EAST HAMPTON TOWN

WATER QUALITY IMPROVEMENT PLAN

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EXECUTIVE SUMMARY

This Water Quality Improvement Plan (WQIP) was developed as part of the Community Preservation Fund (CPF) with the goal to help protect and improve environmental integrity in ecologically sensitive areas in the Town of East Hampton. The mission of the CPF is to preserve community character through the acquisition and preservation of land. Since its inception, the CPF has preserved over 2,000 acres of land in the Town of East Hampton alone. State and local law makers are proposing a re-authorization of the CPF tax currently in place through 2030, from 2030 through 2050, with a component allowing up to twenty (20) percent of revenues raised to be directed to water quality improvement efforts. The rationale is that while land preservation was the dominating policy issue since the 1980s, water quality has become the dominant issue of this decade. To preserve community character, the economy, and the environment, our water should be protected in addition to our lands. Under the proposed CPF amendment the definition of community character will expand to include the protection and improvement of the quality of all water resources. East Hampton's waterbodies and watersheds serve the livelihoods of fishermen and a host of other stakeholders, offer places of recreation, provide the major economic resources where tourism is based, and connect directly to and feed the sole source groundwater aquifer system that provides all of the town's potable, washing and agricultural water needs. They are also home to many endangered or threatened flora and fauna as listed in the federal and state legislation and recreationally and commercially important wildlife. The protection of East Hampton surface waters, wetlands and watersheds are as important to preserving the quality of its groundwater.

Watershed planning is a means to protect and restore water resources, as well as the local economies that rely on these essential coastal resources. The purpose of this plan is to provide a comprehensive approach to educate, plan for and implement incremental improvements with a goal of protecting and restoring watershed health in the Town of East Hampton. Current local water quality issues include occurrences of harmful algal blooms (HABs), reduction in water clarity, low dissolved oxygen levels resulting in potential fish kills, and excessive bacteria levels leading to shellfish and bathing beach closures. These issues stem from human inputs of pollutants such as pathogens, bacteria and nutrients (specifically nitrogen and phosphorus) to surface waters. The largest contributions of these pollutants are from urban stormwater runoff directly to surface

waters and from cesspools and septic systems discharging nutrients into the groundwater table, which permeates to surface waters. Such systems were never designed to remove nutrients from wastewater. While these systems were designed to prevent bacteria and pathogens form reaching groundwater and surface waters, that protection ceases to be reliable when systems fail or are not properly maintained. The New York State Department of Environmental Conservation (NYSDEC) has designated the quality of many East Hampton waterbodies as impacted and as such has developed total maximum daily loads (TMDLs), or pollution budgets, for pathogens and bacteria. NYSDEC, Long Island Regional Planning Council (LIRPC), and Suffolk and Nassau Counties are developing an aggressive nitrogen abatement initiative for the entirety of Long Island, the Long Island Nitrogen Action Plan (LINAP) that will assess and identify sources of nitrogen pollution and develop an implementation plan to achieve reduction endpoints. These initiatives push the need for local management of target pollutants within the watersheds of East Hampton in order to improve water quality and restore beneficial uses.

Several watershed studies have already been completed by the Town through funding from the Peconic Estuary Program, the New York State Department of State and the New York State Department of Environmental Conservation which provide specific recommendations for water quality improvements in local watersheds. The site-specific recommendations defined by these entities will be implemented as part of the CPF water quality improvement plan. Priority water quality improvement includes prioritization of management practices to emphasize stormwater runoff abatement and cesspool/septic system upgrades. Much of the nutrient and bacteria management will be addressed by controlling stormwater runoff, requiring inspections and regular maintenance of septic systems, and incentivizing upgrades of cesspools and conventional septic systems located within close proximity to impacted waterbodies. To facilitate the improvement of sanitary waste treatment the Town intends to offer a rebate program to upgrade cesspools and conventional septic systems to systems with nitrogen reducing capabilities. These components represent the best use of CPF funding to improve water quality in East Hampton.

Overall, the WQIP provides a characterization of the existing natural, cultural and human resources within the watershed, identifies key factors impacting the watersheds in the Town of East Hampton, provides general and site specific recommendations for watershed improvement, and provides an implementation strategy for the recommendations provided. This plan will focus on water quality improvement through emphasis on wastewater treatment, agricultural non-point

source pollution control and abatement, aquatic habitat restoration, and pollution prevention projects.

INTRODUCTION

Local Setting

The Town of East Hampton is located on a peninsula in Suffolk County and is the easternmost town on Long Island. East Hampton has a long and rich history with a connection to the land and seas. Today, East Hampton is a seasonal tourist destination and maintains agricultural and maricultural economies. Before colonial settlement 350 years ago, indigenous natives had the earliest roots in agriculture on the fertile outwash plain and fishing and shellfishing from the abundant coastal waters (Town of East Hampton, 2004).

Today's coastal issues are linked to East Hampton's historic and present day economies and preserving water quality are interconnected and vital to the Town's social, environmental, and economic well-being. East Hampton Town has a long record of sound planning and environmental protection on which to build its coastal management policies. In recent years the Town has often taken a lead in innovative land use techniques and preservation of open space. Pressures of historic and modern development, year-round population increasing and intensive seasonal influx of tourists cause adverse impacts to the environment.

Regional Water Quality

The Peconic Estuary is located on the eastern end of Long Island, New York between the North and South Forks (Figure 1). It is one of 28 estuaries in the National Estuary Program (NEP), administered by the United States Environmental Protection Agency (USEPA) under Sec. 320 of the Clean Water Act to protect and preserve nationally significant estuaries which are threatened by pollution, development, or overuse. The Peconic Estuary was accepted into the program as an "estuary of national significance" in 1992. Its waters cover approximately 158,000 acres with 450 miles of shoreline and support a wide array of wildlife. Bordering this estuary are the towns of East Hampton, Southampton, Brookhaven, Riverhead, Southold, and Shelter Island. The region is popular for vacationing and supports a wide variety of both recreational and commercial activities and contains abundant natural resources. Boating, swimming and sunbathing are a few of the many recreational activities that draw thousands of people to this region. Fishing and shellfishing are

two of the predominant local industries that are directly dependent upon the water quality of the estuary. Economic studies of the overall Peconic Estuary region have estimated that those businesses and industries directly tied to the estuary produce upwards of $450 million of annual income within the region (Peconic Estuary Program, 2001).

Unfortunately, many of the tidal creeks and harbors within the Peconic Estuary, including Accabonac Harbor, Northwest Creek, Fort Pond and Lake Montauk are currently classified on the New York State Department of Environmental Conservation (NYSDEC) 303(d) list as impaired due to pathogen. Specifically, the shellfishing beds in the Peconic Estuary have been monitored for several decades by the NYSDEC in order to assess the safety of these shellfish for consumption. High levels of coliform bacteria have resulted in the closure, either seasonal or year-round, of much of the most productive shellfish beds in the estuary. Coliform bacteria, specifically fecal coliform (FC), are produced in the intestinal tracts of warm-blooded animals and are present in high concentrations in their fecal matter. FC bacteria are used as an indicator for the presence of other, potentially harmful pathogens. In 2006, a Total Maximum Daily Load (TMDL) for pathogens was developed for the impaired waterbodies in the estuary, and in 2007, a TMDL for nitrogen was developed (Peconic Estuary Program, 2001). A TMDL is a regulatory term in the U.S. Clean Water Act, representing a value of the maximum amount of a pollutant that a body of water can receive while still meeting water quality standards (NYSDEC, 2015).

Major sources of both pathogen and nitrogen loading to the estuary are from stormwater runoff and release from cesspools and conventional septic systems. Groundwater containing high concentrations of nitrogen from residential wastewater naturally migrates to surface waters that are then affected by excess nitrogen. High pathogen and nitrogen loads to the tidal creeks within the estuary are problematic and directly harm water quality by causing the following common issues: reduction in water clarity; bacteria levels in excess of acceptable levels for human contact or consumption of shellfish; overabundance of nitrogen leads to over stimulation of plants and/or algae, resulting in excess plant decay and low dissolved oxygen levels during summer months. Algae consume oxygen at night, potentially depleting dissolved oxygen levels in the water column. When algae die, they can settle through the water column to the sediments, where the organic matter is decomposed by bacteria. Bacterial decomposition uses oxygen, as well as releases nitrogen back into the water column. Algal blooms can lead to repeated or prolonged periods of low dissolved oxygen, particularly in poorly flushed embayments. The low levels of dissolved

oxygen threaten aquatic life and can result in fish kills; and excess algae, plants, and decaying plant material can cause the loss of other plant species (e.g., eel grass) that are important to the aquatic ecosystem.

Local Water Quality

The water quality impairments within the Peconic Bay Estuary are evident in many local watersheds in the town of East Hampton. Nitrogen discharges to the ground and surface waters of East Hampton have adversely affected the water quality of the Town's surface waters, in particular the saline waters. Wastewater nitrogen is the primary nitrogen source. Nutrient discharges from cesspools and septic systems (nitrogen and phosphorous) and stormwater cause many water quality issues in East Hampton's surface waters. Bacterial contamination from malfunctioning septic systems and stormwater have also impaired East Hampton's surface waters and led to shellfish closures and bathing bans at select locations (Lombardo Associates, Inc, 2014).

Several watershed studies have already been completed by the Town which provide specific recommendations for water quality improvements. Several grants, totaling over $650,000, have already been awarded to the Town by NYS Department of State (NYSDOS), NYSDEC, and Suffolk County for site specific water quality improvement projects. On-going projects include stormwater retrofit and restoration projects, reactive barriers, and several habitat restoration initiatives. The site-specific recommendations for water quality improvements defined by these entities will be implemented as part of the basis of a CPF water quality improvement plan.

PROJECT PURPOSE

The purpose of this WQIP is to outline the water quality improvement needs in the watersheds of the Town of East Hampton and make specific recommendations for the use of CPF funding to effectively improve existing water quality caused by existing development and land use. The referendum in November 2016 would allow for the protection and improvement of water quality by funding improvement projects. Based on a 10 year average of CPF revenue (2005-2015), approximately $4,600,000 could be available annually for water quality improvement projects. Over the life of the CPF WQIP, approximately $152,000,000 could be available for water quality improvement projects. This funding would allow the Town of East Hampton to make significant improvements to water quality using a targeted approach in each watershed of concern.

