizers and pesticides, animal wastes, sediments and garbage.

The polluted runoff and heavy flows discourage native vegetation in the creeks, increase algae growth in the ponds, suffocate wildlife species, reduce aesthetics and erode the shorelines. The pollutants are carried to the bay where the negative effects continue on a larger scale.





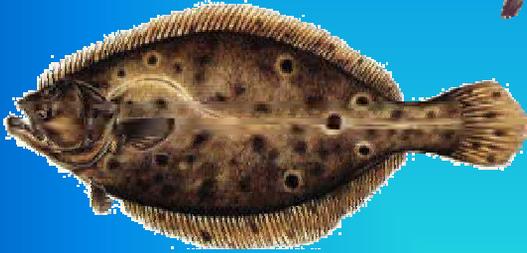
Oyster



Large Mouthed Bass



Scallop



Fluke (*Paralichthys dentatus*)



Alewife (*Alosa pseudoharengus*)

The surrounding species, many familiar to both commercial and recreational fishing and boating enthusiasts, are found in the creeks, rivers and bay and are affected by pollutant levels in the waterbodies.

Photo Credit: clam, Suffolk County Cornell Cooperative Extension (SC CCE); large mouthed bass, [www.museum.state.il.us](http://www.museum.state.il.us); weakfish, NYSDEC – Byron Young ; brook trout, [www.seagrant.wisc.edu](http://www.seagrant.wisc.edu); fluke, [www.mass.gov](http://www.mass.gov); scallop, [www.assateague.com](http://www.assateague.com); alewife, [www.maine.gov](http://www.maine.gov); flounder, SC CCE; oysters, SC CCE.



Brook Trout (*Salvelinus fontinalis*)



Weakfish (*Cynoscion regalis*)



Clam in seagrass



Flounder in seagrass



Beyond the pollutant effects on wildlife, the waterfront still plays a vital role in the Sayville and Bayport communities. Commercial shipyards provide employment, ferries carry tourists to Fire Island National Seashore, and residents visit waterfront parks and boat on local waters. Reducing the pollutant loads in Green's Creek, Brown's River and the Great South Bay through the enactment of the recommendations outlined in the Watershed Management Plan will improve the water quality for all.



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## **1.0 INTRODUCTION**

Watershed management plans (WMPs) guide the long-term management of a community's land and water resources with the ultimate goal of protecting and improving both water quality and living resources. This WMP for Green's Creek and Brown's River, two tributaries of the South Shore Estuary Reserve (SSER), is consistent with the objectives of the SSER Comprehensive Management Plan (CMP) completed in 2001. The SSER CMP identified nonpoint source pollution entering the estuary's tributary creeks and rivers from stormwater runoff as a primary issue. Preparation of this WMP implements a specific CMP recommendation to develop watershed management plans for priority SSER tributaries. In addition, the WMP addresses CMP recommendations related to nonpoint source pollution reduction, habitat protection and restoration, and education, outreach and stewardship.

Green's Creek and Brown's River are adjacent waterbodies located along the south shore of Long Island in the eastern section of the Town of Islip. Both of the tributaries discharge to the Great South Bay portion of the SSER. Green's Creek is a two-mile long system and Brown's River is a three-mile long branched system of streams, impounded lakes and tidal estuary. Both support a diversity of plants and animals and have a variety of habitats. Since World War II (post-1945), the areas surrounding the stream corridors have undergone extensive land use changes, some of which have adversely influenced the creeks and their corridors. Conditions of the creeks are closely tied to the Great South Bay ecosystem, where inflow from the tributaries along the south shore mainland affect the water quality and ecosystem of the bay.

The WMP is necessary because there is evidence that the natural resources of the creek corridors have been impaired. The plan characterizes the natural resources, habitats, and environment of the watersheds, identifies water quality and living resource impairments, recommends actions to protect the watersheds from further degradation, and develops a strategy to restore the watersheds. The plan also forms a framework to guide future decisions and provides a point of reference by which progress can be measured.

The final document will guide long-term development of the Green's Creek and Brown's River watersheds land and water resources to improve the quality of the water in the creeks and subsequently the Great South Bay portion of the SSER.

## **1.1 GOALS AND OBJECTIVES**

The overall goal of this WMP is the protection, restoration, and enhancement of water quality and living resources in Green's Creek and Brown's River.

For the Green's Creek and Brown's River corridors, the specific goals that will aid in achieving the overall goal are:

- Improve the water quality in the Green's Creek and Brown's River watersheds.
- Improve the ecological health in the Green's Creek and Brown's River watersheds.
- Enhance the eligibility of the watersheds for funding through participation in partnerships in regional environmental initiatives.

The specific objectives of this WMP include:

- Develop recommendations for management practices in the watersheds that can enhance the stated goals.
- Develop recommendations to energize public participation in reducing non-point source pollution.
- Develop recommendations for educational materials that will promote public awareness and enhance stewardship of the watersheds.
- Develop a method to prioritize future drainage projects.
- Develop designs for five infrastructure improvement projects.

## **1.2 SOUTH SHORE ESTUARY RESERVE**

The SSER and its Council of Stakeholders were created by Article 46 of the State Executive Law titled the *Long Island South Shore Estuary Reserve Act* (Act). The Act declared it to be in the public interest to protect and manage the estuary as a single integrated system, and in furtherance of that goal, directed the SSER Council to prepare a management plan for the estuary identifying actions to protect and enhance the region's natural, cultural and recreational resources and its water-based economy.

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The SSER encompasses major embayments including the Hempstead Bays, South Oyster Bay, Great South Bay, Moriches Bay, Quantuck Bay, and Shinnecock Bay, and their 326 square mile watershed in Nassau and Suffolk counties. The SSER extends approximately 75 miles from the Nassau/Queens county border at East Rockaway Inlet to the eastern shoreline of Shinnecock Bay at Heady Creek in the Village of Southampton. The SSER is bounded by the barrier islands to the south and the upland limits of the Reserve's watershed to the north.

The SSER Council is chaired by the New York State Secretary of State and represents the interests of multiple state agencies with estuary management responsibilities, Nassau and Suffolk Counties, south shore municipal governments, and recreation, business, academic, conservation, and citizens groups. With technical support from the New York State Department of State (NYSDOS) Division of Coastal Resources, the SSER Council prepared and adopted the CMP in 2001. Subsequent to CMP adoption, the SSER Council has operated as an information-sharing platform among key estuary stakeholders, investigated emerging management issues, and facilitated new partnerships to advance CMP implementation.

## **2.0 WATERSHED CHARACTERIZATION**

The characterization of the watershed examines the existing conditions of the watersheds. Watershed character is a composition of the natural and developed environments of the watershed. Changes in the character of the Green's Creek and Brown's River watersheds over the past half century have been significant. Following World War II, the area experienced rapid residential and commercial development and, as a result of this development, the watershed lost significant areas of native vegetation and gained extensive impermeable surfaces. The watersheds character and the water quality changed due to the effect of the extensive development and road construction. Runoff from developed lands increased stormwater input to the creeks. The runoff carries pollutant-laden sediments from the developed lands and built environment.

The watershed characterization describes the following aspects of the study area:

- watershed boundaries through delineation of the lands that drain to the surface waters,
- geographic setting including physical conditions, habitats, land use, and cultural characteristics,
- water quality characterization through review of existing records and data,
- stormwater drainage infrastructure from existing mapping and field assessments,
- inter-municipal jurisdiction and agreements through review of municipal boundaries and responsible authorities, and,
- land and water use regulations and laws from local codes and regulations.

### **2.1 WATERSHED STUDY AREA DELINEATION**

Green's Creek and Brown's River are two of 23 watersheds and/or drainage areas located totally within the Town of Islip (Town). Brown's River is the second largest drainage area within the Town and Green's Creek is the fifth largest drainage area. Together they represent 17.1% of the Town of Islip land area that drains into the Great South Bay. The main branches of the creeks are perennial groundwater-fed freshwater stream and pond systems that receive large inputs of stormwater runoff during significant storm events. The Green's Creek and Brown's River

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drainage systems are located entirely within the glacial outwash plain that extends south to the Great South Bay shoreline. The southern ends of both creeks include bulkheaded canals that provide safe harborage for vessels and access to the open bay. The watershed limits are shown on aerial photography on Figures GR 2.1.1 and BR 2.1.1.

Field evaluation of the watershed determined alterations to the natural drainage pattern that limits surface runoff that can reasonably be expected to enter the creek. The surface drainage boundary is the limit of the drainage area from direct surface runoff or drainage through infrastructure that can be expected to outfall into the creek. Runoff from the area between the surface drainage boundary and the watershed boundary is collected into drainage structures that infiltrate to groundwater. The watershed limits and the surface drainage boundary are shown on Figures GR 2.2.3 and BR 2.2.3.

### **2.1.1 Green's Creek**

The Green's Creek watershed boundary, as defined in the SSER CMP, encompasses a total of 2447 acres or 3.82 square miles. The watershed boundaries were defined using topographic data of the sites natural drainage pattern that did not include grade and drainage changes based on the development of the area.

In its current form, the creek's headwaters originate north of Tariff Street and the creek terminates at the Great South Bay. Green's Creek has a single main branch with a secondary branch known as Sunset Lake located south of Montauk Highway (SC Rte 85). The creek is approximately two miles in length along its main branch. The length can vary depending on seasonal fluctuations in groundwater levels, prevailing weather patterns, and resultant stormwater inputs. The creek is tidal south of Montauk Highway and freshwater north from Montauk Highway to its headwaters.

The surface drainage area that contributes runoff directly to Green's Creek is 384 acres with 39 outfalls.

### **2.1.2 Brown's River**

The Brown's River watershed boundary, as defined in the SSER CMP, encompasses a total of 4,973 acres or 7.77 square miles. The watershed boundaries were defined using topographic data of the sites natural drainage pattern that did not include grade and drainage changes based on the development of the area.

In its current form the river system includes two main branches, the Mill Pond (western) branch and the San Souci (eastern) branch, which originate just south of Sunrise Highway and meet north of Middle Road in Roosevelt County Park, from where the river flows to Great South Bay. North of the confluence, the Mill Pond branch extends 1.5 miles and includes one shallow 6-acre pond, called Mill Pond, located immediately north of Montauk Highway. The river length along the San Souci branch is approximately three miles. This branch contains Lotus Lake, which is located between Montauk Highway and the LIRR tracks, as well as a series of ponds called San Souci Lakes located north of Montauk Highway. The San Souci branch has a secondary tributary that extends northwest from Lotus Lake into Islip Grange. At the southern limit of the river, a small tributary extends to the east. The lengths vary depending on seasonal fluctuations in groundwater levels, prevailing weather patterns, and resultant stormwater inputs. The river branches are freshwater from the headwaters to the dams located at Montauk Highway on the Mill Pond branch and at the Long Island Rail Road (LIRR) tracks on the San Souci Branch and tidal from the dams south to the bay. In addition to the dams mentioned above, there are earthen dams that create the San Souci Lakes north of Montauk Highway. These dams were created when the lakes were constructed to grow cranberry crops. According to area sources, one of the earthen dams failed several years ago and damaged plant and animal life in the lake.

The surface drainage area that contributes runoff directly to Brown's River is 1187 acres with 37 outfalls.

## **2.2 GEOGRAPHIC SETTING**

The Geography Setting of the watersheds includes a description of the watershed topography, hydrology, soils, climate, land use, development patterns, parks and public lands, natural

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resources and cultural and historic resources. In addition, this section includes an analysis of the surface areas that drain to the waterbodies, a description of the reaches of each waterbody and the subwatershed limits of each outfall.

### **2.2.1 Topography**

Long Island is located on the eastern edge of what is known as the Atlantic Coastal Plain. The Coastal Plain is part of a landform that extends underwater to become the Continental Shelf. The plain and shelf combination is about 300 kilometers wide and stretches from Florida to Newfoundland, Canada. It is bounded by higher ground to the west and by the underwater Continental Slope to the east. Long Island is a glacial, depositional landform marking the southernmost limit of the last advance of the Laurentide ice sheet during the Wisconsinan Stage of the Pleistocene Epoch, about 22,000 years ago.

The upper Pleistocene deposits, which form the uppermost principal geologic unit on Long Island, include glacial morainal sediments, till, outwash, and glaciolacustrine sediments that were deposited during the Wisconsinan glaciation of the Pleistocene series. This unit consists mostly of moderately to well-sorted sand and fine gravel, which is highly permeable in most places but locally contains fine-grained, poorly permeable layers of silt or clay. The saturated part of the upper Pleistocene deposits forms the upper glacial aquifer, which contains the water table throughout most of Long Island and is the source of base flow to streams.

Long Island is composed of two end moraines, the Harbor Hill Moraine to the north and the Ronkonkoma Moraine to the south, and their outwash plains. The Ronkonkoma Moraine extends along the south shore forming the South Fork and is fronted by the Atlantic Ocean to the south. The land grades from higher elevations at the watersheds northern limits to sea level at the bay. The Green's Creek and Brown's River watersheds are located in the central portion of the Ronkonkoma Moraine's outwash plain. Topography for each watershed is shown on Figures GR 2.2.1 and BR 2.2.1.

## **2.2.2 Hydrology**

The hydrology of the watersheds includes a description of the methods used to determine the surface drainage area of each watershed, groundwater flows, and sanitary disposal systems and issues.

### **2.2.2.1 Surface Hydrology**

Development in the watersheds has substantially altered the pattern of runoff and the limits of the surface runoff reaching both Green's Creek and Brown's River. Preparation of the WMP included review of all located and accessible drainage infrastructure and connectivity, along with the locations of topographic high points, to determine the limits of runoff contributing to the creeks or to infrastructure that discharges into the creeks. Following data collection and input, sub-drainage areas were delineated that identify the actual surface drainage areas and the area that is contributing to each outfall. The delineation is discussed further in Section 2.4.

In a number of areas storm runoff directly discharges to the creeks from street ends, boat ramps, lawns and landscaped areas, and over bulkheads. However, surface drainage for most of the area does not flow overland to open waters of the creeks but is conveyed through stormwater drainage structures and piping or groundwater flow. Stormwater drainage structures collect runoff and deliver it to the creeks through numerous outfall pipes.

### **2.2.2.2 Groundwater Flow**

Large areas of the watershed no longer drain to the creeks but are intercepted by drainage structures that either leach to groundwater or convey the runoff to recharge basins for infiltration. This runoff may eventually reach the creeks in the form of groundwater flow. Due to the filtering action of the soils, this flow will have substantially lower pollutant levels than the surface flow that reaches the creeks and bay.

According to Suffolk County Department of Health Services (SCDHS) Water Table Contours mapping, dated March 2002, the depth to groundwater ranges from sea level at the bay to approximately 30' at the northern limits of the watersheds.

The lower portions of Green's Creek and Brown's River are located within Hydrogeologic Zone VI, which extends from the bay north to Sunrise Highway. Zone VI is characterized by shallow flow that discharges streamflow and underflow to the Great South Bay. The watershed area north of Sunrise Highway is within Hydrogeologic Zone I. Zone I is characterized as a major deep recharge zone that contributes water to the middle and lower portions of the Magothy aquifer.

### **2.2.2.3 Sanitary Waste Disposal**

Sanitary sewage disposal in the watershed is through individual septic systems or cesspools. Large developments may have on-site sewage disposal systems but account for only a small fraction of the entire watershed area. Both the septic and the larger on-site systems discharge to groundwater. No direct discharges of sanitary sewer to surface waters were identified, although field verification did not examine individual lots in the northern reaches. Homes built prior to the 1970's were generally built with cesspools, which are leaching structures without septic tanks to remove solids prior to infiltration. In the 1970's, development regulations were modified to require installation of disposal systems that include a septic tank and leaching pools. Waste enters the septic tank from which the liquid effluent goes into leaching pools or fields, while the heavier solids settle to the bottom of the tank where they are gradually decomposed by bacteria.

Further treatment of wastewater occurs in the soil beneath the leaching pool or field. Effluent filters out of the tank and into the soil, which provides the final treatment and disposal of the effluent. The soil filters the effluent as it passes through the pore spaces. Chemical and biological processes treat the effluent. After the effluent has passed into the soil, most of it percolates downward and outward, eventually entering the groundwater. The process works best where the soil is dry and permeable and contains oxygen several feet below the leaching pools. Shallow depth to groundwater and saturated conditions reduce the treatment ability of the soils.

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Cesspools, the earlier form of disposal system, lack the septic tank that separates the wastes and keeps solids from entering the flow to groundwater. This increases the potential for pollutants to enter groundwater and subsequently reach the creeks and bay.

The most serious problem with cesspools and improperly functioning septic tank systems is the introduction of nitrates into groundwater. Housing densities of 1 to 2 dwellings per acre are necessary to maintain nitrate levels below the United States Environmental Protection Agency (USEPA) standard limit of less than 10 mg per liter. (Source: SUNY Stony Brook).

A secondary concern of on-site sanitary systems is the potential for improper disposal of organic compounds including paint thinners, petroleum products, grease cutters and household chemicals that can leach into groundwater and subsequently discharge to surface waters.

The Town and SCDHS approve the design and siting of all septic systems and have plumbing codes that require practices that are compatible with properly functioning systems. There is currently no level of government regulation that mandates annual or periodic inspections of individual on-site septic and cesspool systems to ensure proper function. There is no enforcement of maintenance standards.

#### **2.2.2.4 Water Supply**

Suffolk County Water Authority (SCWA) provides all of the public water supply wells within the watershed. Service to this region is administered through the SCWA's western and central regional offices. SCWA states that the majority of the water served to SCWA customers is pumped from the Magothy aquifer.

#### **2.2.3 Surface Drainage Areas, Reaches and Subwatersheds**

The watershed boundaries that define the study areas are identified in SSER CMP. The watershed boundaries were defined using topographic data of the sites natural drainage pattern that did not include grade and drainage changes based on the development of the area. The topography and watershed boundary are shown in Figures GR 2.2.3 and BR 2.2.3.

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Field evaluation of the watersheds determined alterations to the natural drainage pattern including drainage structures, piping and elevations modifications. A combination of mapping alterations and establishing highpoints that limit surface runoff that can reasonably be expected to enter the creeks was used to establish the surface drainage boundaries shown on Figures GR 2.4.1 and BR 2.4.1. These are the limits of the area where pollutants from roads and properties can be expected to wash into the waterbodies either from direct surface runoff or through drainage infrastructure. The runoff from the area between the surface drainage boundary and the watershed boundary is generally collected into drainage structures, such as recharge basins or leaching wells that infiltrate to groundwater. These structures do not have a direct connection to the river, but at the southern limit of the watershed, they may drain directly to the Great South Bay. For the purposes of this study, the storm drainage infrastructure reviewed was limited to those structures and surface areas that are connected to a system that directly drains into either Green's Creek or Brown's River. The drainage area that contributes surface runoff directly to Green's Creek is 384 acres with 39 outfalls. The drainage area that contributes surface runoff directly to Brown's River is 1187 acres with 37 outfalls.

The reaches, which are shown on Figures GR 2.4.1 and BR 2.4.1, were defined to provide general delineation of areas along each waterbody to target recommendations. Along Green's Creek two reaches were identified, the first, G1, is the tidal reach south of Montauk Highway that is generally bulkheaded. The second reach, G2, extends from Montauk Highway north to the headwaters. This reach is freshwater with adjacent residential properties, manicured lawns and street runoff inputs along the majority of the reach.

Brown's River was divided into five reaches. The southern reach, Reach B1, is tidal, extends from the bay to Middle Road, and includes numerous marinas and bulkheaded shoreline. Reach B2 extends from Middle Road to Montauk Highway through extensive Town and County preserved lands. Reach B2 is tidal south of the dams and freshwater above. The third reach, is the eastern branch, which extends from Montauk Highway north along San Souci Lakes to the headwaters near Sunrise Highway. Reach B3 is generally undeveloped along its entire length. Reach B4, is the western branch that extends north from Montauk Highway at Mill Pond to the

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headwaters near Sunrise highway. Along this reach, the river follows a narrow corridor of preserved land surrounded by residential properties. The drainage infrastructure in Reach B4 requires additional investigation to determine the extent of the developed area that is ultimately draining to creek. The fifth reach, B5, is located between Reaches B3 and B4 and extends into recreational land.

The final step in determining the subwatersheds was to identify the limits between each outfall. This was completed by reviewing the drainage infrastructure connected to each outfall, and the road drainage patterns and the topographic high points. The limits of each subwatershed are shown on Figures GR 2.4.3-1 through GR 2.4.3-3 and BR 2.4.3-1 through BR 2.4.3-8 with the subwatersheds described in Sections 2.4.3 and 2.4.4 of this report.

#### **2.2.4 Soils**

In general, soils in the study area are similar to those found throughout the south shore of Long Island and are relatively young geologically. Soil associations are landscapes having distinctive general soil properties. Each association is named for the major soils it contains, and normally consists of one or more major soil type and at least one minor soil. Figures GR 2.2.4 and BR 2.2.4 show the soils mapping for each watershed.

Based upon information obtained in the Soil Survey of Suffolk County, New York (U.S. Soil Conservation Service, April 1975), and with a general exception of the immediate creek corridors, the majority of the watershed area is characterized as Riverhead Sandy loam, Riverhead and Haven soils or Plymouth Sandy loam (RdA, RhB, PIA, PIB).

The soils along the Green's Creek corridor south of Montauk Highway is classified as cut and fill lands (CuB, CuC) with limited areas of Carver and Plymouth sands (CpA), Berryland mucky sand (Bd), and tidal marsh (Tm). North of Montauk Highway the creek corridor soils consist of Berryland mucky sand (Bd) at the creek and some areas of cut and fill lands (CuC) and Carver and Plymouth sands. At the northern limits of the original creek, Deerfield sands (De) are included with the other soils discussed above.

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Soils along the Brown's River corridor south of Montauk Highway include areas of tidal marsh (Tm) and cut and fill lands (CuB). In the vicinity of Montauk Highway and extending north, Berryland mucky sands (Bd) and Carver and Plymouth sands (CpC, CpE, CpA) line the river corridor. Further north the corridor is defined by Deerfield sands (De), muck (Mu), Atsion sands (At) and areas of cut and fill lands (CuB, CuC). Northern of the watershed limits the original drainage corridor is defined by Carver and Plymouth sands (CpA, CpC, CpE).

The Riverhead and Plymouth soils are generally deep, well-drained, moderately coarse-textured soils. Permeability is moderately-rapid to rapid with low fertility. Native vegetation associated with these soils consists of black oak, white oak, red oak, scrub oak, and pitch pine.

Cut and fill lands are areas that have been regraded during development and the soil profile altered.

The Atsion and Berryland soils are found along the immediate river corridor margins and tidal marshes and generally consist of deep, poorly drained, coarse-textured soils. Native vegetation associated with these soils includes red maple, pitch pine, white oak, black gum and highbush blueberry. These soils are found where there is a water table ranging from at the surface to 18" below grade.

Tidal and muck soils are level areas of poorly drained organic soils and wet areas.

### **2.2.5 Climate**

Temperatures in Suffolk County in the winter average 32.4 degrees Fahrenheit, compared to summer average of 71.9 degrees. Suffolk County area receives total annual precipitation of 42-inches. A portion of that falls as snow. The average annual snow depth for Suffolk County is 30.0-inches.

## **2.2.6 Land Use and Cover**

The land use and cover section of the WMP includes a description of the predominant land uses in each watershed and the role that impervious cover plays in the generation of storm runoff and pollutant load calculations.

### **2.2.6.1 Land Use**

Land use and what happens on the land plays an important role in determining surface water uses and the quality of the surface waters and is a consideration in the development of a WMP. For example, lands that provide recreational access to the surface waters, such as marinas and boat ramps, require location on the shoreline; however, these uses have the potential to impact the quality of the surface waters. Additionally, certain land uses and practices such as filling of wetlands and the discharge of stormwater can adversely affect surface waters and natural resources.

Predominant land uses in the watersheds are shown on Figures GR 2.2.6 and BR 2.2.6. The land uses are predominantly densely-developed, single-family detached housing, parks and preserves, commercial businesses including marinas and retail, community uses including schools and roads. The 2001 report entitled "*Stormwater Outfall and Conveyance Identification & Mitigation Plan*" (Outfall Plan) discussed in Section 2.2.11 of this report estimated the percentages of land use type for the entire watershed for each creek. Descriptions of the largest landowners within each drainage area and the usages of the lands owned are included in this section.

#### **Green's Creek**

The Green's Creek watershed is 81% residential with the majority being single-family residences. The watershed includes 6.1% commercial land with the remaining percentages comprising industrial, parks and service uses. There is high-density commercial usage along Montauk Highway/Main Street. Commercial water-dependant usage is located below Montauk Highway along the western shoreline of the creek. There is limited commercial and

# APPENDIX A

## MINUTES OF PUBLIC MEETING

September 26, 2006 – 7:30 PM

Green's Creek and Brown's River Watershed Action Plan  
Meeting Location: Sayville Middle School

The Green's Creek and Brown's River Watershed Action Plan Public Meeting panel included the following individuals:

Christopher Bodkins – Councilman, Town of Islip (CB)  
Eugene Murphy - Planning Commissioner, Town of Islip (EM)  
Thomas Marquardt - Principal Planner, Town of Islip (TM)  
Gregory Greene - Vice President, Cashin Associate, P.C. (GG)  
Nancy Lenz, - Project Manager, Cashin Associates, P.C. (NL)

The Meeting began with introductions by Councilman Bodkins, Commissioner Murphy, and Cashin Associate, P.C. Gregory Greene. Nancy Lenz from Cashin Associates, P.C., provided an overview of the Green's Creek and Brown's River Watershed Action Plan (Plan) with a Power Point presentation. Following the presentation the meeting was opened to public questions and comments. The comments and questions received are as follows:

**Speaker:** Mike Jane

**Question/Statement:** Mr. Jane questioned whether the effect that DDT spraying in the mid-to late 1950's has on the current water quality issues was addressed in the Plan as the spraying resulted in widespread wetland vegetation die-off and ecosystem damage in Green's Creek Reach 2.

**Panel Response:** GG stated that the effect of DDT spraying can still be found in the sediments of the tributaries along the south shore and is not limited solely to Green's or Brown's.

**Speaker:** Resident on Brookdale Court

**Question/Statement:** The resident questioned whether a location could opt out of the plan if they feel they are not contributing to the pollutant problem. He stated that a grassed swale at the end of Brookdale is already filtering runoff. Resident directed attention to the fact that the MTA is storing creosote railroad ties in their right-of-way and encroaching into adjacent properties. In addition, stated that there is debris piled within the creek corridor at the Cherry Avenue School property.

**Panel Response:** NL stated that a swale or infiltration trench is the recommended solution at that location so they may already be meeting the recommended practice in which case no additional work may be required. The MTA site will be investigated and MTA notified if appropriate.

**Speaker:** Mr. Quinn from 429 Hillside Avenue

**Question/Statement:** Mr. Quinn stated that the pond in back of his home is now a "mosquito infested swamp" and the Town has not been responsive to requests over the past 25 years for improvements. He stated that sands from streets and eroded soils from the Cherry Avenue soccer field construction several years ago washed down Tariff into the river and filled the pond.

**Panel Response:** EM stated that the site would be inspected.

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industrial usage located near the LIRR tracks and more extensive industrial and commercial use north of Sunrise Highway.

The main marine uses on Green's Creek include commercial and public marinas. Additional marine uses include boat storage, seafood market and wholesalers, boat repair and automobile parking areas. Maintenance and dredging of the Green's Creek channel is under the jurisdiction of Suffolk County.

There are several large property owners along the creek. These include Suffolk County which owns 5.9 acres along the lower southwestern shoreline that has been recently developed as a recreational park (Green's Creek Park) and 5.8 acres north of Brook Street that are known as Brookside Nature Preserve. Islip Town owns a 2.3-acre preserved parcel immediately adjacent to the nature preserve.

The Sayville School District (School District No. 4) owns three parcels totaling 47.9 acres on Green's Creek. Sayville High School and Cherry Avenue Elementary School are located on two of the parcels. The third parcel is undeveloped and vegetated. The school parcels are generally developed with buildings, asphalt and lawn. A 100' wide buffer has been maintained adjacent to the creek at the elementary school although a 30' wide by 300' length area in the buffer is being used for brush disposal. Near the Sayville High School parking lot, the creek runs through the undeveloped school district property. At this location the buffer varies but averages about 100' width. At the southern segment, the school property ends at the creek and the buffer is limited to 10' width. The schools athletic fields are located in the area.

### **Brown's River**

The Brown's River watershed is 74.1% residential with the majority being single-family residences. Commercial usage accounts for 14.89% of the watershed. The commercial use is located along Montauk Highway/Main Street and commercial water-dependant usage is located along the east and west shorelines of the river below Middle Road. Additional commercial and most industrial uses are located north of Sunrise Highway. There are over

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100 acres of built and/or potential industrial land located east of Brown's River immediately south of Sunrise Highway at the eastern limit of the watershed boundary.

Marina use includes three public and six commercial marinas with a total of 432-boat slip on Browns River. In addition, the marina facilities include Fire Island Ferry Service, dry storage space, fueling stations, boat repair and sales, and extensive automobile parking areas.

There are several large property owners along the river. Suffolk County has property holdings totaling 46.3 acres along east side of the lower river and from immediately south of Middle Road to the headwater of the San Souci branch comprising approximately 342.8 acres. New York State Department of Environmental Conservation (NYSDEC) owns 9.8 acres that is designated as a conservation area along the small eastern tributary.

Islip Town owns lands in three primary locations along Brown's River totaling 117.6 acres. These locations include: the eastern shoreline of the Mill Pond branch extending almost continuously north to Sunrise Highway (34.0 acres); several parcels from Lotus Lake north including Lotus Lake Preserve (32.5 acres), Islip Grange (12.0 acres), and Broadway Avenue Park (28.4 acres); and property at the mouth of the river that is used for marina and beach facilities, including bayfront land on the west side (8.5 acres) and riverfront property on the east shoreline (2.2 acres).

Girl Scouts of Suffolk County owns Camp Edey, a parcel of approximately 95.6 acres of largely undeveloped land on San Souci Lakes, where they operate a summer day camp and year-round educational and recreational programs on land they describe as a nature preserve. Although a sale is not anticipated at this time, Suffolk County retains the right-of-first-refusal were the property to be sold.

Other large landowners adjacent to the river are Saint Anne's Parish and the Union Cemetery of Sayville, which, when combined, own approximately 40 acres along the west shoreline south of Montauk Highway.

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The Brown's River channel is maintained by the United States Army Corp of Engineers (USACOE) who dredged the channel in the beginning of 2005. Approximately 19,975 cubic yards of materials were dredged from the federal navigation channel and the Town marina and docking facility. The dredged material was placed at sites along Brown's River furnished by Islip Town and Suffolk County. Prior dredging was conducted in 1995 when approximately 20,297 cubic yards of materials was dredged. The maintenance cycle for dredging of Brown's River is approximately 8-10 years.

#### **2.2.6.2 Impervious Cover**

The conversion of land underlain by permeable soils to impervious surfaces (such as streets, sidewalks, roofed areas and parking lots) significantly reduces infiltration of precipitation to the water table and creates large volumes of street runoff. The runoff flows into storm-sewer systems that discharge either to recharge basins and leaching structures, which allow groundwater infiltration, or directly to the creeks and bay. Stormwater disposal through storm sewers that flow to the creeks and bay have several main hydrologic consequences. First, stormwater does not replenish the ground-water system. Second, peak stream discharges during individual storms are larger and more variable than in undeveloped areas. Third, the ratio of surface runoff to base flow in streams that receive street runoff is increased and, fourth, pollutants that wash off lawn and landscape areas and from impervious surfaces are carried directly into surface waters.

