



4.0 RECOMMENDATIONS

The characterization of water resources within the Lake Montauk Watershed, input from the TAC and the public, and regulatory considerations were all considered and factor into the development of recommendations in support of improvement of water quality. The overall intent of this document is to identify those measures that can be implemented to reduce existing water quality impacts and make meaningful strides toward water quality improvement. The recommendations provided herein will be incorporated into an Implementation Plan which will further evaluate each recommendation as well as specific improvement projects, with respect to priority in scheduling and methods for implementation.

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

4.1 Waterbody Recommendations

As demonstrated in **Section 2.4.4** of the Watershed Characterization, two areas within Lake Montauk in particular demonstrate consistent elevated levels of pathogens; the southern portion of the Lake and the Coonsfoot Cove area (between Star Island and the western shoreline of the Lake). Water quality monitoring data/analysis from CCE suggests that some of these pathogens may come from anthropogenic influences, indicating possible failure of septic systems in the Ditch Plains area. The following recommendations are provided to better understand the extent of the pathogen problem within the Lake and ascertain the source of pathogens impacting the Lake.

B-1: Establish regular water quality testing for pathogens and other pollutants within the Lake, particularly after large rain events.

Lake Montauk is identified within the Peconic Estuary Program's pathogen TMDL as an impaired waterbody. As indicated in **Section 2.4.4**, data for pathogen sampling is limited to what is conducted by NYSDEC; all other sampling efforts are not conducted on a regular basis. In addition, pathogens are the only pollutant that is regularly tested for; a significant lack of data regarding other potential pollutants (e.g. nitrogen) is lacking for the Lake. As a result, there is insufficient data for a full understanding of the dynamics of this waterbody. There is sufficient data to recognize that water quality issues exist in the southern portion of the Lake and Coonsfoot Cove area; however, a clearer understanding of waterbody dynamics and processes could be gained from regular water quality monitoring and



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measurements of tidal flushing within the system. Identifying and obtaining funding for expansion of efforts in support of regular water quality monitoring of this waterbody would further assist in identification of measures to improve water quality and reduce environmental stress on this ecosystem. Water quality testing should be conducted six-eight times/year in a variety of locations and include the following parameters: temperature, clarity, salinity, dissolved oxygen (all of which can be done in the field), and total coliform, fecal coliform, Chlorophyll- α and total nitrogen via lab testing. Additionally, counts for brown tide algae and red tide algae would also be beneficial.

B-2: Expand water quality sampling parameters to determine if a significant input of pesticides is affecting Lake water quality.

General concern regarding pesticides and potential impacts on the Lake has been expressed by the community. Review of historic aerial photographs does not identify the presence of significant farming operations that could historically have contributed to pesticide input in the lake; however, single family residences have existed in the area since prior to 1938. These residences are a potential source of pesticides entering the Lake as various pesticide applications for tick, mosquito and other common pest control may be used on these residential properties. As such, it is recommended that water quality sampling for pesticides at key outfall locations be conducted in order to determine if a significant input of pesticides is entering the Lake. As pesticide sampling can be costly, initial screenings could be conducted at specific sampling locations. CCE sampling stations 2, 8, 10, 11 and 14 are suggested for initial screening as the stations have upland catchment areas with high density residential uses, the golf course, and some farming uses.

B-3: Investigate the contribution of septic systems to pollution within the Lake.

Data from CCE's DNA testing of sources of pathogens entering the Lake indicate a human source from the southern portion of the Lake (**Section 2.4.4**). Due to the poorly drained soils and the shallow depth to groundwater within the Ditch Plains neighborhood, the potential for failing sanitary systems and direct input into the Lake exists. As a result, outfalls and culverts in the Ditch Plains neighborhood should be investigated to determine if any direct inputs from sanitary systems exists. Systems in this neighborhood should also be inspected (pursuant to the provisions of Chapter 210 of the Town Code) and dye tested if necessary preceding and during heavy storm events or during periods peak usage to determine if any systems overflow and discharge directly to the existing system of wetlands and conveyance ditches that ultimately discharge to the Lake. Further recommendations regarding potential solutions to failing sanitary systems in this neighborhood are provided in **Section 4.2.3** below.

B-4: Establish regular water quality testing for pathogens, phosphorus, and chlorophyll- α in Big Reed Pond as the limited sample results available suggest potential pollutants within the pond.