The primary purpose is to improve water quality and preserve community character by implementing best management practices, restoring degraded habitats, improving stormwater management techniques and upgrading conventional sanitary systems with innovative alternatives with nitrogen removal capabilities within priority watersheds. The need for improvements stem from both the designated impairments in local watersheds by NYSDEC through the development of total maximum daily loads (TMDLs) for pathogens and from local and regional initiatives to reduce pollutant inputs to our surface and groundwater. These initiatives emphasize the need for local management of target pollutants within the watersheds of East Hampton in order to improve water quality and restore beneficial uses.

The Town of East Hampton intends to use its CPF resources wisely and to systematically approach the nitrogen problem and other pollutants of concern in high priority areas by concentrating first on **Reduction** tactics (upgrading of systems to require treatment before disposal into the ground) and then considering **Remediation** (treatment in groundwater) and **Restoration** tactics (treatment in waterbody), where such projects are reviewed and found to be appropriate and cost effective. It is important to note that not every technology and approach is appropriate for every watershed and therefore the merits of each tactic in context with the watershed and surrounding habitat will require additional analysis as well as approvals from regulating authorities where required.

Pursuant to the Peconic Bay Region Community Preservation Act, projects eligible for funding shall include:

- Wastewater Treatment Improvement Projects;
- Non-Point Source Abatement and Control Program Projects;
- Aquatic Habitat Restoration Projects; and,
- Pollution Prevention Projects

A detailed list of projects for water quality improvements to be implemented in each watershed is included as **Appendix A** and is depicted on Figure 2. The recommendations provided by the incorporated villages of East Hampton and Sag Harbor have been included in this plan. The Proposed Water Quality Restoration Initiative provided by the Village of East Hampton is included as **Appendix B** and the Water Quality Improvement Project Plan provided by the Village of Sag Harbor has been included as **Appendix C**. Additional components of the plan necessary to achieve the overall goal of water quality improvement include prioritization of management practices to

emphasize stormwater runoff abatement and cesspool/septic system upgrades. To facilitate the improvement of sanitary waste treatment the Town intends to offer a rebate program for upgrades of cesspools and conventional septic systems to systems with nitrogen reducing units. These components represent the best use of CPF funding to improve water quality in East Hampton. Proposed projects will address existing sources of pollution and will not promote new development to achieve a net reduction in pollutants entering surface waters.

TOWN-WIDE PROJECTS AND INCENTIVES

On-site Wastewater Treatment Rebate and Incentive Program

Wastewater treatment modification and upgrades utilizing nitrogen-reducing technology will have a significant impact on water quality in receiving waterbodies. A cesspool or conventional septic system is an onsite wastewater treatment system which generally consists of a buried chamber or excavation that receives discharges of wastewater from a building for the purpose of collecting solids and discharging liquids into the surrounding soil. Historically, onsite sanitary septic systems were meant to contain liquids and solids to control the release of pathogens and bacteria, but not to treat nutrients such as nitrogen. Cesspools and conventional septic systems can release effluent containing concentrations of total nitrogen well upwards of 50 mg/L, over 5 times the New York State drinking water standard of 10 mg/L. Unfortunately, surface waters are exceedingly more sensitive to nitrogen inputs than groundwater; the Peconic Estuary Program has set a goal of a summertime average of no more than 0.45 mg/L of nitrogen in surface waters. Therefore, it is imperative that the existing nitrogen producing cesspools and conventional septic systems be upgraded, modified or replaced by innovative/alternative onsite wastewater treatment systems (I/A OWTS).

All sanitary systems within the groundwater contributing area of each watershed have the potential to contribute nutrients to the waterbody. The areas with sanitary systems situated in locations with shallow depth to groundwater have the greatest potential to discharge nutrients and pathogens to surface waters of East Hampton. Sanitary systems without adequate vertical separation between the bottom of the leaching pool and groundwater do not function properly as there is insufficient conversion of ammonia to nitrate and nitrite (the nitrification portion of the intended treatment process) and reduced natural attenuation of the sediments separating the

system from groundwater. Additionally, as some systems may be located in clay soils with poor leaching capacity, overflow during storm events may directly discharge pathogens and nutrients to surface runoff.

Suffolk County has proposed and is implementing an ambitious program for innovative and alternative onsite disposal systems to replace conventional systems. These systems are currently being evaluated by SCDHS to reduce nitrogen discharges from on-site wastewater treatment systems and are capable of reducing nitrogen concentrations in effluent over 80% (below 10 mg/L). Upon approval by SCDHS, these systems may be implemented locally with recommendations on a site by site basis. Priority locations for septic system upgrades were identified in the 2015 East Hampton Town Comprehensive Wastewater Management Plan. Neighborhood-cluster septic treatment systems would be capable of treating waste from many small lots in high density neighborhoods. These types of systems are recommended in the Montauk business district, the Lake Montauk dock area, Ditch Plains, Camp Hero, southern Three-Mile Harbor watershed, East Hampton Village Business Center and high density neighborhoods in Springs. Individual septic upgrades are recommended for residences throughout the town with priority locations in the immediate vicinity of surface waters particularly where annual impacts are evident.

Incentives and Rebates

The Town will provide a rebate program to entice homeowners and commercial businesses to upgrade their cesspools and septic systems to highly efficient nitrogen reducing systems as such become permissible under Suffolk County Health Codes. The rebate program will be diverse and varied to apply to most Town residents, possibly allowing for additional reimbursement based upon income. The best performing technology should be encouraged over the least expensive. Certain factors may trigger a need to upgrade or replace a cesspool or septic system with a nitrogen reducing system with the best available technology such as;

1. New construction (though it is not the Town's intention to use CPF monies to offer rebates or incentives in connection with any new construction);
2. Replacement of a failing septic system ("failing" defined in the following section);
3. Renovation of a property that increases the square footage of the building by 25% or more (identified by the application for building permit) or the primary structure is being elevated such as in a flood hazard zone; or

4. If a property is sold or ownership transferred.

Routine Inspection and Regular Maintenance

A program for the inspection and regular maintenance of septic systems may be developed and could be established to require property owners to provide proof of inspection and certification of sanitary systems. This program would be designed to aid in the identification of failed or improperly maintained septic systems. A failed system is one that meets any of the criteria below. Note that a septic system can appear to function in a manner that disposes of the waste and still be considered "failing" under any of the five criteria below. A backup of sewage or leakage onto the ground surface are not the only criteria for failure.

- System fails to accept sewage, as evidenced by sewage backing up onto the ground surface or into the building it serves;
- The liquid level in the system is less than 6 inches from the bottom of the drainage pipe;
- System has to be pumped more than 4 times per year;
- System has contaminated a drinking water well, stream or wetland; or
- The bottom of the system is below the groundwater table at any time of year, resulting in direct connection between the waste in the system and the groundwater.

If an inspection reveals a substandard septic system, the system would have to be pumped or replaced, depending on the severity of the failure.

Agricultural Stewardship Program

The Town of East Hampton seeks to support efforts to reduce groundwater contaminants associated with agricultural operations, a non-point source of pollution. New York State approved an Agricultural Environmental Management (AEM) Program for nitrogen and pesticide reduction for Long Island agriculture. The AEM Program is a statewide voluntary, incentive based process that helps farmers to make common sense decisions to achieve their business objectives while protecting and conserving natural resources and groundwater quality. The County of Suffolk, together with the input and assistance of Cornell Cooperative Extension (CCE), Suffolk County Soil & Water District (SCSWD), NRCS, American Farmland Trust, Long Island Farm Bureau, PEP, NYS DEC, Suffolk County Water Authority, Suffolk County Planning Department, and Suffolk County Department of Health Services (SCDHS) established an Agricultural Stewardship Program to fulfill the requirements of the State AEM Program.

The Town of East Hampton seeks to undertake an agricultural stewardship program for projects that meet the standards under the AEM Program. The agricultural stewardship program may be made available to any farmer operated agricultural land wherein the land has been in active agricultural production for a minimum of two years. This applicant shall be eligible for the rebate of costs including, costs for labor, materials, and site restoration necessary for implementation of the project but, shall not include financing or interest charges. The goal of the project must be to implement best management practices (BMPs) associated with agricultural operations, and must be in compliance with all state and local laws and codes and be approved by the Town of East Hampton. A BMP is any practice, or combination of practices, that is determined to be an effective and feasible means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals. To be eligible for CPF funding, any proposed BMP must be based on scientific evidence that they will make a meaningful reduction in nutrient loading, and all such projects must be accompanied by independent verification of implementation as proposed, and monitoring of baseline conditions and end results submitted to the Town for public review.

An applicant must submit a recommendation that the project meets the standards and/or qualifications of a BMP by CCE and/or SCSWD and as stated above, that the project purpose is to reduce groundwater contaminants, nitrogen and pesticides associated with agricultural operations. The project plan shall set forth the location, detail, and description of the BMPs to be installed and/or incorporated into the existing agricultural operation. The Town may contribute funding for the development, testing, monitoring, research, on-farm demonstrations, technical assistance engineering or construction, related to both design/writing and implementation of the plan, i.e. evaluation and development of BMPs for fertilizer usage or crop rotations.

Land Acquisition for Water Quality Projects

The Town of East Hampton may pursue preferential properties for acquisition using the designated 20% of CPF revenue for water quality improvement projects. By purchasing land using the water quality improvement budget the Town can implement water quality improvement projects on the acquired property. Such projects may include; stormwater abatement and control, habitat restoration, or installation of community septic waste treatment where neighborhood parcels are not adequate for single home waste treatment. Available shoreline properties could be

utilized as a platform for stormwater remediation and/or habitat restoration projects. The purchase of shoreline properties has an additional benefit of removing the nitrogen producing on-site septic system and any fertilizer treatments on the property as a source of nitrogen to the abutting waterbody. Inland properties could be utilized for community low-nitrogen wastewater treatment projects with adequate separation from both groundwater and surface waters. Any and all acquisitions will be routed through both the Water Quality Technical Advisory Committee and the Community Preservation Fund Advisory Board prior to review by the Town Board.