In order to predict pollutants loads in stormwater draining to Green's Creek and Brown's River a calculation entitled the "Simple Method" (Schueler, 1987) was used. Imperious cover is one of the factors considered in the analysis of pollutant loading included in Section 4 of this report. Roadways through business and commercial areas, including Montauk Highway and Middle Road, generally have little vegetation along their rights-of-way. Where vegetation does exist, compaction and siltation reduce the ability to infiltrate significant amounts of runoff. In Section 4.2, the estimated percentage of impervious surface of highways and large commercial roads is assumed to be 100%. For the residential areas, where ¼-acre lots with lawns and ornamentally landscaped front yards dominate, the percentage of imperious surface is assumed to be 70%. The actual percentage of imperious surface will vary for each specific site and must

be calculated with regards for actual site surface and soil types when a specific structural measure is being designed.

### **2.2.7 Development Trends**

The development trends section of this report includes a description of the zoning in place in the watersheds and the population of the communities where the watersheds are located.

#### **2.2.7.1 Zoning**

Land use south of Sunrise Highway in both watersheds is predominantly residential and zoned accordingly. Commercial zones are located at Montauk Highway for retail and business use, along the creek shorelines for marine commercial and along Sunrise Highway for large-scale commercial development. Industrial zones intermixed with commercial zones are generally located north of Sunrise Highway.

The area is largely developed with only a few large vacant or underdeveloped parcels remaining. These parcels include a 7.4 acre parcel at the southeast corner of Sunrise Highway and Lincoln Avenue in the Brown's River watershed, a 15.6 acre parcel south of Montauk Highway along the western shoreline of Green's Creek, and numerous parcels of industrial zoned lands located south of Sunrise Highway east of the headwaters of the Brown's River Sans Souci branch.

#### **2.2.7.2 Population**

As of 2004, Long Island (Nassau and Suffolk Counties) was home to about 2.81 million people and Suffolk County accounted for about 1.47 million of them. The Town of Islip had 329,257 residents in 100,800 residences. The watershed areas encompass portions of the hamlets of Bayport, Sayville and West Sayville. These hamlets accounted for 31,813 residents or 9.7% of the Town population.

### **2.2.8 Parks, Preserves and Lands in Public Ownership.**

Numerous parcels of land have been preserved along both creek corridors. In addition, other parcels provide recreational uses along the waterfront providing residents with opportunities to

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access the water. Municipal and preserved parcels are listed below and shown on Figures GR 2.2.8 and BR 2.2.8.

### **2.2.8.1 Green's Creek**

#### **Town of Islip**

- 2.9-acres of preserved lands adjacent to the County-owned Brookside County Park Preserve.
- West Sayville Marina. This facility is located on the bay west of Green's Creek.

#### **Suffolk County**

- Brookside County Park Preserve. In 1999, Suffolk County purchased a 5.8-acre parcel of land now known as Brookside County Park Preserve (also as Brookside Audubon Sanctuary) with funding from the Clean Water Act. Green's Creek runs through this parcel that was formerly part of the Isaac Green estate. The Town of Islip purchased 2.9 acres abutting Brookside to increase the preserve area.
- Green Creek County Park. A 5.9-acre passive recreational facility located at the south-west end of Green's Creek. This park with 600 linear feet of bulkheaded waterfront was recently developed with boardwalks, landscaping and site amenities.

#### **Private Lands**

- Eight parcels of land, totaling 3.26 acres, on the east side of the creek between Easy Street and Tower Street were designated nature preserve as part of the approval for development of adjacent parcels. These parcels remain in private ownership but have a covenant preventing future development.
- Sayville School District owns 47.9 acres of land including or abutting Green's Creek. The district has maintained buffers along the creek at the Cherry Avenue School and owns an undeveloped parcel adjacent to the Sayville High School parking lot.

### **2.2.8.2 Brown's River**

#### **Town of Islip**

- Sayville Beach. A recreational facility located just west of the mouth of Brown's River.
- Numerous parcels, totaling 34 acres, along the Mill Pond branch of Brown's Creek have been preserved creating a linear preserve extending almost completely from Sunrise Highway south to Mill Pond.
- The 32.5-acre parcel of land where Lotus Lake is located.
- Brown's River Marina East and Brown's River Marina West. Town facilities located on the east side and west side of the river.
- Port-o-Call Marina. A Town facility located on the west side of the river.

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**Suffolk County**

- Suffolk County owns numerous large parcels along Brown's River including the Meadow Croft Estate, the former summer home of John Ellis Roosevelt, located in the center of an 86-acre nature preserve known as Roosevelt County Park. The estate is located on land between the two branches of Brown's River. The park property includes extensive marsh and tidal river. Both the Mill Pond branch and San Souci Lake branch drain to the Great South Bay through this parcel. Laughlin Vineyard is also located in the park behind Meadow Croft.
- Sans Souci Lakes County Preserve is a 302-acre parcel along the western shoreline of the San Souci branch of Brown's River. It contains a series of freshwater ponds. This preserve extends 3.5 miles north from Roosevelt County Park.
- Parcels totaling 46.3 acres along the lower east side of Brown's River.

**New York State Department of Environmental Conservation**

- Parcels totaling 9.8 acres along the eastern tributary at the south end of Brown's River. These lands have been designated as a conservation area by New York State.

**Private Lands**

- Camp Edey, owned by Girl Scouts of America, is described as a 95.6-acre nature preserve that is used as a day camp. The camp was named after the late Bellport environmentalist Birdsell Otis Edey. The tract of land is largely undeveloped and includes San Souci Lakes. Although not currently preserved, Suffolk County retains the rights of first refusal to purchase this property for preservation should it be put up for sale.

**2.2.9 Natural Resources**

The natural resources section of this report includes descriptions of the wetland habitats, living resources, and endangered species within the watersheds and the use impairments, habitat losses, and invasive species that have impacted the natural resources.

**2.2.9.1 Wetland Habitats**

Wetlands can be considered a transitional habitat that occurs between upland and aquatic environments where the water is the primary controlling factor of the associated plant and wildlife. There are four general categories for wetlands found in the United States: marshes, swamps, bogs, and fens. The two types of wetlands found in the creek watersheds are marshes and swamps. Figures GR 2.2.9 and BR 2.2.9 shown the limits of wetland areas.

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Marshes - The USEPA describes marshes as periodically saturated, flooded, or ponded with water and characterized by herbaceous (non-woody) vegetation adapted to wet soil conditions. Marshes are further characterized as tidal marshes and non-tidal marshes.

Tidal Marshes – These are marshes that occur along coastlines and are influenced by tides and often by freshwater from runoff, rivers, or ground water. Salt marshes are the most prevalent types of tidal marshes and are characterized by salt-tolerant plants such as smooth cordgrass (*Spartina alterniflora*), saltmeadow cordgrass (*Spartina patens*), saltgrass (*Distichlis sp.*), and Virginia glasswort (*Salicornia virginica*). Salt marshes have one of the highest rates of primary productivity associated with wetland ecosystem because of the inflow of nutrients and organics from surface and/or tidal water.

Tidal freshwater marshes are located upstream of estuaries. Tides influence water levels but the water is fresh. The lack of salt stress allows a greater diversity of plants to thrive. Cattails (*Typha latifolia*), wild rice (*Zizania spp.*), pickerelweed (*Pontederia cordata*), and arrowhead (*Sagittaria spp.*) are common and help support a large and diverse range of birds, fish and other wildlife.

As shown in Figure BR 2.2.9, tidal marshes, both salt high marsh and freshwater tidal marsh, are limited to Brown's River near the fork where the River splits to two branches and along portions of the small secondary branch located near the bay. Phragmites, an invasive species, is the predominant plant species in this area. Due to the dense development of the lower half of the Green's Creek, there is little tidal marsh remaining in that reach. The NYSDEC has identified a single location with tidal high marsh along the western side of Green's Creek south of Montauk Highway. This parcel is currently vacant although there have been proposals to develop the site for housing.

Non-tidal Marshes – These marshes are dominated by herbaceous plants and frequently occur in poorly drained depressions, floodplains, and shallow water areas along the edges of lakes and rivers. Non-tidal freshwater marshes are characterized by periodic or permanent shallow water, little or no peat deposition, and mineral soils. They typically derive most of

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their water from surface waters (including floodwater and runoff), ground water and precipitation. The upper limits of both Green's Creek and Brown's River contain areas of freshwater marsh as shown in Figures GR 2.2.9 and BR 2.2.9.

Swamps – The USEPA describes swamps as fed primarily by surface water inputs and dominated by trees and shrubs. Swamps occur in either freshwater or saltwater floodplains. They are characterized by very wet soils during the growing season and standing water during certain times of the year. Swamps are classified as forested, shrub, or mangrove. The types of swamps found in the Green's and Brown's Creek watersheds are forested and shrub. A freshwater red maple/black tupelo co-dominant forested swamp is located on the upper reach of Green's Creek within Brookside Preserve. Dominant shrubs in the swamp are summer sweet (*Clethra alnifolia*) and sassafras (*Sassafras albidum*).

Submerged Aquatic Vegetation - According to NYSDOS mapping titled SSER Estuarine Fish Habitats, there is no submerged aquatic vegetation (SAV) on either creek. Studies conducted by the Sayville High School Advanced Placement Environment Science (SHS APES) class identified SAV in Green's Creek north of Montauk. The three species identified were duckweed (*Lemna minor*), microspora (*Microspora sp.*) and the third, not positively identified, water-chickweed (*Callitriche palustris*). Microspora was noted to be the dominant species in areas of stagnant water and typically overpopulates in areas where the water quality has been degraded and levels of nitrates in the water may be elevated. According to a local source, Brown's River north of the Mill Pond no longer has any submerged aquatic vegetation.

### **2.2.9.2 Living Resources**

Many fish and wildlife are directly connected to tributaries and the wetlands associated with them. Each of the water bodies within Green's Creek and Brown's River watersheds provide a unique habitat that relates directly to the diversity of species found within the watershed.

The habitats along Green's Creek and Brown's River represent a rich diversity of ecotypes typical of these valuable tributary corridors. These run the spectrum from the brackish lower

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reaches to the nearly pure freshwater seeps that provide groundwater inputs in the upper reaches. A host of representative animal species can be found still frequenting these relic habitats. Avian suites include waterfowl including both puddle ducks (such as black ducks), and diving ducks (such as buffleheads); wading birds (such as great blue, green-backed, and black-crowned night herons); raptors (such as osprey and red-tailed hawk), and a wide variety of migrating and nesting passerines (songbirds) during different seasons. Mammalian inhabitants include muskrat and other small mammals such as meadow vole. Reptiles and amphibians represent a particularly important suite as they have perhaps suffered greater losses than any other group. Eastern painted turtle, snapping turtle, green frog, northern water snake, and others can still be found in the more secretive haunts along both these creeks. Finally, water-based insects such as striders, dragonflies, mosquitoes and numerous other species are dependent upon these varied habitats.

The diversity of the fisheries located within the watersheds has been influenced by factors such as fish-stocking programs, invasive and non-native fish releases, native and introduced predators, flow rates in the creeks, structures, aquatic vegetation changes, siltation of the ponds and lakes, and varying water quality. Fish species of the Great South Bay are shown on Figure 2.2.9.2. The species identified to be utilizing the Green's Creek and Brown's River watersheds can be divided into three different categories: naturally reproducing, stocked, and introduced/alien.

According to the NYSDOS map entitled *South Shore Estuary Reserve (SSER): Stream Water Quality*, the NYSDEC has designated the Mill Pond Branch of Brown's River with a water quality classification sufficient to support trout spawning and Green's Creek with a water quality classification that is sufficient to support trout. In waters suitable for trout spawning, the dissolved oxygen (DO) concentration shall not be less than 7.0 mg/L from other than natural conditions. In water suitable to support trout, the minimum daily average for DO shall not be less than 6.0 mg/L and at no time shall the concentration be less than 5.0 mg/L.

There are a number of diadromous species native to Long Island waters, meaning they either spend most of their life in brackish/freshwater and migrate out to sea to spawn

### Striped Bass



Min. size 26" Crest limit one fish between 26" and 30", one fish greater than 30"  
Season 4/15-12/15

(Recreative fishing allowed between phytoplankton blooms may possess 2 fish with a maximum 26" crest length.)

### Summer Flounder (Fluke)



Min. size 18" Crest limit 4  
Season 5/6 - 8/12

(Summer Flounder must be brought in alive intact, except that the white skin on top may be removed for bait.)

### Bluefish



Crest limit 15, no more than 10 of which may be less than 12" in total length  
Season all year

### Winter Flounder



Min. size 12" Crest limit 10  
Season 4/1 - 1/31

### Weakfish



Min. size 10" Crest limit 6  
Season all year

### Blackfish



Min. size 14" Crest limit 10  
Season 1/21 - 5/31

### Scup (Porgy)



Min. size 10.5" Crest limit 25  
Season 6/1 - 10/31

(Porgies aboard licensed party/charter boats may catch possess up to 60 scup between 9/1-10/31.)

### Black Sea Bass



Min. size 17" Crest limit 25  
Season all year

### Cod



Min. size 22" Crest limit none  
Season all year

### Spanish Mackerel



Min. size 14" Crest limit 15  
Season all year

### Put Back the Big Ones

The fun you have today can produce millions of fish in the future. Big fun can actually pay biggest dividends. For instance, a 30-lb striped bass can produce 1.3 million more eggs than a 10-lb fish. For fun on only water and minimal protection, please don't put back a pond.

FIGURE 2.2.9.2: FISH SPECIES OF THE GREAT SOUTH BAY

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(catadromous), or spend most of their life in the sea and travel into brackish/freshwater to spawn (anadromous). The only catadromous species common to the south shore tributaries is the American eel (*Anguilla rostrata*).

The Brown's River from the bay north to the dams along the Mill Pond and San Souci branches currently serve as anadromous fish runs for alewives (herring) and salmonids (trout). The existing dams prevent the fish runs from utilizing the branches to their fullest extent. The Brown's River Mill Pond branch north of the dam near Montauk Highway has historical salmonid (brook trout, *Salvelinus fontinalis*) occurrences although the NYSDEC and other local sources state that trout are no longer observed in this location. Green's Creek also has historical salmonid (brook trout, *Salvelinus fontinalis*) occurrences but the NYSDEC and other local sources state that trout are no longer found in this creek.

Two species of fish that have been recorded to be naturally reproducing within Mill Pond on Brown's River are largemouth bass and sunfish. According to the NYSDEC, San Souci Lakes have populations of bass, sunfish and perch. No records were obtained for other reaches of Brown's River or for Green's Creek. The largemouth bass (*Micropterus salmoides*) species is considered to be of high recreational value.

Mill Pond was stocked with 400 rainbow trout (*Salmo gairdneri*) by the NYSDEC in March 2005. The NYSDEC was expected to stock Mill Pond with 200 brown trout (*Salmo trutta*) by October 2005. Water quality decline, due to increased temperature, pollutants and stormwater runoff, prevent the stream from holding trout year-round. In addition, by late spring growth of aquatic plants in Mill Pond renders fishing difficult.

Historically, the Bluepoint Oyster Company used 11,500 acres of underwater lands of the Great South Bay in the vicinity of Green's Creek and Brown's River for harvesting oysters and hard clams. Additional commercially viable shellfish beds were located on either side of this area according to *SSER: Commercially Viable Shellfish Beds (1990's Town Data)*. This area falls within the jurisdiction of the Town of Brookhaven.

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According to the map entitled *SSER: Shorebird Concentration Areas*, there are no known concentrations of shorebirds in the vicinity of Green's Creek and Brown's River. According to the map entitled *SSER: Waterfowl Use Areas*, diving ducks use the bay in the vicinity of Green's Creek and Brown's River. According to the SSER CMP, the bay south of Green's Creek and Brown's River has a high feeding habitat value for diving ducks. Shorebirds and waterfowl identified in the vicinity of Green's Creek during SHS APES class field investigations include osprey (*Pandion haliaetus*), great blue heron (*Ardea herodias*), black-crowned night heron (*Nycticorax nycticorax*), mallard (*Anas platyrhynchos*) and belted kingfisher (*Megaceryle alcyon*). *The New York State Breeding Bird Atlas (2000-2005)* identifies 59 species of bird sited in the vicinity of Green's Creek and Brown's River. The majority of species had a NYS legal status of Protected. In addition, seven were listed as Game Species, two as Unprotected, and one, the Cooper's hawk (*Accipiter cooperii*), as Protected – Special Concern. Tidal wetlands parcels within the South Shore Estuary area of Long Island including Brown's River have been designated Bird Conservation Areas (BCA) by the NYSDEC. The BCA is a concentration site for waterfowl, shorebirds and wading birds that supports a wide diversity of wetland-dependent and upland species including at risk species such as northern harrier, common tern, osprey, seaside sparrow, clapper rail and short-eared owl. The BCA's provide management guidance and recommendations to improve habitats, reduce impacts and increase educational efforts.

### **2.2.9.3 Rare, Threatened and Endangered Species**

New York State Natural Heritage Program (NYNHP) suggested that 11 of 14 rare plant occurrences in their records were reported within the last 20 years in the vicinity of the Green's and Brown's watershed. All 11 of the recent reports are at the Sayville Grasslands located on the northwest section of the Federal Aviation property one-half mile west of Cherry Avenue and 0.15 miles north of the LIRR. This location is at the western limit of the Green's Creek watershed. Also on the NYNHP list as occurring in the Sayville grassland is the moth species Coastal Barrens Buckmoth, (*Hemileuca maia ssp. 5*), with a NY status of Special Concern.

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In addition, one avian species, least tern (*Sterna Antillarum*), is on the list and has a NY legal status of Threatened. Four locations are identified as possible nesting sites for this species, three along the south bayshore west of Brown's River and one along the east shore of Brown's River on Suffolk County property. The identified site on the east shore of the river is a dredge spoil location and the identified sites along the bay west of Brown's River are small public beach areas surrounded by parking, bulkhead and recreational space.

#### **2.2.9.4 Living Resource Use Impairments**

Impairments to water bodies can often be described in terms of their effects on the fish population of the water bodies. The New York State Department of Health (NYSDOH) issues health advisories concerning the consumption of sport fish caught in New York State waters. The NYSDOH has issued no specific advisories for Green's Creek or Brown's River. There are NYSDOH general advisories issued for marine striped bass, bluefish and American eel in the water along the south shore of Long Island. The contaminant of concern is PCB's and the recommendation is to eat no more than one meal per week of the species included in the advisory.

Shellfish restrictions are discussed in Section 2.3.1. The ability of finfish to survive and propagate is discussed in Section 2.2.9.2. Table 2.2.9.4 includes a table of the use impairment, pollution sources and types of pollution types. Those items in **bold type** were identified in the SSER CMP Technical Report: Status and Trends. Additional fishing restrictions were included based on advisories issued by the NYSDOH. Dam impairments are included based on discussions with representatives from Trout Unlimited.

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**Table 2.2.9.4 Green's Creek and Brown's River Use Impairments.**

<b>Waterbody</b>	<b>Use Impairments</b>	<b>Pollution Source</b>	<b>Pollution Type</b>
Green's Creek	- <b>Fish Survival</b> -Shellfishing restrictions -Fish Consumption	- <b>Stormwater</b> -Waterfowl -Dams	- <b>Nutrients</b> - <b>Silts</b> -Physical Impairments
Brown's River	- <b>Fish Survival</b> - Fish Consumption - Shellfishing restrictions	- <b>Stormwater</b> -Dams	- <b>Nutrients</b> - <b>Silts</b> -Physical Impairments
Great South Bay	- <b>Shellfishing – seasonal restrictions</b> -Fish Survival -Fishing -Fish Consumption -Bathing -Fish Propagation	- <b>Stormwater</b> -Boats/marina -Industry/Activity Specific	- <b>Pathogen Indicators</b> - <b>Nutrients</b> - <b>Water level</b> - <b>Silt</b> - <b>Metals</b> - <b>Thermal changes</b>

**2.2.9.5 Habitat Loss**

Habitat loss can be attributed to a number of conditions. Construction during the development of the area included the filling of wetlands to increase buildable land and the hardening of the shoreline through the construction of bulkheads and revetments to reduce erosion and stabilize lands. Population increase since the early 1900's has strained infrastructure and local resources. Local ground water supplies have been contaminated by development activities. Ground water levels decrease with demand and affect stream flow, and untreated storm waters are released directly into surface waters.

**2.2.9.6 Invasive Species**

Invasive plants may include either exotics or genetic variants of species otherwise considered native, that have developed adaptive strategies to compete successfully with local native populations for limited habitat resources. Exotics can be described and include any non-native species that may have been released directly into the watershed area or have expanded populations in the surrounding area and eventually entered into the watershed. Invasive species are of concern due to their potential to displace indigenous species and threaten native local populations.

Several species identified as invasive by the Invasive Plant Council of New York (IPC) were observed along the creek corridors. These species include common reed (*Phragmites australis*), garlic mustard (*Alliaria petiolata*), honeysuckle (*Lonicera sp.*), Japanese

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knotweed (*Polygonum cuspidatum*), multiflora rose (*Rosa multiflora*), Norway maple (*Acer platanoides*), Oriental bittersweet (*Celastrus orbiculatus*), and porcelain-berry (*Ampelopsis brevipedunculata*). Along Reach 2 of Green's Creek running bamboo (*Phyllostachys spp.*), a dominant invasive, was observed by SHS APES. This species was most likely originally planted as an ornamental screen on private properties along the river. Phragmites is the dominant invasive species along both waterbodies. Extensive areas of Brown's River in Reaches 1 and Reach 2 south of the dams have been infested with this species. In addition, smaller infested areas exist north of the dam on Brown's River and along the length of Green's Creek.

Additional species identified as invasive by the IPC include black locust (*Robinia pseudoacacia*), black swallow-wort (*Cynanchum spp.*), buckthorn (*Rhamnus spp.*), curly pondweed (*Potamogeton crispus*), autumn or Russian olive (*Elaeagnus spp.*), Eurasian water milfoil (*Myriophyllum spicatum*), Japanese barberry (*Berberis thunbergii*), Japanese Stilt grass (*Microstegium vimineum*), purple loosestrife (*Lythrum salicaria*), knapweed (*Centaurea maculosa*), and water chestnut (*Trapa natans*). Although these species were not specifically identified as present in the watershed, they can be expected to be found within the watershed based on their known abundance and distribution.

#### **2.2.10 Historic and Cultural Resources**

Long Islands Traditions conducted a cultural and historic resources survey to document and interpret maritime heritage and resources in the area that extends from Oakdale to Brookhaven Hamlet. The work was undertaken with support from the SSER Council and other agencies and groups. The final document, a Cultural Resources Report, will be used by the SSER Council and its partners for implementation of the SSER CMP and development of the Bayway. Both Green's Creek and Brown's River have been identified as having historic significance based on the maritime cultural heritage of the Great South Bay.

The area surrounding Green's Creek and Brown's River was initially small agricultural villages. In the 1830's the growth in New York City created a market for wood and the cutting and shipping of this commodity was a large part of the Sayville economy. Some of

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the ponds on these creeks, particularly Mill Pond, were constructed to process the wood. At the same time, fishing, clamming and oystering were the main industries along the shorelines. The Bluepoint Oyster Company located near the mouth of the Green's Creek was established by 1912 and was for a time the world's largest producer and shipper of oysters. Figure 2.2.10 contains a reprint from Newsday discussing the importance and value of Blue Point Oysters in the 1800's.

When the railroad reached Sayville in 1868, a summer tourism industry began that included the construction of hotels, summer estates and resort communities of the wealthy and continued into the late 19<sup>th</sup> century and early 20<sup>th</sup> century (1870-1930). Meadowcroft, a Roosevelt summer estate, is one of the original summer estates, and Brookside Preserve is a portion of another, the Isaac Green estate.

Cranberry bogs were established in the swampy wetlands around Sayville in 1870. These ponds, now known as San Souci Lakes, and the earth dams that created the bog cells, are still visible. The existing drainage structure located at the north end of the lakes was likely used to control the flow of water into the bog cells.

### **2.2.11 Prior Studies**

This section includes a description of prior studies that provided background information for the development of this report.

#### **Long Island South Estuary Reserve Comprehensive Management Plan (SSER CMP)**

The SSER CMP was adopted in 2001 to provide a blueprint for the long-term health of the Reserve's bays and tributaries, tidal wetlands, wildlife, tourism and economy. The SSER CMP identifies future actions that, when implemented, will ensure the long-term health of the estuary and its tributaries as a natural and cultural treasure, and as the foundation of the local economy.

The CMP identifies nonpoint source pollution from stormwater runoff as the primary water quality impairment issue in the SSER. Nutrients, sediments, and bacteria are identified as the key pollutants that stormwater runoff carries from the surface areas, into the tributaries, and subsequently into the bay. High nutrient and sediment loads in surface waters threaten fishing,



# IT HAPPENED

# ON LONG ISLAND



## 1800s: Blue Point Harvests the World's Finest Oysters

During the 1800s, Blue Point oysters, harvested from Great South Bay, were considered the world's finest. At the height of their popularity, over a hundred thousand barrels were shipped annually. Englewood-Queen Victoria served only oysters from Blue Point at Buckingham Palace in London, making use of their oyster shells (some sailed first). The valuable oysters were often stolen and even counterfeited, and the New York State legislature imposed strict controls on them. Blue Point oyster (shell meat) was so valued by the public that it resulted from the controls that they tried to escape from the union. By the twentieth century, the Great South Bay's oyster level had become too high to allow the oysters to grow. Blue Point oyster oysters are shown here in an undated photo. — Cynthia Blair

PHOTO COURTESY OF THE NEWSDAY ARCHIVES



Newsday

Newsday

Newsday

Newsday

Newsday

Newsday

Newsday

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fish propagation and fish survival. Vessel waste discharges and waterfowl are contributors to the coliform bacterial load, which is in turn responsible for closure of the bays shellfish beds. In addition to nonpoint source pollution, SSER tributaries are impacted by habitat degradation including hydro-modifications that affect fish resources.

In *Chapter 7: Implementation*, the SSER CMP identifies several actions related to Green's Creek and Brown's River, including actions to reduce nonpoint source pollution, restore habitat in tributaries, and restore diadromous fish. Included in these recommendations is the development of WMPs. The SSER CMP identified Green's Creek and Brown's River as priority areas for the following implementation actions:

*Green's Creek and Brown's River*

- Priority areas for stormwater remediation
- Sites for potential open space acquisition

*Brown's River*

- Priority stream corridor for restoration.
- potential wetland restoration sites

***Stormwater Outfall and Conveyance Identification & Mitigation Plan (Outfall Plan)***

The Stormwater Outfall and Conveyance Identification & Mitigation Plan (Outfall Plan) was completed by Nelson Pope & Voorhis, LLC for the Town of Islip in November 2001 with a programmatic addendum covering the Great Cove area completed in November 2003. The Outfall Plan was paid for in part by a grant from the NYSDOS and by the Town of Islip. Volumes I and II of the Outfall Plan include an inventory of outfall structures along the entire south shoreline of the Town and the tidal and non-tidal tributaries; an assessment of drainage areas and pollutants levels; delineation on watershed boundaries to the Great South Bay; and a prioritized list of pollutant contributions and degraded waters.

## **2.3 WATER QUALITY CHARACTERIZATION**

The primary objective of most on-going water quality monitoring programs in New York State is to prevent human health impacts from exposure to pathogenic bacteria and viruses (e.g., the

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hepatitis and Norwalk viruses, and Salmonella bacteria), which can result from either direct contact with contaminated water or the consumption of tainted shellfish. Water quality testing for these pathogens typically entails testing for the presence of coliform bacteria, which are relatively easy to measure. As coliform bacteria co-exist with the pathogens of primary concern mentioned above, the coliform bacteria serve as indicator of the possible presence of the pathogens.

Alterations in stream and stormwater system discharge occur routinely as a result of seasonal and yearly fluctuations in precipitation, seasonal changes in groundwater levels, increased urbanization and respective changes to drainage systems, and the pattern and extension of wastewater and drinking water systems which affect typical water withdrawal and replenishment budgets. The water bodies found in each watershed are for the most part “gaining systems”, that is, largely replenished by groundwater. Therefore, localized variations in the water budget may result in changes to surface water storage capacity, groundwater levels, and the rate at which the water bodies and stormwater flow. Removal of vegetation, compaction of soils, and construction of impervious surfaces can significantly affect normal hydrologic processes, cause waters to become stagnant or turbulent, decrease soil permeability, cause erosion and soil deposition, improve or aggravate flooding conditions, increase or decrease water and pollutant residence times, and affect natural water quality functions such as the settling of soil particles.

### **2.3.1 Water Quality Classifications/Designated Uses**

Table 2.3.1 below, summarizes general water quality classifications for the waterbodies in terms of their best usage as determined by the NYSDEC. Both Green's Creek and Brown's River are uncertified shellfishing areas. With the exception of the immediate vicinity of the mouths of both creeks, the bay is seasonally certified for shell fishing (closed May 1 through December 14). At the southern end of Green's Creek 11,500 acres of underwater lands were formerly managed by the Bluepoint Oyster Company for growing and harvesting oysters and hard clams. The Nature Conservancy took ownership of these lands in 2002 and is developing a management plan to restore the viability of the lands for shellfish and sea grasses.

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<b>Table 2.3.1 NYSDEC Water Quality Classifications.</b>		
<b>Waterbody</b>	<b>Water Classification</b>	<b>Best Usage</b>
Green's Creek – freshwater	C (T)	The best usage of Class C waters is fishing. These waters shall be suitable for fish propagation and survival. The water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes. (T) - waterbody historically supported trout population
Green's Creek – saline	SC	The best usage of Class SC waters is fishing. These waters shall be for fish propagation and survival. The water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes.
Brown's River – freshwater	C	The best usage of Class C waters is fishing. These waters shall be suitable for fish propagation and survival. The water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes. Mill Pond C(T) - (T) - waterbody historically supported trout population Reach north of Mill Pond to source C(TS) – (TS) waterbody historically supported trout spawning
Brown's River- saline	SC	The best usage of Class SC waters is fishing. These waters shall be for fish propagation and survival. The water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes.
Brown's River – San Souci Lakes- freshwater	B	The best usages of Class B waters are primary and secondary contact recreation and fishing. These waters shall be suitable for fish propagation and survival.
Great South Bay*	SA	The best usages of Class SA waters are shell fishing for market purposes, primary and secondary contact recreation and fishing. These waters shall be suitable for fish propagation and survival.
* Not including waters at the mouth of Green's Creek and Brown's River.		

The specific usage of fresh waters is dependent upon naturally functioning ecosystems, which are commonly characterized by a number of water quality parameters. The two major parameters

include dissolved oxygen and coliform bacteria concentrations. Adequate dissolved oxygen is essential to the growth and reproduction of finfish and shellfish. Dissolved oxygen is also required in the natural decomposition of organic wastes. Current public health standards call for low coliform bacteria concentrations since the presence of such bacteria is regarded as an indication of potentially pathogenic contamination due to human or animal wastes.

### **2.3.2 Impairments**

This section of the WMP includes a description of the impairments that have been identified as impacting the water quality of Green's Creek and Brown's River.

**Toxic Substances** – Toxic substances encompass a broad range of materials that can have adverse impacts on the environment or human health. These substances include oil, organic and metallic chemical residues from manufacturing, anthropogenic (human-made) chemicals, and agricultural and horticultural pesticides. Many of these toxic substances are a result of human development and activity.