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As described in **Section 2.4.4**, only one sample has been taken from Big Reed Pond by the NYSDEC, which revealed high levels of chlorophyll- α and low levels of clarity, suggesting potential pollution within the Pond. As no other known data exists regarding this pond, no conclusions regarding the health of the pond can be drawn. As a result, regular water quality testing (6-8 times per year) should be conducted within the Pond and include the following parameters: temperature, clarity, TDS, dissolved oxygen (all of which can be done in the field), and enterococcus, fecal coliform, Chlorophyll- α , total nitrogen, total phosphorus and cyanobacteria counts via lab testing. Once a data set is collected, pollutants within the Pond and potential sources can be more clearly identified. Remedial actions can then be determined to improve the health of the Pond.

B-5: Consider the use of aeration systems the lower portion of the Lake to promote growth of aerobic bacteria and stunt/reduce growth of anaerobic bacteria (most pathogens are anaerobic).

Several projects conducted in New York, New Jersey, South Dakota, Minnesota and India have demonstrated success through utilization of aeration systems to reduce pathogens within the target waterbodies. Aeration systems increase the oxygen concentration levels throughout the water column and help circulate waters to the surface, where ultraviolet can kill and or weaken the bacteria which improves water quality. **Appendix K-1** provides information on an example aeration system that has been utilized successfully in similar situations. Further investigation into this remediation technique should be conducted to determine its feasibility and efficiency, particularly for the southern portion of the Lake.

B-6 Continue to fund and expand the Town's shellfish hatchery and seeding program, including eel grass protection and restoration.

Shellfish are filter feeders, meaning that they feed on particles and organisms floating in the water column. A significant establishment of shellfish within the Lake can assist in reducing pathogens and filtration of the water; thereby improving water quality. The Shinnecock Bay Restoration program currently provides an example of such a program with similar goals.

Eel grass surveys and restoration are also part of the Town's shellfish program. As eelgrass provides essential habitat for shellfish, finfish and other marine organisms, the presence of this habitat would potentially aid in the increase in shellfish within the Lake, thereby promoting increased natural filtration of Lake waters. Continued funding to support eel grass growth in the Lake is important for the long term health of the Lake.



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B-7: Manage waterfowl populations.

Waterfowl are a key source of pathogens in surface waters. Therefore managing populations by reducing favorable conditions for waterfowl to congregate near surface water on private and public lands can assist in improving water quality. Methods to control populations include discouraging lawn areas for waterfowl to congregate near surface water on private and public lands; encourage use of fencing, unmowed surface water and wetland vegetated buffer zones, egg oiling and disruptive measures such as border collies and sonic devices where necessary. It is noted that Suffolk County and many east end municipalities are required to conduct goose management under the NYSDEC MS4 Program; therefore teaming with local municipalities, the Peconic Estuary Program and other resources may be possible for training or implementation of goose and waterfowl management programs to assist in reducing the costs for such programs. Additionally, goose/waterfowl management can be accomplished through volunteer efforts. Adoption of local laws prohibiting feeding of waterfowl on public lands (see Recommendation R-2) and providing educational material and signage regarding the issues associated with feeding of waterfowl can also help the public gather greater understanding of the issue. Educational material could also be developed for local homeowners regarding methods to control goose/waterfowl on their properties and the reasons why control of waterfowl is important to water quality.

B-8: Determine, identify and map tidal flushing and circulation in Lake Montauk.

As described in the **Section 2.4.4**, high levels of pathogens were identified in the southern portion of the Lake and in the Coonsfoot Cove area. As pathogen problems area generally not identified in other areas of the Lake, tidal flushing may play a key role in pathogen residence times resulting in the pollution impairment. Consideration should be given to conducting a study that would evaluate the circulation within the Lake and estimate residence time of surface water in key impairment areas of the Lake. Such a study would aid in determining additional remedial factors that could remove Lake impairments.

4.2 Upland Recommendations

This section details recommendations that would apply to the upland areas that contribute to surface waters, involving: stormwater runoff reduction; municipal facility improvements; upland wastewater management; regulatory guidance; natural resource enhancement and invasive species control; and, stewardship and public education. All recommendations pertain to land surface areas and would aid in improving environmental conditions including groundwater and surface water quality.