Proposed Projects

Proposed projects may include implementation of any of the following pollutant control mechanisms in the watershed study areas in the Town of East Hampton;

- Wastewater Treatment – The planning, design, construction or modification of a sanitary wastewater treatment system in order to reduce or eliminate the discharge of pollutants, including nutrients, or the replacement or upgrade of existing on-site wastewater treatment systems (i.e. cesspools or conventional septic systems) with nitrogen-reducing systems as approved by SCDHS.
    - *Innovative and Alternative Systems* – Implementing on-site wastewater treatment technologies designed to achieve advanced tertiary treatment that are accepted as capable of achieving the total nitrogen concentrations that are less than conventional systems. Systems currently being reviewed by Suffolk County are capable of removing more than 80% of total nitrogen in septic effluent.
    - *Vessel Pump-out Systems* – Addition of permanent or portable devices capable of removing human sewage from a marine holding tank. The Peconic Estuary was designated as a Vessel Waste No Discharge Zone (NDZ) in 2002 to help protect shellfish beds and keep water safe and clean for swimming and recreation. There are currently two municipal vessel pump out stations in East Hampton; located in Three-Mile Harbor at the Town Commercial Dock and in Lake Montauk at the Star Island Municipal Marina. Some marinas operate private pump out stations for customers. Additional systems may be necessary to prevent unlawful discharge of boat waste.

- Other projects that have been shown to reduce nutrient loading will also be considered such as constructed wetland wastewater treatment projects, urine-diverting or composting toilets, and water re-use projects.

- Non-Point Source Pollution (NPS) Abatement – The control of diffuse sources of pollution such as runoff of nutrients, pesticides, toxics, and pathogens. Abatement of NPS pollution is focused on land and runoff management practices, rather than on effluent treatment from point sources.
  - *Stormwater Collection and Control* – A system of conduits and all other devices designed to collect and carry stormwater to a point source for treatment or natural buffers designed to redirect stormwater to allow for infiltration and natural treatment processes. Stormwater control will result in the net reduction of untreated runoff directly entering surface waters. The Town of East Hampton has been covered under a Municipal Separate Storm Sewer System (MS4) permit issued by the EPA and administered by the NYSDEC since 2009. This is due to the fact that Accabonac Harbor, Lake Montauk and Northwest Creek have surpassed their TMDL levels for pathogens. The MS4 permit requires the Town to implement a stormwater management program to reduce the discharge of pollutants to the maximum extent practicable to protect water quality.
  - *Agricultural Pollution Abatement* – Management of agricultural practices to reduce overland runoff of pollutants entering waterbodies. This may include reduction or modification of fertilizer applications to land, control of waterfowl or animal wastes, crop rotation management, or direct runoff control mechanisms.
  - *Groundwater Treatment* – Seepage of nutrient-rich groundwater contributes a significant source of total nitrogen to surface waters. A permeable reactive barrier (PRB) is an in-situ treatment zone designed to intercept nitrogen enriched groundwater before entering waterbodies. The PRB is used to introduce a carbon source into the groundwater either using trenching or injection. As groundwater flows through the medium, microbes naturally occurring in the groundwater consume the carbon source, as well as oxygen, developing an anaerobic environment. This process releases nitrogen gas to the atmosphere, reducing the groundwater nitrogen load to surface waters. This technology can remove between 75 and 95% of the total nitrogen. Installation at

strategically important locations, can achieve the desired nutrient reductions at lower cost than wastewater system improvements.

- Aquatic Habitat Restoration – Management and restoration activities intended to improve ecological functioning of aquatic habitat in specific surface waters of ecological significance. May include projects such as the cultivation and removal of marine vegetation such as seaweed for shellfish habitat or demonstration projects utilizing oyster nurseries which naturally remove nitrogen from their environment. These projects can remove between 8% and 15% of total nitrogen from the treatment area. Efforts to restore habitats and organisms should be undertaken only in locations that are "restoration-ready" where circumstances in which the physical environment and water quality are suitable to support the resource to be restored.
- Pollution Prevention – The improvement or maintenance of a facility that significantly or measurably reduces or eliminates the use, generation or discharge of toxic or hazardous substances (including nutrients). This will be a small portion of the plan as there are few point sources in the Town of East Hampton in need of modification. The pollution prevention component will be mostly comprised of education of the public to reduce the amount of pollution produced.

Priority Areas

Priority areas for remediation projects include;

- Locations with drinking water wells (no public water)
- Sites that are located in the Harbor Protection Overlay District (HPOD)
- Sites near waterbodies listed as TMDL impaired or the site of restoration efforts
- Sites that have shallow depth to groundwater
- Sites that may be located in flood or storm surge zones
- Sites with porous or impervious soils which limit proper treatment of wastewater
- Areas where groundwater reaches surface water bodies quickly
- Homes that are built on small lots

Remedial Monitoring

Water quality monitoring will be conducted at the beginning of projects to document baseline conditions and following the implementation of remedial actions for the purpose of

calculating measurable results in connection with any project and to determine the efficiency of remediation in improving water quality. In the case of aquatic habitat restoration projects, monitoring will be designed to measure the success of the restoration project using methods such as; bio-monitoring, surveys, and water quality monitoring.

WATERSHED STUDIES

There are watersheds of concern that will be targeted for water quality improvements as outlined below in this WQIP (Figure 2). These study areas include;

- Accabonac Harbor Watershed
- Three-Mile Harbor Watershed
- Georgica Pond Watershed
- Hook Pond Watershed
- Northwest Creek Watershed
- Lake Montauk Watershed
- Fort Pond Watershed
- Napeague Harbor
- Wainscott Pond
- Village of Sag Harbor Shoreline

Accabonac Harbor Watershed

General Watershed Characteristics

Accabonac Harbor (Figure 3) is a broad estuary located within the Town of East Hampton on the north side of Long Island's South Fork. The watershed is on a coastal plain where topography is extremely flat with little elevation change throughout much of the watershed, with the exception of a few isolated areas along the watershed boundaries. The watershed, which includes Pussy's Pond, is abutted to the north by Gardiners Bay, to the east by Napeague Bay, Three-Mile Harbor watershed to the west, and rural and urban areas of East Hampton to the south. There are two primary arterial roadways within the watershed: Springs-Fireplace Road, which runs north to south; and Old Stone Highway, which runs east to west within the watershed (Horsley Witten Group, Inc., 2013). The low sandy bay shore of Gerard Drive was originally developed with small summer-camp homes in the 1930's, when a sluice at the north end of the harbor was paved over, and has frequently been a problem area for storm induced flooding and erosion.

Land Use and Infrastructure

Land use is primarily residential, with pockets of higher density along Gerard Drive, at Louse Point, in Barnes Landing subdivision, and along Devon Landing Road south of Fresh Pond. Many of the original residences in these areas are small summer cottages. Most neighborhoods are made up of low to medium density (one-quarter to one acre), single-family residential lots constructed between the 1960s and 1970s; new construction is minimal. Commercial development is minimal. There is considerable preserved open space, including Town parks and municipal bay beaches located at Gerard Park, Louse Point, Barnes Landing, Alberts and Little Alberts Landings, Fresh Pond and Abrahams Landing. The Town also maintains several launching ramps and other public access points in Accabonac Harbor, at Louse Point, Landing Lane, Shipyard Lane, and Gerard Drive. There is a significant inter-tidal, salt marsh zone that borders Accabonac Harbor that is mostly undeveloped.

Gerard Drive, the northerly barrier spit enclosing Accabonac Harbor, has numerous small homes on lots which are vulnerable to flooding and erosion. Flooding and erosion concerns limit development surrounding Accabonac Harbor, particularly for the Louse Point and Gerard Drive areas, for the bluff from Louse Point to Barnes Landing, and residences between Fresh Pond and Abrahams Landing Road to the south. Progressive installation of erosion protection structures along the shores has led to destruction of beaches, loss of public access, and opportunities for water-dependent recreation in these areas. Extensive cooperative efforts by Town and State government and private agencies have resulted in preservation of many fragile undeveloped parcels in Accabonac Harbor's network of salt marshes.

Soils and Hydrology

The soils in the watershed are mapped by the USDA Natural Resources Conservation Services as Carver and Plymouth sands, Montauk fine sandy loam/loamy sand/silt loam, Plymouth loamy sand, dunes, beaches, and tidal marsh, with lesser amounts of Berryland mucky sand, Deerfield sand, Haven loam, Riverhead sandy loam, and Wareham loamy sand. The hydrologic soil group (HSG) indicates the infiltrative capacity of the soils, with Type A indicating high infiltration rates (i.e., sands and gravels) and Type D representing very poorly drained soils. The watershed is mostly comprised of HSG Type A and Type C soils. Much of the Type A soil is found near the center of the watershed and extends to the south, east of Springs-Fireplace Road. The Type C soil zones are located in the northern and western residential areas.

Existing Water Quality

To comply with the Clean Water Act, the NYSDEC compiles a Priority Waterbodies List (PWL). Accabonac Harbor is included under PWL# 1701-0047 as an impaired waterbody, and in 2006, a TMDL for pathogens was developed for this area with urban stormwater runoff identified as a pollutant source, along with inputs from forest runoff, waterfowl, and boat pollution. In addition, the NYSDEC has designated portions as closed and/or seasonally closed for shellfishing.

Completed and Ongoing Projects

In 2011, a field reconnaissance project was performed by the Horsley Witten Group, Inc through a grant from the NYSDOS in the Accabonac Harbor Watershed to identify stormwater retrofit and restoration sites. At each field location the drainage conditions and site constraints were evaluated to determine the stormwater retrofit options with the best reported pollutant removal capability. Hot spots with the highest potential to contribute pollutants to the creeks and tributaries were identified as candidates for structural and non-structural pollution prevention controls. Stormwater retrofits recommended in the Accabonac Harbor Subwatershed Management Plan will be implemented to control stormwater runoff of pollutants into the harbor and associated tributaries.