**Pathogens and Pathogen Indicating Organisms** – Pathogens can cause human illnesses such as hepatitis A. Common pathogens and pathogen indicator organisms include bacteria such as *E. coli* and protozoa such as *Giardia lamblia* and *Cryptosporidium sp.* (the latter two in freshwater only). *E. coli* is an enteric (intestinal) bacteria, usually not harmful in and of itself. *E. coli* is easily detected and its presence is used to indicate the possible presence of pathogens that are both more serious and more difficult to detect. The suspected causes of this impairment are stormwater runoff and waterfowl.

**Nutrients** – Nutrients usually refer primarily to phosphorus and nitrogen, two elements that are necessary for plant growth. Nonpoint sources of nitrogen and phosphorus are the recognized causes of water quality degradation in many water bodies. In freshwater systems, phosphorus is usually the least available element relative to demand, while in marine systems, nitrogen is often the controlling factor. Phosphorus discharge regulations are set through the National Pollutant Discharge Elimination System (NPDES). The fertilizing effects of nitrogen and phosphorus have created water quality problems in many coastal and inland areas. They cause cultural

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eutrophication. Eutrophication is typified by rampant algal and plant growth leading to diminished water quality, which can cause problems including aesthetic impairments, and undesirable swimming conditions. When the accumulated plant mass decomposes, it causes a bloom of bacteria that feeds on the plant mass. This bloom extracts oxygen from the water, reducing the level of dissolved oxygen in the water. Oxygen deprivation can cause mobile animals to leave an area, which is one reason areas low in oxygen (hypoxic) often have low numbers of fish. In cases that are more serious and for species that cannot flee, hypoxia can stunt growth or kill. Stormwater runoff is a major contributor to this impairment.

**Oxygen Demanding Wastes** – Oxygen demanding wastes include pollutants such as sewage that require oxygen for decomposition. By stripping oxygen from the water column, these materials induce hypoxia. In extreme cases, when all oxygen has been removed from an environment, anaerobic conditions prevail. As the organisms that flourish in such conditions are very different from those in aerobic conditions much of the chemistry of the system changes. Stormwater runoff containing animal feces from local resident pets and waterfowl are the major contributors to this impairment.

**Floatables** – Besides the obvious negative aesthetic effects, trash can impact aquatic life either through ingestion or entanglement. Marine mammals, turtles, birds, fish and crustaceans have been effected by entanglement in or ingestion of debris. Entanglement can cause wounds, loss of limbs, strangulation and loss of ability to swim. Ingestion can block intestinal tracts and sharp items can damage mouths, intestinal tracts and stomachs. Buoyant floatables, which are transported through the waterbody into the marine environment, and items manufactured from synthetics, which persistent in the environment for long periods of time, tend to be more harmful than settleable elements and materials that biodegrade quickly.

Elements of floatable trash that represent significant threats to human health include items which contain toxic substances, discarded medical wastes, broken glass and human or pet wastes. The dumping of larger trash such as furniture, appliances automobiles, and shopping carts can create physical barriers to the stream flow and increase shoreline erosion. Human actions are a major contributing factor to floatables pollution.

**Silt and Sediment** – Silt and sediment can cause water quality problems in several ways. Sediments can alter the composition of bottom substrate. Such shifts may affect the survival of ecological communities in a given area. Mechanical covering immobile of organisms can also be a problem. Increased turbidity from silt and sediment entering a water system impacts the biota through light attenuation or smothering and burial. Turbidity creates economic impacts by reducing recreational use (closing of beaches because of turbidity) and increasing the need for maintenance dredging. The major contributors to this impairment are road runoff and erosion.

## **2.4 STORMWATER DRAINAGE INFRASTRUCTURE**

As described in Sections 2.1.1 and 2.1.2, the original watershed was defined by surface topography. Stormwater drainage systems installed to collect storm runoff from the network of roads and large-scale development has substantially altered the drainage patterns within the watershed.

### **2.4.1 Existing Information**

The Outfall Plan, discussed in Section 2.2.11 of this document, located outfalls Town-wide, analyzed pollutant potential and made recommendations for various stormwater mitigation projects. This study forms the foundation for the development of the Green's Creek and Brown's River WMP. The Outfall Plan documented the size, type and locations of outfalls within the Green's Creek and Brown's River watersheds. Town Geographic Information System (GIS) records provided data on upland drainage structures and piping. Outfalls are identified on Figures GR 2.4.1 and BR 2.4.1

### **2.4.2 Infrastructure Survey and Mapping Methodology**

The drainage information as described above was reviewed and field inspection of the structures conducted to determine the accuracy and completeness of the information. The connectivity of the storm drainage structures to the outflows was determined by inspecting the interior of structures that could be opened to observe existing piping and direction of flows. The surface area that contributes runoff to each outfall was determined by locating and mapping road topographic high points. During the field verification, 21 additional outfalls and several areas

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where infrastructure connectivity and drainage flow could not be determined were identified. In addition, areas where road runoff flows to surface waters or wetlands were identified. These are discussed under their specified reach below.

Drainage information from engineering plans for River Road and Brown's River Road improvements were reviewed. Available Suffolk County Department of Public Works (SCDPW) mapping and plans for Montauk Highway and Middle Road were also reviewed. A copy of the Town GIS mapping was modified to include the coordinates for all field-identified structures and new drainage information from mapping and plans. Figures GR 2.4.3 and BR 2.4.3 and the associated detailed maps show the results of this work for each creek. For structures outside of the surface drainage boundary, Town GIS data are shown.

Each structure reviewed was assigned an identification number. The outfalls discussed are listed by that number (i.e., Outfall 343) which corresponds to the maps. Where the outfall was identified in the Outfall Plan that identification number is also included (i.e., Outfall 321/BR10; on the map this is shown as 321/BR10). At locations where only the NPV BR# is shown, additional information on that outfall has not been collected.

Identification numbers along the roads are associated with locations where road end run-off drains into the creeks or areas where roads drains to wetlands along road shoulders.

Drainage areas were calculated for newly observed outfalls, outfalls where additional information was collected, or where no prior calculation was prepared. The linear length of street contributing area was measured and multiplied by a typical right-of-way (R-O-W). A 50' R-O-W was used for the majority of the residential streets. A 75' R-O-W was generally used for Montauk Highway and Middle Road. It was increased to 100' at the wider segments of road.

As described in Section 2.2.3 of this report, the surface drainage area of each waterbody has been divided into reaches and subwatersheds to aid in the assessment of impairments associated with each watershed. The following descriptions have been divided by reach.

### 2.4.3 Green's Creek Reaches and Outfalls

#### 2.4.3.1 Reach G1 – Great South Bay to Montauk Highway (Main Street)

This tidally influenced creek reach is bulkheaded except for a section of natural shoreline in the northwest limit that is currently vacant land. Marina use occupies the southwestern shoreline while dense residential use dominates the western shoreline including Sunset Lake. According to the Outfall Plan, there are 31 outfalls in this reach. Twenty of these outfalls are identified as discharging roof/lawn runoff from residential properties. Most are 3" diameter (one is 6" and one is 12") and have contributing areas ranging from 1,000 to 1,500 SF. These outfalls, identified as 494-499, 501, 503, 504, 507-512, 515-515, are not further discussed in this section. Community educational efforts into Best Management Practices (BMPs) methods and Integrated Pest Management (IPM) programs to reduce pesticide and fertilizer use can best reduce pollutants at these locations. These efforts are discussed in Section 3.2. The remaining 11 structures are discussed below. A dam is located at Montauk Highway that prevents the tidal flow from reaching farther north in the creek.

The building and parking areas of several commercial properties on Montauk Highway are in close proximity to Green's Creek and runoff may flow overland to the creek.

Outfall 433/GN25- An extensive storm drain system of catch basins and piping exists along **Montauk Highway** extending from the culvert at Green's Creek east to Greene Avenue and extends north on Greene Avenue to Swayze Street. Surface flow from the Railroad Avenue intersection in downtown Sayville flows to the piped system. Road runoff from several side streets also contributes to the system. In nine locations between Greene Avenue and Railroad/Candee Avenue, building roof drain systems discharge runoff into the gutter on Montauk Highway. Montauk Highway is under the jurisdiction of SCDPW who is currently developing plans for reduction of the storm runoff entering Green's Creek. The estimated runoff area to this outfall is 400,000 SF.

Outfall 428/GN35 - Road runoff from **Montauk Highway** extending west to Rollstone Avenue is directed to a drainage catch basin that discharges into Green's Creek. Several unconnected catch basins located upland of the outfall are full of water. Montauk Highway is

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under the jurisdiction of SCDPW who is currently developing plans for reduction of the storm runoff entering Green's Creek. The estimated runoff area to this outfall is 160,000 SF.

Outfall 493/GN26 - Road runoff from **West Street** on the spit of land between Green's Creek and Sunset Lake is discharged to the creek thru a 1' diameter corrugated metal pipe. The Outfall Plan estimated runoff area to this outfall is 8,000 SF.

Outfall 500/GN24 - Runoff from the parking area of a commercial marina discharges into Green's Creek thru a 3" diameter pipe. The Outfall Plan estimated runoff area to this outfall to be 2,000 SF.

Outfall 502/GN4 - Runoff from the north end of **Sunset Drive** is discharged into Green's Creek at this location thru a 6" diameter pipe. The estimated runoff area to this outfall is 20,000 SF.

Outfall 505/GN6 - Road runoff from **Jones Drive** is discharged into Green's Creek through a 1' diameter corrugated metal pipe. The estimated runoff area to this outfall is 130,000 SF.

Outfall 506/GN7 - Road runoff from the north end of **Anita Drive** is discharged into Green's Creek through a 1' diameter pipe. The estimated runoff area to this outfall is 15,000 SF.

Outfall 513/GN12 - Road runoff from the south end of **Anita Drive** is discharged into Green's Creek through a 2' diameter pipe. The estimated runoff area to this outfall is 12,500 SF.

Outfall 514/GN16 - Road runoff from **Palmer Circle** and the south end of Sunset Drive is discharged into Green's Creek through a 2' diameter corrugated pipe. The estimated runoff area to this outfall is 50,000 SF.

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Outfall 520, 521/GN 22, 23 - Runoff from **Clyde Street** and Suffolk County park property is discharged into Green's Creek through two 6" diameter PVC pipes. The Outfall Plan estimated runoff area to this outfall to be 30,000 SF.

**2.4.3.2 Reach G2 - North of Montauk Highway to Headwaters North of Tariff Street**

This reach extends north from Montauk Highway to the headwaters located north of Tariff Street. Freshwater wetlands line this reach of the creek. The surrounding lands are predominantly residential use. The Sayville School District occupies large parcels of land located along the western shoreline and the District trustees own a parcel south of Brookside that spans both shorelines of the Creek. Parking fields for the schools are reported to have outfalls to the creek. The extensive lawn areas at the high school athletic field are in close proximity to the creek. Preserved lands in this reach include Brookside County Park Preserve (Brookside Preserve) with adjacent Town preserved lands north of Brook Street, along with several privately held preserved parcels along the east side of the creek on Cliff Avenue. According to the Outfall Plan, there are three outfalls in this reach. Five additional outfalls were identified during field verification. Several small dam and weir structures have been constructed north and south of Brook Street. SHS APES reported that flashboards at the weir north of Brook Street had been removed in 2004 and dewatered the northern reach. The flashboards have since been replaced. The SHS APES report also identified an area of minor slope failure near the entrance to Brookside Preserve and trail erosion at the footbridge near the elementary school and areas of waste dumping at the northern limit of the creek.

Outfall 406/GN34 - Road runoff from **Tariff Street** is collected into a piped system of catch basins and manholes that discharge into Green's Creek at a bulkheaded culvert on the south side of Tariff. The drainage area extends along Tariff Street west to Milton Street and Mobile Street and east to Yonda Drive and includes portions of the adjacent side streets. The estimated runoff area to this outfall is 155,000 SF.

Outfall 413 - Road runoff from **Tower Street** is collected into a piped system of catch basins and manholes that discharge into the Green's Creek at a bulkheaded culvert south of Tower. The drainage area extends along Tower Street west to midway between Cherry Street and

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Hillside and east to Cliff Avenue. The drainage area includes Hillside Avenue north and south of Tower Street and Cliff Avenue north of Tower. The estimated runoff area to this outfall is 55,000 SF.

Outfall 474 - Murill Place road runoff is collected into a double catch basin and discharges into Green's Creek at the headwall at the east end of the street. The drainage area includes all of Murill Place. The estimated runoff area to this outfall is 10,000 SF.

Outfalls 416,419/GN33 - Road runoff from **Easy Street** is directed to Green's Creek via roadside swales. There are several non-functioning, water- and debris-filled, catch basins located along Easy Street. Drainage cannot enter the catch basin on the north side of Easy Street due to elevation differences. The drainage area extends from midway between Cherry Avenue and Hillside Avenue east to Greeley Avenue. The estimated runoff area to this outfall is 87,500 SF.

Outfall 532 - Road runoff from **Lorraine Circle** is collected in drainage system of 16 structures (13 leaching basins and 3 manholes) with overflow piping into Green Creek at Brookside preserve. The estimated runoff area to this outfall is 50,000 SF but the leaching basins may be able to contain the WQSE if the system is piped to overflow the larger storms.

Outfall 422/GN32 - **Brook Street** road runoff enters the creek via road drainage grates that discharge directly into the culvert beneath the road. The drainage area from this outfall extends west to Division Street and south on Cherry Street for 1000 feet. The estimated runoff area to this outfall is 90,000 SF.

Outfall 424/GN32 - **Brook Street** road runoff enters the creek via road drainage grates that discharge directly into the culvert beneath the road. The drainage area from this outfall extends east to Greeley Avenue and includes about 200 feet of area on the adjacent side streets. The estimated runoff area to this outfall is 72,000 SF.

Outfall 491 - Baymens Court road runoff is collected in two catch basins that discharge through a pipe to Green's Creek. The drainage area includes all of Baymens Court. The estimated runoff area is 12,500 SF. The outfall location of the pipe was not field verified.

Road End Runoff - There are several locations within this reach where road runoff surface drains to the end of the road and into the creek or adjacent lands. These locations include **Amelia Place (Outfall 471), Howard Court (Outfall 467), Brookdale Court (Outfall 468), Case Court (Outfall 469), and Olive Street (Outfall 492)**. The estimated runoff areas for these streets range from 9,000 SF to 15,000 SF.

#### **2.4.4 Brown's River Reaches and Outfalls**

##### **2.4.4.1 Reach B1 – Great South Bay to Middle Road**

This reach of the river is tidally influenced. Commercial water-dependent uses including marinas, boat storage and ferry transportation are prevalent along with single-family residences. Significant portions of this reach are bulkheaded. There are few drainage structures on many of the roads adjacent to the river. At these locations, road runoff discharges directly to the river at the road ends or to wetlands adjacent to the roads.

Along the west shoreline, there are a number of water-dependent commercial uses including marinas, boat yards, ferry terminals and associated land uses, including the marina operated by Sayville Ferry Service. The Ferry Service is a concession of the National Park Service that operates ferries to the Fire Island communities of Cherry Grove, Water Island, Fire Island Pines and Sailor's Haven. The service is operational from mid-May thru mid-October. Loose stone parking lots for long-term and day parking are located along both sides of Brown's River Road. The marina and boat yard facilities have boat ramps and lifts, docking space, off-season boat storage and vehicular parking for boaters during the summer season. Several of the facilities also offer boat repairs services. Along the eastern shoreline, there is a Town marina facility and a private marina located on the small eastern tributary of the River. The marinas include three public and six commercial marinas that contain 432 boat slips. There are a several homes with bulkheaded property and boat docking along this reach.

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The Outfall Plan identified 16 outfalls in this reach. One additional outfall was identified during field verification.

Outfall 314/BR14 - A force main discharges runoff from the **Brown's River Road** and **River Road** stormwater collection system as discussed in Section 2.4.5.1. All runoff is carried through a water quality inlet which removes floatables and sediments with attached pollutants prior to discharge to the River via a pump station and the force main. The drainage area includes all of Brown's River Road west to Foster Avenue and River Road north the immediately below Terry Street. The estimated runoff area from this outfall is 77,000 SF.

Outflow 329/BR9 - This outfall pipe was sealed at **River Road** during construction for Outfall 314 above. It is not expected to discharge any runoff into the River.

Outfall 327 - As above, this outfall pipe was sealed at **River Road** during construction for Outfall 314 above. It is not expected to discharge any runoff into the River.

Outfall 321/BR10 - This pipe provides tidal flow connection to the wetland located on the east side of River Road. There do not appear to be any structures contributing runoff into this system. The wetland receives runoff from the adjacent parking area and residential properties.

Outfall 320/BR11 - This pipe provides tidal flow connection to the wetland located on the east side of River Road. There do not appear to be any structures contributing runoff into this system. The wetland receives runoff from the adjacent parking area and residential properties.

Outfall 338/BR2 - This outfall pipe discharges runoff from a piping system at the intersection of **Terry Road** and **River Road**. The drainage area includes all of Terry Street west to Foster Avenue and West River Road to River Street. The estimated runoff area to this outfall is 45,000 SF. During storm events, this area floods and runs over the bulkhead and into the River. The Town has proposed modifications to this area as discussed in Section 2.4.5.3.1

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Outfall 341/BR12 - This outfall directs runoff from **Willow Street** east to the River. The estimated runoff area to this outfall is 30,000 SF.

Outfall 340/BR13 - This outfall allows road drainage to enter the river from the street and parking area of the Town Marina at River Road. The runoff area to this outfall is estimated to be 30,000 SF.

Outfall 379/BR01 - A commercial marina boat ramp allows the adjacent area to surface drain directly to the River. The Outfall Plan estimated runoff area to this outfall to be 10,000 SF.

Outfall 396,397/BR8,8A - This outfall is a pipe culvert under **Seamans Avenue** that connects tributary tidal wetlands and surface waters to Brown's River. Road runoff in this area sheet flows into the wetlands. There are no road drainage structures on the road in this area.

Outfalls 343,344,345/BR5,6,7 - These outfalls direct runoff from a commercial marina to the River. The estimated runoff area of the marina is 30,000 SF.

Outfall 375/BR29,30 - Runoff extending from Railroad Avenue and Main Street in downtown Sayville is carried east along **Middle Road** and discharges into Brown's River west of Bryan's Bridge through two catch basins. This road is under the jurisdiction of the SCDPW. There are currently no drainage structures on this length of road. According to the representatives of SCDPW, there have been discussions regarding the installation of a drainage system along this section of Middle Road and a survey of the road right of way was recently completed. No schedule for the design or implementation of these measures has been identified. The estimated runoff area to this outfall is 100,000 SF. SCDPW is in the early stage of planning drainage improvements for this road as discussed in Section 1.4.5.3.

Outfall 377/BR18,19 - Runoff along **Middle Road** 200' east of Baywood Lane is carried west, and discharges into Brown's River east of Bryan's Bridge through two catch basins.

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This road is under the jurisdiction of the SCDPW. There are currently no drainage structures on this segment of road. The estimated runoff area to this outfall is 75,000 SF.

Road Runoff. There are numerous locations within this reach where road runoff surface drains directly into the creek or adjacent wetlands. These locations include the east side of the River along Brown's River Road, Bay Avenue and Seaman Avenue. There are no drainage structures or curbs to collect or concentrate the runoff. The area has a shallow groundwater depth and the wetlands are phragmites dominated. Most control measures are not feasible due to the shallow depth to groundwater and the invasive tendencies of the phragmites that dominate the wetlands. Along the west shoreline, numerous street ends drain to the river. The estimated runoff areas for the streets ends range from 9,000 SF to 15,000 SF.

#### **2.4.4.2 Reach B2 - Middle Road to Montauk Highway**

In this reach, the river splits to two branches. Lotus Lake is located at the upper eastern limit north of the LIRR tracks. The river runs through Roosevelt County Park, which is mainly surrounded by residential development. A large parcel of land along the east side of the river is the site St. Ann's Parish. The parish includes a church and cemetery north of Middle Road, additional buildings and grounds south of Middle Road and large expanses of lawn that slope toward wetlands that have been preserved as part of Roosevelt County Park. This reach is tidally influenced below the dam structures located at Montauk Highway on the Mill Pond Branch and at the LIRR on the San Souci Branch. The branches are freshwater above the dams. There are large areas of tidal and freshwater wetlands and few outfalls in this reach.

The Outfall Plan identified five outfalls in this reach and an additional six were identified during field verification.

Outfall 132 - Amy Street drainage is collected into catch basins and outflows through a pipe into Lotus Lake south of Montauk Highway. The estimated runoff area to this outfall is 80,000 SF.

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Outfall 135 – Runoff from **Montauk Highway** from Lowell Road to Old Broadway Avenue is collected in a piped system and discharges into a small tributary of the San Souci branch. The tributary water has a surface sheen indicating oils in the runoff. The tributary extends north under Montauk Highway and is described further in Reach 5. The estimated runoff area is 135,000 SF

Outfall 417/BR26 – This drainage area of **Montauk Highway** at the San Souci branch extends 2400' east of the discharge to the watershed limit and is collected in a piped system that discharges into the San Souci branch. This road is under the jurisdiction of SCDPW who provided plans of the drainage system at this location. The estimated runoff area is 240,000 SF.

Outfall 413/BR 16 This drainage area of **Montauk Highway** and Old Montauk Highway at the San Souci branch is approximately 400' in length and is collected into a catch basin system that discharges into a small recharge area approximately 5000 SF x 2' depth. The recharge area has an asphalt swale that allows overflow into the San Souci branch. A second swale allows drainage from Montauk Highway to directly enter this recharge area. This road is under the jurisdiction of SCDPW who provided plans of the drainage system at this location. The estimated runoff area is 40,000 SF.

Outfall 414 This drainage area of **Montauk Highway** at the San Souci branch is approximately 400' in length and is collected into a catch basin that discharges into the San Souci branch. This road is under the jurisdiction of SCDPW who provided plans of the drainage system at this location. The estimated runoff area is 40,000 SF.

Outfall 98,99,432,435/BR24 – The drainage area of **Montauk Highway** at the Mill Pond branch extend from 600' west of Mill Pond east to Amy Drive and discharges into the river at the culvert south of Mill Pond. According to plans provided by SCDPW, there are four pipe outfalls into the culvert under Montauk Highway. The northwest, Outfall 99, collects runoff from one basin and limited surface area. The estimated runoff area is 5000 SF. The northeast, Outfall 98, collects runoff from the intersection of Montauk Highway and Mill

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Pond Road. The estimated runoff area is 15,000 SF. The southwest, Outfall 435, collects runoff into a piped system. The estimated runoff area is 72,000 SF. The southeast, Outfall 432, collects runoff into a piped system of basins that extends 2000' to the east. The estimated runoff area is 240,000 SF. SCDPW installed a water quality inlet immediately prior to Outfall 432 in 2003.

Outfall 351 - Drainage from **Montauk Highway** extending from Lincoln Avenue east to north of the LIRR overpass is collected and piped to this outfall. According to SCDPW, road runoff from this section of road is collected into a piped drainage system that runs along the LIRR easement and discharges into the Mill Pond branch on the north side of the railroad. This discharge was not observed and no mapping was provided by SCDPW. Based on the drainage pattern for the adjacent sections of Montauk Highway, the estimated runoff area for this outfall is 170,000 SF

Outfall 407/BR 31 – **Baywood Lane** drainage is collected into two catch basins and outflow through a pipe into the east side of the river north of Middle Road. The outflow pipe is located in an easement between two residences. The estimated runoff area is 60,000 SF.

#### **2.4.4.3 Reach B3 – The East Branch – San Souci Lakes**

This reach is the eastern branch of Brown's River located between Montauk Highway and Sunrise Highway. This is the longest river reach and contains freshwater wetlands. This reach is in a natural setting with only minor development along the lower perimeter. Suffolk County owns lands designated as preserve along the west side of the river and Girls Scouts of Suffolk County owns the lands along the east shoreline as discussed in Section 2.2.6.1 of this report.

There do not appear to be any outfalls in this reach. A weir or dam structure (BR15) exists at the northern end of the branch. This structure is believed to date to the development of the cranberry bogs along this branch.

#### **2.4.4.4 Reach B4 – The West Branch – Mill Pond**

This reach is the west branch between Montauk Highway and Sunrise Highway. North of Mill Pond the river is narrow and contains freshwater wetlands. For the majority of this reach the Town owns a narrow width of preserved property along one shoreline. Residential properties surround the river and preserve land. Where no preserve land exists, the residential properties extend to the river. Mill Pond is located at the southern end of this reach. The pond is stocked with trout by the NYSDEC in the spring for fishing but heavy aquatic vegetation growth renders fishing difficult by mid-summer.

The Outfall Plan identified one outfall in this reach and an additional nine outfalls were identified during field verification.

Outfall 1 – This outfall collects road runoff from **Richmar Drive** and **Julbet Drive**. The storm runoff is piped through Town preserve land and discharges through a headwall into the River in a densely vegetated area. The estimated runoff area to this outfall is 77,000 SF.

Outfall 3 - This outfall collects runoff from the north end of **Astor Drive** and the east end of Versa Place. Storm runoff discharges through a headwall into a small stream that carries the runoff to the river. The stream was reported to have been constructed at the same time as the housing to direct the road runoff into Brown's River. The estimated runoff area to this outfall is 145,000 SF.

Outfall 23 - This outfall collects runoff from **Ort Court**. The catch basins connected to the outfall are full of sediment reducing the structure capacity. Runoff collects and overflows the curb into the river. Runoff that is infiltrating through the catch basins into the outfall has an oily surface sheen. Upland catch basins that should collect initial storm runoff and associated sediments are clean. The estimated runoff area to this outfall is 40,000 SF.

Outfall 24 - This outfall collects road runoff from **Julbet Drive** at Sunrise Highway. The stream at this location is intermittent and appears to carry only storm runoff. Dumping of

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trash and brush is evident. The estimated runoff area to this outfall is 15,000 SF. There is a 34-acre vacant parcel adjacent to the channel. This parcel has been proposed for development as housing.

Outfall 5 - This outfall collects runoff from **Valerie Court** into a recharge basin. The basin has an overflow structure that discharges via a corrugated metal pipe into Brown's River. The overflow structure does not appear to separate the initial flow from the larger storm event or provide significant sediment settlement prior to overflow. The estimated runoff area to this outfall is 97,500 SF.

Outfall 57 - This outfall collects drainage from **Revelyn Court**. The runoff area to this outfall is estimated to be 35,000 SF.

Outfall 6 - Road runoff from **Dunn Court** is collected into a concrete curb inlet that discharges via a pipe into Brown's River. The pipe appears to run in an easement between two residential properties. Catch basins were installed upland of the inlet, but road grades prevent drainage from reaching the catch basins. As a result, all runoff continues to enter Brown's River. The estimated runoff area to this outfall is 40,000 SF.

Outfall 83/NPV BR 20 - Storm runoff from **Aldrich Street** and Astor Drive is collected in catch basins and piped into the river. CB 82 is filled with sediments. A separate upland system is not connected to the catch basins that flow into the river. The upland system collects runoff into a system of pipes and catch basins. The estimated runoff area to this outfall is 17,500 SF.

Outfall 94 - Storm runoff is collected into a catch basin on the east side of **Astor Drive** and discharges through a pipe into Brown's River. Three catch basins on the west side of the street do not appear to be piped to the outflow structure. The estimated runoff area to this outfall is 12,500 SF. The estimated runoff area to this outfall is 12,500 SF

Outfall 429 - Storm runoff is collected into catch basins on **Astor Drive** and discharges through a pipe into Brown's River. The estimated runoff area to this outfall is 75,000 SF.

#### **2.4.4.5 Reach B5 – Islip Grange and Broadway Park Tributary**

This small tributary is located between the Mill Pond and San Souci branches and discharges into Lotus Lake. The river extends through Islip Grange, a Town historical facility, and into Broadway Avenue Park, a Town recreational facility. Both facilities have large expanses of lawn. Review of drainage structures north and east of the park seem to indicate that storm drainage from the surrounding streets is directed through the park in a piped system. System infrastructure could not be determined and requires additional review. Until further information is obtained, this drainage area cannot be quantified.

### **2.4.5 Watershed Quality Improvement Projects**

The water quality improvement projects sections includes a discussion of projects to improve the water quality that have been implemented in each drainage area, educational efforts that have been undertaken and projects that are planned by both the Town and Suffolk County.

#### **2.4.5.1 Implemented Improvement Projects**

Several projects and activities have been undertaken to reduce pollution levels in the creeks.

##### *Brown's River Road Flood Abatement Project (River Road Project)*

The Town reconstructed Brown's Road and Brown's River Road on the west side of Brown's River in 2003 to reduce flooding. The project required NYSDEC tidal wetland permitting. As the proposed project increased runoff into Brown's River, the NYSDEC required that the quantity of increased runoff be mitigated by the reduction of a similar quantity in other areas that drained to the river. NYSDEC required that those measures be installed prior to construction beginning on the River Road project. To mitigate the increased runoff into the river, the Town installed leaching pools upslope from outfalls to the river along Collins Avenue and Colton Avenue in the tidal section of the river and further north at Brook Lane in the river's freshwater reach.

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The River Road project entailed installation of a piped system of catch basins and manholes along the two roads that direct runoff from the road into a water quality inlet prior to being pumped into a pipe that outfalls into Brown's River. The water quality inlet uses centrifugal force to remove sediments and is treating the entire flow through the pipe (12- 14 CFS). The treated volume is in excess of the volume required for the water quality storm event (WQSE). Prior to this project, the road runoff was conveyed through a series of four additional outfalls into the river. Two existing outfalls were bulkheaded. The remaining two were redesigned to maintain tidal flushing of the wetland areas on west side of the road. Those wetlands collect surface drainage from the adjacent parking and residential areas.

Mill Pond Water Quality Inlet

SCDPW installed a water quality inlet (WQI) immediately south of Mill Pond on Brown's River in 2003. This system treats road runoff from a 2000' section of Montauk Highway west of Mill Pond and discharges to the river on the south side of Montauk Highway.

**2.4.5.2 Prior Educational Efforts.**

Keep Islip Clean (KIC), a local community group, implemented a Storm Drain Stenciling Program in 1991 to raise public awareness of the connection of storm drains to surface and groundwater. Stencils were provided by New York State Sea Grant Extension program. KIC also coordinates beach and stream clean-ups. Islip Town Environmental Council (ITEC) is currently funding the purchase of "no dumping" medallions that will be installed on storm drainage grates by the Islip Department of Public Works.

**2.4.5.3 Planned Improvement Projects**

2.4.5.3.1 Town of Islip

Town of Islip has several mitigation projects in the planning phase within the Brown's River watershed. The projects are proposed to provide drainage improvements, wetland restoration and public access to the waterfront.

*Restoration at Brown's River Road*

The project area is the southern end of the Town of Islip Marina at the intersection of Brown's River Road and Bay Avenue on the east side of Brown's River. No drainage infrastructure exists and road surface runoff currently drains directly to adjacent wetlands on either side of the road. A 60' x 65' area at the southern end of the marina is proposed for active and passive stormwater abatement techniques to treat the road runoff. The bulkhead is proposed to be restored. Existing phragmites will be removed and a new boat waste pump-out facility will be installed.