4.2.1 Stormwater Runoff

Specific best management practices (BMPs) to help reduce pollutant loads from stormwater runoff at specific locations are described below. Stormwater BMPs may provide pollution source reduction, pollutant removal and flood control. The NYSDEC issued an updated Stormwater Design Manual in August 2010 (hereafter “2010 Design Manual”) which includes new guidance on the use of low impact design (LID) principles (i.e., preservation of open space and clustering development, reduction of impervious surfaces, retention of natural buffers, etc.) to reduce runoff volumes generated from development activities and the use of “green infrastructure” practices (i.e., rain gardens, bioretention areas, vegetated swales, green roofs, etc.) to provide water quality treatment close to the source of the runoff by utilizing natural features, promoting groundwater recharge and emulation of preconstruction hydrology. Where possible, LID and green infrastructure practices are recommended herein.

Drainage improvement projects were selected based on land use and impervious cover within the contributing area, proximity of potential pollutant sources to surface waters and availability of publically owned land in proximity of the discharge point(s) for physical placement of drainage improvement projects. Sample details and general information on improvement projects are provided in

Appendix L. In general, it would be beneficial to conduct long term water quality monitoring in proximity to implemented projects to provide a measure of the project’s success. Pilot programs for long term monitoring could be considered to provide an initial evaluation of the cost vs. benefits of such a program. The identified improvement projects are described below (see **Figure 22**):



S-1: Coordinate with the operators of the animal farm located on South Fenimore Drive to prepare an agricultural BMP program and create a vegetated buffer surrounding the on-site pond to reduce pathogen input into the Lake.



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Inspection of the farm property revealed several areas for potential improvement, especially as it relates to pathogen pollution of the Lake. As such, the Town should coordinate with the operator of the farm to ensure that best management practices are applied on the property. Noted potential improvements include:

- Regular removal and disposal of animal manure within the animal paddocks.
- Establishment of a vegetative buffer around the on-site pond to provide for filtration of nutrients entering the pond.
- Control of animal access to the waterbody to reduce direct deposition of manure.
- Control runoff from the barnyard.
- Compost manure to the maximum extent feasible.
- Store manure in a properly constructed facility if it cannot be utilized.
- Goose management on open mowed areas.

The combined use of improvements to this farming practice could result in a significant pathogen reduction to the Lake, as pathogens from these sources currently have a direct vector to the Lake. It is noted that Station 7 of CCE's DNA analysis identified horses as one of the sources of pathogens taken from that sample, further suggesting that improvements to this farm could foster a reduction in pathogen inputs to the Lake. Improvements at this site would benefit from long term water quality monitoring to demonstrate project success. As such, these improvements could be part of a long term monitoring pilot program.

S-2: Create a shallow vegetated drainage depression at the landscape medians between the intersections of West Lake Drive, North Fernwood Drive and Star Island Road.

The landscape medians at this location form two "triangles" that consist of mowed lawn. Currently, stormwater is captured in this area via raised catch basins that may discharge directly to the Lake. The lawn area presents an opportunity for a shallow vegetated drainage depression that would provide catchment and biological uptake of nutrients and pathogens prior to overflow to the Lake. Vegetation could consist of native grasses that could be mowed periodically so that these areas may continue to be utilized for staging during community events while continuing to provide biological uptake of pollutants in stormwater. Subsurface leaching galleys could be utilized to provide further storage and detention of stormwater in this area. These measures would directly reduce pathogen and nutrient input to the Lake.

S-3: Investigate the feasibility for drainage improvements on the north side of Montauk Highway, opposite Caswell Road.

Information provided by Town staff and data reviewed for this report indicates that the Ditch Plains neighborhood is a potential significant source of pathogens to the



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Lake. This area is known for poorly draining soils, shallow depth to groundwater, and high development density all of which contribute to increased runoff and potential failure of septic systems during storm events. As a result, effective improvements for this area are limited. Further discussion of sanitary system improvements is provided in **Section 4.2.3**. A potential stormwater improvement project could be located in the area on the north side of Montauk Highway, opposite Caswell Road (see **Figure 22**).

Additional feasibility analysis should be conducted to determine connectivity of the existing stormwater system and options for stormwater improvements in this area; however, preliminary investigations suggest that a constructed wetland would be beneficial for pathogen treatment. Constructed wetlands have been utilized around the country as effective means of pathogen treatments. An example is provided in **Appendix L**. Generally, these engineered wetlands consist of a wet pond or initial detention area that overflows to a vegetated wetland areas to provide biological treatment, that would eventually overflow and discharge to the Lake. Significant attenuation is provided through such a system, effectively reducing pathogen inputs to the target waterbody.



S-4: Implement the proposed drainage improvement project prepared for the South Lake Beach parking lot in the NYSDEC MS4 Retrofit Plan.