An ongoing pilot demonstration project is being conducted in Pussy's Pond by Cornell Cooperative Extension. The water quality investigation will determine the chemical flux of nitrogen constituents across the sediment/water column interface at selected sites along the shoreline of Pussy's Pond. The pilot study is testing the efficiency of nitrogen removal from impacted groundwater by PRB cells within the soil/groundwater interface. The most recent results demonstrate an approximate average of 85% reduction in nitrogen on the east and west banks of Pussy's Pond. The results from this study will support the implementation of this technology to protect this area from nitrogen rich groundwater intrusion by denitrifying groundwater before seepage into Accabonac Harbor.

Additionally, a Pussy's Pond Park Restoration Project is planned for late 2016 which will include the removal of 1.33 acres of the invasive species *Phragmites australis* via excavation and revegetation with native species, installation of a bio-retention area to aid in reduction of stormwater runoff and the stabilization of the Pond banks to reduce erosion.

Water Quality Improvement Recommendations

Wastewater Treatment

- Residential cesspool/septic system upgrades to systems with nutrient removal
- Installation of a PRB groundwater treatment system for nitrogen removal
- Investigate need for additional vessel pump out station

Non-Point Source Pollution Abatement

- Implement stormwater Retrofit opportunities such as the installation of bioretention areas, wet swales, path stabilization, constructed wetlands and paved drainage flumes along roadways, parking lots, and walking paths where recommended in the 2013 Accabonac Harbor Subwatershed Management Plan

Aquatic Habitat Restoration

- Develop community based restoration projects
- Expand shellfish seeding areas and install oyster reefs to protect and enhance the shellfish population in the watershed
- Facilitate the protection and restoration of seagrass population if the habitat is deemed restoration ready
- Implement invasive vegetation control and promote the growth of native plants

Three-Mile Harbor Watershed

General Watershed Characteristics

Three-Mile Harbor (Figure 4) is a large estuary located within the Town of East Hampton on the north side of Long Island's South Fork. Both Hands Creek and Hog Creek are included within the Three-Mile Harbor watershed boundary. Steep bluffs with elevations of 25'-40' comprise the coastline from Hedges Bank to Lafarge's Landing at the end of Old House Landing Road, dipping to near sea level at Sammy's Beach and Maidstone, before ascending to bluffs of almost 60' east of Maidstone Park Beach between Flaggy Hole Road and Runnymede Drive. The rocky beaches beneath the bluffs widen to sandy beaches at Sammy's Beach and Maidstone Park, both enhanced by periodic dredge spoil from the Three-Mile Harbor channel.

The baymouth spits of both Hog Creek and Three-Mile Harbor were originally closed intermittently by littoral drift, but the harbor entrances were eventually stabilized for navigation in the 1930's and maintained by the installation of a 650' steel sheet and piling jetty to the west and a

600' stone jetty on the east. Dredging of a channel, later extended to the southern end of the harbor, has permitted use of the harbor by medium draft recreational craft and small commercial vessels. The south end of Three-Mile Harbor was not navigable south of Marina Lane until the navigation channel was extended to the head of the harbor.

Land Use and Infrastructure

Present land use is primarily residential, with relatively few undeveloped lots along the shores of Three-Mile Harbor and Hog Creek. Recreational marinas are located on the east side of the harbor close to the channel, making Three-Mile Harbor the busiest harbor in the Town for recreational boating on the bays. The Town also operates a commercial dock at Gann Road on the east side which is used extensively by smaller commercial draggers and baymen. The harbor supports nine private recreational marinas, a Town recreational boat basin and the Town commercial dock, plus two homeowners' association marinas and approximately fifty individual private docks. Although the marine character of Three-Mile Harbor is primarily recreational, it is also the center for an active inshore fishery, with several small trawlers and numerous baymen using it to tie up and offload. Commercial development, including all of the recreational marinas and associated restaurants and services, is along the east side of Three-Mile Harbor where the channel is located. The Town-owned commercial dock at Gann Road is utilized by bay trawlers, lobstermen and baymen, as well as for headquarters of the Town Harbormaster, and the Town's municipal pump out station.

Hog Creek, at the east end of the reach, is a shallow narrow estuary fringed with saltmarsh, artificially opened to Gardiner's Bay and dredged and widened for development in the 1950's. Alteration and destruction of the original Hog Creek shoreline through installation of lawns, filling of wetlands, and construction of bulkheads, docks and piers have all contributed to instability of the present shoreline. Hog Creek is one of the fastest shoaling inlets in the Town, having been dredged four times within the past fifteen years, approximately the same frequency as Accabonac Harbor.

Soils and Hydrology

The soils in the watershed are mapped by the USDA Natural Resources Conservation Services as Carver and Plymouth sands, Montauk fine sandy loam/loamy sand/silt loam, Plymouth loamy sand, dunes, beaches, and tidal marsh, with lesser amounts of Berryland mucky sand, Swansea muck, Deerfield sand, Riverhead sandy loam, Sudbury sandy loam, Wareham loamy sand

and gravel pits. The hydrologic soil group (HSG) indicates the infiltrative capacity of the soils, with Type A indicating high infiltration rates (i.e., sands and gravels) and Type D representing very poorly drained soils. The watershed is predominantly comprised of HSG Type A soils with less than 5% HSG Type B and C soils.

Existing Water Quality

Three-Mile Harbor is included under the New York State Priority Waterbodies List as a water body with minor impacts that is considered to be stressed by pathogens. In 2006, a TMDL for pathogens was developed for this area with urban stormwater runoff identified as a pollutant source, along with inputs from onsite septic systems and boat pollution. This assessment is based on seasonal shellfishing closures. Recreational uses and aquatic life are also considered to be stressed by occasional algal blooms which contribute to periodic low dissolved oxygen levels.

Completed and Ongoing Projects

Three-Mile Harbor will be the subject of a Green Reach Infrastructure Demonstration (GRID) Nitrogen and Stormwater Abatement project which will include the installation of a reactive zone through installation of a PRB behind the existing bulkhead and establishment of a bioretention swale at the town docks in Southern Three-Mile Harbor. The reactive barrier designed and installed by Cornell Cooperative Extension, will allow for the biodegradation of nitrate and nitrogen in groundwater using a matrix of organic media and materials as a source of carbon. The barrier will be constructed with a permeability that is greater than the surrounding sediments to encourage the movement of pore water through the media while minimizing flow around the treatment area. The Town of East Hampton was awarded $125,000 to implement this project through the Suffolk County Water Quality Protection Review Program. An additional GRID project funded through a NYS DEC Water Quality Improvement Project grant for $375,000 awarded to the Town of East Hampton will be conducted in the Three-Mile Harbor watershed on Town property at Gann Road. This demonstration project will include the installation of a series of vertical injection wells along a 200’ stretch at Gann Road and the injection of carbon substrates under pressure as a PRB to intercept and treat nitrogen impaired groundwater prior to entering surface waters. It is expected that this treatment will remove up to 100% of the nitrate in the intercepted groundwater. These two GRID projects will demonstrate the efficiency of nitrogen removal in groundwater in Suffolk County. The projects are consistent with recommendations

and action items contained in the Peconic Estuary Comprehensive Conservation Management Plan (PEP CCMP) and will assist the Town in complying with the NYS DEC MS4 permit.

Water Quality Improvement Recommendations

Wastewater Treatment

- Residential cesspool/septic system upgrades to systems with nutrient removal
- Community Systems with nitrogen removal for neighborhood/area wide
- Installation of PRB groundwater treatment system for nitrogen removal
- Investigate need for additional vessel pump out stations

Non-Point Source Pollution Abatement

- Retrofit and improve stormwater management to reduce stormwater intrusion into the harbor as well as all recommendations outlined in the Three Mile Harbor Subwatershed Management Plan

Aquatic Habitat Restoration

- Demonstration projects on the use of oyster/shellfish aquaculture as nutrient removal and water quality improvement tools
- Develop community based restoration projects
- Expand shellfish seeding areas and install oyster reefs to protect and enhance the shellfish population in the watershed
- Facilitate the protection and restoration of the seagrass population
- Establish seaweed meadows (kelp) grow out areas to facilitate nitrogen uptake
- Implement invasive vegetation control and promote the growth of native plants

Georgica Pond Watershed

General Watershed Characteristics

Georgica Pond (Figure 5) is a 290-acre coastal lagoon on the west border of East Hampton Village and Wainscott on the south shore of Long Island. The lagoon is separated from the Atlantic Ocean by a natural 50-foot (15 m) sandbar barrier, and is bounded by low banks and a gently sloped shore. The Ocean inlet is periodically opened to allow flushing and exchange of fresh and sea water, which is managed by the East Hampton Trustees who monitor a cycle of draining the lagoon and replenishing it with Atlantic Ocean water. The pond is relatively shallow with a maximum depth of approximately 6 feet.

The Cove Hollow Road Stormwater Pipe transports an unknown quantity of stormwater runoff that discharges directly to Georgica Cove. The Cove Hollow Pipe begins near the Long Island Rail Road (LIRR) trestle at the State Route 114 drainage sump and terminates at the Cove Hollow Road dead end, collecting stormwater water in route and discharging to Georgica Cove. It is believed to have been installed in the 1920's by New York State.

Land Use and Infrastructure

The Georgica Pond watershed is approximately 50% developed, 45% undeveloped and 5% open water. The predominant land uses within the watershed are residential properties and deciduous and evergreen forests with some agricultural croplands, commercial and industrial areas, and parks and open space. The land area immediately surrounding the Pond is privately owned and developed with residential homes with manicured lawns directly abutting the Pond. Agricultural lands and residential neighborhoods abut the watershed to the east. Residential and industrial areas including the East Hampton Airport are located to the northwest. Deciduous/evergreen forests, open space and agricultural lands make up the drainage area to the north of Georgica Pond.