*Improvements to Candee Avenue*

This project proposal includes improvements to Candee Avenue and the bulkheaded 2.6-acre Town park parcel at the southern end of Candee Avenue. The site is within the Brown's River watershed but drains directly to the Great South Bay. As the park is topographically lower than the road, runoff currently floods the park. Additionally, the southern end of Candee Avenue drains directly to the Great South Bay. The Town is proposing a series of improvements for the site including:

- Improvements to the road end to eliminate road runoff into the bay including the creation of a cul-de-sac and formalized parking and installation of drainage infrastructure that may include stormwater infiltrators in the road right-of-way.
- Regrade the park and provide walks to the waterfront, benches, and low-maintenance environmentally compatible landscaping.
- Removal of the existing bulkhead and installation of native wetland vegetation.

*Terry Street Improvements*

This proposed project is located at the eastern end of Terry Street where there is an existing deteriorated bulkhead. Soil behind the bulkhead has eroded into the River. Road runoff directly enters the River and tides breach the bulkhead. The project will include an analysis of the contributing area and of conditions of the existing drainage infrastructure. A drainage mitigation plan will be developed based on the finding of the analysis and solutions may include stormwater infiltrators or partial sedimentation chambers. In addition, the project will include replacement of the deteriorated bulkhead and new curb and railing.

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2.4.5.3.2 Suffolk County

SCDPW is in the initial stages of developing two projects that will reduce stormwater runoff from urbanized area from entering the creeks. No timeframe for implementation has been set.

One project is the installation of retention basins that will intercept the Montauk Highway drainage flow that is currently piped directly to Green's Creek. The drainage area to be mitigated extends from Atlantic Avenue west of Green's Creek east to downtown Sayville. The project required acquisition of two vacant parcels for construction of the basins. SCDPW has estimated the Montauk Highway runoff areas to be 1.5 acres (65,500 SF) west from the creek and 2.8 acres (122,000 SF) extending east from the creek.

The second SCDPW project is proposed for Middle Road in the Brown's River watershed. There is no existing drainage infrastructure in place for a 2000' length of the road. Drainage surface flows along the road edge to grates that outfall directly into the River. According to SCDPW, there have been discussions regarding the installation of a drainage system along this section of Middle Road and a survey of the road right-of-way was recently completed. No schedule or funding for the design or implementation of these measures has been identified.

## **2.5 INTER-MUNICIPAL JURISDICTION AND AGREEMENTS**

Jurisdiction over the waterways of the Green's Creek and Brown's River, the watersheds and the shoreline is divided among numerous entities at multiple levels of government. Although the Town of Islip exercises the primary authority over decisions pertaining to these waters, there are a number of Federal, State, County, and local private entities that have responsibilities concerning the management and uses in this area.

The following sections provide a brief description of the roles played by public agencies that are expected to be involved in actions to implement this plan.

### **2.5.1 Jurisdictional Boundaries**

The watersheds are located completely within the Town of Islip. The Great South Bay in this location is under the jurisdiction of the Town of Brookhaven. Suffolk County and New York State own land totaling approximately 360 acres (350 and 10 respectively) within the watersheds and in particular along the shoreline of the creeks. Suffolk County has jurisdiction over Montauk Highway (SC Route 85) and Middle Road (SC Route 65). The New York State Department of Transportation (NYSDOT) has jurisdiction over Sunrise Highway and the services roads. In addition, the USACOE has dredging responsibility for Brown's River while Suffolk County has dredging responsibility for Green's Creek.

### **2.5.2 Federal**

Federal agencies with jurisdiction in the watersheds include the following agencies.

#### **2.5.2.1 United States Environment Protection Agency (USEPA)**

USEPA's mission is to safeguard human health by protecting the integrity of the environment. USEPA pursues this goal by developing legislation and national environmental protection programs and by administering funding to states and municipalities for the development and implementation of environmental plans, policies, projects, and programs. USEPA sponsors a number of programs that advocate the protection of natural resources such as surface water quality, including various Clean Water Act (CWA) programs, and publishes a variety of environmental protection and planning guidance documents to provide technical support and educational assistance to the public.

#### **2.5.2.2 United States Army Corp of Engineers (USACOE)**

USACOE's mission with regards to the water of the United States is to provide services for planning, design, building, and operating water resources and other civil works projects including navigation and dredging, flood control, environmental protection and disaster response.

### **2.5.3 New York State**

New York State agencies with jurisdiction in the watersheds include the following agencies.

#### **2.5.3.1 New York State Department of Environmental Conservation (NYSDEC)**

The NYSDEC manages the State's recreational and commercial fisheries, tidal and freshwater wetlands, and other natural resources common to the coastal environment. NYSDEC is responsible for the preservation of water quality throughout the State, especially through the administration of the permit program under the State Pollution Discharge Elimination System (SPDES) and oversight of spill remediation activities. The recent expansion of SPDES (Phase II) covers municipal stormwater systems and construction sites greater than one acre in area. NYSDEC also oversees the implementation of the requirements of the National Shellfish Sanitation Program, including enforcement activities with regard to the illegal taking of shellfish from uncertified waters.

NYSDEC roles within the Green's Creek and Brown's River watersheds includes establishing and implementing a number of natural resource protection programs, including environmental permitting programs; enforcing the State's environmental laws; freshwater fish stocking and licensing; resource management and planning; conducting site inspections, scientific research, and water quality testing; and providing technical assistance to private entities and municipalities.

#### **2.5.3.2 New York State Department of State (NYSDOS) Division of Coastal Resources (DCR)**

NYSDOS DCR provides technical and financial assistance to governments, businesses, and private organizations for the improvement of waterfronts, and specifies policies on issues that affect coastal areas. The DCR is responsible for administering the mandates of the Federal Coastal Zone Management Act of 1972 and the State Waterfront Revitalization Act of 1981, including its responsibility for reviewing Local Waterfront Revitalization Program (LWRP), Harbor Management Plans (HMP), and various coastal projects for consistency with the State's Coastal Management Plan.

NYSDOS has been involved in numerous coastal planning initiatives in the State and has dedicated a wealth of technical expertise and financial assistance to these projects.

#### **2.5.3.3 New York State Department of Health (NYSDOH)**

NYSDOH identifies water-bodies that have compromised water quality that may have adversely affected the suitability of fish for human consumption.

### **2.5.4 Suffolk County**

Suffolk County agencies with jurisdiction in the watersheds include the following agencies.

#### **2.5.4.1 Suffolk County Department of Public Works (SCDPW)**

SCDPW is the agency responsible for maintaining the County roadways and corresponding drainage infrastructure in the Town. County roads include Montauk Highway (County Rte 85) and Middle Road (County Rte 65). In addition, the County is responsible for maintenance of the Sunrise Highway service roads. The manner in which the County plans, engineers, constructs and maintains its stormwater infrastructure and roads can have significant and lasting effects on local water quality

#### **2.5.4.2 Suffolk County Department of Health Services (SCDHS)**

SCDHS conducts a sampling program during the summer season to monitor total and fecal coliform bacteria levels that determine whether the waters at public bathing beaches are suitable for swimming. Samples are collected twice weekly, from mid-April to the end of September of each year. The County collects samples at the mainland beach facilities. Beach facilities are closed if test results indicate that bacteria levels exceed NYS bathing beach standards.

#### **2.5.4.3 Suffolk County Planning Commission (SCPC)**

The SCPC has discretionary approval authority over subdivision applications, in accordance with the provisions in the *SCPC Subdivision Guidebook* (Guidebook). The SCPC is

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authorized to review and comment upon all proposed subdivisions that lie wholly or partly within 500 feet of:

- 1) The boundary of any village or town.
- 2) The boundary of any existing or proposed county, state, or federal park or other recreation area.
- 3) The right-of-way of any existing or proposed county or state parkway, thruway, expressway, road or highway.
- 4) The existing or proposed right-of-way of any stream or drainage channel owned by the county or for which the county has established channel lines.
- 5) The existing or proposed boundary or any other county, state or federally owned land, held or to be held for governmental use.
- 6) The Atlantic Ocean, Long Island Sound, and any bay in Suffolk County or estuary of any the foregoing bodies of water.

The SCPC's General Statement of Policy regarding shoreline development states: *The shoreline of Suffolk County is one of its prime economic, aesthetic, and environmental assets. It is the objective of the Commission to encourage the preservation of this resource through the prevention of the degradation of any body of water, the use of adequate setbacks to offset the affect of erosion, the discouragement of those activities that will hasten erosion and disturb the ecological balance of the area, and the preservation of the aesthetic attributes of the shoreline.*

The Guidebook contains specific guidelines for subdivision development at locations on tidal streams, rivers, wetlands, and other tidal bodies in the area. The Guidebook also contains SCPC policy and guidelines on stormwater in subdivisions.

#### **2.5.4.4 Suffolk County Department of Planning (SCDP)**

Suffolk County Department of Planning (SCDP) is responsible for conducting planning research and preparing regional/county-wide plans. The SCDP also maintains a master list for the land acquisitions programs that include farmlands, environmental sensitive lands and parklands.

#### **2.5.4.5 Suffolk County Parks, Recreation and Conservation**

The Suffolk County Parks Department is responsible for maintaining County-owned park and preserve facilities. County parks and preserves with the watersheds include San Souci Lakes County Preserve Roosevelt County Park, Green's Creek County Park, and Brookside County Park Preserve.

### **2.5.5 Town of Islip**

The Town has the authority to regulate land use activities in its respective unincorporated communities. The Town also regulates the use of underwater lands and the placement of structures on underwater lands within its respective boundary.

#### **2.5.5.1 Supervisor/Town Board**

The Town Board is the legislative body of the Town of Islip. The Board has the final responsibility for all matters pertaining to the operation of the Town. It exercises this authority in the form of local laws, ordinances and resolutions. The Town Board conducts regularly scheduled public meetings on matters relating to zoning, budget and public safety. The principal duty of the Board is to regulate land use within the Town in such a way that it advances the health, safety and welfare to Town residents.

#### **2.5.5.2 Department of Planning**

The Department of Planning through the Division of Planning is responsible to update the Comprehensive Plan, prepare studies, reports, plans and programs for the Town Board for the purpose of fostering, maintaining and monitoring the orderly growth and development of the Town, and in seeking to achieve the highest and most efficient available levels of service for the Town and its residents. The Planning Division also serves as staff for the Planning Board and the Zoning Board of Appeals.

The Planning Department oversees planning activities related to the protection and enhancement of environmental resources, and assists Town departments in obtaining environmental permits and grants. It also develops, implements, and coordinates programs

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for water conservation, the preservation of the marine environment and marine life, and the protection of wetlands.

The Islip Town Environmental Council (ITEC) is appointed by the Town Board and operates under the Department of Planning. The powers and duties of the ITEC include:

- A. Advise 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 insofar as beauty, quality, biologic integrity and other environmental factors are concerned and, in the case of man's activities and developments, with regard to any major threats posed to environmental quality, so as to enhance the long-range value of the environment to the people of the Town of Islip.
- B. Develop and, after receiving general approval by resolution of the Town Board, conduct a program of public information in the community that shall be designed to foster increased understanding of the nature of environmental problems and issues and support for their solutions.
- C. Conduct such studies and surveys as may be necessary to carry out the general purposes of this local law.

#### **2.5.5.3 Town Planning Board**

The Town Planning Board is empowered to approve subdivision and land development projects and recommends approval or disapproval of proposed zoning changes to the Town Board. The Planning Board reviews all subdivision applications and determines required site improvements including roads, curbs and sidewalks, drainage structures or positive drainage systems.

#### **2.5.5.4 Public Works Department**

The Public Works Department plays a critical role in stormwater and pollutant control delivery system maintenance and the preservation of surface water quality. The Division of Highway and Road Maintenance is responsible for supervision of road construction, maintenance, repair, and drainage structures, street sweeping, and snow removal on Town roads and parking lots. In addition, this division is responsible for town-operated litter and

refuse collection and cleaning of all town properties. The Division of Marina and Beach Maintenance is responsible for construction, alteration and maintenance of all docks and marinas.

#### **2.5.5.5 Parks, Recreation and Cultural Affairs Department**

The Town's Parks Recreation and Cultural Affairs Department through the Division of Parks is responsible for maintaining Town-owned park, marina and beach facilities, developing and supervising recreational activities, the operation of all marinas and boat launching ramps, and the operation of the Town's golf course. The Department's Division of Public Safety enforces provisions of the Town Code including but not limited to Chapter 37 - Parks, Swimming Pools, Marinas, Boats, and Waterways and Chapter 44 - Shellfish.

#### **2.5.5.6 Department of Building and Engineering**

The Town's Department of Buildings and Engineering has two divisions. The Division of Building administers and enforces zoning laws and applicable local laws, ordinances and regulations in addition to NYS building codes. The Division of Engineering has responsibility for engineering design of all highways roads, streets, sidewalks, bridges, Town parking lots, drains and drainage structures, and Town buildings, parks, grounds, and other public works structures or improvements.

#### **2.5.5.7 Department of Environmental Control**

The responsibilities of the Department of Environmental Control include control against activities that would impair, damage or destroy the natural resources and environment of the Town. The Environmental Facilities Division has responsibilities that include removal and disposal of garbage and rubbish. According to Town Code Section 10A-8, the Environmental Services Division responsibilities include providing educational programs and literature distribution regarding the environment and conservation, recycling programs, shellfish and bay management programs, inspects and enforces Town Regulations related to environmental matters, including waterways and litter. The Division of Harbor Police's Bay Constables and Harbormasters provide enforcement of Town regulations on the waterways.

#### **2.5.5.8 Board of Zoning Appeals**

The Board of Zoning Appeals issues variances and exemptions from the towns zoning ordinances when it is determined that public welfare is served and neighboring properties are not substantially injured and conducts public hearings prior to granting requests.

#### **2.5.5.9 Nature Preserve Trust**

In 1974, the Town adopted a local law to establish a Nature Preserve Trust within the Town. Land dedicated to the trust may not be used for any purpose not specified in the dedication resolution and shall be kept forever wild and in its natural state. The Town's wetland properties are included in the Trust, in addition to other properties identified as having ecological significance. The Town Environmental Control Department is charged with management of all properties included in the Town Nature Preserve Trust.

### **2.5.6 Adjacent Municipalities**

The Town of Islip jurisdiction extends to the southern land limit. Green's Creek and Brown's River are located within the center of the Town of Islip and their watershed boundaries do not extend to or adjoin other municipalities. The waters of the bay immediately south of Islip lands are under the jurisdiction of the Town of Brookhaven. Roads under the jurisdiction of both Suffolk County and New York State extend through both watersheds.

### **2.5.7 Citizen/Civic Groups and Non-profit Organizations**

In addition to federal, state, county and local governmental agencies, there are varieties of private organizations that have been created to oversee, protect and preserve significant environmental features that are important to their region or municipality. Some organizations that may have an interest in the Green's Creek and Brown's River watersheds include the Great South Bay Audubon Society, The Nature Conservancy – Long Island Chapter, South Shore Estuary Reserve (SSER), Citizens Campaign for the Environment, Ducks Unlimited, Trout Unlimited, Long Island Sierra Club, West Sayville Civic Association, and various civic groups and local property owner associations. The Sayville High School Advanced Placement Environmental Science Class has conducted studies on Green's Creek over the past several years.

## **2.6 LAND AND WATER USE REGULATIONS AND PROGRAMS**

Town of Islip land use and water use regulations and programs that effect the land and water usage with the watershed are outlined below.

### **2.6.1 Regulations**

The following description of applicable regulations and programs was prepared by the NYSDOS and included in the *SSEER CMP Appendix A, Technical Report Series Institutional Framework Part II: Local Government Agencies* dated May 1999.

**Animals (Chapter 12, Code of the Town of Islip).** This chapter is divided into five articles: General Regulations of Dogs, Leasing of Guard Dogs, Wild Animals, Equine Livestock, Pigeons and Poultry and Penalties. The section on nuisances prohibits persons harboring a dog to allow such dog to soil, defile, or defecate on any thoroughfare, sidewalk, passageway, bypath, play area, park and/or any place where people congregate or walk or on public property or private property without the owners' permission. All animals referred to in this chapter are required to be confined and the storage of manure must be managed so that there is no discomfort to neighbors or endangerment of public health.

**Building Code (Chapter 7, Code of the Town of Islip).** This chapter sets up the Building Code which states that before a certificate of occupancy can be issued all sanitary construction must be inspected and have a certificate of compliance from the Suffolk County Department of Health and that all electrical wiring must be inspected and have a certificate of compliance from the New York Board of Fire Underwriters. The NYS Uniform Fire Prevention and Building Construction Code is utilized in conjunction with the local building code.

**Environmental Quality Review (Chapter 13B, Code of the Town of Islip).** This chapter adopts the State Environmental Quality Review Act and the rules and regulations set forth in Part 617 of Title 6 of the New York Code Rules and Regulations for the Town of Islip.

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**Excavations and Topsoil Removal (Chapter 15, Code of the Town of Islip).** This chapter establishes that before any topsoil, earth, sand, gravel, rock or other substances are removed from the ground, the owner must have written permission from the Town Board, which requires the submission of a detailed statement and plan of the proposed work prepared by a licensed engineer or land surveyor. The Town's goal is to provide for the proper use of land and to prevent excavations from being left in a dangerous state or causing soil erosion that depletes the land of its natural vegetative cover.

**Fire Prevention Code (Chapter 18, Code of the Town of Islip).** This chapter authorizes the Chief of the Bureau of Fire Prevention or any inspectors to enter any building or premises for an inspection or investigation and requires a permit to maintain, store or handle materials that produce conditions hazardous to life or property or to install equipment used in conjunction with such activities.

**Housebarges (Chapter 25A, Code of the Town of Islip).** This chapter prohibits long-term residential use on the waterways of the Town of Islip. The storage or use of housebarges is prohibited either in the open water or in marinas.

**Junkyards (Chapter 29, Code of the Town of Islip).** This chapter legislates the license requirements, permissible locations, maintenance, fencing standards for junkyards. It also provides penalties for offences.

**Littering (Chapter 32, Code of the Town of Islip).** This chapter prohibits disposal of litter in or upon public, private, or commercial property within the town except in public receptacles. It requires that all property and fronting sidewalks be free of litter.

**Nature Preserve Trust (Chapter 13, Code of the Town of Islip).** This chapter provides for the management, protection and preservation of areas that have unique properties to be kept in a natural state and used only for the purposes defined in the dedication resolution. The Town has dedicated the wetland properties it owns to the Nature Preserve Trust. The Town Planning Department is charged with making recommendations as to properties which should be acquired

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by the Town and the Environmental Control Department is charged with management of the dedicated properties.

**Parks, Swimming Pools, Marinas, Boats and Waterways (Chapter 37, Code of the Town of Islip).** This chapter regulates and limits the use of Town parks and recreational facilities to residents and/or owners of taxable property in the town. Permits for special activities are required. Swimming and bathing are restricted. Article II of this chapter contains the regulations for marinas; and Article III contains the navigation regulations.

**Shellfish (Chapter 44, Code of the Town of Islip).** This chapter requires that no person take shellfish from the Towns underwater lands without first obtaining a permit. There are three types of permits: a personal permit, a commercial permit and a senior citizen personal permit. No one person can hold more than one type of permit at a time. The remainder of the chapter relates the restrictions on the taking of specific types of shellfish, penalties for offences, the permitted manner of taking shellfish and penalties for offenses.

**Solid Waste (Chapter 21, Code of the Town of Islip).** This chapter regulates the collection and disposal of solid waste. Permits are required for a person to be in solid waste service, and restrictions on both collection and disposal are set forth.

**Streams, Freshwater (Chapter 47, Code of the Town of Islip).** This chapter is designed to protect streams and prevent the despoliation and destruction of associated wetlands by holding the landowner responsible for maintenance of the stream flowing through or abutting his property. It lists the streams to be protected and prohibits placement of fill or foreign material in a stream unless a permit has been obtained from the Town Board. Penalties for offences are described.

**Streets and Sidewalks (Chapter 47A, Code of the Town of Islip).** This chapter regulates the use of the Towns streets and sidewalks. It states that no person shall allow any sand, gravel, cinders, topsoil, mud, earth or other materials to be deposited or washed upon any street or highway. Nor can there be any obstruction of either the streets or sidewalks. Standards and specifications for

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sidewalk or street repair are found in the chapter, as well as the requirements for a permit for work.

**Subdivision Improvements (Chapter 47B, Code of the Town of Islip).** This chapter authorizes the Planning Board to review subdivisions as a precedent to the issuance of a building permit in order to determine which improvements are necessary under the Town of Islip subdivision regulations.

**Economic Development Zone (Chapter 53, Code of the Town of Islip; The New York State Economic Development Zones Act of 1986 Article 18-B of the General Municipal Law).** This chapter designates a portion of the Town as an economic development zone to attract private business and industry to a specific area by providing incentives.

**Trawling and Eel Dredging (Chapter 56, Code of the Town of Islip).** This chapter prohibits eel dredging or trawling by the use of nets accompanied by cutting boards and/or chain over the lands under water owned by the Town. Penalties are also listed.

**Trees (Chapter 57, Code of the Town of Islip).** This chapter disallows the theft, damage or removal of trees from property without the owners' written permission and without a land clearing permit. This chapter gives the police the authority to take action on violations.

**Water Quality (Chapter 66, Code of the Town of Islip).** This chapter regulates the storage and transmission of hazardous substances. The law is intended to protect and preserve the environment, the quality of surface waterways and the aquifer that is the sole source of water supply for the Town.

**Wetlands and Watercourses (Chapter 67, Code of the Town of Islip).** This is a local law regulating the dredging, filling, deposition or removal of materials, diversion or obstruction water flow, placement of structures and other uses in the watercourses, coastal wetlands and tidal marshes in the Town of Islip unless a permit has been issued under Chapter 13 of the Code

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entitled Environmental Review. The law includes the issuance of penalties for offenses and requires corrective actions.

**Zoning (Chapter 68, Code of the Town of Islip).** This chapter sets out the general provisions of the zoning code including the application of the ordinance, permits and reviews, and use district regulations.

Additional applicable Town regulations identified include **Subdivision and Land Use Regulations of the Town, Section 6, General Requirements and Design Standards.** This regulation contains requirements for development of property (Section 6.2) for a subdivision as follows:

- A subdivision will be designed to cause minimal alteration of the topography, watercourse, drainage ways and their banks, and trees.
- Watercourses will not be disturbed to a minimum of 50' from their edge. A conservation easement or covenant will be filed for such areas stating that no clearing or alteration is allowed without Planning Board approval.
- A waterways easement will be required in a width of 15' from the bank of any stream or drainage way.
- Drainage, in accordance with Section 6.5 of the regulations, shall be as follows in relation to stream and drainage ways:
  - Overall site plan shall be designed to minimize the effect on the existing drainage ways and channels, whether permanent or seasonal, and to prevent damage to surrounding properties.
  - Where existing brooks, water bearing ditches and dry streambeds giving evidence to seasonal run-off use are encountered, such areas shall be maintained for drainage purposes in their existing natural state.
  - Recharge basins shall be required to contain an 8" rainfall with coefficient of runoff based on runoff characteristics. Where a positive overflow is acceptable to the Town, the storage capacity will be designed for a 5" rainfall.
  - For site plan approval, storm water storage for a 2" rainfall must be provided.

The Town has designated a Wetlands and Watercourse Management Area Overlay District for areas regulated by the NYSDEC as wetlands and adjacent buffer areas. Residential properties with the Overlay district allow a maximum density of one unit per 43,560 SF. Non-residential zones shall not use the lands within the overlay district for buildings or parking.

### **2.6.2 Programs**

**Clam Seeding Program.** Seed clams are placed on the Town-owned underwater lands to replenish the hard clam population. In July 1985, the Town secured permit approval from the US Army Corps of Engineers and the NYS Department of Environmental Conservation to establish a seed clam nursery and two spawner clam sanctuaries.

**Recycling Programs.** The Town of Islip Resource Recovery Agency provides information to homeowners on resource recovery, source reduction, and recycling. The Town implemented two recyclable materials programs. The first, Stop Throwing Out Pollutants (STOP) is conducted twice annually and collects common household hazardous wastes. The second, We Recycle America Proudly (WRAP), collects newspaper, metal, glass and plastic products.

### **3.0 PROTECTION AND MANAGEMENT RECOMMENDATIONS**

Protection and management recommendation focus on measures that stakeholders of the tributaries can implement to aid in reducing pollutant loads to the water bodies. These recommendations include proactive measures that can be undertaken by community members, municipal employees and local organizations to reduce the pollutant loads generated on the lands within the watershed and reduce the need to for intensive structural measures to remove pollutants.

The protection and management recommendations described in the following section are organized as follows:

- habitat recommendations including wetland restoration and diadromous fish habitat recommendations,
- educational and outreach recommendations including community outreach materials, tributary signage, homeowner stewardship recognition programs and school educational programs,
- point and non-point source management and pollution control recommendations including monitoring and educational programs, structural control actions, non-structural actions and land use regulations, and;
- institutional recommendations including task forces and collaborative programs.

Management recommendations are shown on Figures GR 3.0 and BR 3.0.

#### **3.1 HABITAT PROTECTION AND MANAGEMENT RECOMMENDATIONS**

The SSER CMP recommends the following actions to achieve the objective of *coastal habitats protected and restored to support shellfish, finfish and coastal bird populations* (Outcome 4 in *Chapter 7: Implementation of the SSER CMP*).

- Restoration of tidal wetlands (SSER CMP Implementation Action 4-1)
- Coordination of wetland restoration efforts (SSER CMP Implementation Action 4-2)
- Restoration of anadromous fish (SSER CMP Implementation Action 4-3)
- Habitat Restoration in Tributaries (SSER CMP Implementation Action 4-4)

The Green's Creek and Brown's River Watershed Advisory Committee (WAC) identified improvement of water quality and ecological health in the watersheds as goals for the WMP. It is important to consider a coordinated approach to water quality improvement and habitat

restoration and protection since the two are inextricably linked. Healthy habitat is dependent on adequate water quality and water quality is influenced by the presence and quality of wetland and riparian habitats.

### **3.1.1 Wetland Restoration**

Based on previous, ongoing, and proposed wetland restoration projects in other Long Island locations, the following restoration principles can be included as potentially feasible for application in these watersheds. Further monitoring and analysis is necessary to determine suitable restoration opportunities and feasibility. These recommendations identify where in the watersheds certain restoration principles may have applicability. As described in earlier sections, the reaches of each creek have been defined as follows:

#### **Brown's River Reaches**

Reach B1: Great South Bay north to Middle Road (main river and easterly tributary).

Reach B2: Middle Road north to Montauk Highway.

Reach B3: East Branch - San Souci Lakes; Montauk Highway to headwater south of Sunrise Highway.

Reach B4: West Branch - Mill Pond; Montauk Highway to headwater south of Sunrise Highway.

Reach B5: Islip Grange and Broadway Avenue Park tributary.

#### **Green's Creek Reaches**

Reach G1: Tidal portion of Green's Creek bounded by the Great South Bay to the south and Montauk Highway to the north. Dominate substrate is sand.

Reach G2: Freshwater portion from Montauk Highway north to headwater north of Tariff Street. Dominate substrate is sand and gravel.

#### **3.1.1.1 Removal of Dredge Spoils**

Wetland functions in the watersheds have been lost due to the conversion of both tidal and fresh water wetlands through physical filling. Filling results primarily from channel dredging but can also be a result of residential or commercial use activities. Reclaiming wetland acres

through removal of dredge spoil, enables the restoration of wetland functions, resulting in a net gain of wetlands.

**Specific Actions:**

- Determine the intended future use of two major active dredge spoil disposal sites on the east side of Reach B1. Both of these sites have received spoil during 2005, and the potential for their remediation hinges on their intended use. While dredging is often in the public interest, it cannot proceed without disposal sites. Alternative sites must be identified and be able to accommodate the ten-year cycle of dredging expected in Brown's River.
- If relocation is feasible, identify sites where dredge spoil can be transported, permit requirements, costs, and responsibility. For future spoil reduction, indiscriminate dredging practices should be discouraged.
- Determine the potential for remediation of the several much smaller sites resulting from bulkheading and personal boat docking slips that exist along Reach B1.

**3.1.1.2 Removal of Tidal Restriction/Improvements of Tidal Flow**

Natural tidal movement that existed previously in the watersheds have been altered by human activities including, but not limited to, road construction, bulkheading, and filling. Restriction of tidal movement degrades vegetative communities and wildlife habitat.

**Specific Actions**

- Investigate the wetlands for potential for connection improvements to restore tidal flow in Reach B1, including:
  - a culvert restriction in the east branch at Brown's River Road;
  - connection to a residential pond at Demarre Lane;
  - connection to salt marsh remnants adjacent to the dredge spoil site at the Islip Marina; and,
  - connection to wetlands on the west side, adjacent to Sayville Ferry parking lots.
- Consider the creation of additional flow in at least two locations in Reach B2. Under Middle Road, direct to the west branch, and under the entrance road to Meadowcroft Estate. Improving flow at these sites would also improve the habitat in Reach B1.

**3.1.1.3 Removal of Invasive Species**

The removal of invasive species in the watershed is principally aimed at invasive plants, but this should also include control of invasive animal organisms, such as alien fish species that threaten natural biodiversity. The most widespread and visibly notable plant threats are phragmites, purple loosestrife, Japanese knotweed, bamboo, and others. Invasive aquatic

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plant species, including fanwort (*Cabomba carolina*) and curly pondweed (*Potamogeton crispus*), are becoming prevalent in ponds on Long Island. Control methods for each species will vary greatly based on numerous factors but there is general recognition that invasive species threats are increasing, widespread, and deleterious to natural wetland functions.

**Specific Actions:**

- Address extensive monocultures of phragmites, which is the single largest habitat degradation within the watershed. Phragmites should be controlled to restore native brackish marsh vegetation. Removal of phragmites through mechanical, chemical or fire means should be coordinated with the revegetation effort discussed in Section 3.1.1.5.
  - Both sides of Brown's River are heavily inundated (and have been for decades) with phragmites in Reach B1 and B2 midway to the LIRR. The phragmites tends to convert the area to a marginally functioning wetland at best.
  - Extensive stands of phragmites occupy the majority of open space in the watershed. This is true on the east branch as well.
  - Phragmites occurs in some isolated (treatable) locations in upper limits of Reach B2.
- Investigate potential remediation of additional invasive species.
  - Additional invasive species such as Japanese knotweed, bamboo, multiflora rose and Asiatic bittersweet are also abundant in the upland boundary in most of the reaches.
  - Some purple loosestrife occurs in upper limit of Reach B2. Japanese knotweed is more prevalent in these freshwater reaches.
- Investigate successful local and regional initiatives that remove invasive species from sensitive sites.
- Monitor ponds and creeks for submerged aquatic alien invasives for detection and, if necessary, early mitigation action.

**3.1.1.4 Improvements of Altered Hydrologic Landscape**

The most prevalent alteration of water movement in tidal systems stems from systematic grid ditching that occurred for mosquito control. This issue is being addressed and widely acknowledged in the *Suffolk County Vector Control and Wetlands Management Long Term Plan*. The *Long Term Plan* addresses Salt Marsh Management Best Management Practice procedures and Open Marsh Water Management (OMWM) projects to restore grid-ditched wetlands thereby improving marsh habitat diversity and limiting invasive species. Efforts should be made to incorporate the future directions included in this work in projects within the Green's Creek and Brown's River wetlands. Other examples of alterations that effect water movement include navigation ditches to private residences, and dikes on the marsh.