The South Lake Beach parking area is currently asphalt that leads to the beach entrance. In preparation for the Town's Retrofit Plan for the Lake, a drainage improvement project for this area was suggested to reduce runoff from the parking lot. The proposed project included regarding of the parking area that would pitch the runoff to a pervious swale located in the center of the lot.



S-5: Implement the proposed drainage improvement project prepared for the Star Island Town Dock in the NYSDEC MS4 Retrofit Plan.



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The Star Island Town Dock currently consists of an asphalt area utilized for parking and storage of fishing equipment and supplies. In preparation for the Town's Retrofit Plan for the Lake, a drainage improvement project for this area was suggested to reduce runoff from the parking lot. The proposed project included installation of permeable pavement for the parking area, installation of garbage receptacles and relocation/organization of commercial fishing equipment.

S-6: Implement the proposed drainage improvement project prepared for the West Lake Drive Boat Ramp in the NYSDEC MS4 Retrofit Plan.

The Star Island Town Dock currently consists of a gravel/dirt area utilized for boat access to the Lake. In preparation for the Town's Retrofit Plan for the Lake, a drainage improvement project for this area was suggested to reduce runoff from the boat ramp. The proposed project included installation of permeable pavement for the ramp, relocation of bluestone storage that occurs on the side of the ramp, and installation of a bioretention area on the side of the ramp.

S-7: Create a bioretention area on the northwest corner of West Lake Drive and Flamingo Avenue.

The parcel located on the northwest corner of West Lake Drive and Flamingo Avenue is currently owned by the Town through purchase utilizing Community Preservation Funds. This site provides an opportunity for installation of a bioretention area to provide catchment and treatment of runoff draining from the surrounding roadways.

S-8: Provide pre-treatment where feasible for existing and proposed drainage infrastructure.

While several direct outfalls exist to Lake Montauk, it is recognized that it may not be feasible to remove all of these due to the constraints inherent in the characteristics of the watershed (e.g., poorly draining soils, presence of wetlands, etc.). As a result, providing treatment of stormwater prior to its discharge to an outfall would aid in water quality improvements without compromising existing drainage. Pre-treatment options include bioretention areas, vegetated swales, catch basin inserts and other green infrastructure techniques. Vegetated options (such as bioretention and vegetated swales) have the additional benefit of providing nutrient uptake through the root systems of the vegetation. These systems can be designed to provide "off-line" treatment for regular storm events. Stormwater drainage system inserts provide a method for treating pollutants within existing drainage infrastructure, where limited land area is available. Many municipalities in Long Island are currently utilizing such inserts to aid in pollution reduction. Inserts require regular maintenance and replacement of filter media to ensure effectiveness of the practice. (See **Appendix L** for examples/cut sheets).



4.2.2 Municipal Facilities Recommendations

M-1: Complete a GIS based mapping of the entire stormwater management system and “sewershed”. Utilize the GIS mapping and a GIS database to effectively map locations and track maintenance and inspections of stormwater management practices.

The NYSDEC MS4 Permit requirements include mapping of all outfalls and storm sewershed (or the catchment area that drains into the storm sewer system based on the surface topography in the area served by the stormsewer). Mapping the overall system using GIS provides a means to maintain and update information associated with the stormwater infrastructure, including tracking systems for maintenance (i.e., which catch basin has been cleaned out, the frequency of cleanings needed and, establishment of a regular maintenance schedule). This tracking system would also aid in prioritization of catch basin cleanouts, repairs and replacements, as well as help prioritize areas for street sweeping based on the frequency of necessary drainage cleaning.

It is important to note that all stormwater management systems require maintenance to ensure the practices are properly functioning. GIS is an excellent tool to keep mapping updated and track information such as frequency of inspections and maintenance of the systems. It is important for the Town to keep stormwater system mapping up to date and for the mapping to be used by highway and maintenance staff to ensure maintenance personnel are aware of the locations of specific stormwater practices and are fully informed regarding the specific maintenance requirements of the stormwater practice (i.e., maintenance personnel know the locations of all systems with inserts and when such inserts need to be changed; know the location of bioretention areas and so vegetation is properly maintained, etc.).

M-2: Coordinate with NYS to establish a Goose Management Program on the Montauk Downs golf course.

Interviews with the Montauk Downs Golf Course facilities manager and inspection of the golf course revealed a need for a goose management program within the golf course. Measures that could potentially reduce the presence of geese on the golf course include egg oiling and disruptive measures such as border collies and sonic devices. The Town should seek to work with the State and the golf course manager to determine the best option for goose management on the golf course, which would further reduce pathogen input from goose waste.