Soils and Hydrology

The soils in the Georgica Pond watershed are mapped by the USDA Natural Resources Conservation Services as Carver and Plymouth sands, Plymouth loamy sands, and Bridgehampton silt loam, with lesser amounts of Riverhead sandy loam, Raynham loam, Wareham loamy sand, Haven loam, cut and fill land, dunes, beaches, and gravel pits. The hydrologic soil group (HSG) indicates the infiltrative capacity of the soils, with A indicating high infiltration rates (i.e., sands and gravels) and D representing very poorly drained soils. The Georgica Pond watershed is mostly comprised of HSG Type A and Type B soils.

Existing Water Quality

Georgica Pond is included under PWL# 1701-0145 as a water body with impaired segments due to shellfishing use that is considered to be stressed by pathogens. In 2006, a TMDL for pathogens was developed for this area with urban stormwater runoff identified as a pollutant source, along with inputs from onsite cesspool and conventional septic systems and, to a much more limited extent, excrement from waterfowl and wildlife. This assessment is based on restrictions on shellfishing for consumption purposes. Recreational use and public bathing are also considered to be stressed based on beach monitoring and the shellfishing advisory.

Completed and Ongoing Projects

An ongoing evaluation of environmental issues is being conducted on Georgica Pond by the Stony Brook University Gobler Laboratory and funded by the Friends of Georgica Pond Foundation, a group of local homeowners and stakeholders advocating for protection of the Pond. The project aims to evaluate nutrient sources to Georgica Pond through water quality monitoring and modeling, genetic and toxin analysis of algae in Georgica Pond, collection of continuous water quality monitoring, and recommend management strategies to restore Georgica Pond to a healthy condition. Additional work in the remediation plan developed by the Friends of Georgica Pond Foundation includes the use of an aquatic weed harvester in collaboration with the East Hampton Town Trustees to remove macroalgae from the surface of the Pond. The macroalgae is believed to store excessive nutrients and it is hoped that its removal will cause dramatic reductions in nitrogen and phosphorus. The foundation also advocates for the installation of permeable reactive barriers on properties surrounding the pond and more frequent opening of the pond to the Atlantic Ocean by dredging the mouth and removing bottlenecks of sand and invasive Phragmites in Georgica Cove. The Pond is currently opened twice a year by the town trustees in the spring and the fall to flush the Pond with saline water.

Water Quality Improvement Recommendations

Wastewater Treatment

- Residential cesspool/septic system upgrades to systems with nutrient removal
- Use a Commercial Areas Sewage District Analysis to complete a preliminary planning assessment and determine the feasibility for a community treatment system for the Village commercial districts
- Installation of PRB groundwater treatment system for nitrogen removal
    - Proposed location along Stone Road and Goose Creek Lane
    - Proposed location along Georgica Road and Georgica Close Road

Non-Point Source Pollution Abatement

- Cove Hollow stormwater pipe study and upgrade
    - Undertake an engineering study to determine the contributing areas, quantity of stormwater runoff entering the pipe and quality of stormwater that exists
    - Install additional drywells within the watershed to reduce the quantity of stormwater entering the pipe

    - Expand the existing Village program of installing filtering systems within stormwater drains to prevent sediments and debris from entering the pipe
    - Develop an end of pipe treatment system to treat stormwater before entering Georgica Cove for removal of runoff contaminants
- Installation of shoreline buffers with native vegetation and infiltration systems to minimize direct runoff into the pond from Route 114 and the Village of East Hampton
- Maintain nature trail bottom lands to improve water circulation and sediment removal
- Implement agricultural BMPs for fertilizer and crop management

Aquatic Habitat Restoration

- Develop community based restoration projects
- Projects that enhance habitat for the fish and crabs formerly found in the pond
- Facilitate the protection and restoration of the seagrass population if the habitat is deemed restoration ready
- Implement invasive vegetation control and promote the growth of native plants
- Coordinate with the Village to target specific areas for dredging in accordance with the recommendations to remove nitrogen enriched sediments

Hook Pond Watershed

General Watershed Characteristics

Hook Pond (Figure 6) is a small freshwater pond located in the Village of East Hampton on the southern shore of Long Island. The watershed is comprised of Hook, Town and Duck Ponds, freshwater wetlands/small creeks, and lands within the watershed. Historically, Hook Pond was open to the ocean until November 1933, when sand dune stabilization efforts isolated the pond from the ocean (Lombardo Associates, 2015). A drainage outlet was added to control the pond water levels for storm events as needed which is maintained by a control gate located on the southwestern end of the pond. This change created a freshwater pond with flow exiting into the ocean.

Land Use and Infrastructure

The Hook Pond watershed is approximately 75% developed, 21% undeveloped and 4% open water. The predominant land use within the Hook Pond watershed is residential with some commercial and industrial areas, and parks and open space. Residential homes border the

watershed to the north with Town Pond and the Village of East Hampton commercial shops, schools and agricultural areas beyond. The Maidstone golf course borders the pond to the southwest with the watershed outlet and Atlantic Ocean beyond. Residential properties border the watershed to the west and open space/vacant land with residential properties beyond to the east.

Soils and Hydrology

The soils in the watershed are mapped by the USDA Natural Resources Conservation Services as Bridgehampton silt loam, Carver and Plymouth sands, and Plymouth loamy sands, with silty substratum, with lesser amounts of Raynham loam, Montauk loamy sand, Haven loam, dunes, beaches, Swansea muck, Riverhead sandy loam, cut and fill land, urban land, and gravel pits. The hydrologic soil group (HSG) indicates the infiltrative capacity of the soils, with A indicating high infiltration rates (i.e., sands and gravels) and D representing very poorly drained soils. The Hook Pond watershed is mostly comprised of HSG Type A and Type B soils.

Existing Water Quality

Hook Pond is included under PWL# 1701-0131 as a water body with no known impacts. A 1999 Lake Classification and Inventory study found no evidence of water quality impairment but some weed growth and shallow water depths were noted. High sedimentation rates were also suspected. Historical watershed studies suggest that Hook Pond is eutrophic with phosphorous as the limiting nutrient. The suspected sources of nutrient enrichment are stormwater and benthic release as the major contributors of phosphorous and wastewater from cesspools and conventional septic systems as the major contributor of nitrogen. Additional local water quality monitoring is required to determine specific impacts to local uses.

Completed and Ongoing Projects

A water quality improvement project was conducted on Hook Pond in 2015 by Lombardo Associates on behalf of the Village and Town of East Hampton. The study summarized previous work conducted at the Pond and made recommendations for a water quality monitoring program as well as stormwater pollution and restoration management practices. As a result, the Village of East Hampton plans to implement two stormwater control projects through a grant totaling $46,375 provided by the Suffolk County Water Quality Protection and Restoration program. The first project will convert an existing 250-foot long channel that conveys stormwater runoff from North Main Street to Hook Pond into a ½-acre bioswale to store and filter stormwater. Eleven stormwater filters to help remove pollutants will also be installed in existing stormwater basins in the area.

The second project is located on a ¼-acre of the village green, where stormwater collects from Route 27, Route 114, and Main Street and overflows into Town Pond. This area will be excavated to approximately 12 to 18 inches and replanted with turfgrass to create micropools, shallow pools that remove pollutants from stormwater runoff during storm events. Both projects will aid in the reduction of sediment, debris, and nutrients entering Hook and Town Ponds.

Water Quality Improvement Recommendations

Wastewater Treatment

- Residential cesspool and septic system upgrades to systems with nutrient removal
- Use a Commercial Areas Sewage District Analysis to complete a preliminary planning assessment and determine the feasibility for a community treatment system for the Village commercial districts
- Neighborhood collection, treatment and disposal system implementation and management
- Installation of PRB groundwater treatment system for nitrogen removal
    - Proposed location along Maidstone Lane and Egypt Lane

Non-Point Source Pollution Abatement

- Critical areas once identified will be assessed for the appropriate management practices based on site conditions, physical constraints, and retrofit feasibility to limit stormwater intrusion into the pond
- Maintenance of nature trail bottom lands to improve water circulation and sediment removal

Aquatic Habitat Restoration

- Develop community based restoration projects
- Implement invasive vegetation control and promote the growth of native plants
- Conduct planning and feasibility studies to determine options or target areas for dredging Hook and Town Ponds for the purposes of nutrient rich sediment removal and promote an increase in water circulation

Northwest Creek Watershed

General Watershed Characteristics

Northwest Harbor (Figure 7) is a large natural embayment formed by Shelter Island, Sag Harbor, and the northerly shore of East Hampton, known as Northwest Woods, which includes

Barcelona Neck, the Grace Estate, and Cedar Point County Park. Although it extends to the intensively developed shoreline of Sag Harbor Village, the reach shoreline is sparsely developed, its terrain ranging from saltmarshes surrounding Northwest Creek and the sand spit of Cedar Point, to high bluffs along Barcelona Neck.

The natural harbor of Northwest made Northwest Landing East Hampton's first colonial shipping port, until it was eclipsed by neighboring Sag Harbor during the heyday of whaling in the mid 1800's. Northwest Harbor and Northwest Creek were bountiful fin and shellfishing grounds for the Native Americans as well as the European settlers. The geographic attributes of the area, plus the absence of development impacts continue to make Northwest Creek one of the most productive nurseries for shellfish and finfish in the Town.

Land Use and Infrastructure

Large tracts of parkland and preserved open space including Barcelona Neck, now Sag Harbor State Park, the Town-owned Grace Estate, Cedar Point County Park, and The Nature Conservancy's Mashomack Preserve on Shelter Island have kept the shorelines of Northwest Creek in a largely natural state. Recreational and open-space comprise the greatest proportion of the watershed. Through a combined effort by New York State, Suffolk County, and East Hampton Town and privately owned reserved areas, approximately 2,000 acres have been committed to permanent open space.

Present development within the watershed consists of sparse residential construction in the subdivisions of Settlement at Northwest and Grace Estate, and a small concentration of residential housing at Northwest Landing. The golf course at Barcelona Neck managed by the Sag Harbor Golf Club, the County dock at Northwest Creek, and the infrastructure of Cedar Point County Park are the only additional development.