**Specific Actions:**

- Address the impacts of the grid ditching for past mosquito control attempts on the west side of Reach B1, immediately south of Middle Road.
- Investigate the impacts of the ditch networks found east of Brown's River Road on the east branch of Brown's River, west of the Sayville Ferry parking lot on Reach B1, along both sides of the main river in Reach B2, and the west side of the west branch of Brown's River.

**3.1.1.5 Riparian Buffers/ Stewardship Opportunities**

Re-establishment or conversion of the interface of the wetland community and residential and/or other uses can be improved with the use of natural vegetative plantings that will restore wetland functions.

**Specific Actions:**

- The interface with residential properties can be suitable for riparian buffer and red maple swamp habitat restoration if homeowners are so inclined. Opportunities exist in the upper limit of Reach B2 on Brown's River and Reach G2 on Green's Creek. This action can be combined with removal of invasives discussed in Section 3.1.1.3
- Homeowner education should include information about the importance of buffers.

**3.1.1.6 Wetland Construction for Stormwater Management**

Stormwater inputs and nonpoint pollution sources can be remediated using constructed wetland systems. These can also replace lost wetland habitats for invertebrate and amphibian communities. The potential for coordinating wetland restoration and stormwater management discussed in Section 3.3 should be explored.

**3.1.2 Diadromous Fish Habitat Restoration Recommendations**

**3.1.2.1 Improvement of Fish Passage**

Allowing for and improving the natural life cycle of diadromous fish can be accomplished through the removal of physical barriers to migration, using fish ladders when necessary, and the restoration of landscape features and other modifications that favor improved fish habitat.

**Specific Actions:**

- Investigate current impediments to fish passage in the watersheds.

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- Examine culverts and bridges for the applicability of fish habitat improvement strategies, using the recently approved passage enhancement at San Souci Lakes as a model.
- Investigate whether a flap gate exists on Green's Creek beneath Montauk Highway. Such a flap gate would impede native trout migration and prevent salt water in Reach G1 from mixing with freshwater in Reach G2.
- Conduct a feasibility study for the removal of homeowner-constructed dams located between Montauk Highway and Brook Street in Reach G2.
- Conduct a detailed study of potential impacts of weir and flashboard removal and the relation to potential for restoration and reintroduction of trout within the Green's Creek watershed in Brookside Preserve Reach G2.

### **3.1.2.2 Improvements to Instream Habitat**

Natural streambeds have been altered through numerous human activities. Channel functions have been degraded by channel dredging and channel filling for residential and business uses. Physical improvements can be accomplished to increase dissolved oxygen levels, improve aquatic communities, and derive other benefits. Restoration to a more natural, stable channel and improvement of stream flow can restore ecosystem functionality while protecting property and infrastructure and reducing maintenance costs.

#### **Specific Actions:**

- Complete Stream Visual Assessment Protocol (SVAP) for the Brown's River and the segment of Green's Creek not currently completed.
  - SVAP was developed by United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) and is a broad-based analysis protocol that provides an overall picture of the stream corridor and surrounding riparian ecosystem and integrates major stream quality indicators in a semi-qualitative, visual manner (geomorphic/hydrologic, fisheries, water quality, and invertebrate). The SVAP can also be used to identify specific eroded shoreline and stream banks, vegetative communities, and locations of invasive species.
  - SVAP is reliable and easy to use. The data collection should be carried out through collaboration between Town of Islip, Trout Unlimited and local high school environmental programs.
- Conduct a Focused Geomorphic Reconnaissance (FGR).
  - An FGR is a simple adaptation of Rosgen's geomorphic assessment methods that includes analysis and inventory of specific stream reaches (problem reaches and reference reaches) to identify stream reaches requiring habitat improvement or restoration.
- Conduct a Detailed Geomorphic Evaluation (DGE).
  - The results of the SVAP and FGR studies should be used to identify objectives for more detailed studies.

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- Seek available information from agencies, then fill information gaps by partnering with agencies or doing independent fieldwork (geomorphic surveying, invertebrate and water sampling using approved methods with processing by an agency or lab).
- A DGE should verify agreement with or document deviations from optimum reference values previously estimated by rapid methods.
- Identify and implement instream habitat improvement projects based on information obtained through the above-mentioned studies.

### **3.1.2.3 Streambank Stabilization**

Stabilization of streambanks helps to prevent erosion and sediment loading, thereby contributing to improved water quality. Stabilization projects can often be successfully combined with trail and other access enhancements.

#### **Specific Actions:**

- Prioritize eroded sites identified during the SVAP. Review the potential to reduce the velocity of runoff from an outfall entering the creeks/river where it is identified as increasing stream erosion.
  - Conduct a slope stabilization and wetland plant restoration on eastern side of entrance to Brookside Preserve in Reach G2.
  - Prepare and implement a plan for trail stabilization along the trail near the new footbridge closest to Cherry Avenue Elementary School in Reach G2.
  - Stabilize the trail/slope area at five locations on Green's Creek: southwest of footbridge at Brookside Preserve near Cherry Avenue Elementary School; northwest of footbridge; northeast of footbridge; tributary at southeast entrance to Brookside Preserve; and at West Sayville Pediatric Center. Deterioration is evident and the areas are losing stability due to erosion caused mostly by runoff.
  - Develop bioengineering techniques for streambank stabilization including the use of coir fiber log reinforcement, backfill of soil, and planting of native wetland vegetation in these areas to help restore banks and improve local water quality conditions by limiting sediment loading. Target vegetation should mimic existing stable native vegetation at each location.

### **3.1.2.4 Research of Trout Populations**

A better understanding of the extents of trout use in each tributary will aid in identifying where projects and improvements would be most useful and effective.

#### **Specific Actions:**

- Conduct a more extensive ichthyology study to determine the population density of trout in both the saltwater and freshwater portions of the creeks. Tariff Street (site of the 1996 DEC electro-shocking study for Green's Creek) may be situated too far north to reveal

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significant data. Begin surveys in Reach G1 and the southern end of Reach G2 of Green's Creek during the months of September through December. Studies should be carried out through collaborative efforts between Trout Unlimited, NYSDEC, Town of Islip and SHS APES class.

### **3.2 EDUCATION AND OUTREACH RECOMMENDATIONS**

Education of watershed residents about the potential impacts that their actions have on water quality and habitat in the creeks and in Great South Bay is essential to improved stewardship of valuable watershed resources.

The SSER CMP recommends the following actions to achieve the objective of *heightened public awareness of the estuary* (SSER CMP Outcome 10):

- Working with outreach partners to promote estuary-related education, stewardship and outreach activities (Implementation Action 10-5)
- Creation of a homeowner certification program for nonpoint source pollution efforts (Implementation Action 10-13)

ITEC can potentially provide contribution to education and outreach/research implementation through printing of outreach materials and purchase of monitoring equipment.

#### **3.2.1 Community Outreach Materials**

Educational materials that focus of a different community groups, each with varied impacts and effects on the watersheds, can be used to increase knowledge of the interrelationship between land use and water quality.

##### **3.2.1.1 Homeowner Outreach Material**

- Outreach materials focusing on homeowners in the watersheds should be created by SSER Office in cooperation with high school students in the watershed, ITEC, and the local watershed advisory committee when formed.
- The outreach material should include definitions of the key terms including *watershed* and *nonpoint source pollution*; maps of the watersheds; discussion of the watershed management plan; and guidelines for the implementation of homeowner best management practices and native landscaping/buffer creation principles.

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- Additional topics may include:
  - wetlands and the impacts of dumping waste in them,
  - invasive ornamental species (these themes may also be addressed in separate outreach materials if deemed more appropriate),
  - reduction of waste disposal into roadway drainage basins,
  - proper function and maintenance of septic systems, and,
  - pesticide and fertilizer usage and methods to reduce reliance.

The outreach materials should be distributed to watershed residents, and made available at public locations such as libraries and the Long Island Maritime Museum.

Outreach materials may also direct residents and businesses to such sources as the New York State Integrated Pest Management (IPM) Program website developed by Cornell University ([www.nysipm.cornell.edu](http://www.nysipm.cornell.edu)) and The Nature Conservancy Invasive Species Task Force. IPM is discussed further in Section 3.3.3.3 of this report.

#### **3.2.1.2 Boating Outreach Material**

Outreach materials focused on recreational and commercial boating should also be created by the SSER Office in cooperation with local students, ITEC and the local watershed advisory committee when formed. The materials may be based on the homeowner material but include information about boater and marina BMPs, and should be distributed at local marinas and marine retail stores. The Town should consider requiring distribution of the materials with rental of slips. Alternatively, this information could be incorporated into the homeowner outreach as one material.

The marina outreach effort should include an educational program for marina owners on the impacts of boat discharges, fuels and oil spills and clean up, storm runoff, pervious and impervious surfaces and best management practices that mitigate these impacts. Recommendations should include providing regular inspection of pump-out facilities to ensure proper operation; constructing exterior tanks and maintenance areas in self-contained locations with roofs, in interior locations, or with solid pads and drainage structure; posting spill contingency plan at fueling stations; and. using phosphorus-free detergents for boat

washing. It could also be suggested that marina owners consider installation of stormwater treatment systems, as has been done at a private marina in Freeport.

### **3.2.1.3 Commercial Outreach Material**

Local plant nurseries, home and garden centers and lawn care businesses provide an additional opportunity to educate residents in Integrated Pest Management Programs (IPM) and the different vegetative maintenance products that can be used at the point-of-sale. Encourage businesses to carry informational materials and alternative products or offer seminars on IPM and BMP's and the effects of indiscriminant and over use of fertilizers and pesticides on the watershed, creeks and bay.

## **3.2.2 Expand and Develop Signage**

Signage that provides information on the identity of the tributaries and a discussion of the importance of the waterbodies can aid in public awareness of the significance of their actions on the health of the waters.

### **3.2.2.1 Tributary Identification**

Expand the SCDPW tributary identification program. The County and the Town should work together, with assistance from local schools, the SSER Citizens Advisory Committee, ITEC and other local organizations to expand the system of signs identifying the creeks at road crossings.

### **3.2.2.2 Interpretive Exhibits**

Strategically located signs, interpreting the historical, ecological, and recreational value of Brown's River and Green's Creek will build public awareness, appreciation, and stewardship of the creeks and their watersheds.

#### **Specific Actions**

- Identify feasible and appropriate locations for interpretive exhibits. Consider as potential locations recognized South Shore Bayway *Destinations* and *Connectors* in the watersheds, such as Sayville Beach Park and Marina, Green's Creek County Park, and

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the Sayville Ferry Terminal, and others, including public lands identified in Section 2.2.8 as potential sites.

- Work with the SSER Office to identify additional sites in the watersheds to nominate to become South Shore Bayway *Destinations* and *Connectors* including the sites identified in Section 2.2.8.
- Identify interpretive themes relevant to these locations and develop corresponding text and graphics to be included in an interpretive exhibit. For recognized South Shore Bayway *Destinations* and *Connectors*, these efforts should be coordinated with the SSER Office and use of New York State Coastal Resource Interpretive Program (NYSCRIP) should be considered.
- Create and install interpretive exhibits.

### **3.2.3 Homeowner Stewardship Recognition Program**

The SSER CMP recommends development of a homeowner certification program for nonpoint source pollution prevention. Initiating a program to recognize homeowners who employ BMP's and IPM in their landscaping and housekeeping activities will promote awareness and stewardship among watershed residents.

Local high school students, community organizations and/or civic associations should work together, with guidance from the Town, ITEC and the SSER Office, to develop a homeowner stewardship recognition program based on the following:

- Develop a set of criteria for recognition, including implementation of BMP's for stormwater runoff control and nonpoint source pollution prevention, and use of native landscaping principles.
- Create a simple application package that explains the recognition program, criteria, and application process. The package should also include background information about BMP's and native landscaping (could be taken from the initial outreach materials).
- Distribute the application package to watershed residents following distribution of initial outreach materials discussed in Section 3.2.1. Promote the program and solicit applications, with help from the SSER Office and WAC and through school curriculum.
- Review applications and identify accepted applicants. Present recognized homeowners with certification of their recognition, in a format that can be displayed in a front yard or window (to promote program visibility). Publicize the program and recognized homeowners in the newspaper and on appropriate websites, including the SSER Council website.

### **3.2.4 Expand School Watershed Education Programs**

Watershed educational programs provide a means to continue and coordinate educational programs in the watershed's schools, while collecting important tributary data and providing additional community education mechanisms.

#### **3.2.4.1 Encourage Collaboration among Schools for Data Collection**

The SHS APES class has made significant contributions to data collection and education/outreach for Green's Creek, while educating local students about the importance of tributaries. Collaboration between Sayville High School and Bayport-Blue Point High School, and cooperation between high schools and organizations such as Trout Unlimited and Ducks Unlimited, could increase data collection in the watersheds and heighten local understanding and stewardship of the watersheds and the estuary. Efforts should be made to encourage the sharing of resources and experience for watershed data collection and analysis.

#### **3.2.4.2 Storm Drain Stenciling**

Stenciling has been completed on Cherry Avenue, Division Avenue, and Brook Street in the Green's Creek watershed. Students should continue and expand the stenciling program, completing primary streets first, then secondary streets, in both the Green's Creek and Brown's River watersheds. Connection of drainage structures to outfalls should be confirmed with the Town prior to stenciling. As an alternative, "drains to bay" disks can be utilized in place of the stenciling.

#### **3.2.4.3 Initiate Elementary School Watershed Education by High School Students**

High school students that have conducted research and outreach related to the watersheds are a very valuable resource. High school students can provide presentations to elementary and junior high school students about local watersheds and nonpoint source pollution.

### **3.3 POINT AND NONPOINT SOURCE MANAGEMENT AND CONTROL RECOMMENDATIONS**

Stormwater enters Green's Creek and Brown's River from streets, parking lots, driveways and other impervious surfaces of the drainage area with little or no treatment. There are numerous storm pipes that discharge directly; a point source; into the ponds and creek channels located within the watershed. At other locations, the impervious areas drain indirectly into wetlands and creeks as overland flow, a non-point source.

Strategies to minimize point and non-point control will require an integrated approach involving management and operational measure, structural control techniques, non-structural control actions and land use modifications. Management programs and educational actions focus on the education of community members to identify water quality issues within their community and on measures to track improvements. Structural control actions include recommendations on methods to implement the stormwater improvements and target projects included in Section 4 of this report. Non-structural control actions include programs to reduce pollutant generation and continued mapping of pollutant sources. Land use improvements include recommendations for preserving natural vegetation, modification of laws and regulations and water quality improvement activities.

### **3.3.1 Management Programs and Educational Actions**

Management programs and educational actions focus on the education of community members to identify water quality issues within their community and on measures to track improvements.

#### **3.3.1.1. Water Quality Sampling and Monitoring Programs**

A program to test the water quality of each creek and the associated ponds and lakes should be established for each reach to determine the actual pollutant loads in the waterbodies and to identify improvements in the water quality over time. To ensure data consistency and allow for comparative evaluation, a water quality sampling and monitoring program that establishes consistent standard protocols for water sampling, water testing and recording data should be established by a responsible agency, such as the NYSDEC, for all tributaries to the SSER.

#### **Specific Actions:**

- Testing methods, protocols and location selection should follow standard protocols identified for all tributaries within the SSER for comparison purposes.
- Sampling and monitoring programs should be managed by qualified individuals who can oversee the program and insure that standard protocols are followed. When volunteers collect samples or process data, the following publications describe standard procedures and practices that should implemented to ensure consistency and future value of the data. The USEPA published *Volunteer Stream Monitoring: A Methods Manual (EPA 841-B47-003,)* details practices of quality assurance, quality control and quality assessment measures for water quality conditions of stream flow, dissolved oxygen, temperature, pH,

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turbidity, phosphorus, nitrates, total solids, conductivity, total alkalinity, and fecal bacteria. A second USEPA publication, *Volunteer Lake Monitoring A Methods Manual (EPA 440-4-91-00)*, includes standard procedures for monitoring water quality conditions in lake including algae, aquatic vegetation, dissolved oxygen, and sedimentation.

- Establish a central database to maintain the inventory of testing results.

### **3.3.1.2 Town Personnel Educational Programs**

Town personnel, those in the field and those charged with developing and implementing Town operations and policies that can affect the watershed, should receive regular education on the impacts of non-point source pollution and mitigation methods.

#### **Specific Actions:**

The Town should establish an educational program for Town employees including personnel from the departments such as Public Works, Building and Engineering, Parks, Planning and Development, and Environmental Control. New York State Sea Grant operates a program entitled Nonpoint Education of Municipal Officials (NEMO) - Water Quality Education that can be used to develop these programs. As local governments control the vast majority of land use decisions that affect water quality, the goal of the NEMO program is to introduce the concept of nonpoint source pollution to local officials, and to provide local governments with tools for improving water quality. New York Sea Grant's NEMO program is modeled after the highly successful University of Connecticut Cooperative Extension NEMO program. NEMO operates in over 20 states nationwide with workshops tailored to local communities.

In addition, educate Town inspectors and field personnel to identify and respond to spills in the watershed and the proper notification procedures required.

### **3.3.1.3 Illicit Discharge Detection and Elimination (IDDE) Program**

An Illicit Discharge Detention and Elimination (IDDE) program identifies additional discharges to streams that are not composed entirely of stormwater. Sources of illicit discharges can include sanitary wastewater, effluent from septic tanks, commercial car wash wastewaters, oil disposal and radiators flushing, laundry wastewater, spills from road accidents, and improper disposal of automobile and household toxics.

**Specific Actions:**

The Town should develop an IDDE program in accordance with the requirements of State Pollution Discharge Elimination System (SPDES) Phase II for regulated municipal separate storm sewer systems (MS4's). Programs must include mapping of all identified outfalls, a regulatory mechanism to prohibit non-stormwater discharges and an enforcement mechanism, a plan to detect and address discharges, educational effort for the Town, businesses and the public, a mechanism for citizen reporting of suspected illicit discharges and BMP's and measurable goals.

### **3.3.2 Structural Control Actions**

Structural control actions include recommendations on methods to implement the stormwater improvements and target projects included in Section 4 of this report.

#### **3.3.2.1 Water Quality Storm Event (WQSE) Control**

The pollutant load in storm runoff has been identified as being contained in the initial 90% of the average annual stormwater runoff volume. That volume is identified as the water quality storm event (WQSE). The ability to either capture and infiltrate or treat and release this volume of runoff will reduce the pollutant load contributed to the water bodies. NYSDEC requires that the water quality goals for stormwater treatment target the removal of 80% of the suspended organic and inorganic material and 40% of total phosphorus.

**Specific Actions:**

- Install drainage structures as described in Section 4 when roads are reconstructed to contain the WQSE.
- Reconstruction of streets in the watersheds shall require an analysis of the existing storm runoff quantity from the WQSE and the discharge overflow rate to the creeks. When a project is proposed where existing drainage structures are in place, the Town should review the capacity of existing structures and recharge basins to determine if additional capacity is required or if additional storm runoff can be piped and discharged to the basins. Reconstruction programs should include replacement of older concrete structures with ungrated curb openings with new grated structures with access covers. These new structures will increase safety, collect debris and allow cleaning of sediments.
- The Town should develop a program that will monitor the success of the structural control measures in meeting the NYSDEC water quality goals. Data collection should

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include analysis of improvements to water quality and hydrology. Sampling and testing of water quality prior to implementation of improvements will provide background data that is currently sparse for each of the waterbodies and provide a level of comparison to assess improvements.

- At road ends that direct drainage to creeks, develop vegetated swales and infiltration trenches to filter WQSE. Where erosion is apparent these measures may not be adequate. When erosion is encountered, implement control measures that will prevent further erosion from the WQSE and from larger storms events and restore the eroded area.

### 3.3.3 Non-Structural Control Actions

Non-structural control actions include programs to reduce pollutant generation and continued mapping of pollutant sources.

#### 3.3.3.1 Drainage Structure Maintenance Program

Cleaning and inspection of drainage structures and WQIs should be conducted on a regular basis. Lack of maintenance can allow pollutants to overflow into waterbodies, cause flooding and increase erosion.

##### Specific Actions:

- Inspect drainage measures to determine if reduced capacity exists because structures are filled with debris or due to changes to drainage system.
- Develop a systematic maintenance program to clean debris from all drainage structures in the watersheds. Eventually this program will need to be undertaken throughout the Town and will require sufficient dedicated resources and funding to achieve the goals of this WMP and the larger SSER CMP.
- Identify funding sources for equipment purchases and personnel increases. Suffolk County should be encouraged to do the same for their roadway maintenance programs. Review the feasibility of developing a maintenance agreement between the County and Town.
- Develop a system for mapping all new drainage structures and develop a database on the Town GIS system. This information is necessary for the development of a maintenance program.
- Use the Town GIS mapping to track cleaning schedules and identify areas that need maintenance. With the records maintained in the GIS, as the program is implemented, a pattern of areas that require varied schedules should emerge and the maintenance schedules modified accordingly.
- Review the street sweeping program and determine if modifications are necessary such as focusing on roads that drain to creeks and conducting sweeping in early spring and following major winter storm events to remove sediments prior to runoff to creeks.

### **3.3.3.2 Drainage Infrastructure Investigations**

Provide further investigation of locations where storm systems have not been confirmed including additional field investigation, review of historic documents, interview with Town personnel and residents and testing programs, such as ink dye testing.

#### **Specific Actions:**

- Investigate Brown's River Reach B5 through Islip Grange and Broadway Avenue Park.
- Investigate the east side of Reach B1 at the northern limit of the NYSDEC property to determine if an outfall exists and if the infrastructure is collecting runoff from surrounding residential area and discharging to surface waters.
- Investigate Outfall 351 in Browns River Reach B2. SCDPW reported the drainage from Montauk Highway is piped in an easement along the railroad tracks and discharges into the west side of the river.

### **3.3.3.3 Integrated Pest Management (IPM) Programs**

The Town should work with large landowners in the watershed to develop programs or measures to reduce reliance on fertilizers and pesticides in the watershed including developing Integrated Pest Management (IPMs) programs to reduce the use of pesticides and fertilizers on lawn and landscaped areas. IPM programs develop maintenance methods and procedures to reduce the levels of fertilizers and pesticides needed on a site. IPM's are useful for all property owners including single-family residents but can be especially useful where large expanses of lawn are typical such as at Town and County park properties, school properties and for the grounds of St. Anne's Church and Cemetery.

#### **Specific Actions:**

- The Town Parks and Recreation department should develop IPM plans for all their facilities. These plans can be modified to address athletic facilities, which have more specific requirements for turf grass quality as opposed to passive recreational parks.
- As the Town constructs new or reconstructs existing athletic fields, they should investigate the use of synthetic turf surfaces, which require no fertilization or pesticide application. In addition, synthetic fields decrease maintenance costs, increase safety, and are becoming more prevalent at school and park facilities.
- The Town should encourage residents to use Town compost to reduce the needs for fertilizers. Educational materials should alert residents to the Islip Resource Recovery Authorities' MacArthur Compost Facility to view gardens installed using composted materials and for educational programs on home composting. The same facility has locations for disposal of recyclable materials.

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- The Town should work with large shoreline landowners, such as the Sayville School District and St Anne's Parish to develop IPM programs for their grounds in a similar manner to the Town program discussed above. Sayville High School should also investigate the use of a synthetic turf surface when reconstruction of the sports fields near the creek is planned.

#### **3.3.3.4 Impervious Surfaces Reduction**

Reducing the amount of paved surface within the watershed allows additional precipitation to infiltrate to groundwater and reduces concentrated flow volumes into the creeks.

##### **Specific Actions:**

- Develop recommendations on ways to decrease impervious surface in the watershed. Recommendations could include gravel surfaces, planted islands that contain runoff, planting centers of cul-de-sac, and pervious pavements.
- Identify locations to test various pervious pavements. The focus should be on the lower elevations of the watershed where depth to groundwater prevents structural infiltration practices and those areas with less intensive usage during inclement weather including marina and parks parking areas. Inspect and evaluate the products for further use.
- Acquire environmentally sensitive undeveloped parcels to reduce future development in the watershed as discussed in Section 3.3.4.

#### **3.3.3.5 Sanitary System Function Review**

Improperly functioning cesspools and septic systems have been identified as a contributor of bacteria and nitrates to surface waters. This is a larger issue in aging and densely populated communities and areas with high groundwater tables. Suffolk County approves the initial installation of septic systems but there are currently no requirements for the regular inspection of these systems to ensure their proper operation at either the County or Town level.

##### **Specific Actions:**

- Discuss the adoption of a sanitary system inspection program with Suffolk County Department of Health Services. The inspection requirement could be on a 5-year schedule or required when a property is sold. Inspection and certification could be provided to property owners by private businesses. Implementation of an inspection program will require dedicated resources and funding to achieve the goals of this WMP and the larger SSER CMP.
- As an initial step, provide educational materials to homeowners on methods to identify improperly functioning systems and procedures for having a system inspected, cleaned,

repaired or reconstructed. As a further step, the Town can investigate the potential to develop a homeowner septic tank upgrade incentive program for properties within the watersheds targeting areas with high groundwater tables.

### **3.3.3.6 Shoreline Filter Restoration**

Identify lawn and pavement areas that allow surface runoff to wash off the ground surface directly into the creeks and work with property owners to install native vegetation that can act as a filter to reduce pollutant loads from entering creeks.

#### **Specific Actions:**

- Encourage homeowners to plant filter strips of tall grass species where lawns drain directly to creeks.
- See Section 3.1.1.5 for additional discussion of buffers.

### **3.3.4 Land Use Improvement Recommendations**

This section identifies measures such as acquiring property, changing use regulations and modifying allowable uses that will change land uses and subsequently reduce effects on the waterbodies.

#### **3.3.4.1 Property Acquisition and Land Preservation**

Identify parcels whose acquisition will prevent additional increases in storm runoff. Specific parcels should include privately-owned undeveloped parcels such as the 15.6-acre parcel and adjacent 0.9 acre parcel on the west side of Green Creek south of Montauk Highway (SC Tax Lots #0500-407-5-25.8 and #0500-429-2-10.2) discussed earlier and parcels adjacent to San Souci Lakes (SC Tax Lot #0500-407-5-25.13). Where parcels cannot be acquired for preservation the Town should increase the buffer requirements for future development along the creeks, wetlands and waterbodies and require buffer area restoration plans that include removal of invasive species and planting of appropriate native materials as part of the site plan approval documents.

#### **3.3.4.2 Law and Regulation Enforcement**

Existing Town laws and regulations should be enforced to reduce impacts on the watersheds. Laws that require greater enforcement efforts include the ban on ATV use on Town

properties and littering and dumping laws. Identify increased funding requirements to adequately staff the Town Code Enforcement Department to increase surveillance efforts.

#### **3.3.4.3 Modification of Existing Laws and Regulations**

Update Town laws and regulations related to watershed quality to reflect the current BMPs and most up-to-date expertise on the subject. Additional information on revisions to existing laws and regulations are included in Section 5.2 of the Plan.

#### **3.3.4.4 Creek and River Clean –Up Events**

The Town should develop a procedure to work with area groups to sponsor and undertake regular annual events to remove dumped debris and litter from the creeks. The municipality can encourage volunteer efforts by providing the heavy equipment and operators, dumpsters and disposal components necessary for a clean-up event. The trash removed should be quantified and documented as part of the Town SPDES Phase II program requirements.

#### **3.3.4.5 Approval Processes Modification**

The Town should adopt additional measures in Subdivision and Land Development Regulations including:

- A requirement to separate the WQSE storage volume from the larger storage volume if the potential for overflow to a waterway exists.
- A requirement that the 8” rainfall storage capacity for recharge basins not be reduce to 5” rainfall with a positive overflow to a waterway unless extended detention to maintain an acceptable discharge rate into the waterway can be achieved.

#### **3.3.4.6 Inter- Municipal Implementation Effort Coordination**

The Town should work with Suffolk County to identify mitigation measures and locations where actions to reduce road runoff from county roads can be implemented. Additional inter-governmental coordination efforts are included in Section 5.1 of the Plan.

### **3.4 INSTITUTIONAL DEVELOPMENT RECOMMENDATIONS**

Institutional recommendations include recommendations for groups and programs that can be developed to increase the planning and analysis efforts that are being conducted in the watersheds.

#### **3.4.1 Task Force**

A consortium of agencies and groups should be assembled to begin planning for a comprehensive approach to addressing the management issues. The task force should include state, county, and local government representatives, local concerned citizens and business owners, and environmental groups. The current Watershed Advisory Committee could serve in this manner. A successful prototype for this task force is the Beaverdam Creek Wetland Restoration Task Force. Establishment of a task force will in turn lead to significant funding opportunities from a variety of programs with the mutual goal of restoring wetlands in the creeks and SSER.

#### **3.4.2 High School Program Collaboration**

Cooperative efforts between environmental programs at Sayville High School and Bayport High School should be developed to continue and expand habitat data collection and analysis in the watersheds. The high school programs should also work with stakeholder organizations such as Trout Unlimited, Ducks Unlimited, Great South Bay Audubon Society, SSER, NYSDOS, Islip and Suffolk County Department of Parks and Recreation, and Islip Planning Department. This is discussed further in the recommendations included in Section 3.2 Education and Outreach Recommendations

## **4.0 POLLUTANT LOAD ANALYSIS AND RESTORATION ACTIONS**

Pollution load analysis and restoration actions focuses on the pollutants carried in stormwater runoff along with an analysis and ranking of the outfalls and recommendations for target locations and actions that can reduce pollutants and improve water quality in Green's Creek and Brown's River. Implementation strategies are identified for each outfall that focus on structural improvements that can reduce the pollutant loads entering the creek and river. Target projects and priority actions include non-structural and structural measures that can provide the greatest water quality improvement impact on the watershed. This section includes a discussion of:

- pollutant sources, runoff and loads,
- pollutant loading including a methodology to quantify and rank the loads
- stormwater improvement and implementation strategies including structural best management strategies, implementation recommendations and outfall ranking, and;
- waterbody target projects and priority actions.

### **4.1 POLLUTION**

The major sources of pollution to the Green's and Brown's Creek watersheds that contribute to the closure of surface waters for bathing, fish consumption, and shellfish harvesting include nonpoint and point sources. The main nonpoint pollution sources include stormwater runoff from street and highway collection systems and marinas, waterfowl that inhabit the freshwater ponds and lakes along the creeks, and pesticide and fertilizer runoff from residential lawns.

#### **4.1.1 Pollutant Sources**

According to Schueler (1987), pollutants accumulate on imperious surfaces and each rainfall event that generates runoff washes up to 90% of the pollutants into the receiving waters. The watershed's various surfaces are the primary sources of many pollutants including sediments, pet droppings, hydrocarbons from vehicle oil and grease, vegetative matter, litter and debris. In addition, unvegetated surfaces erode, oils are dumped to storm structures, excessive amounts of fertilizer and pesticides are applied to lawns and gardens, and salts and sands are applied to roads in winter. As neighborhoods grow older, they tend to become more impervious as new additions, decks, driveways, road improvements and infill development are constructed. Canada geese have

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reached nuisance levels at many local parks, golf courses and other locations with expansive lawn area where their large populations contribute increased fecal loads to the surface runoff. Sanitary septic systems and cesspools can contribute bacteria and nutrient loads to surface runoff if the systems are not functioning properly or by groundwater movement where they are improperly sited with regard to depth the groundwater or distance to surface waters.

Each year, enormous amounts of soil are transported from streets, parking lots, and construction sites, via sheet wash, rill erosion, and concentrated runoff flows. Mineral and organic sediment is generally considered the largest surface water pollutant per mass and volume. The eroded material is either captured within manufactured drainage infrastructure or discharged directly to receiving waters. In addition to concerns over siltation of wetlands and waterbodies, soil erosion is a major factor in the depletion of soil resources by the removal of valuable topsoil.

Typically, water turbidity is at its highest during and immediately after the completion of the “first flush” of a storm event as a result of increased stormwater and pollutant load discharge. The “first flush” refers to the initial rainfall event that washes the majority of the surface pollutant deposits into the waterbodies. The “first flush” is also referred to as the “water quality storm event” (WQSE). Pollutant loading is further exacerbated by the absorption of other pollutants such as oil, bacteria, metals, and organic chemicals to the soil particles. Dissolved or suspended solids may carry oxygen-dependent substances, which can contribute to the depletion of dissolved oxygen in water and potentially affect aquatic organisms.

Large-scale deposition of soil can inhibit natural pollutant attenuation processes, silt-up stream channels and wetlands, decrease flood storage capacity, reduce the effectiveness of stormwater pollution treatment devices, and inhibit the natural functions of water bodies, including use by fish and wildlife for feeding, breeding, and cover. In addition, mineral soil particulate matter, organic detritus, and man-made pollutants can act in concert to increase the level of turbidity in streams, rivers and shallow, low-energy coastal systems. The resultant decrease in water clarity diminishes sunlight penetration and inhibits the process of photosynthesis in submerged aquatic vegetation. Finally, when solids settle in low-energy/low flow environments, they can bury benthic flora and fauna, including aquatic plant life and invertebrates.

#### **4.1.2 Runoff and Loadings**

Stormwater runoff contributes contaminants to receiving waters. Human activities, in particular land development, generally have an overriding effect on natural contaminant inputs to stormwater discharges. Land development alters stormwater drainage characteristics within a watershed, which can have a profound effect on water quality of adjacent waterbodies. Development results in the replacement of permeable natural land surfaces (i.e., woodlands, meadows, etc.) with impervious surfaces such as roadways, buildings, walkways and pavements. Even in areas cleared for development that are subsequently replaced with landscaping, the planted vegetation generally has a lower capacity for absorbing rainwater than the original vegetation; this is especially true with respect to turf areas. The overall consequence of these conditions is that development generally increases the amount of runoff generated on a given parcel of land. The augmented volume of runoff from developed properties results in an increase in the amount of pathogens and other deleterious substances carried from the land surface to receiving waters.

#### **4.2 SURFACE RUNOFF AND POLLUTANT LOADING**

In order to quantify and rank the pollutant loading from the outfalls and surfaces identified in the Green's Creek and Browns' River watersheds a method to estimate these loads on a planning level was required. Pollutant loading calculations were developed using the Simple Method outlined in *New York State Stormwater Management Design Manual* (NYSSMDM) dated October 2001. The Simple Method calculations estimate the water quality storm event (WSQE) or "first flush" for each sub-watershed drainage area. The WSQE is estimated to carry 90% of pollutant loads to surface waters. Capturing and infiltrating or detaining and filtering these runoff quantities will significantly reduce the pollutants reaching the surface waters. Actual final design criteria and calculations used to determine mitigation measures and pollution removal rates will be dependent on the types of pollutants found in the runoff and a detailed analysis of the land use, impervious cover, soil types, hydrology and topography of the site.

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Water Quality Storm Events (WQSE) were sized using the NYSSMDM Sizing Criteria 90 % rule where as:

$$WQ_v = ((P)(R_v)(A))/12$$

WQ<sub>v</sub> = water quality volume (in acre feet)

$$R_v = 0.05 + 0.009(I)$$

I = impervious Cover (Percent)

P = 90% rainfall event Number per chart = 1.2 inches on Long Island

A = site area in acres

Pollutant Loading Calculations were calculated using the NYSSMDM *Appendix A: The Simple Method to Calculate Urban Stormwater Loads*. The Simple Method estimates pollutant loads for chemical components as a product of annual runoff volume and pollutant concentration where as:

$$L = 0.226 * R * C * A$$

L = Annual Load (lbs)

R = Annual Runoff (inches)(42")

C = Pollutant Concentration (mg/l)(see below)

A = Area(Acres)

0.226 = Unit Conversion factor

The Simple Method estimates pollutant loads for bacteria with a different unit conversion factor to account for different units where as:

$$L = 103 * R * C * A$$

L = Annual Load (Billion Colonies)

R = Annual Runoff (inches)(42")

C = Pollutant Concentration (mg/l)(see below)

A = Area(Acres)

103 = Unit Conversion factor

Pollutant loading calculation results are shown on Table 4.2. The pollutant concentrations for 'C' taken from NYSSMDM Table A.1 - National Median Concentrations for Chemical Constituents

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Annual Pollutant Loading Estimates  
TABLE 4.2

**Green's Creek**

Outfall Structure CA ID/NPV ID	Street	Type of Outfall	Adjacent Land Use	Contributory Area	Contributory Area	Impervious Area	Water Quality Storm Event Volume	Water Quality Storm Event Volume	Annual Rainfall	Annual Runoff	Total Nitrogen-TN 2.0 mg/l	Total Suspended Solids-TSS 54.5 mg/l	Total Phosphorus-TP 0.26 mg/l	Fecal Coliform 1000col/ml	Zinc-Zn 0.129 mg/l	Lead-Pb 0.0507 mg/l	Rank
Units				SF	Acres	%	WQv-acre-feet	WQv-Cubic Feet	inches	inches	lbs	lbs	lbs	billion colonies (BC)	lbs	lbs	
<b>Reach G1</b>											<b>ESTIMATED AVERAGE ANNUAL LOAD</b>						
433/GN25	Montauk Hwy	pipe	com/road	400,000	9.18	100	0.872	38,000	42	35.91	149.05	4061.56	19.38	50946.69	9.61	1.49	1
428/GN35	Montauk Hwy	pipe	com/road	160,000	3.67	100	0.349	15,200	42	35.91	59.62	1624.62	7.75	20378.68	3.85	0.60	2
493/GN26	West Rd	1" pipe	res/road	8,000	0.18	70	0.012	544	42	25.70	2.13	58.14	0.28	729.34	0.14	0.02	22
500/GN24	marina	3" pipe	mar. lot	2,000	0.05	100	0.004	190	42	35.91	0.75	20.31	0.10	254.73	0.05	0.01	23
502/GN04	Sunset Dr	6" pipe	res/road	20,000	0.46	70	0.031	1,360	42	25.70	5.33	145.36	0.69	1823.36	0.34	0.05	13
505/GN06	Jones Dr	1" pipe	res/road	130,000	2.98	70	0.203	8,840	42	25.70	34.67	944.85	4.51	11851.81	2.24	0.35	4
506/GN07	Anita Dr N	1" pipe	res/road	15,000	0.34	70	0.023	1,020	42	25.70	4.00	109.02	0.52	1367.52	0.26	0.04	14
513/GN12	Anita Dr S	2" pipe	res/road	12,500	0.29	70	0.020	850	42	25.70	3.33	90.85	0.43	1139.60	0.22	0.03	16
514/GN 16	Palmer Cir	2" pipe	res/road	50,000	1.15	70	0.078	3,400	42	25.70	13.34	363.40	1.73	4558.39	0.86	0.13	9
520,521/GN22,23	SC park	2-6" pipe	park/road	30,000	0.69	100	0.065	2,850	42	35.91	11.18	304.62	1.45	3821.00	0.72	0.11	10
<b>Reach G2</b>																	
406/GN34	Tariff St	pipe	road	155,000	3.56	70	0.242	10,540	42	25.70	41.34	1126.55	5.37	14131.00	2.67	0.41	3
413	Tower St	pipe	road	55,000	1.26	100	0.120	5,225	42	35.91	20.49	558.46	2.66	7005.17	1.32	0.20	8
474	Murill Pl	pipe	res/road	10,000	0.23	70	0.016	680	42	25.70	2.67	72.68	0.35	911.68	0.17	0.03	19
471	Amelia Pl	surface	res/road	12,500	0.29	70	0.020	850	42	25.70	3.33	90.85	0.43	1139.60	0.22	0.03	16
416,419/GN33	Easy St	swales	road	87,500	2.01	100	0.191	8,313	42	35.91	32.60	888.47	4.24	11144.59	2.10	0.33	6
467	Howard Ct	surface	res/road	9,000	0.21	70	0.014	612	42	25.70	2.40	65.41	0.31	820.51	0.15	0.02	21
468	Brookdale Ct	surface	res/road	10,000	0.23	70	0.016	680	42	25.70	2.67	72.68	0.35	911.68	0.17	0.03	19
469	Case Ct	surface	res/road	15,000	0.34	70	0.023	1,020	42	25.70	4.00	109.02	0.52	1367.52	0.26	0.04	14
532	Lorraine Cir	surface	res/road	50,000	1.15	50	0.057	2,500	42	18.90	9.81	267.21	1.27	3351.76	0.63	0.10	11
422/GN32	Brook St W	open cul	road	90,000	2.07	100	0.196	8,550	42	35.91	33.54	913.85	4.36	11463.01	2.16	0.34	5
424/GN32	Brook St E	open cul	road	72,000	1.65	100	0.157	6,840	42	35.91	26.83	731.08	3.49	9170.40	1.73	0.27	7
491	Baymens Ct	pipe	res/road	12,500	0.29	70	0.020	850	42	25.70	3.33	90.85	0.43	1139.60	0.22	0.03	16
492	Olive St	surface	res/road	30,000	0.69	70	0.047	2,040	42	25.70	8.00	218.04	1.04	2735.03	0.52	0.08	12

"C" Valve Source; NYSDEC Stormwater Management Design Manual, Table A.1, October 2001

LEGEND:

- com. road - paved road, heavy traffic, no to little fertilized lawn adjacent
- road - paved road, mid to heavy traffic, little fertilized lawn adjacent
- res/ road - paved road light traffic, adjacent residential with fertilized lawn
- mar. lot - boat storage, vehicle parking
- overflow - structures hold storm flow
- surface - surface runoff to creek, no structures
- open cul - open grate drops runoff directly into culvert

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TABLE 4.2

**Brown's River**

Outfall Structure CA ID Number	Street	Type of Outfall		Contribution Area	Contribution Area	Impervious Area	Water Quality Storm Event Volume	Water Quality Storm Event Volume	Annual Rainfall	Annual Runoff	Total Nitrogen-TN 2.0 mg/l	Total Suspended Solids-TSS 54.5 mg/l	Total Phosphorus-TP 0.26 mg/l	Fecal Coliform 1000col/ml	Zinc-Zn 0.129 mg/l	Lead-Pb 0.0507 mg/l	Rank
Units				SF	Acres	%	WQv-AC-FT	WQv-CF	inches	inches	lbs	lbs	lbs	BC	lbs	lbs	
<b>ESTIMATED AVERAGE ANNUAL LOAD</b>																	
<b>Reach B1</b>																	
314/BR14*	Brown's Riv Rd	pipe	com. road	77,000	1.77	100	0.168	7,315	42	35.91	28.69	781.85	3.73	9807.24	1.85	0.29	7*
329/BR9	River Rd	pipe	sealed	0	0.00	100	0.000	0	42	35.91	0.00	0.00	0.00	0.00	0.00	0.00	35
327	River Rd	pipe	sealed	0	0.00	100	0.000	0	42	35.91	0.00	0.00	0.00	0.00	0.00	0.00	35
321/BR10	River Rd	culvert	wetland	675,000	15.50	0.15	0.080	3,466	42	1.94	13.60	370.47	1.77	4647.04	0.88	0.14	19
320/BR11	River Rd	culvert	wetland	675,000	15.50	0.15	0.080	3,466	42	1.94	13.60	370.47	1.77	4647.04	0.88	0.14	19
338/BR2	Terry Rd	pipe	com. road	45,000	1.03	100	0.098	4,275	42	35.91	16.77	456.93	2.18	5731.50	1.08	0.17	14
341/BR12	Willow St	pipe	res/road	30,000	0.69	70	0.047	2,040	42	25.70	8.00	218.04	1.04	2735.03	0.52	0.08	28
340/BR13	River Rd	pipe	com. road	30,000	0.69	100	0.065	2,850	42	35.91	11.18	304.62	1.45	3821.00	0.72	0.11	22
379/BR01	marina	surface	boat ramp	10,000	0.23	100	0.022	950	42	35.91	3.73	101.54	0.48	1273.67	0.24	0.04	32
396/BR8,8A	Seamans Ave	culvert	wetland	0	0.00	70	0.000	0	42	25.70	0.00	0.00	0.00	0.00	0.00	0.00	35
343-345/BR5-7	marina	pipe	mar. lot	30,000	0.69	100	0.065	2,850	42	35.91	11.18	304.62	1.45	3821.00	0.72	0.11	22
346	Hamilton St	surface	res/road	40,000	0.92	100	0.087	3,800	42	35.91	14.90	406.16	1.94	5094.67	0.96	0.15	18
347	Hampton St	surface	res/road	25,000	0.57	100	0.055	2,375	42	35.91	9.32	253.85	1.21	3184.17	0.60	0.09	27
348	Pine St	surface	res/road	32,500	0.75	100	0.071	3,088	42	35.91	12.11	330.00	1.57	4139.42	0.78	0.12	21
375/BR29,30	Middle Rd W	culvert	com. road	100,000	2.30	100	0.218	9,500	42	35.91	37.26	1015.39	4.84	12736.67	2.40	0.37	6
377/BR18,19	Middle Rd E	culvert	com. road	75,000	1.72	100	0.164	7,125	42	35.91	27.95	761.54	3.63	9552.51	1.80	0.28	8
<b>Reach B2</b>																	
132	Amy St	12" pipe	res/road	80,000	1.84	70	0.125	5,440	42	25.70	21.34	581.44	2.77	7293.42	1.38	0.21	11
135	Montauk Hwy	pipe	com. road	135,000	3.10	100	0.294	12,825	42	35.91	50.30	1370.78	6.54	17194.51	3.24	0.50	4
414	Montauk Hwy	pipe	com. road	40,000	0.92	100	0.087	3,807	42	35.91	14.93	406.92	1.94	5104.25	0.96	0.15	15
413BR16	Montauk Hwy	asph. sw.	com. road	40,000	0.92	100	0.087	3,807	42	35.91	14.93	406.92	1.94	5104.25	0.96	0.15	15
417/BR26	Montauk Hwy	18" pipe	com. road	240,000	5.51	100	0.523	22,800	42	35.91	89.43	2436.93	11.63	30568.02	5.77	0.89	1
99/BR24NW	Montauk Hwy	15" pipe	com. road	5,000	0.11	100	0.011	475	42	35.91	1.86	50.77	0.24	636.83	0.12	0.02	34
98/BR24NE	Montauk Hwy	15" pipe	com. road	15,000	0.34	100	0.033	1,425	42	35.91	5.59	152.31	0.73	1910.50	0.36	0.06	29
435/BR24SW	Montauk Hwy	12" pipe	com. road	72,000	1.65	100	0.157	6,840	42	35.91	26.83	731.08	3.49	9170.40	1.73	0.27	9
432/BR24SE*	Montauk Hwy	24" pipe	com. road	240,000	5.51	100	0.523	22,800	42	35.91	89.43	2436.93	11.63	30568.02	5.77	0.89	1*
351	Montauk Hwy	pipe	com. road	170,000	3.90	100	0.371	16,150	42	35.91	63.35	1726.16	8.23	21652.35	4.09	0.63	3
407/BR30	Baywood Ln	pipe	res/road	60,000	1.38	70	0.094	4,080	42	25.70	16.00	436.08	2.08	5470.07	1.03	0.16	15
<b>Reach B3</b>		No Outfalls Identified															
<b>Reach B4</b>																	
1	Richmar Dr	18" pipe	res/road	77,000	1.77	70	0.120	5,236	42	25.70	20.54	559.64	2.67	7019.92	1.32	0.21	12
3	Astor Dr N	30" pipe	res/road	145,000	3.33	70	0.226	9,860	42	25.70	38.67	1053.87	5.03	13219.33	2.49	0.39	5
23	Ort Ct	12" pipe	road	40,000	0.92	70	0.062	2,720	42	25.70	10.67	290.72	1.39	3646.71	0.69	0.11	24
24	Julbet Dr	18" pipe	road	15,000	0.34	70	0.023	1,020	42	25.70	4.00	109.02	0.52	1367.52	0.26	0.04	31
5	Valerie Ct	12" pipe	res/road	97,500	2.24	70	0.152	6,630	42	25.70	26.00	708.63	3.38	8888.86	1.68	0.26	10
57	Revelyn Ct	18" pipe	res/road	35,000	0.80	70	0.055	2,380	42	25.70	9.34	254.38	1.21	3190.87	0.60	0.09	26
6	Dunn Ct	12" pipe	res/road	40,000	0.92	70	0.062	2,720	42	25.70	10.67	290.72	1.39	3646.71	0.69	0.11	24
83/BR 20	Aldrich St	15" pipe	res/road	17,500	0.40	70	0.027	1,190	42	25.70	4.67	127.19	0.61	1595.44	0.30	0.05	30
94	Astor Dr	30" pipe	res/road	12,500	0.29	70	0.020	850	42	25.70	3.33	90.85	0.43	1139.60	0.22	0.03	33
429	Astor Dr	30" pipe	res/road	75,000	1.72	70	0.117	5,100	42	25.70	20.00	545.10	2.60	6837.58	1.29	0.20	13
<b>Reach B5</b>		Outfalls Identification requires research/testing															

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\* = a water quality inlet (WQI) has been installed on this outfall. Loads and ranking are prior to installation of the WQI.

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in Stormwater are: Total Suspended Solids (TSS)-54.5 mg/l; Total Phosphorus (TP)-0.26 mg/l; Total Nitrogen (TN)-2.00 mg/l; and Fecal Coliform (F Coli)-1.5(1,000 col/ml.), Zinc (Zn)-0.129 mg/l and Lead (Pb)-0.0507 mg/l.

Annual runoff was calculated as  $R = P \cdot P_j \cdot R_v$

R = Annual Runoff (inches)

P= Annual Rainfall (inches) (42")

P<sub>j</sub> = Fraction of annual rainfall events that produce runoff (typ. 0.9)

R<sub>v</sub> = Runoff coefficient

$$R_v = 0.05 + 0.9(I_a)$$

I<sub>a</sub> = impervious fraction (100% for commercial street, 70% for residential streets)

### 4.3 STORMWATER IMPROVEMENT AND IMPLEMENTATION STRATEGIES

This section includes a description of best management practices (BMP) including infiltration practices, filtering systems and water quality inlets and implementation recommendations for each outfall in the watersheds.

#### 4.3.1 Best Management Practices for Pollutant Removal Benefits – Structural Measures

The structural measures described below have been selected based on the identified site conditions of a developed urban/suburban area with an extensive road system and landscaped properties where retrofit and reconstruction will be required for the majority of measures installed. The actual BMPs selected will depend on the pollutants of concern. Road runoff with heavy sediment and hydrocarbon loads will require different solutions than residential areas with fewer roadways and reduced traffic volume but increased soluble pollutants loads including phosphorus, nitrogen and fecal bacteria. Recommended practices have been selected in accordance with the *New York State Stormwater Management Design Manual*.

#### **4.3.1.1 Stormwater Infiltration Practices**

Infiltration practices are designed to capture, temporarily store, and then infiltrate runoff through the soil layer where pollutant removal processes occur. Infiltration practices have moderate to high removal capabilities for particulate and soluble urban pollutants. Design parameters can enhance the removal rates but particles can rapidly clog some infiltration methods. A means to remove the accumulated sediments should be addressed prior to installation. Infiltration in leaching wells, leaching basins, and recharge basins can be utilized in urban and developed areas to provide the capacity needed for treating the WQSE.

#### **4.3.1.2 Stormwater Filtering Systems**

Filtering practices are designed to capture, detain and filter stormwater through porous materials, such as sand, soil, or organic materials. During the filtering process, sediment particles and attached pollutants, such as hydrocarbons, are removed. Removal of soluble pollutants, such as nitrogen and phosphorus, is limited by the filtration period and filtering material. Filtering systems for larger areas include bioretention basins, dry swales and wet swales that can filter and release the WQSE. Grass filter strips can be used to filter small areas.

#### **4.3.1.3 Constructed Ponds and Wetlands**

Constructed stormwater ponds and wetlands provide moderate to high pollutant removal capacity, both soluble and particulate, through both settling and biological uptake. Wetlands and ponds require significant dedication of land that is not generally available in the majority of the largely developed watersheds of Green's Creek and Brown's River.

#### **4.3.1.4 Water Quality Inlets/Emerging Technologies**

With the increased awareness of the effect of storm runoff on the surrounding waterbodies, the development of numerous technologies to deal with pollutant removal has ensued. These new technologies will continue to develop over the next several years. Many of the new technologies are designed for retrofit of existing stormwater structures and are best suited for ultra-urban areas and road right-of-ways where sediment and hydrocarbons are of greatest

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concern. Locations where soluble materials, including fertilizers and pesticides, are prevalent may not be suited to many of these devices. Many of these technologies have not been in existence for sufficient periods to demonstrate a proven ability to meet the pollutant removal standards over an extended period and require care during selection. The devices should be selected for the pollutants of concern for each location with consideration of the NYSDEC requirements for pollutant removal rates and the maintenance requirements of each. Some of these technologies may provide an interim measure to reduce pollutant levels in the waterbodies until a long-term solutions can be implemented. The general categories of new technology are:

- *Catch Basin Inserts*. The inserts contain a pollutant removal medium that is suspended in existing basins and storm water is treated as it passes through the insert. These devices are suitable for small drainage areas and ultra -urban retrofit sites. The type of pollutant removed varies by specific insert and can include both particulate and soluble pollutants.
- *Hydrodynamic Separators*. These devices, called water quality inlets (WQI), remove sediments and attached hydrocarbons using a swirl concentrator. These systems can allow a high flow storm event to bypass the swirl. Two of these devices have been installed within the Brown's River watershed. These devices are suitable for ultra -urban retrofit sites and have the longest history of use of the emerging technologies.
- *Media Filters*. These systems consist of filter cartridges that are enclosed in a concrete vault. The filter cartridges can be a variety of materials including organic medium, sand, or charcoal that can trap particulates and soluble pollutants dependent on the filtration period.

#### **4.3.2 Implementation Recommendations**

Outfalls have been ranked by the size of the WQSE. Where WQSE's were equal, the outfalls were ranked equally. The ability to improve the water quality at an outfall is based on the ability to site a technique into the area. Recommendations for each outfall are preliminary in nature and based on the available land area, land use, and currently available technologies. Final designs for road improvements and drainage systems should include a detailed analysis of the drainage area.

Suffolk County Soil and Water Conservation District (SCSWCD) prepared a report entitled *Brown's Creek and Green Creek Prioritization of Stormwater Outfalls* (January 2006) that includes recommendations for pollution reduction at each outfall. The locations that SCSWCD identified as priorities have been noted herein. In some locations, an abbreviated description of

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the SCSWCD recommendations has been included. The SCSWCD report should be reviewed for a complete description of their recommendations.

#### **4.3.2.1 Green's Creek**

##### *Reach 1 – Great South Bay to Montauk Highway (Main Street)*

This tidally influenced creek reach is bulkheaded except for a section along the northwest shoreline that is currently undeveloped land. Marina use and parkland occupies the southwestern shoreline. These marinas have vehicle parking for boat owners who have rented slips and boat storage during the winter months. Many offer boat mechanical repair services as well.

Residential use dominates the western shoreline including around Sunset Lake. There is little open space near the western shoreline and the area is bulkheaded limiting the types of techniques that can be implemented. According to the Outfall Plan, there are 31 outfalls in this reach. Twenty of these outfalls are 3" diameter and/or discharge roof/lawn runoff from residential properties. These outfalls have contributing area of 1,000 to 1,500 SF. BMP's and IPM for pesticide and fertilizer use can best reduce pollutants at these locations.

Outfall 433/GN25 – **Ranked 1. Montauk Highway** is under the jurisdiction of SCDPW. The County has developed an initial study and is currently developing plans for reduction of the storm runoff entering Green's Creek. The WQSE volume is estimated to be 38,000 CF. The Town should encourage the County to develop a system that at a minimum contains the WQSE prior to overflowing to the Creek and work with County to identify and aid in acquiring necessary property for infrastructure.

Outfall 428/GN35 – **Ranked 2. Montauk Highway** is under the jurisdiction of SCDPW. The County has developed an initial study and is currently developing plans for reduction of the storm runoff entering Green's Creek. The WQSE volume is estimated to be 15,200 CF. The Town should encourage the County to develop a system that at a minimum contains the WQSE prior to overflowing to the Creek and work with County to identify and aid in

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acquiring necessary property for infrastructure. In addition, the Town should coordinate with Suffolk County to have debris-filled basins cleaned and then inspected on a regular basis.

Outfall 493/GN26 – **Ranked 21.** The WQSE volume is estimated to be 544 CF. The Town should investigate installing infiltration trenches or filter strips along road shoulder or leaching structures to contain water quality storm prior to overflow into the storm inlet and into the creek.

Outfall 500/GN24 – **Ranked 22.** SCSWCD verified this outfall and noted that the existing gravel parking lot absorbs most runoff with only larger storm events draining to the outfall. The WQSE volume is estimated to be 190 CF.

Outfall 502/GN 04 – **Ranked 12.** Runoff from the north end of **Sunset Drive** is discharged into Green's Creek at this location through a 6" diameter pipe. The WQSE volume is estimated to be 1,360 CF. The Town should install upgradient leaching basins to contain the WQSE. Where groundwater depth does not allow leaching basins, the installation of a WQI should be considered.

Outfall 505/GN 04 – **Ranked 4.** Road runoff from **Jones Drive** is discharged into Green's Creek through a 1' diameter corrugated metal pipe. The WQSE volume is estimated to be 1,360 CF. The Town should install upgradient leaching basins to contain the WQSE. Where groundwater depth does not allow leaching basins, the installation of a WQI should be considered.

Outfall 506/GN 07 – **Ranked 13.** Road runoff from the north end of **Anita Drive** is discharged into Green's Creek through a 1' diameter pipe. The WQSE volume is estimated to be 1,020 CF. The Town should install upgradient leaching basins to contain the WQSE. Where groundwater depth does not allow leaching basins, the installation of a WQI should be considered.

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Outfall 513/GN12 –**Ranked 15.** Road runoff from the south end of **Anita Drive** is discharged into Green's Creek through a 2' diameter pipe. The WQSE volume is estimated to be 850 CF. The Town should install upgradient leaching basins to contain the WQSE. Where groundwater depth does not allow leaching basins, the installation of a WQI should be considered.

Outfall 514/GN16 – **Ranked 9.** Road runoff from **Palmer Circle** and the south end of Sunset Drive is discharged into Green's Creek through a 2' diameter corrugated pipe. The WQSE volume is estimated to be 3,400 CF. The Town should install upgradient leaching basins to contain the WQSE. Where groundwater depth does not allow leaching basins, the installation of a WQI should be considered.

Outfall 520,521/GN 22,23 – **Ranked 10.** Runoff from Green's Creek County Park and the adjacent road surface is discharged into Green's Creek through two 6" diameter PVC pipes. The WQSE volume is estimated to be 2,850 CF. It is recommended that the Town work with the County to determine if an infiltration system can be sited at this location. The County should be encouraged to implement IPM practices on this and all other County parks to reduce fertilizer and pesticide use. The Town should install leaching structures in the road to contain the WQSE or the County could construct a bioretention basin on the parkland.

Reach 2 – Montauk Highway to North of Tariff Street.

This reach extends north from Montauk Highway to the headwaters located north of Tariff Street. Freshwater wetlands line this reach of the creek. The surrounding lands are predominantly residential use. School district properties occupy large parcels of land located along the western shoreline. Runoff from the school's parking fields is collected in drainage structures that are reported to drain into Green's Creek. The school facility may be a good location to installed catch basin filters that could be monitored by classes as part of the Advanced Placement Environmental Science Program. Any modifications to the parking facilities should address containing or treating the WQSE from the parking fields. The extensive lawn areas at the high school athletic field are in close proximity to the creek, possibly allowing pollutants to wash into the creek. Preserved lands in this reach include the

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nature preserve north of Brook Street along with several privately held preserved parcels along the east side of the creek on Cliff Avenue. The area north of Tariff Street has an area where debris, including large appliances, is being dumped. Recommendations discussed in Section 3.3.4.4 include events to remove debris from the creeks shorelines.

Outfall 406/GN34 –**Ranked 3.** Road runoff from **Tariff Street** is collected into a piped system of catch basins and manholes that discharge into the Green's Creek at a bulkheaded culvert on the south side of Tariff Street. The drainage area extends along Tariff Street west to Milton Street and Mobile Street and east to Yonda Drive and includes portions of the adjacent side streets. The WQSE volume is estimated to be 10,540 CF. The Town should install upgradient leaching structures to infiltrate WQSE and reconfigure piping to contain the WQSE and allow larger storm events to pass. Alternately, the Town can investigate whether the LIPA or Town land north of Tariff Street can be used to develop an infiltration basin.

Outfall 413 – **Ranked 8.** Road runoff from **Tower Street** is collected into a piped system of catch basins and manholes that discharge into Green's Creek at a bulkheaded culvert south of Tower Street. The drainage area extends along Tower Street west to midway between Cherry Street and Hillside Avenue and east to Cliff Avenue. The WQSE volume is estimated to be 5,225 CF. Adjacent lands are residential or covered by a nature preserve covenant. It appears that no land outside the road right-of-way is available for a stormwater treatment. The Town should install upgradient leaching structures to infiltrate the WQSE and reconfigure the piping between structures to contain the WQSE while allowing larger storm events to pass or install a WQI at the end of the system.

Outfall 474 – **Ranked 18.** **Murill Place** road runoff is collected into a double catch basin that discharges into the Green's Creek at the headwall at the east end of the street. The drainage area includes all of Murill Place. The WQSE volume is estimated to be 680 CF. The Town should determine if a filtration trench or swale can be constructed on the outflow side of the headwall prior to runoff entering the creek. If that is not feasible, the Town should install upgradient leaching structures to capture and infiltrate the WQSE.

Outfalls 416,419/GN33 – **Ranked 6.** Road runoff from **Easy Street** is directed to Green's Creek via roadside swales. There are several water and debris-filled drainage structures located along Easy Street. Drainage cannot enter the leaching basin on the north side of Easy Street due to elevation inconsistencies. The drainage area extends from midway between Cherry Avenue and Hillside Avenue east to Greeley Avenue. The WQSE volume is estimated to be 8,313 CF. Drainage structures along Easy Street should be cleaned. When the road is reconstructed, the existing structures should be replaced with larger leaching structures and road grades modified to enhance drainage. The existing swales should be reconstructed to improve filtration capacity. The Town should determine if acquisition of undeveloped land along the east shoreline between Easy Street and MTA easement is feasible or if land was preserved during apartment complex development and add information to GIS database.

Outfall 532 – **Ranked 23.** Road runoff from **Lorraine Circle** is collected in a drainage system of 16 structures (13 leaching basins and three manholes) with overflow piping into Green's Creek at Brookside Preserve. The WQSE volume is estimated to be 2,500 CF. The systems piping should be reconfigured to capture the WQSE (and any additional capacity available) in leaching structures that infiltrate to groundwater. The piping should be reconfigured to allow larger storm quantities to bypass and outfall into the creek.