Soils and Hydrology

The soils in the Northwest Creek watershed are mapped by the USDA Natural Resources Conservation Services as Carver and Plymouth sands and tidal marshes with lesser amounts of Atsion sand, Berryland mucky sand, Deerfield sand, Montauk loam/loamy sand, Swansea muck, Plymouth loamy sands, Wareham loamy sand, cut and fill land, dunes and beaches. The hydrologic soil group (HSG) indicates the infiltrative capacity of the soils, with A indicating high infiltration rates (i.e., sands and gravels) and D representing very poorly drained soils. The

Northwest Creek watershed is mostly comprised of HSG Type A soils with less than 5% Type B and C soils.

Existing Water Quality

Northwest Creek and associated tidal tributaries are included under PWL# 1701-0046 as an impaired waterbody, and in 2007, a TMDL for pathogens was developed for this area with urban stormwater runoff identified as a pollutant source, along with inputs from agricultural activity and open space/forest runoff, direct waterfowl and wildlife inputs and pollution from boats and marinas. In addition, portions of Northwest Creek and Harbor are listed as uncertified and seasonally certified for the taking of shellfish for use as food.

Completed and Ongoing Projects

There have not been any significant environmental studies conducted on Northwest Creek to date. The only remedial activity conducted in the watershed is dredging for maintenance of navigability and flushing of waters. The most recent dredging was completed in late 2015; all dredged material was used for an ongoing beach nourishment project for the upper beach area located to the east of Northwest Creek and Little Northwest Creek.

Water Quality Improvement Recommendations

Wastewater Treatment

- Residential cesspool and septic system upgrades to systems with nutrient removal
- Investigate need for vessel pump out station

Non-Point Source Pollution Abatement

- Critical areas once identified will be assessed for the appropriate management practices based on site conditions, physical constraints, and retrofit feasibility to limit stormwater intrusion into the pond
- Storm flooding prevention of development adjoining wetlands at the end of Northwest Landing Road
- Relocation of existing artificial channels or restoration of historic channels considered to ameliorate flooding and water quality problems

Aquatic Habitat Restoration

- Develop community based restoration projects
- Expand shellfish seeding areas and install oyster reefs to protect and enhance the shellfish population in the watershed

- Facilitate the protection and restoration of the seagrass population if the habitat is deemed restoration ready
- Implement invasive vegetation control and promote the growth of native plants

Lake Montauk Watershed

General Watershed Characteristics

Lake Montauk (Figure 8) is the eastern most watershed of concern and is situated between the village of Montauk and Montauk Point. The watershed encompasses the land area draining to Lake Montauk inclusive of both Big and Little Reed Ponds. The topography of the watershed area generally trends from higher elevations along the outer boundaries of the subwatersheds located on the western, southern and eastern sides of the lake, to lower elevations nearing Lake Montauk, and towards Block Island Sound to the north and the Atlantic Ocean to the south. The highest elevations occur in hill areas occupied by residential developments in the northwestern portion of the watershed in the vicinity of Flamingo Avenue and North Farragut Road, and in the eastern portion of the watershed, between Talkhouse Lane and Startop Drive.

Land Use and Infrastructure

The Lake Montauk watershed area is approximately 2,728 acres in size, the majority of which is occupied by recreation and open space which generally represents areas with a mixture of some constructed materials and vegetation in the form of lawn grasses, medium density residential, transportation/utilities and low density residential uses. Vacant land also occupies a significant portion of the watershed and generally represents deciduous forest and vegetated tidal wetlands. Although high density residential, commercial, agriculture and marinas occupy a much smaller portion of the watershed, these uses represent the remainder of the major uses that occupy lands.

The tidal wetlands within the watershed are located where the shoreline intersects and interfaces with tidal waters. These wetlands contain saline waters, which originate from the ocean-fed surface waters associated with the lake. These features are formed by coastal processes and, with the exception of formerly connected tidal wetlands, are subject to tidal influence. These areas are vital to the ecological systems to which they serve and function to control storm surges during flood and major storm events which may impact sensitive watershed areas.

Soils and Hydrology

The soils in the Lake Montauk watershed are mapped by the USDA Natural Resources Conservation Services as Bridgehampton silt loam and Montauk loam/loamy sand, with lesser amounts of Scio silt loam, Wallington silt loam, Whitman sandy loam, Swansea muck, Raynham loam, Riverhead and Haven soils, Berryland mucky sand, tidal marshes, urban land, beaches and dunes. The hydrologic soil group (HSG) indicates the infiltrative capacity of the soils, with A indicating high infiltration rates (i.e., sands and gravels) and D representing very poorly drained soils. The Lake Montauk watershed is mostly comprised of HSG Type B and C soils with smaller amounts of Type A and D soils.

Existing Water Quality

Lake Montauk is included under NYS DEC PWL# 1701-0031 as an impaired waterbody, and in 2006, a TMDL for pathogens was developed for this area with boating pollution identified as a pollutant source, along with inputs from urban stormwater runoff and onsite cesspools and conventional septic systems. Beneficial use impairments are due to seasonal shellfishing closures. While the central portion of the Lake generally exhibits good water quality, the northwest portion of the Lake (Coonsfoot Cove) and the southern portion of the Lake are areas that do not receive significant tidal flushing and have significant pollution inputs from the watershed (Nelson, Pope and Voohris, 2014). Water quality data demonstrated the following impairments: bathing beach closures due to high levels of pathogens at East Lake Drive Beach and South Lake Drive Beach, high nitrogen levels, poor water column clarity and high chlorophyll-a levels in Big Reed Pond, shellfishing closure due to potential pathogens at Coonsfoot Cove (permanent), Star Island/Western Lake Shore (seasonal), Montauk Lake Marina and Club (seasonal) and Southern Lake (seasonal) (Nelson, Pope and Voohris, 2014).

Completed and Ongoing Projects

A Watershed Management Plan was completed for the Lake Montauk Watershed in December 2015 for the Town of East Hampton. The management plan summarized existing and historical conditions from available data and made specific stormwater runoff and watershed management recommendations to be implemented for future improvements in water quality. One proposed recommendation, preservation of undeveloped shoreline of Lake Montauk, has been initiated by the Town of East Hampton through the purchase of some undeveloped lots. Specific

water quality recommendations for improvements in the Lake Montauk Watershed are summarized within this report.

Since 2013 the Concerned Citizens of Montauk (CCOM) has partnered with the Surfrider Foundation Blue Water Task Force to conduct water quality testing for pathogens. This work aims to expand the scope of water sampling conducted by the SCDHS which is limited in frequency and distribution of sampling locations. The Lake would be an ideal waterbody to establish marine algae grow out areas. Marine algae aquaculture has the potential to create economic development opportunities within East Hampton Town and simultaneously; improving water quality via bioextraction of nitrogen and carbon nutrients in the water body. Growth and harvest of marine algae results in the direct removal of dissolved nutrients and carbon, which will reduce the potential for eutrophication and excess carbon emissions. Many plants and animals cannot survive when there is too much nitrogen in the water, but seaweed is able to "capture" the nitrogen, as well as other contaminants in the water.

Water Quality Improvement Recommendations

Wastewater Treatment

- Residential cesspools and septic system upgrades to systems with nutrient removal
- Wastewater collection from the dock properties, Montauk airport, and Flamingo avenue with transmission to the Montauk Manor-Fire Department wastewater treatment site
- Community/neighborhood wastewater treatment systems to serve areas with malfunctioning or problematic septic systems at the docks, Ditch Plains, and Camp Hero
- Investigate need for additional vessel pump out stations

Non-Point Source Pollution Abatement

- Implement recommendations from the Lake Montauk Watershed Management Plan
- Critical areas once identified will be assessed for the appropriate management practices based on site conditions, physical constraints, and retrofit feasibility to limit stormwater intrusion into the pond
    - Create a vegetated drainage depression at the landscape medians between intersections of West Lake Drive, North Fernwood Drive and Star Island Road
    - Investigate feasibility for drainage improvements on the North side of Montauk Highway

    - Create a bio-retention area on the Northwest corner of West Lake Drive and Flamingo Avenue
- Provide pretreatment where feasible for existing and proposed drainage infrastructure
- Encourage and incentivize use of green infrastructure on-site and in drainage design
    - Incentivize vegetative buffers on properties that abut the lake
    - Incentivize buffers and filter strips adjacent to boardwalk areas in industrial and working waterfront areas
- Amend Chapter 225, Article IV of Town Code to include minimum buffer requirements
- Develop an agricultural best management practice program for the animal farm located on South Fenmore Drive
    - Implement vegetated buffer surrounding on-site retention pond to reduce pathogen inputs into Lake Montauk

Aquatic Habitat Restoration

- Consider use of aeration systems to lower portion of the Lake to promote growth of aerobic bacteria and stunt the growth of anaerobic bacteria
- Provide wetland restoration and water quality improvements by reconstructing wetlands in Ditch Plains to engineered wetlands planted with native species. This would provide vegetative pathogen removal of waters seeing from Ditch Plains developed areas
- Develop community based restoration projects
- Continue to fund and expand the Town's shellfish hatchery and seeding program, including eel grass protection and restoration
- Expand shellfish seeding areas and install oyster reefs to protect and enhance the shellfish population in the watershed
- Initiation of a leasing program allowing growers to farm shellfish and other marine organisms (clams, scallops, kelp)
- Establish additional seagrass and seaweed grow out areas
- Implement invasive vegetation control and promote the growth of native plants
    - Develop an early detection/rapid response program for highly invasive species approaching the area to aid in prevention of these species becoming established

Pollution Prevention

- Develop signage to inform the public regarding laws, public safety and human impacts

- Develop public outreach program to provide public "good housekeeping" tools

Fort Pond Watershed

General Watershed Characteristics

Fort Pond (Figure 9) is a small watershed situated in the hamlet of Montauk on the south fork of Long Island. Fort Pond has been closed off from the Atlantic Ocean since before the European settlers colonized the South Fork. Historically, it opened up to the Long Island Sound either on its own or with the help of the Montaukets, as intermittent inlet channels are visible on the northwest side of the pond on US Coast Survey Maps of Montauk drawn in 1838 and 1892. Modern infrastructure added includes; the railroad and industrial road along the north side of the pond, NYS Route 27 and the Montauk Center constructed on the flat area just south of the pond, major roads constructed on the east side of the Pond Edgemere Street/Flamingo Avenue and on the west side Second House Road.