Outfall 422/GN34 – **Ranked 5.** **Brook Street** road runoff enters the creek via road drainage grates that discharge directly into the culvert beneath the road. The drainage area from this outfall extends west to Division Street and south on Cherry Street for 1000 feet. The WQSE volume is estimated to be 8,550 CF. Land on the north side of Brook Street is owned by the Town and County and land to the south is owned by the school district. The Town should install upgradient leaching structures, reconfigure the piping to capture and infiltrate the WQSE, and allow larger storm events to bypass the leaching structures and outfall to the creek. The Town should also consider a WQI at the outfall due to the heavy traffic volume at the school.

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Outfall 424/GN32 – **Ranked 7. Brook Street** road runoff enters the creek via road drainage grates that discharge directly into the culvert beneath the road. The drainage area from this outfall extends east to Greeley Avenue and includes about 200 linear feet of road on the adjacent side streets. The WQSE volume is estimated to be 6,840 CF. Land on the north side of Brook Street is owned by the Town and County and land to the south is owned by the school district. The Town should install upgradient leaching structures, reconfigure the piping to capture and infiltrate the WQSE, and allow larger storm events to bypass the leaching structures and outfall to the creek. The Town should also consider a WQI at the outfall due to the heavy traffic volume at the school.

Outfall 491 – **Ranked 15. Baymens Court** road runoff is collected in two catch basins that discharge through a pipe to Green's Creek. The drainage area includes all of Baymens Court. The WQSE volume is estimated to be 850 CF. This outfall pipe was not field verified. The Town should install upgradient leaching structures, reconfigure the piping to capture and infiltrate the WQSE, and allow larger storm events to bypass the leaching structures and outfall to the creek.

Road End Runoff. There are several additional locations within this reach where road runoff surface drains directly to the creek. These locations include **Amelia Place (Outfall 471) - Ranked 15, Howard Court (Outfall 467) – Ranked 20, Brookdale Court (Outfall 468) – Ranked 18, Case Court (Outfall 469) – Ranked 13, and Olive Street (Outfall 492) – Ranked 11.** The WQSE volume for these streets range from 600 to 1000 CF. The Town should review each road end to determine if a road end infiltration trench or swale can be constructed. If an infiltration trench or swale is not feasible, the Town should install upgradient leaching structures to capture and infiltrate the WQSE.

#### **4.3.2.2 Brown's River**

##### Reach 1 – Great South Bay to Middle Road

This reach of creek is tidally influenced. Commercial water-dependent uses including marinas, boat storage and ferry transportation are prevalent along with single-family residences. Significant portions of this reach are bulkheaded. There are few drainage

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structures on many of the roads adjacent to the creek. At these locations road runoff discharges directly to the creek at the road ends and to wetlands adjacent to the roads.

Along the west shoreline, there are a number of water-dependent commercial uses including marinas, boat yard, ferry terminals and associated land uses. The Sayville Ferry Service is a contractor to the National Park Service that operates ferries to the Fire Island communities of Cherry Grove, Water Island, Fire Island Pines and Sailor's Haven is located along this reach. Service is generally limited to mid-May through mid-October. Loose stone parking lots for long-term and day parking are located along both sides of Brown's River Road. The marina and boat yard facilities have boat ramps and lifts, docking space, off-season boat storage and vehicular parking for boaters during the summer season. Several of the facilities also offer boat repair services. There is a town marina located along the eastern shoreline and a private marina located on the small eastern tributary of the creek. There are a several homes with bulkheaded property and boat docking along this reach. At the northern limit of the small eastern tributary a series of drainage structures exist. It appears that these structures may be connected to an outflow pipe into the tributary but the outfall location could not be identified.

Outfall 314/BR14 – **Ranked 7(w/o WQI)** A force main discharges runoff from the **Brown's River Road and River Road** stormwater collection system discussed in Section 2.4.5.1. All runoff is carried through a WQI which removes floatables and sediments with attached pollutants prior to discharge to the creek. The WQSE volume is estimated to be 7,315 CF. The WQI reduces the levels of sediments and hydrocarbons that are the main concern along this road. As lawn areas do not exist in this location, no further remediation is required. The Town should inspect the WQI on a regular basis to ensure proper operation.

Outflow 329/BR9 – **Ranked 35**. This outfall pipe was sealed at **River Road** during construction for Outfall 314 above. This pipe is no longer carrying storm runoff and it is not expected to discharge any runoff into the creek. No remediation is required.

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Outfall 327 – **Ranked 35**. As above, this outfall pipe was sealed at **River Road** during construction for Outfall 314 above. It is not expected to discharge any runoff into the creek. No remediation is required.

Outfall 321/BR10 – **Ranked 19**. This pipe provides connection of tidal flow to the wetland located on the east side of **River Road**. There do not appear to be any structures contributing runoff into this system. The wetlands receive runoff from the adjacent parking areas and residential properties. Those flows are then carried into Brown's River during tidal fluctuations. The WQSE volume is estimated to be 3,466 CF. The Town should provide educational materials on BMP's and IPM for adjacent homeowners to reduce pollutant loads and encourage construction of grassed swales or filter strips between the parking lot and backyards and the wetland to filter runoff.

Outfall 320/BR11 – **Ranked 19**. This pipe provides connection of tidal flow to the wetland located on the east side of **River Road**. There do not appear to be any structures contributing runoff into this system. The wetlands receive runoff from the adjacent parking area and residential properties. Those flows are then carried into Brown's River during tidal fluctuations. The WQSE volume is estimated to be 3,466 CF. The Town should provide educational materials on BMP's and IPM for adjacent homeowners to reduce pollutant loads and encourage construction of grassed swales or filter strips between the parking lot and backyards and the wetland to filter runoff.

Outfall 338/BR2 – **Ranked 14**. This outfall pipe discharges runoff from a piped system at the intersection of **Terry Road** and **River Road**. The drainage area includes all of Terry Street west to Foster Avenue and West River Road to River Street. The WQSE volume is estimated to be 4,275 CF. During storm events, this area floods and the bulkhead is breached. The Town is currently studying methods to eliminate the flooding conditions at this location. The solution should include methods such as upgradient leaching basins to store the WQSE. In addition, reconstruction of the damaged bulkhead and raising the elevation will help to alleviate tidal surges over the bulkhead and increase the depth available for drainage

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structures. The solution may also include the installation of a WQI similar the WQI described for Outfall 314.

Outfall 341/BR12 – **Ranked 28** This outfall directs runoff from **Willow Street** east to the creek. The WQSE volume is estimated to be 2,040 CF. The Town should install upgradient leaching structures to infiltrate the WQSE. As an alternative measure, SCSWCD proposed the removal of pavement at the road end and the construction of a grass filter strip. SCSWCD also identified SCTM parcel #500-409-5-42 for acquisition for additional treatment measures.

Outfall 340/BR13 - **Ranked 22.** This outfall allows drainage to enter the creek from the marina parking area. The WQSE volume is estimated to be 2,850 CF. The Town should install upgradient leaching structures to capture and infiltrate the WQSE.

Outfall 379/BR1 - **Ranked 32.** This location is a privately-owned commercial marina with boat ramp that allows the marina site to surface drain directly to the creek. The WQSE volume is estimated to be 950 CF. As recommended by SCSWCD, the marina owner should receive BMP education and be encouraged to install downspouts and gutters on site buildings.

Outfall 396/NPV BR8,8A - **Ranked 35.** This outfall is a pipe culvert under **Seamans Avenue** that connects tributary tidal wetlands and surface waters to Brown's River. Road runoff in this area sheet flows into the wetlands. There are no road drainage structures on the road in this area. Removal of roadside phragmites and installation of native grasses would improve filtering prior to entering wetland but maintenance efforts to prevent displacement of the grasses by phragmites would be significant.

Outfalls 343,344,345/BR5,6,7 - **Ranked 22.** These outfalls direct runoff from a commercial marina to the creek. The WQSE volume of the marina is estimated to be 2,850 CF. The marina owner should receive BMP educational materials.

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Outfall 375/BR29,30 - **Ranked 6.** Runoff extending from Railroad Avenue and Main Street in downtown Sayville is carried east along **Middle Road** and discharges into Brown's River west of Bryan's Bridge through two catch basins. This road is under the jurisdiction of the SCDPW. There are currently no drainage structures on this stretch of road. According to the representatives of SCDPW, there has been discussion regarding the installation of a drainage system along this section of Middle Road and a survey of the road right-of-way was undertaken. No schedule for the design or implementation of these measures has been identified. The WQSE volume is estimated to be 9,500 CF. The Town should encourage the County to develop a drainage system that at a minimum contains or treats the WQSE prior to overflowing to the river. The system could be either the installation of upgradient leaching structures to capture and infiltrate the WQSE or the installation of a WQI at this location, as this is predominantly commercial road runoff and space may be available to site a unit.

Outfall 377/BR18,19 - **Ranked 8.** Runoff extending from McConnell Avenue is carried west along **Middle Road** and discharges into Brown's River east of Bryan's Bridge through two catch basins. This road is under the jurisdiction of the SCDPW. There are currently no drainage structures on this length of road. The WQSE volume is estimated to be 7,125 CF. The Town should encourage the County to develop a drainage system that at a minimum contains or treats the WQSE prior to overflowing to the river. The system could be either the installation of upgradient leaching structures to capture and infiltrate the WQSE or the installation of a WQI at this location, as this is predominantly commercial road runoff and space may be available to site a unit.

Road Runoff. There are numerous locations within this reach where road runoff surface drains directly into the creek or adjacent wetlands. These locations include the east side of the river along **Brown's River Road, Bay Avenue, and Seaman Avenue.** There are no drainage structures or curbs to collect or concentrate the runoff. The area has a shallow groundwater depth and the wetlands are phragmites dominated. Removal of roadside phragmites and installation of native grasses would improve filtering prior to entering wetland but maintenance efforts to prevent displacement of the grasses by phragmites would be significant. Along the west shoreline several street ends drain to the wetlands, including at

**Hamilton Street (346) - Ranked 18, Hampton Street (347) – Ranked 27, and Pine Street (348) – Ranked 21.** The Town should investigate either constructing grass swales to filter the runoff or installing leaching basins to capture and infiltrate the WQSE.

*Reach 2 - Middle Road to Montauk Highway*

In this reach, the creek splits to two branches. Lotus Lake is located at the upper eastern limit north of the LIRR tracks. The creek runs through Roosevelt County Park, which is surrounded by residential development. This reach is tidally influenced below the dam structures located at Montauk Highway on the Mill Pond Branch and at the LIRR on the San Souci Branch. The branches are freshwater above the dams. There are large area of tidal and freshwater wetlands and few outfalls in this reach. St Anne's Parish and Cemetery occupy a large parcel of land along the west side of the river.

*Outfall 132 - Ranked 11. Amy Street* drainage is collected into catch basins and outflows through a pipe into Lotus Lake south of Montauk Highway. The WQSE volume is estimated to be 5,440 CF. The Town should install upgradient leaching structures to capture and infiltrate the WQSE.

*Outfall 135 – Ranked 4.* Runoff from **Montauk Highway** from Lowell Road to Old Broadway Avenue is collected and discharges into a small tributary of the San Souci branch. The WQSE volume is estimated to be 12,825 CF. The tributary water has a surface sheen indicating oils in the runoff. SCSWCD recommends that a bioretention basin or wetland be constructed in the median between Montauk Highway and Old Montauk Highway and runoff from Montauk Highway be redirected to this area for filtration. This tributary extends north under Montauk Highway and is described further in Reach 5. This work would be under the jurisdiction of Suffolk County.

*Outfall 414/BR26 - Ranked 15. Montauk Highway* is under the jurisdiction of SCDPW. Drainage from the south side of Montauk Highway at the San Souci branch is collected in a catch basin that discharges into at the south headwall of the culvert under Montauk Highway.

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The WQSE volume is estimated to 3,807 CF. SCDPW should install upgradient leaching structures to capture and infiltrate the WQSE.

*Outfall 413/BR16* - **Ranked 15. Montauk Highway** is under the jurisdiction of SCDPW and improvements are the responsibility of the County. The existing piping system directs flows to a small recharge basin that overflows via an asphalt swale into San Souci Lakes. A second swale allows some road runoff to directly enter the recharge basin. The WQSE volume is estimated to be 3,807 CF. SCDPW should review the existing drainage system to ensure that the basin has not silted up and to determine if the existing basin can capture and infiltrate the WQSE. The overflow to the lake should be redesigned so that the larger storm events bypass the recharge basin. If additional capacity is needed to capture the WQSE, upgradient leaching basins can be installed. The second swale that allows road runoff to directly enter the basin should be removed and runoff redirected to the piping system.

*Outfall 417/BR26* - **Ranked 1. Montauk Highway** is under the jurisdiction of SCDPW and improvements are the responsibility of the County. The drainage area of Montauk Highway at the San Souci branch extends 2400' east of the discharge to the watershed limit and is collected into a piped system that discharges into the San Souci Lakes north of the road. The WQSE volume is estimated to be 22,800 CF. The Town should encourage the County to develop a system that at a minimum contains the WQSE prior to overflowing to the River. Solutions may include installing upgradient leaching structures to capture and infiltrate the WQSE or installing of a WQI. Alternately, the Town can work with the County to identify land parcels that can be used to site infiltration measures such as a recharge basin.

*Outfall 98/BR24* - **Ranked 34. Montauk Highway** is under the jurisdiction of the SCDPW. Drainage from a small area on the northwest side of Montauk Highway is collected in a single catch basin and piped to the culvert south of Mill Pond. The WQSE volume is estimated to be 475 CF. SCDPW should install upgradient leaching structures to capture and infiltrate the WQSE or provide a piped connection to the WQI installed for Outfall 99/BR24 below.

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Outfall 99/BR24 - Ranked 29. Montauk Highway is under the jurisdiction of the SCDPW. Drainage from northeast side of Montauk Highway from the Mill Pond Road intersection is collected in catch basins and discharges into the culvert south of Mill Pond. The WQSE volume is estimated to be 1,425 CF. SCDPW should install upgradient leaching structures to capture and infiltrate the WQSE or provide a piped connection to the WQI installed for Outfall 432/BR24 if capacity exists.

Outfall 435/BR24 - Ranked 9. Montauk Highway is under the jurisdiction of the SCDPW. The southwest Outfall 435 collects runoff from the north and south sides of Montauk Highway extending 700' west from the culvert. Drainage is collected in a piped system that discharges into the south headwall of the culvert under Montauk Highway. Information on the extent of the piping system was not provided by Suffolk County. The WQSE volume is estimated to be 6,840 CF. The Town should encourage the County to develop a system that at a minimum contains the WQSE prior to overflowing to the river. Solutions may include installing upgradient leaching structures to capture and infiltrate the WQSE or the installation of a WQI.

Outfall 432/BR24 - Ranked 1(w/o WQI). Montauk Highway is under the jurisdiction of the SCDPW. This outfall is located on the southeast headwall of the culvert under Montauk Highway east from Mill Pond Road to Lowell Road. The piping system extends 2000' east. The WQSE volume is estimated to be 22,800 CF. Suffolk County installed a WQI on the south side of the road east of Mill Pond in 2003. No additional mitigation is needed at this site. The County should inspect and clean the WQI to ensure that it continues to remove TSS and hydrocarbons.

Outfall 351 - Ranked 3. Montauk Highway is under the jurisdiction of the SCDPW and collects drainage from Montauk Highway near the LIRR overpass. According to the SCDPW, road runoff from this section of road is collected into a piped drainage system that runs along the LIRR easement and discharges into the Mill Pond branch on the north side of the railroad. This discharge was not observed and no mapping was provided by SCDPW. This outfall requires additional investigation either through additional coordination with

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SCDPW or field testing. The WQSE volume from Montauk Highway is estimated to be 16,150 CF.

Outfall 407/BR30 - **Ranked 15. Baywood Lane** drainage is collected into catch basins and outflows through a pipe located in an easement between residential properties. The WQSE volume is estimated to be 4,080 CF. The Town should install upgradient leaching structures to capture and infiltrate the WQSE.

Road End Runoff. There are several locations where street ends drain to the river. The estimated runoff areas for the street ends range from 9,000 SF to 15,000 SF. Filtering swales or leaching basins can be installed by the Town to capture and infiltrate the WQSE.

Reach 3 – The East Branch – San Souci Lakes

This reach is the eastern branch of Brown's River located between Montauk Highway and Sunrise Highway. This is the longest river reach and contains freshwater wetlands. This reach is in a natural setting with only minor development along the lower perimeter. Suffolk County owns lands designated as preserve along the west side of the creek and Girls Scouts of Suffolk County owns the lands along the east shoreline as discussed in Section 2.2.6.1 of this report. It is reported that all-terrain vehicle (ATV) use at the northern limit of this area is damaging the existing vegetation.

There do not appear to be any outfalls in this reach. A weir or dam structure (NPV BR15) exists at the northern end of the branch. Additional earthen dams exist between the lakes. The County and State should be encouraged to periodically review the structural integrity of the dams so that failure of the structures does not impact the lower reaches of this stream. Failure of a dam could result in damage to downstream ecosystems and habitats. Damage, such as shoreline erosion and habitat impacts, from dam failures should be identified and remediated as soon as possible. The Town and County should work to enforce bans on ATV use in the area.

Reach 4 – The West Branch – Mill Pond

This reach is the west branch between Montauk Highway and Sunrise Highway. North of Mill Pond the creek is narrow and contains freshwater wetlands. For the majority of this reach the Town owns a narrow width of preserved property along alternating shorelines. Residential properties surround the river and the preserved lands. Roads direct runoff toward the river. Where no preserved land exists, the residential properties extend to the river. Runoff from residential properties can carry fertilizers and pesticides loads into the river. These soluble pollutants are a major concern for the waterbodies and are not easily addressed in a densely populated area. Soluble pollutants are best mitigated by long periods of detention in wetlands or filters. These measures require significant land area to implement that is not available in a majority of this reach. Educational efforts focusing on IPM and the use of BMP's can significantly reduce fertilizer and pesticide loads. Several emerging technologies are designed to remove soluble pollutants. If used, these systems should be implemented on a preliminary or trial basis and monitored to determine if the pollutant removals levels justify the expense and the maintenance requirements.

Outfall 1 – Ranked 12. This outfall collects road runoff from **Richmar Drive** and **Julbet Drive**. The storm runoff is piped through Town preserved land and discharges through a headwall into the river in a densely vegetated area. The WQSE volume is estimated to be 5,236 CF. The Town should install upgradient leaching structures to capture and infiltrate the WQSE or install an emerging technology designed to remove sediments and soluble pollutants.

Outfall 3 - Ranked 5. This outfall collects runoff from the north end of **Astor Drive** and the east end of **Versa Place**. Storm runoff discharges through a headwall into a small drainage swale that carries the runoff to the creek. The swale is reported to have been constructed at the same time as the area housing to direct the road runoff into Brown's River. The WQSE volume is estimated to be 9,860 CF. The Town should install upgradient leaching structures to capture and infiltrate the WQSE or investigate construction of a bioretention basin or wetland to treat runoff.

Outfall 23 - **Ranked 24**. This outfall collects runoff from **Ort Court**. The catch basins connected to the outfall are full of sediment reducing the structure capacity. Runoff collects and overflows the curb into the river. Runoff that infiltrates through the catch basins into the outfall has an oily surface sheen. Upgradient basins that should collect initial storm runoff and associated sediments appear clean. The WQSE volume is estimated to be 2,720 CF. Clean existing catch basins and investigate drainage patterns to determine if upgradient basins are capturing runoff. The Town should install additional upgradient leaching structures to treat the entire WQSE. As an additional measure, SCSWCD recommended developing the existing low area on the north side of Ort Court into a retention/infiltration area to capture and infiltrate the portion of the WQSE that cannot be infiltrated in upgradient structures while allowing larger storm events to flow directly into the river bypassing the recharge basin. A detailed description of the SCSWCD recommendation is included in their report.

A vacant parcel located north of Ort Court is reported to be a site of proposed housing development. The Town should require on-site capture and infiltration of the entire WQSE and on-site extended detention of larger storm events volumes.

Outfall 24 - **Ranked 31**. This outfall collects road runoff from **Julbet Drive** at Sunrise Highway. The stream at this location is intermittent and appears to carry only storm runoff. Dumping of trash and brush is evident. The WQSE volume is estimated to be 1,020 CF. The Town should install upgradient leaching structures to capture and infiltrate the WQSE.

Outfall 5 - **Ranked 10**. This outfall collects runoff from **Valerie Court** into a recharge basin. The basin has an overflow structure that discharges via a corrugated metal pipe into Brown's River. The overflow structure does not appear to separate the initial flow from the larger storm event or provide significant sediment settlement prior to overflow. The WQSE volume is estimated to be 6,630 CF. The piping system should be reconstructed by the Town to allow the WQSE to be infiltrated through the existing recharge basin and allow the larger storm events volumes to bypass the recharge basin directly to the river.

Outfall 57 - **Ranked 26**. This outfall collects drainage from **Revelyn Court**. The WQSE volume is estimated to be 2,380 CF. The Town should install upgradient leaching structures to capture and infiltrate the WQSE.

Outfall 6 - **Ranked 24**. Road runoff from **Dunn Court** is collected into a curb inlet that discharges via a pipe into Brown's River. The pipe runs in an easement between two residential properties. Catch basins were installed upland of the inlet, but road grades prevent drainage from reaching the catch basins. As a result, all runoff continues to enter Brown's River. The WQSE volume is estimated to be 2,720 CF. The Town should reconstruct the road to improve the cross slope, reset existing structures and install additional upgradient leaching basins to capture and infiltrate the WQSE.

Outfall 83/BR 20 - **Ranked 30**. Storm runoff from **Aldrich Street** and **Astor Drive** is collected in catch basins and piped into the river. CB 82 is filled with sediments. A separate upland system is not connected to the catch basins that flow into the river. The upland system collects runoff into a system of pipes and catch basins. The WQSE volume is estimated to be 1,190 CF. The Town should clean sediments from the existing structures.

Outfall 94 - **Ranked 33**. Storm runoff is collected into a catch basin on the east side of **Astor Drive** and discharges through a pipe into Brown's River. Three catch basins on the west side of the street do not appear to be piped to the outflow structure. The WQSE volume is estimated to be 850 CF. The Town should install additional upgradient leaching structures to infiltrate a portion of the WQSE. Alternatively, the Town could construct a bioretention basin or swale on Town-owned parcels on either the northeast or southwest corner of Aldrich Street and Astor Drive to treat some of the WQSE and redirect the piping from Outfall 83 to this location. SCSWCD recommended a similar solution.

Outfall 429 - **Ranked 13**. Storm runoff from **Astor Drive** is collected into a catch basin system and discharges through a pipe into Brown's River. The WQSE volume is estimated to

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be 5,100 CF. The Town should install additional upgradient leaching structures to capture and infiltrate the WQSE.

*Reach 5 – Islip Grange and Broadway Park Tributary*

This small tributary is located between the Mill Pond and San Souci branches and discharges into Lotus Lake. The river extends through Islip Grange, a Town historical facility, and into Broadway Avenue Park, a Town recreational facility. Both facilities have large expanses of lawn. Review of drainage structures north and east of the park indicate that storm drainage from the surrounding streets may be directed through the park in a piped system. System infrastructure could not be verified and requires additional investigation through field testing or record review. Until further information is obtained, this drainage area cannot be quantified. It appears that there is adequate space here to develop a drainage system to contain the WQSE within the park space and allow the larger storm event to bypass. IPM and BMP's to reduce fertilizer and pesticide use on the lawns should be implemented.

#### **4.4 TARGET PROJECTS AND PRIORITY ACTIONS**

The top 10 projects (five for each watershed) were selected as target projects because they are estimated to contribute the greatest average annual pollutant loads into the creeks and Great South Bay. Mitigation at these locations will provide a significant reduction in the pollutant loads. The top five ranked projects for Green's Creek address water quality at Outfalls:

- 433/GN 25 and 428/GN 35 on Montauk Hwy,
- 406/GN 34 on Tariff St,
- 505/GN6 on Jones Street; and,
- 422/GN32 on Brook Street.

The top five ranked projects for Brown's River address water quality at Outfalls:

- SE98/BR24, 351, and 135 on Montauk Highway,
- 375/BR29,30 on Middle Road; and,
- 3 at Astor Drive.

Of these 10 projects, six are located on roads under the jurisdiction of Suffolk County. Target projects and priority actions are shown are Figures GR 4.4 and BR 4.4.

While the target projects represent the ten most significant projects, a potential mitigation action for each outfall is described in Section 4.3.2, as other factors may influence the order in which the projects are implemented. As the target projects are conceptual, the actual implementation measures may vary significantly. The order in which projects and actions are initiated should be based on several key components including but not limited to:

- 1) severity of the problem;
- 2) goals and objectives of the project and the assumed or known effectiveness of the action;
- 3) technical feasibility;
- 4) timing;
- 5) planned or necessary road reconstruction work;
- 6) availability of funding; and
- 7) other planned local and regional planning efforts and implementation projects.

In their 2006 report, SCSWCD reviewed the outfalls and identified projects that they found to have a high priority. The Brown's River projects identified in that report are:

- Montauk Highway at San Souci BR 16 & 17,
- Terry Road 338/BR2,
- Montauk Highway at Mill Pond BR 24-27,
- Valerie Court Outfall 5; and,
- Ort Court Outfall 23.

SCSWCD recommended high priority actions and projects at Green's Creek are:

- acquisition of wetland on the west side Green's Creek (Parcels SCTM #500-407-5-25.8 and SCTM #500-429-2-10.2),
- Jones Drive 605/GN 6 at,
- Montauk Highway GN 25&35,
- Brook Street GN 32; and,
- Tariff Street GN 3.

#### **4.4.1 Non-Structural Priority Actions**

Several of the recommendations included in Section 3.0 have been identified as priority actions that should receive special focus due to their relationship to stormwater impacts and ability to reduce significant pollutant loads into the waterbodies.

In sub-watersheds dominated by residential properties, the runoff from lawns and landscaped areas carries significant fertilizer and pesticide loads. Methods to reduce these types of loads at a

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point source prior to entering the waterbodies exist but generally require significant land area not easily found in developed neighborhoods, long detention periods, significant funding and continued maintenance. Acquisition of lands, along with construction and maintenance costs, can impact taxes, particularly, when similar actions will be required on a Town-wide basis. A focused effort to reduce fertilizer and pesticide use in watersheds will be a cost effective means to reduce these pollutant levels in the watershed. Numerous actions and recommendations that address this issue have been included in Section 3, including in Section 3.2 Education and Outreach Recommendations.

A Drainage Structure Maintenance Program should be developed as discussed in Section 3.3.3.1. The success of structural drainage solutions is dependent on the ability to maintain the maximum pollutant removal capacities of the structures. The ability to have a successful maintenance program is based on the capacity to fund the manpower and equipment requirements.

Land acquisition will preserve habitats, reduce potential additional impervious surface and provide opportunities to install structural measures to reduce polluted runoff. Several properties have been identified for acquisition in Section 3.3.4.1. As the watersheds are largely developed, it is important to actively identify and acquire those parcels deemed important to the health of the creek, river and bay.

#### **4.4.2 Town Target Projects**

Of the top 10 structural projects identified, four fall under the jurisdiction of the Town of Islip. These projects, once implemented, will require inclusion in a Town maintenance program to maintain the pollutant removal capacities of the design. Average costs for various structural measures have been estimated to provide a cost comparison basis for review of the implementation actions.

For leaching basins costs, it is assumed that a 10' diameter structure with a 5' effective depth and a capacity of 68.42 CF per vertical linear foot (VLF) of effective depth will be installed. Each installed leaching basin, including asphalt pavement and concrete curb restoration, averages \$4350.00 per structure. Average costs for bioretention basins with a 5' filtering medium depth

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are expected to average about \$20.00 per square foot of bioretention surface area. WQI costs vary based on size and site conditions, an average cost of \$25,000 is assumed. All costs are in 2006 construction dollars. The estimated total construction cost to implement the Town target projects discussed herein is \$590,000.

**Green's Creek**

**Ranked 3 - Tariff Street - Outfall 406/GN 34.**

The WMP recommendation is to install upgradient leaching basins along the street length to capture and infiltrate the WQSE volume of 10,540 CF prior to flow into the creek. The total vertical feet of storage necessary to contain the WQSE is 154 VLF, which will require 31 leaching basins. The anticipated cost for this improvement is \$135,000.00. SCSWCD also identified this location as a High Priority.

**Ranked 4 - Jones Drive - Outfall 505/GN06.**

The WMP recommendation is to install upgradient leaching basins along the street length to capture and infiltrate the WQSE volume of 8,840 CF prior to flow into the creek. The total vertical feet of storage necessary to contain the WQSE is 129 VLF, which will require 26 structures. The anticipated cost for this improvement is \$115,000.00. SCSWCD also identified this location as a High Priority.

If groundwater depth in some of the subwatershed is too high for leaching basin installation, the Town should install a WQI or catch basin inserts to remove insoluble pollutants and provide focused effort to reduce fertilizers and pesticides use.

**Ranked 5 - Brook Street - Outfall 422/GN32.**

The WMP recommendation is to install upgradient leaching basins along the street length to capture and infiltrate the WQSE volume of 8,550 CF prior to flow into the creek. The total vertical feet of storage necessary to contain the WQSE is 125 VLF, which will require 25 structures. The piping of the existing structures should be reconfigured to allow the WQSE to be contained in the basins and to allow larger storm events to bypass the basins. The anticipated

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cost for this improvement is \$110,000.00. SCSWCD also identified this location as a High Priority.

If groundwater depth in some of the subwatershed is too high for leaching basin installation and due to the heavy traffic volume near the school, the Town should consider installing a WQI or catch basin inserts to remove insoluble pollutants.

**Brown's River**

Four of the top five priority structural projects for Brown's River are within the jurisdiction of Suffolk County and are discussed in Section 4.4.3. As only one Brown's River subwatershed within Town jurisdiction was included by this ranking method, the next two highest ranked sites within Town jurisdiction have also been included here.

**Ranked 5 - Astor Drive - Outfall 3.**

The WMP recommendation is to install upgradient leaching basins along the street length to capture and infiltrate the WQSE volume of 9,860 CF prior to outflow into the river. The total vertical feet of storage necessary to contain the WQSE is 144 VLF, which will require 29 structures. The anticipated cost for this improvement is \$130,000.00.

As an alternative, the Town could construct a bioretention basin at this site to detain and filter a portion of the WQSE in place of some of the leaching basins. There is adequate Town land to construct a bioretention basin for a portion of the flow and a swale to the river exists at this location. The system should be designed to allow larger storm events to bypass both the leaching basins and the bioretention basin. Installation of a bioretention basin requires that the existing site vegetation be cleared, but replanting would be included in the bioretention design. A bioretention basin requires a sediment trap, bioretention field and piping, and bypass piping for overflow. For a bioretention area to treat one acre of drainage area, the bioretention basin would be approximately 25' wide by 85' length with 5' depth of filtering medium, the cost would be \$45,000. Other infiltration or filtering practices, such as wet swales or dry swales could also prove effective at this location.

The additional projects within Brown's River include:

**Ranked 10 - Valerie Court - Outfall 5.**

The WMP recommendation is for the Town to review the existing system and determine if the overflow pipe can be removed and the existing system re-piped to allow larger storm events to bypass the basin after the WQSE has been captured. In addition, it is recommended that the Town review the infiltration ability of the basin to determine if silts and sediments have reduced the infiltration capacity of the basin bottom.

If the review determines that a bypass system can be installed, the Town would need to install several drainage structures and new piping to bypass the recharge basin, remove the basin overflow structure and excavate silted materials from the basin bottom. The anticipated cost for these improvements is estimated to be \$30,000. SCSWCD also identified this location as a High Priority.

**Ranked 11 - Amy Street - Outfall 132.**

The WMP recommendation is to install upgradient leaching basins along the street length to capture and infiltrate the WQSE of 5,440 CF prior to flow into the river. The total vertical feet of storage necessary to contain the WQSE is 80 VLF requiring 16 structures. The anticipated cost for this improvement is \$70,000.00.

**4.4.3 Multi-jurisdictional Target Projects**

Of the top 10 ranked projects, six are located on roads that are under the jurisdiction of Suffolk County and represent the highest priority projects with regards to total suspended solids and hydrocarbons pollutants. Except where noted herein, the construction costs have been developed using the unit costs in 2006 dollars included in Section 4.4.2 Town Target Projects. The estimated construction costs to implement the multi-jurisdictional target projects discussed herein is \$1,750,000. The multi-jurisdictional project locations include:

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**Green's Creek**

**Ranked 1 - Montauk Highway - Outfall 433/GN25.** WQSE volume of 38,000 CF, and

**Ranked 2 - Montauk Highway - Outfall 428/GN35.** WQSE volume of 15,200 CF

SCDPW is currently developing plans to construct stormwater collection and recharge facilities for both of these outfalls. The SCDPW's conceptual plans call for the construction of recharge basins, which require land acquisition. The plans also include the installation of additional leaching structures and piping along Montauk Highway. The construction costs for this project will be developed and borne by Suffolk County. Preliminary estimates by the SCDPW to construct both projects total \$1.05 million dollars (2004 costs) inclusive of property acquisition, recharge basin construction, culvert reconstruction and all other necessary improvements.

The Town should request the opportunity to review the plans to ensure that the WQSE is being permanently contained and infiltrated in a manner that will not allow larger storm events to flush the pollutants into the creek. The Town should also request that a new culvert design address the ability to allow for fish passage. SCSWCD also identified this location as a High Priority.

**Brown's River**

**Ranked 1 - Montauk Highway - Outfall 417.**

The Town should work with the County to identify sources for construction funding for improvements at this location and to identify parcels that are available for constructing infiltration measures such as recharge basins. If land for an infiltration measure cannot be identified, an alternative solution would be for the County to install leaching basins in the road to capture and infiltrate the WQSE volume of 22,800 CF and install a WQI prior to discharge of the additional flow to the river. The total vertical feet of storage necessary to contain the WQSE is 333 VLF requiring 67 structures. WQI costs vary based on size and site conditions, an average cost of \$25,000 is assumed. The anticipated construction cost for installing 67 leaching basins and a WQI is \$320,000.00. The actual cost will be based on the flows that require treatment and can vary significantly from the average cost. SCSWCD also identified this location as a High Priority.

**Ranked 3 -Montauk Highway -Outfall 351.**

The existence of this outfall was reported by SCDPW, no plans were available for review and the actual outfall and drainage infrastructure could not be field verified. According to the SCDPW, this outfall is connected to drainage structures that collect road runoff from Montauk Highway. Further investigation of the actual infrastructure associated with this outfall should be conducted. As this reported outfall appears to contribute a larger quantity of commercial street runoff to the river, mapping of this system should be a priority project.

Based on the information available, the initial recommendations would be to install leaching basins in the road where appropriate and install a WQI prior to discharge of the remainder of the storm event volume. Based on the leaching basin criteria discussed in Section 4.4.2, the total vertical foot of storage required is estimated at 236 VLF, requiring that 47 structures be installed. Based on the costs for leaching basin and WQI's discussed in Section 4.4.2, the anticipated cost for this improvement is \$230,000.00.

Alternatively, The County could acquire a vacant site and construct a recharge basin to contain storm runoff including the WQSE volume. The Town should work with the County to identify sources for construction funding for improvements and to identify parcels that are available for constructing infiltration measures such as the recharge basin.

**Ranked 4 - Montauk Highway - Outfall 135.**

Runoff from Montauk Highway between Lowell Road and Old Broadway Avenue is collected in a piped system and discharges into this small tributary of the San Souci branch. This tributary, which has an oily sheen on the surface, extends north under Montauk Highway into Reach 5. Reach 5 extends thorough Islip Grange and Broadway Avenue Park. Both of these facilities have large expanses of lawn and open space. Review of drainage infrastructure north and east of the park appear to indicate that storm drainage infrastructure from the surrounding streets extends through the park and may be contributing to the flow in this tributary.

Drainage system infrastructure in the parks could not be determined and requires additional investigation, possibly through dye testing or other means. It appears that there is adequate space

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within the park near Montauk Highway to develop infiltration or filtering measures that would retain the WQSE and allow the larger storm event to bypass. Until the drainage infrastructure in Reach 5 is determined, no mitigation recommendation can be quantified. The priority action should be to map the existing infrastructure systems. Once the infrastructure system north of Montauk Highway is determined, the Town should work with the County to develop an infiltration system for this location. The Town should also implement BMP's and IPM practices to reduce fertilizer and pesticide use on the lawns.

The SCSWCD report recommends that a bioretention basin or wetland be constructed in the median separating the area between Montauk Highway and Old Montauk Highway and runoff from Montauk Highway be redirected to this area for infiltration. Additionally, the SCSWCD report recommends that the drainage way may be eliminated from the subwatershed by constructing a berm in the drainage way.

**Ranked 6 - Middle Road Outfall - 375/BR29,30.**

The Town should work with the County to identify sources for design and construction funding for a solution for this location. It appears that, based on the lack of available land to site larger infiltration measures, installing leaching basins in the road to capture and infiltrate the WQSE of 9,500 CF and installing a WQI prior to discharge would be a feasible solution. Based on the leaching basin dimensions discussed in Section 4.4.2, the total vertical feet of storage required is estimated at 139 VLF, requiring that 28 structures be installed. Based on the costs for leaching basin and WQI's discussed in Section 4.4.2, the anticipated cost for this improvement is \$150,000.00.

Implementation of these projects along major roads in the study area will significantly reduce the sediment and hydrocarbon pollutant loads into both waterbodies. These projects will likely require acquisition of lands to install recharge basins and leaching basins where space and depth to groundwater is adequate, or WQIs at outfalls where depth to groundwater prohibits alternative measures. While the Town cannot construct these projects, they can work with the County to identify locations for installing structural measures and facilitate public input and education on the need for these measures. Applications for funding for these projects should be prepared as

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joint applications to reflect the bipartisan effort that is being made to improve the water quality of the rivers, bay and SSER.

## **5.0 IMPLEMENTATION STRATEGIES**

Implementation strategies address the methods and means by which the protection recommendations, management actions, target projects, and priority actions identified in the prior sections can be implemented. These strategies include coordination between various municipal agencies, identification of code and ordinance modifications, development of new programs and policies, sources of funding for program and project development, and procedures for monitoring and assessing results.

### **5.1 INTER-GOVERNMENTAL COORDINATION**

Improvement of the water quality in Green's Creek and Brown's River, and subsequently the bay, is a coordinated effort between many levels of government, civic groups, and involved citizens. The Town will be required to closely work with all of these groups to reach the goals and objectives set forth in this Plan.

SPDES Phase II regulations require the Town and the County, and potentially the State reduce the impact of nonpoint source pollutants into waterbodies. The Town and County should consider a task force of interrelated agencies to provide awareness of the actions by related agencies. The task force could include SCDPW personnel charged with responsibility for county drainage infrastructure, Town personnel charged responsibility for Town infrastructure, County and Town planning personnel and GIS staff, and other agency personnel who influence municipal resources that effect surface waters. Sharing of the GIS information developed can eventually lead to mapping of the entire drainage infrastructure in the County. The possibility for joint efforts between the County and Town to implement pollution control measures should be investigated. Joint efforts can include design of infrastructure for both Town and County road runoff, mutual support for the acquisition of properties for recharge structures, infrastructure maintenance agreements, and utilization of County funds to preserve sensitive Town lands from development.

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The SSER Council and the NYSDOS are important resources for the Town. They provide information on the development of educational, outreach and stewardship materials and extensive knowledge of the activities throughout the SSER that may impact the recommendations of this plan.

Groups including Suffolk County Cooperative Extension, Sea Grant, and the SCSWCD have information and educational materials at their disposal that relate to many of the subjects discussed in this Plan include best management practices (BMP), integrated pest management (IPM) and erosion and sediment control (ESC).

Acquisition of funds available through federal and state programs can reduce local costs of implementation measures. Project permitting requires NYSDEC, NYSDOS and USACOE approvals.

School groups and other volunteers monitoring and researching the waterways should coordinate through the Town to develop a data bank of information.

Finally, Town residents implementing the actions and recommendations of this Plan may eventually have the greatest impact on water quality improvement in Green's Creek and Brown's River.

## **5.2 REVISIONS TO CODES, REGULATIONS, AND ORDINANCES**

The Town has implemented many of the codes and regulations generally recommended to reduce pollutant loads including regulations on erosion and sedimentation control, "pooper-scooper" laws, land clearing permitting, and hazardous substances regulations. In addition, the Town has adopted overlay districts for lands along the waterways and setback requirement in the subdivision regulations. The Town should focus on the enforcement of current codes and regulations that reduce pollutants to ensure that the highest levels of compliance are met.

The town should consider modifying sections of the existing code to provide appropriate references to implementation of BMP's for marinas, storm drainage systems and sanitary systems that are referenced in this Plan.

### **5.3 PROGRAMS AND POLICIES**

The programs and policies discussed below have been developed from the recommendations contained in Section 3 of this report and focus on initiatives the Town can undertake to reduce pollutant loads to the waterways. These programs and policies can be adopted by the Town, but will generally require coordination with other municipal agencies and civic groups.

#### **On-site Wastewater Treatment System Outreach and Education**

There is currently no outreach program to educate homeowners and commercial businesses about the proper use of on-site septic systems and the need for periodic maintenance for effective operation. Establishment of a program requiring periodic inspection and recommendations for pump-out of systems should be considered. An example of an approach would be to require pump out, inspection and necessary maintenance and repairs at the time of real property transfers or major redevelopment. Inspections would be performed by licensed private inspectors. The Suffolk County Department of Health Services would require additional training programs for license individual installers to also inspect systems and certify system operation.

Initially the Town can establish an educational program to increase voluntary inspection and maintenance. The educational program can focus on areas near surface waters, with high groundwater tables, or older area where septic tanks may not be installed. The County should consider permitting the use of alternative on-site systems in new development or redevelopment in areas where proper function of standard septic systems is precluded by high water tables.

#### **Operation and Maintenance**

The Town DPW should develop a program to evaluate its local operating procedures in comparison with SPDES Phase II requirements and NYSDOT design and guidance documents, standard specifications and procedural manuals that relate to stormwater runoff abatement and

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control during and following construction. The Town should develop and adopt an internal review manual that outlines the relevant procedures. The Town should evaluate its street sweeping program to improve frequency and location of street sweeping in the watershed. As discussed in Section 4.4.1, the Town will need to develop a drainage infrastructure maintenance program to ensure the proper operation of drainage infrastructure .

The Town should evaluate its system of inspecting drainage structures and determine a schedule for and frequency of inspection that will ensure that the drainage infrastructure function is maintained at the highest level of pollution capture. The Town should determine their additional needs in terms of funding, manpower and equipment that will be necessary to maintain the storm drainage structures that are installed.

The storm drain stenciling program should be expanded to include the entire watershed including Brown's River.

The Town should implement an integrated pest management (IPM) program as a management measure for municipal lands including parks, schools and grounds. IPM information is available through cooperative extension programs. The IPM program can be extended to provide training to lawn and garden center personnel, lawn care companies, and large land owners, such as St Anne's Parish. Lawn and garden center personnel and lawn care companies provide a majority of the lawn care information disseminated to consumers. An IPM educational program developed with Suffolk County cooperative extension programs or SCSWCD could be offered at Town facilities. IPM educational flyers can be developed that are distributed through these center and companies.

**Municipal Official Education**

Town should develop a non-point educational program for municipal employees including personnel from public works, building and engineering, parks, planning and development, and environmental controls. The educational effort should extend to reviewers, inspectors, property managers, maintenance crews and field workers to ensure that the regulations and practices pertaining to nonpoint source management are uniformly understood and enforced.

## **5.4 SOURCES OF FUNDING**

This section identifies sources of funding that can provide a means to finance the development of programs and implementation of improvements for the Green's Creek and Brown's River watersheds.

### **5.4.1 Federal**

#### **5.4.1.1 National Oceanic and Atmospheric Administration (NOAA)**

NOAA is responsible for providing technical assistance through the Resource Conservation and Assessment/Coastal Resources Coordinator (CRC) program. The CRC program was established to restore coastal and marine environments affected by hazardous waste releases through the development of plans and projects to address the elimination of waste sources and the decontamination of affected sites. The CRC program offers technical assistance from a variety of professionals having expertise in evaluating ecological risk, the potential types and sources of pollutants, development and implementation of techniques for evaluating the magnitude and consequences of environmental degradation, assessment of the cost-effectiveness of strategies for remediation, and the design of monitoring protocol.

#### **5.4.1.2 Clean Water Act (CWA), Section 319**

In 1987, Congress amended the Federal CWA by adding Subsection 319, entitled the *Nonpoint Source Management Program*. The purpose of the amendment was to provide guidance and monetary support to state and local governments in the development and implementation of non-point source initiatives.

The USEPA is authorized under subsection 319 of the CWA to distribute federal grants to states for use in state storm water control programs and projects that have been subject to USEPA review and approval. Grants are available for a number of non-point source ventures including financing, procurement of technical expertise, educational instruction, technology transfer, implementation of pilot projects, and the monitoring of particular non-point source

projects. The NYSDEC implements many of the environmental programs developed at the federal level and is responsible for distributing some federal funds to local communities.

## **5.4.2 New York State**

### **5.4.2.1 Coastal Zone Management Act (CZMA)**

The CZMA has been instrumental in providing resources for community redevelopment initiatives such as feasibility studies, planning, engineering, and site plan development. Section 306A of the CZMA provides financial resources to coastal states for the acquisition of land for providing public access to coastal areas. NYSDOS oversees many of the State's coastal protection programs and is responsible for administering federal fund to local communities.

### **5.4.2.2 Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21)**

The Nassau Suffolk Transportation Coordinating Committee (NSTCC) is authorized to administer the initiatives of TEA-21. TEA-21 provides funding for a number of transportation-related projects including stormwater control projects that are proposed for improving environmental quality.

### **5.4.2.3 Clean Water Act State Revolving Loan Fund (CWASRF)**

The primary purpose of the CWASRF is to promote water quality by funding proactive, reactive, and restoration projects and programs to protect water resources. Low-interest loans for water quality control improvements are offered to communities under the Federal Clean Water Act's (CWA), State Revolving Loan Fund (SRLF). The SRLF was initially seeded by funds provided by federal grants and the matching funds of states to finance non-point pollution sources projects that are developed in accordance with the State's *Nonpoint Source Management Plan*. Projects considered eligible for funding include acquisition of environmentally sensitive land; water body and wetland restoration projects, and erosion and sedimentation control projects. As SRLFs are amortized, the loan fund is replenished, and funds become available for dispersal to other entities for their projects. The self-sustaining nature of revolving loan programs is essential in ensuring the availability of future funding resources and the perpetuation of adequate storm water treatment control.

Although funding may be used for a variety of reasons, the fund has often been used for projects that prevent and remediate contamination from what is known to be one of the most ubiquitous water quality contaminants in the United States: methyl tertiary butyl ether (MTBE). MTBE is an ingredient that was added to gasoline to increase oxygen content, yet is being phased-out due to its known impacts on the environment. Over the past decade, MTBE was used in increasing quantities in order to meet the standards set forth under the Federal Reformulated Gasoline and Oxyfuels programs developed by Congress and incorporated into the 1990 amendments to the Clean Air Act.

#### **5.4.2.4 New York State Environmental Protection Fund (EPF)**

The EPF was created in 1993 to provide funding for environmental protection initiatives. The types of projects assisted by EPF grants have included:

- waterfront redevelopment including both planning and implementation of construction initiative, providing public access, and environmental enhancements,
- development or effectuation of inter-municipal water management plans such as undertaking non-point stormwater control projects and restoration of aquatic habitats;
- projects involving the creative use of dredge spoil,
- coastal education programs, and tourism development; and,
- development and effectuation of Local Waterfront Revitalization Programs (LWRP) or other similar local initiatives.

NYS DOS DCR has the authority to issue EPF Local Waterfront Revitalization Plan grants. EPF funds are also provided to the NYS DEC for Water Quality Improvement grants for projects including those for storm water mitigation, and the NYS Office of Parks, Recreation and Historic Preservation for grants for the acquisition and preservation of land to be included as public parklands under Title 7.

#### **5.4.2.5 New York Clean Water/Clean Air Bond Act**

The NY Clean Water/Clean Air Bond Act provides funding for rectifying air quality and water quality impacts. Of particular relevance to this project is the funding available for addressing water quality issues stemming from failing septic systems, direct discharge of sewage effluent, insufficient wastewater treatment, non-point source pollution abatement and control, and aquatic ecosystem degradation. The program has specifically allocated over 30

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million dollars in funding for implementing the water quality initiatives of the comprehensive conservation and management plans for the SSER and Peconic Estuary. Only municipalities and Soil and Water Conservation Districts are eligible for this funding. Eligibility to submit funding applications is based on the following criteria:

- the anticipated effectiveness of the proposed project for meeting the goals of the respective resource management plan, project or program;
- the relative importance of the proposed project relative to other proposed under the same program or plan;
- the ability of the applicant to provide matching funds (where applicable); and,
- the necessity for using Bond Act Funds due to insufficient alternative funding sources.

The amount of State financial assistance is contingent upon the nature of the project. For example; a maximum of 85% of the costs would be provided for improving wastewater facilities, up to 50% may be allocated toward aquatic habitat restoration, pollution mitigation and abatement projects such as non-agricultural non-point source pollutant mitigation; 75% for agricultural non-point pollution control projects with no owner/operator contribution and a maximum of 90% funding when the owner/operator contributes (Peconic Estuary Program 1999).

#### **5.4.2.6 Waterfront Redevelopment**

NYSDOS, in cooperation with the Empire State Development Corporation and other involved state agencies, offers funding and technical support to local governments for preparing and administering waterfront development plans for derelict and underutilized waterfronts, property, and structures which present a potential for redevelopment by being located within or in proximity to a business district that is served by adequate utilities and transportation infrastructure, and where development will:

- result in the creation of public access opportunities between commercial districts and the waterfront;
- significantly revitalize economic vitality in existing business districts;
- promote and expand the recreational, cultural and economic opportunities of the waterfront; and
- augment the protection of environmental resources in project areas.

Funding and technical guidance is provided for necessary planning, design, feasibility analyses, marketing, institution of economic development programs, and project completion.

Candidates for funding are chosen based upon demonstration of community leadership, the ability to effectively develop partnerships with the public and governmental agencies, a willingness of the community at-large to endorse project objectives, and a reasonable expectation of economic success.

### **5.4.3 Suffolk County**

#### **5.4.3.1 Suffolk County Water Quality Protection and Restoration Program**

The County collects funds for implementation of projects that will result in the protection and/or restoration of surface water quality throughout Suffolk County through a ¼% sales tax. The program is approved through December 31, 2013. Eligible project types include Nonpoint Source Abatement and Control, Aquatic Habitat Restoration, and Pollution Prevention Initiatives. Educational and outreach programs and projects that implement vessel waste no-discharge zones are also eligible. A major emphasis of the program is to implement recommendations of the SSER CMP. Information regarding the program and application forms is available from the County's website.

#### **5.4.3.2 Suffolk County Land Acquisition Programs**

The County has a total of twelve programs that provide mechanisms through which the County acquires properties for the following purposes: preserving environmentally sensitive habitats; protecting important groundwater aquifers; preserving tidal and freshwater wetlands and their associated stream corridors; providing access to the bay, sound, and ocean shorelines and beaches; developing active recreation sites for County residents; and acquisition of farmland development rights to retain agricultural use.

### **5.4.4 Islip Town**

#### **5.4.4.1 Town Capital Improvement Funding/Municipal Bonds**

The Town could also fund stormwater infrastructure projects through a variety of standard municipal financing mechanisms such as the use of Town Capital Improvement Funds and General Obligation Bonds (Municipal Bonds).

Although towns are eligible to receive lower interest rates than most other entities when they pledge the full faith and credit of their taxing authority to guarantee payment, bonding of less than one million dollars usually do not meet the minimum requirements for cost-effective underwriting and can, as a result, be prohibitively expensive to issue. One way to fund projects such as stormwater control programs, is to create a multi-jurisdictional alliance that can integrate its plans and financial need and consolidates the debt incurred by the funding process.

Consolidation of debt may include the following:

- development of a project-specific, multi-jurisdictional district;
- utilization of regional or State funding resources to finance projects; and
- consolidation of bonds of a number of local municipal entities to have one joint issue.

## **5.5 PHASE II STORMWATER PERMIT COMPLIANCE**

In 1990, EPA promulgated rules establishing Phase I of the National Pollutant Discharge Elimination System (NPDES) stormwater program. The Phase I program for MS4s requires operators of medium and large MS4s, that is, those that generally serve populations of 100,000 or greater, to implement a stormwater management program as a means to control polluted discharges from these MS4s. The Storm Water Phase II Rule extends coverage of the NPDES stormwater program to certain small MS4s but takes a slightly different approach to how the stormwater management program is developed and implemented. NYSDEC acts as the NPDES permit issuing authority for the state and has issued requirements for two SPDES general permits for stormwater runoff.

Polluted stormwater runoff is often transported to municipal separate storm sewer systems (MS4s) and ultimately discharged into local surface waters without treatment. The EPA's Stormwater Phase II Rule establishes an MS4 stormwater management program that is intended to improve the Nation's waterways by reducing the quantity of pollutants that stormwater picks up and carries into storm sewer systems during storm events. When these pollutants are deposited into nearby waterways, they can impair the waterways, thereby discouraging

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recreational use of the resource, contaminate drinking water supplies and interfering with the suitability of habitat for fish, other aquatic organisms, and wildlife

The EPA established six minimum measures outlining the Phase II program:

- Public Education and Outreach  
Distributing educational materials and performing outreach to inform citizens about the impacts polluted storm water runoff discharges can have on water quality.
- Public Participation/Involvement  
Providing opportunities for citizens to participate in program development and implementation, including effectively publicizing public hearings and/or encouraging citizen representatives on a storm water management panel.
- Illicit Discharge Detection and Elimination  
Developing and implementing a plan to detect and eliminate illicit discharges to the storm sewer system (includes developing a system map and informing the community about hazards associated with illegal discharges and improper disposal of waste).
- Construction Site Runoff Control  
Developing, implementing, and enforcing an erosion and sediment control program for construction activities that disturb one or more acres of land (controls could include silt fences and temporary storm water detention ponds).
- Post-Construction Runoff Control  
Developing, implementing, and enforcing a program to address discharges of post-construction storm water runoff from new development and redevelopment areas. Applicable controls could include preventative actions such as protecting sensitive areas (e.g., wetlands) or the use of structural BMPs such as grassed swales or porous pavement.
- Pollution Prevention/Good Housekeeping  
Developing and implementing a program with the goal of preventing or reducing pollutant runoff from municipal operations. The program must include municipal staff training on pollution prevention measures and techniques (e.g., regular street sweeping, reduction in the use of pesticides or street salt, or frequent catch-basin cleaning).

The WMP overlaps all of the measures included in the SPDES Phase II implementation. Particularly with regards to public outreach and education, illicit discharge detection and elimination, and pollution prevention/good housekeeping. The WMP provide recommendations for educational opportunities, includes infrastructure system mapping of surface water discharges, and identifies priority actions and target projects where municipal and agencies resources can produce pollution reduction solutions.

## **5.6 MONITORING AND ASSESSMENT**

Monitoring methodologies should be developed to determine the degree to which the goals, objectives, standards, and management practices discussed in the WMP are being implemented and assess the implementation success with regards to pollution reduction and habitat health. All monitoring programs should be required to address methods to ensure quality control and quality assurance. The use of the GIS to integrate the collected data into the Town system will allow the non-graphical data; inspection dates, maintenance, materials, etc.; to be analyzed with regards to the graphical data; drainage structure and outfall locations, topography, land use, etc. The USEPA's *Better Assessment Science Integrating Point and Nonpoint Sources (BASINS)* program integrates GIS, national watershed data, and environmental assessment and modeling tools in a single package. GIS provides the ability to analyze the collected data, which in turn can improve data collection methods, systems tracking, and program evaluation. The main components of the WMP that can be monitored and assessed include water quality, habitat restoration efforts and nonpoint pollution control implementation.

As discussed in Section 3.3.1.1, water quality testing procedures should be in accordance with the established protocols. *Volunteer Stream Monitoring: A Methods Manual (EPA 841-B47-003 and Volunteer Lake Monitoring A Methods Manual (EPA 440-4-91-00)* provide protocols and procedures for programs conducted by volunteers. Testing protocols and results should be reviewed by a qualified professional for quality control and quality assurance and to ensure that the data meets standards that allow for comparison to prior results or to data from other

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watersheds. Testing methods, protocols and location selection should follow standard protocols identified for all tributaries within the SSER for comparative analysis.

Wetland restoration projects should be monitored in accordance with the *NYS Salt Marsh Restoration and Monitoring Guidelines* (2000) protocols. The post-construction protocols should be tailored for the specific projects and include, at a minimum, a work plan outlining monitoring parameters and activities, project transects, quadrats and fixed point photo stations locations, establishment of a reference site location, vegetative species occurrences, soil properties, benthic invertebrates in quadrats, invasive species and macrofauna. Standard reporting forms should be developed for recording the monitoring data and results. Similar programs can be developed for upland, freshwater and streambank restoration projects.

Monitoring the implementation of nonpoint source control measures should be in accordance with the USEPA publications *Techniques for Tracking, Evaluating, and Reporting the Implementation of Nonpoint Source Control Measures – Urban* (2001) and *Monitoring Guidance for Determining the Effectiveness of Nonpoint Source Controls* (1997). Monitoring plans should include at a minimum an inspection program, maintenance oversight, and implementation confirmation. The inspection program should include a system to inspect all drainage structures in the drainage areas and data recording to establish a pattern of maintenance requirements. Maintenance oversight should include a centralized system to record monitoring results and maintenance information (recommended is a GIS-based system connected to drainage structure mapping), standards forms to complete for each inspection and cleaning event, and management team to administer, coordinate and schedule the maintenance program. Implementation confirmation should include a record of the recommendations enacted, the success of each, their effectiveness in improving water quality and identification of modifications. Data management is important to the success of the monitoring effort. The system used should address quality control and quality assurance for handling and storage of data.

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**Speaker:** Bob Cizek from Dunn Court

**Question/ Statement:** Mr. Cizak stated that he is concerned that herbicides are not being addressed in the report and that wildlife has disappeared from the Mill Pond Branch. Questioned why the runoff from the 10 storm sewers entering the branch cannot be redirected to other locations where there are basins to accept the runoff. Described how eels could climb up the side of the dam to get upstream but that there are no more eels.

**Panel Response:** NL explained that the term pesticide refers to both insecticides and herbicides. NL also stated that the Plan includes recommendations for each outfall.

**Speaker:** Oliver Hull - West Sayville Civic Association

**Question/ Statement:** Mr. Hull stated that the report needs to be better coordinated with and submitted to SCDPW and other agencies, that the subdivision planning code needs to require that all runoff be contained on-site, and that the existing laws and regulations need to be better enforced. In addition he expressed concern that the SHS is considering expanding their parking lot and increasing the drainage into the creek. Also stated the Town needs to provide funding, possibly through an environmental bond, and should consider a 3-5 year plan to implement the stream improvements

**Panel Response:** The report was reviewed by Suffolk County Soil and Water Conservation District and the Suffolk County Department of Public Works provided available information on the roads in the watershed under their jurisdiction.

**Speaker:** Brendan McCurdy - West Sayville Civic Association

**Question/Statement:** Mr. McCurdy questioned whether dredging had been considered at locations such as the Quinn property discussed earlier.

**Panel Response:** NL stated that the report did not specifically address dredging. Jeff Plackis of Trout Unlimited stated that a return of the tributary to its natural environment and hydrology would allow sediments to flow out of the ponded area without dredging.

**Speaker:** Joel

**Question/ Statement:** Remembers fishing in the headwaters of Brown's River. Stated that a laundry (dry cleaners) located on Hanson Place (west side north of cemetery) had discharged runoff into the river that covered the vegetation with a white substance and wanted to note that the area should be investigated as a potential hot spot.

**Subsequent Action:** An Illicit Discharge Program as recommended would identify any remaining discharges of this type.

**Speaker:** Tom Travic (?) from Saxton Avenue on Green Creek

**Question/Statement:** Mr. Travic stated that he did not want the small weir that has been at the rear of his property since 1954 removed as it would destroy the established ecosystem. Ask for the definition of a dam verses a weir.

**Subsequent Action:** Weirs and dams will need to be identified on a site by site basis and impacts to surrounding properties addressed.

**Speaker:** Sayville High School students

**Question/Statement:** A student stated that the drainage in the SHS parking lot does in fact drain to the creek. Students asked if projects exist that there can be a fund raising campaign for.

**Panel Response:** The panel responded that the plan will require a large amount of funding. However individual projects may be identified that can be accomplished with smaller funds such as testing and monitoring.

**Speaker:** Kathy O’Conner - Suffolk County Parks /Audubon, Brookside Preserve

**Question/Statement:** Ms O’Conner stated that the natural lands owned by the School District should be protected or preserved and school parking should not encroach on the stream corridor or additional runoff be allowed to enter the creek. Ms O’Conner suggested that the student funds could be used to prepare brochures or develop a recognition project such placing heron’s figures on lawns of residents who practice environmental friendly maintenance and landscaping. Stated that weir (180a) on the Brookside Preserve has historic value and should remain but a fish ladder should be considered.

**Speaker:** Jay Kritzer - Marine Biologist with Environmental Defense

**Question/Statement:** Mr. Kritzer stated that some of the dams and weirs that no longer serve their intended function could be removed to allow alewife and trout passage. This could be done on a case-by- case basis. Alewives are the most difficult to attain passage for and will return if access provided. The speaker also noted that the invasive species discussion includes detection and removal and the difficulty in getting rid of invasive species. The Plan should also include methods to prevent undesirable species input and establishment in the watershed including educational efforts to stop aquarium plant dumping, and escape of non-native residential pond plants and ornamental species.

Mr. Kritzer also added information on two other discussions, 1, that although eels have the ability to climb the barriers only a small percentage can make it and 2, regarding the definition of a weir vs. a dam, he responded that a weir does not impound waters and a dam does.

**Subsequent Action:** Weirs and dams will need to be identified on a site by site basis and impacts to surrounding properties addressed.

**Speaker:** Jack Foehrenbach – ITEC Chairman

**Question/Statement:** Suggested fund raising events such as a Summerfest or Seafood Festival to raise the funds for stormwater mitigation. Also stated that the erosion has moved the Fire island Inlet west reducing the flushing at Sayville.

Councilman Bodkins closed with the meeting with a statement confirming the Town of Islip’s commitment to improving the water quality and living resources of the Town surface waters and, subsequently, the Great South Bay, noting that this Watershed Management Plan is an historical event as this is the first Plan completed in New York State. Councilman Bodkins concluded that this Plan will set the groundwork for funding priorities and maintenance programs and that the Town will be proactive in developing partnerships with other municipalities to implement the Green’s Creek and Brown’s River Watershed Management Plan.