The entire watershed comprises approximately 600 acres. The bathymetry of the pond is regular and gradual with an unusually deep maximum depth of 27.9 feet, making it the deepest of East Hampton Town's coves, harbors and ponds. The topography is relatively flat on the north and south sides of the pond with gradual increases in elevation in the eastern and western portion of the watershed and steep bluffs to the northeast.

Land Use and Infrastructure

The Fort Pond watershed is predominantly occupied by residential properties and commercial/industrial uses such as restaurants, shops and hotels. Vacant land also occupies a portion of the watershed and generally represents deciduous forest, vegetated tidal wetlands, grass and shrub lands and barren land (rock/sand/clay). To the south is developed as the Village of Montauk commercial center shops and restaurants with the Atlantic Ocean beyond. To the west of Fort Pond are residential homes, the Montauk School, Pathfinder Day Camp and hotels with deciduous forest beyond. To the north is industrial road, the train station and Fort Pond Bay beyond. To the east of the pond are residential and commercial properties.

Soils and Hydrology

The soils in the Fort Pond watershed are mapped by the USDA Natural Resources Conservation Services as Montauk loam/loamy sands and Bridgehampton silt loam, with lesser amounts of Carver and Plymouth sands, Plymouth loamy sand, Swansea muck, Scio silt loam, Wallington silt loam, Whitman sandy loam, urban land, tidal marshes, dunes and beaches. The

hydrologic soil group (HSG) indicates the infiltrative capacity of the soils, with A indicating high infiltration rates (i.e., sands and gravels) and D representing very poorly drained soils. The Fort Pond watershed is mostly comprised of HSG Type A and B soils with less than 5% Type C and D soils.

Existing Water Quality

Fort Pond is included under NYS DEC PWL# 1701-0122 as an impaired waterbody which needs verification due to public bathing and recreational uses that may be impaired due to the occurrence of harmful algal blooms. Additional impairments potentially include nutrient enrichment (specifically phosphorous), low dissolved oxygen levels and oxygen demand.

Completed and Ongoing Projects

The Fort Pond Watershed was the subject of additional study within the 2015 Town of East Hampton Wastewater Management Plan (WMP). Several corrective actions and management practices were recommended within the plan to address the eutrophic conditions. The recommendations from the 2015 WMP report are included below.

Water Quality Improvement Recommendations

Wastewater Treatment

- Residential cesspool and septic system upgrades to systems with nutrient removal
- Community/neighborhood wastewater treatment systems to serve areas with problematic septic systems in Montauk business areas
- Upgrades to the municipal facilities wastewater treatment system

Non-Point Source Pollution Abatement

- Critical areas will be assessed for the appropriate management practices based on site conditions, physical constraints, and retrofit feasibility to limit stormwater intrusion
- Encourage and incentivize use of green infrastructure on-site and in drainage design
    - Incentivize vegetative buffers on properties that abut the lake and adjacent to boardwalk areas in industrial and working waterfront areas

Aquatic Habitat Restoration

- Develop community based restoration projects
- Expand shellfish seeding areas and install oyster reefs to protect and enhance the shellfish population in the watershed
- Implement invasive vegetation control and promote the growth of native plants

Pollution Prevention

- Develop signage to inform the public regarding laws, public safety and human impacts
- Develop public outreach program to provide public "good housekeeping" tools

Napeague Harbor Watershed

General Watershed Characteristics

Napeague Harbor (Figure 10) is located on the north shore of the south fork of Long Island, approximately five miles west of the hamlet of Montauk, in the Town of East Hampton, Suffolk County. The fish and wildlife habitat includes the entire harbor, Napeague Meadows, and Hicks Island, most of which are within the undeveloped Napeague State Park. The habitat also includes Goff Point, in Hither Hills State Park. This approximate 1,300 acre area contains relatively shallow open water (less than 10 feet deep at mean low water), eelgrass beds, and large expanse of salt marsh, upland meadows, and sparsely vegetated sand and pebble peninsulas. This area is a high quality and productive estuarine ecosystem, supporting a diversity of fish and wildlife species that is rare on Long Island, outside of the major coastal bays on the south shore.

Land Use and Infrastructure

Napeague Harbor is generally bordered by undeveloped land, with the exception of small residential areas on the southeast and west sides. Napeague Harbor is bounded to the east by the Hither Hills State Park, to the south by marsh land with Route 27 and some residential and commercial properties beyond, to the west by marshland and a residential community on Lazy Point, and to the north by Napeague Bay.

Soils and Hydrology

The soils in the Napeague Harbor watershed are mapped by the USDA Natural Resources Conservation Services as dune land, tidal marshes, and Carver Plymouth sands, with lesser amounts of beaches, Berryland Mucky sand, Deerfield sand, fill lands, Swansea muck, Plymouth loamy sands, and Wareham loamy sand. The hydrologic soil group (HSG) indicates the infiltrative capacity of the soils, with A indicating high infiltration rates (i.e., sands and gravels) and D representing very poorly drained soils. The Napeague Harbor watershed is mostly comprised of HSG Type A soils with less than 5% Type B and D soils.

Existing Water Quality

The water quality in this area is extremely high quality and Napeague Harbor is open for shellfishing year-round. There are no listed beneficial use impairments at this time. Road runoff

from New York State Route 27 is identified as a significant contributor to non-point pollution in Napeague Harbor.

Completed and Ongoing Projects

No water quality improvement projects have been completed in the Napeague Harbor Watershed to date.

Water Quality Improvement Recommendations

Wastewater Treatment

- Residential cesspool and septic system upgrades to systems with nutrient removal

Aquatic Habitat Restoration

- Develop community based restoration projects
- Expand shellfish seeding areas and install oyster reefs to protect and enhance the shellfish population in the watershed
    - Expansion of the oyster gardening program to include more members and/or more growing areas to increase filtration and habitat provided by the culture systems
- Algae culture upgrades, larviculture upgrades, nursery system upgrades
- Implement oyster shell recycling program to reduce addition of oyster shells into landfills and provide habitat and substrate for shellfish culture
- Facilitate the protection and restoration of the seagrass population
- Implement invasive vegetation control and promote the growth of native plants

Pollution Prevention

- Develop signage to inform the public regarding laws, public safety and human impacts
- Develop public outreach program to provide public "good housekeeping" tools

Wainscott Pond Watershed

General Watershed Characteristics

Wainscott Pond (Figure 11) is a small freshwater pond located on the south shore of the south fork of Long Island, approximately one-quarter of a mile east of the East Hampton-Southampton Town line in Wainscott, Town of East Hampton, Suffolk County. The topography of the watershed is relatively flat on the south side along the Atlantic Ocean with the elevation increasing significantly inland to the north.

Land Use and Infrastructure

The Wainscott Pond watershed area of approximately 1,050 acres is predominantly agricultural land. The Wainscott Pond watershed is the only watershed in the Town of East Hampton that is highly used for agriculture and farming practices. The second largest land use in the watershed is low density residential with lesser amounts of high density residential, industrial, recreational open space, and vacant lands. Wainscott Pond is bounded to the east by beach lane and Georgica Pond, to the south by the Atlantic Ocean and, to the west by Town Line Road.

Soils and Hydrology

The soils in the Wainscott Pond watershed are mapped by the USDA Natural Resources Conservation Services as Bridgehampton silt loam and Plymouth loamy sand, with lesser amounts of Haven loam, Riverhead sandy loam, beaches, and dunes. The hydrologic soil group (HSG) indicates the infiltrative capacity of the soils, with A indicating high infiltration rates (i.e., sands and gravels) and D representing very poorly drained soils. The Wainscott Pond watershed is mostly comprised of HSG Type A and B soils.

Existing Water Quality

Wainscott Pond is included under PWL# 1701-0144 as an impaired water body due to frequent to persistent occurrences of harmful algal blooms. Aquatic life may also be impacted by resulting low dissolved oxygen in the pond. Nonpoint stormwater runoff, agricultural activity and residential on-site cesspools and septic systems are the suspected sources of pollutants.

Completed and Ongoing Projects

No water quality improvement projects have been completed to date.

Water Quality Improvement Recommendations

Wastewater Treatment

- Residential cesspool and septic system upgrades to systems with nutrient removal

Nonpoint Source Pollution Abatement

- Critical areas will be assessed for the appropriate management practices based on site conditions, physical constraints, and retrofit feasibility to limit stormwater intrusion
- Investigate and promote use of agricultural best management practices
- Investigate the need for increased buffer widths along the Pond borders

Aquatic Habitat Restoration

- Develop community based restoration projects

- Implement invasive vegetation control and promote the growth of native plants

Pollution Prevention

- Promote fertilizer management on agricultural lands in the watershed
- Develop signage to inform the public regarding laws, public safety and human impacts
- Develop public outreach program to provide public "good housekeeping" tools

Village of Sag Harbor Shoreline

General Characteristics

The Village of Sag Harbor shoreline (Figure 12) is an area of concern for water quality improvements in the Town of East Hampton. The Village of Sag Harbor is comprised of a total land area of 1.72 square miles and a total water area of 0.75 square miles, about 60% of the Village lies in the Town of Southampton and 40% is in the Town of East Hampton. The Village of Sag Harbor's lowest topographic elevations occur along its extensive shorelines and northeastern boundary, where shallow depth to groundwater is also evident. Greater than 50% of the Village lies within the 0-2 year groundwater contributing area to local surface waterbodies. The Village is prone to flooding during severe rain events and it sustained extensive long-term damage as the result of Hurricane Sandy in 2012. Surface waters and wetland include Upper, Inner and Outer Sag Harbor Cove, Morris Cove, Ligonee Brook, Sag Harbor, and Sag Harbor Bay.

Land Use and Infrastructure

Sag Harbor land use is primarily medium density residential with some recreational open space and institutional uses and lesser amounts of commercial, industrial, high and low density residential, utilities, and vacant land. Residential lots in Sag Harbor are based on historic settlement patterns and many lots do not conform to current lot size and overall density requirements recognized today as being necessary for groundwater and surface water protection. With many small developed lots in proximity to TMDL waterbodies and in high groundwater areas, it is likely that on-site sanitary treatment systems are contributing to local water quality impairments.

Sag Harbor has its own Wastewater Treatment Facility (WWTF); however, this primarily serves downtown commercial areas in the heart of the north end of the Village. It was first designed as an extended aeration process plant, using chlorine to kill bacteria before entering the bay. The plant has since been upgraded to a sequential batch reactor system (SBR), which processes the effluent using an ultra-violet light system to reduce bacteria prior to outflow. The

SBR facility, with a 0.25 (MGD) design flow, provides tertiary treatment and discharges to Sag Harbor. The remainder of the Village relies on cesspools and septic systems for on-site sanitary wastewater treatment.

The Village operates a municipal separate storm sewer system with 17 outfalls to surface water bodies. Comprised of storm sewer pipes as well as streets and channels, the Village's storm sewer system includes several road ends that contribute direct runoff into surface waters.

Soils and Hydrology

The soils in the Village of Sag Harbor are mapped by the USDA Natural Resources Conservation Services as Carver and Plymouth sands, cut and fill land, with lesser amounts of Plymouth loamy sand, tidal marsh, urban land, Montauk loam, Wareham loamy sand, Berryland mucky sand and beaches. The hydrologic soil group (HSG) indicates the infiltrative capacity of the soils, with A indicating high infiltration rates (i.e., sands and gravels) and D representing very poorly drained soils. The Village of Sag Harbor is mostly comprised of HSG Type A soils.

Existing Water Quality

Sag Harbor and Sag Harbor Cove is included under PWL# 1701-0035 as an impaired water body due to shellfishing use that is considered to be impaired by pathogens. Recreational uses are also considered to be stressed by occasional algal blooms. Based on surrounding land use and other knowledge of the waterbody, the most likely sources of pathogens to the waterbody are largely nonpoint runoff from developed urban and residential areas, direct waterfowl/wildlife inputs; and boats and marinas.

Completed and Ongoing Projects

The village has completed water resource mapping; including watersheds, sewered areas, groundwater contributing areas, depth to water table, wetlands, impaired water bodies, and areas of substandard lots, to facilitate analysis of water quality improvement project potential and benefits.

Water Quality Improvement Recommendations

Wastewater Treatment

- Residential cesspool and septic system upgrades to systems with nutrient removal
- Conduct feasibility testing to determine the advisability of extending the area served by the WWTF to include nearby businesses with high wastewater flows on small parcels and/or with shallow depth to groundwater

Nonpoint Source Pollution Abatement

- Critical areas will be assessed for the appropriate management practices based on site conditions, physical constraints, and retrofit feasibility to limit stormwater intrusion
- Encourage and incentivize use of green infrastructure on-site and in drainage design

Aquatic Habitat Restoration

- Develop community based restoration projects

Pollution Prevention

- Develop signage to inform the public regarding laws, public safety and human impacts
- Develop public outreach program to provide public "good housekeeping" tools

IMPLEMENTATION PLAN

Certification

Before any revenues from CPF may be expended for a water quality improvement project by the Town, each project must be approved by the Town Board, by resolution. Each project will be considered by the Town Board by priority as outlined in this plan where the most prevalent pollutants affecting water quality in the Town and which projects maximize the removal of such pollutants in the most cost effective manner are executed first. The Town Board shall not certify projects as eligible to receive CPF funding that have the purpose or result of accommodating new or additional residential or commercial growth or development. The Town Board shall also not certify projects which fail to demonstrate a net reduction in nitrogen, other nutrients of concern or contaminant loads from existing levels.

Water Quality Technical Advisory Committee

Water quality improvement project design and implementation will be reviewed by a Water Quality Technical Advisory Committee prior to consideration by the Town Board. The committee will make its recommendations directly to the Town Board and will be composed of five (5) to seven (7) individuals knowledgeable about local water quality issues and solutions such as scientists, environmental organizations, local non-profits, and government representatives. The committee will be separate from the main CPF advisory board that currently assesses the purchase of properties in target areas. Members of the committee shall not have financial stake or indirectly gain funding for their organization as part of any outcome of the program. The objective of the

committee is to ensure that projects brought before the Town Board will have significant and effective positive environmental impacts based upon sound science and proven success.

Local/Regional Plan Consistency

The water quality improvement recommendations for the Town of East Hampton provided in this plan are consistent with many of the initiatives defined in the regional Peconic Estuary Program Comprehensive Conservation and Management Plan (CCMP). Relevant management action categories from the PEP CCMP include; nutrients management actions (N), habitat and living resources actions (HLR), pathogens management actions (P), toxics management actions (T), critical lands protection plan management actions (CLPP), and public education and outreach actions (POE). The water quality improvement recommendations for East Hampton Town as consistent with the specific PEP CCMP management actions are outlined in the table below.

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CPF Project Budget

Of the projected $4,600,000 that may be available for water quality projects on an annual basis from CPF revenue, approximately 2.4% will be needed for administrative needs. This will include the salary for one Environmental Analyst and associated office expenses. The Environmental Analyst will be responsible for:

- Day to day implementation and over-sight of approved projects;
- On-site inspection for compliance of approved projects;
- Grant writing to leverage additional funding;
- In house research of additional watershed projects as appropriate;
- Presentation and technical review with the WQTAC

All of the above duties are to be conducted at the discretion of and in conjunction with the Natural Resource Department and the Town Board. The remaining 97.6% will be expended for water quality improvement projects directly.

Cost-Benefit Analysis

The WQTAC and the Natural Resources Department shall support an independent evaluation of project costs and benefits for each stage of analysis to the Town Board. Any proposed water quality improvement project shall be required to demonstrate a cost-benefit analysis with the following findings:

a. Project shall be have a probable use life of at least five years;
b. Consistent with one or more regional water quality improvement plans;
c. Advance measureable water quality improvement;
d. Comply with specific existing or proposed state/regional water quality standards/targets;
e. In the case of aquatic habitat restoration, the project shall be supported by scientific studies demonstrating how it will successfully promote aquatic habitat restoration, and;
f. In the case of pollution prevention, the project shall reduce or eliminate the use, generation or discharge of toxic or hazardous substances, or nutrients.

Implementation Schedule

The following table is an estimated implementation schedule for water quality improvement projects and initiatives including an approximate rating of project priority and cost.

Implementation Schedule								
Year 1-2	**Priority**	**Cost**	**Year 3-5**	**Priority**	**Cost**	**Year 6-10+**	**Priority**	**Cost**
Establish Water Quality Technical Advisory Committee (5-7 members) and initiate project oversight	****	$	Continue project oversight by the Water Quality Technical Advisory Committee	****	$	Continue project oversight by the Water Quality Technical Advisory Committee	****	$
Develop and promote incentive rebate program for septic system upgrades	****	$	Promote incentive rebate program for homeowners to upgrade septic systems	****	$	Promote incentive rebate program for homeowners to upgrade septic systems	****	$
Investigate locations for potential individual on-site wastewater treatment and initiate local pilot studies for nitrogen reducing systems in residential areas upon SCDHS approval of technology	***	$	Install incentivized individual on-site innovative and alternative wastewater treatment systems with nitrogen removal in priority areas and monitor effectiveness	****	$$$	Install incentivized individual on-site innovative and alternative wastewater treatment systems with nitrogen removal and monitor effectiveness	****	$$$$
Promote incentive program for use in high density residential/commercial areas and investigate locations for potential community wastewater treatment	****	$	Install incentivized community on-site innovative and alternative wastewater treatment systems with nitrogen removal in priority areas and monitor effectiveness	****	$$$	Install incentivized community on-site innovative and alternative wastewater treatment systems with nitrogen removal and monitor effectiveness	****	$$$$
Investigate locations for septic system upgrades with nitrogen reducing technology on Town owned properties	****	$	Install upgraded septic systems with nitrogen reducing technology on Town owned properties and monitor	****	$$$	Install upgraded septic systems with nitrogen reducing technology on Town owned properties and monitor	****	$$$
Install PRBs in specified locations in high priority watersheds	****	$$$	Monitor denitrification results from PRB locations and evaluate effectiveness of PRB over-time	***	$$	Monitor denitrification results from PRB locations and evaluate effectiveness of PRB over-time	***	$$
Conduct stormwater management assessments in unassessed watersheds	***	$$	Implement stormwater management BMP improvements in watersheds	****	$$$	Monitor the effectiveness of stormwater management improvements and need for maintenance	**	$$
Implement stormwater management BMP improvements in watersheds where assessments were previously completed	****	$$$	Monitor the effectiveness of stormwater management improvements and need for maintenance	***	$$	Encourage and incentivize use of green infrastructure in site and drainage design	**	$$
Develop educational materials detailing the benefits of natural buffers along shorelines Develop signage to inform the public regarding laws, public safety and human impacts to surface water	*	$	Amend Chapter 255, Article IV of Town Code to include minimum buffer width requirements.	**	$	Develop a public outreach program to educate the public on the resources and importance of the Lake, organize volunteer activities, and provide the public with “good housekeeping” tools.	**	$
Develop educational materials detailing the harmful impacts of invasive species Perform invasive species removal and revegetation of native species	*	$	Perform regular Early Detection/Rapid Response surveys for the prevention of invasive species spreading throughout watersheds Perform invasive species removal and revegetation of native species	**	$	Perform regular Early Detection/Rapid Response surveys for the prevention of invasive species spreading throughout watersheds Perform invasive species removal and revegetation of native species	**	$
Develop Public Education Outreach programs specific to the Federal No Discharge Law	**	$	Install vessel pump out stations in harbors where needed	**	$$	Install vessel pump out stations in harbors where needed	**	$$
Establish seagrass grow out areas	***	$$	Revegetate former eelgrass beds if habitat is restoration ready	***	$$	Expand shellfish seeding areas and install oyster reefs to protect and enhance the shellfish population in the watershed	***	$$

Priority Rating System			**Cost Rating System**	
Low Priority	*		>50,000	$
Low-Medium Priority	**		50,000-100,000	$$
Medium-High Priority	***		100,000-300,000	$$$
High Priority	****		300,000+	$$$$

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