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M-3: Obtain funding for and construct a salt brine preparation facility for use in the Town.

Conversations with the Town indicate the desire for expanding the use of brine for treatment of roadways (rather than sand/salt mixes). Brine is sprayed on to roads before snow starts falling to prevent precipitation from forming a strong, icy bond with the pavement and reduces the amount of salt needed during a storm, since larger quantities of dry salt are needed to de-ice a road in temperatures below 20 degrees. The Town currently obtains their brine from the Town of Southampton and would like to reduce cost and efficiency by establishing a Town operated brine facility. Such a facility would provide long term cost savings as the need for transport of the brine would be eliminated. The Town has indicated it would be willing to provide brine to nearby municipalities such as the Village of East Hampton. The facility would allow for improved road maintenance during winter storms and would reduce the need for sand and salt which are known pollutants.

4.2.3 Groundwater and Wastewater Recommendations

W-1: Develop a program to enforce Town Code §210-5-1 and §210-6-1 which requires inspection and regular maintenance (every three years) of septic systems.

All sanitary systems within the groundwater contributing area to Lake Montauk have the potential to contribute nutrients to the Lake. Areas with sanitary systems situated in locations with shallow depth to groundwater have the greatest potential to discharge nutrients and pathogens to Lake Montauk. Sanitary systems without adequate vertical separation between the bottom of the leaching pool and groundwater do not function properly as there is insufficient conversion of ammonia to nitrite and nitrate (the nitrification part of the intended treatment process) and reduced natural attenuation of the sediments separating the system from groundwater. Additionally, as some systems may be located in clay soils with poor leaching capacity, overflow from these systems during storm events may directly discharge pathogens to surface runoff. As a result, there is a greater potential for groundwater transport and surface water release of available nitrogen and biological pollutants (bacteria and virus) to the Lake.

A program which enforces Town Code §210-5-1 and §210-6-1 which require regular sanitary system inspection and maintenance could be established to require property owners to provide proof of inspection and certification of sanitary systems once every three years. In addition to inspection by a licensed contractor, certification of the system could also be achieved through proof of maintenance (i.e., pumping of the sanitary system) within the three year time frame or proof of new system installation compliant with current SCDHS requirements (i.e., systems



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constructed after 1981). If inspection revealed a failing system or a system which could not be certified pursuant to SCDHS requirements (aged system), the system would either have to be pumped or replaced, depending on the severity of the failure. Once property owners demonstrate certification of a SCDHS approved system (updated since 1981), no additional submission/proofs of a compliant systems would be required (which may encourage property owners to replace antiquated systems rather than continually pumping the systems). **Figure 8** illustrates areas which may potentially have shallow depth to groundwater (less than 8 feet)¹, and could be utilized as a basis for initial strict enforcement of the inspection program. **Figure 4** identifies areas of potential poorly draining soils.

Part of the inspection program could include dye tracking of systems potentially located in poor soils and/or shallow depth to groundwater. This could be accomplished through the use of dyes added to sanitary systems prior to storm events. Systems that are not functioning would become apparent during a storm event as the added dye would exit the system via surface flow and discharge to the nearest waterbody. Tracking of the pigment could also aid in identifying major overland conveyances of stormwater that discharge directly to the Lake.

W-2: Investigate alternative options for treatment of septic waste in high density areas within the watershed.

As described in the **Section 2.2**, portions of the watershed are constrained by poorly draining soils, shallow depth to groundwater and high density of development. As a result, many individual sanitary systems may not be functioning as intended and may provide a direct vector for pathogen contamination to the Lake. As a result, several alternatives to use of individual systems should be considered to aid in improving the conditions that result in the direct discharge of pathogens. Suggested considerations are provided below and further details are provided in **Appendix K-2**.

- A. Installation of Small Community Treatment Systems – Wastewater systems can be implemented that achieve pathogen removal to water quality standards as well as nitrogen removal. However requiring property owners to pay for the full cost of improved wastewater systems may be unaffordable. Grants and alternative funding/financing techniques should be investigated to address the affordability issue.
- B. Alternative Treatment Systems – Research in alternative systems for coastal areas with significant site constraints such as high groundwater tables, poor soils, and small lot sizes has shown success in removal of bacteria and nitrogen using various bed filters (with sand, peat, foam, or textile media), aerobic

¹ This figure was generated utilizing GIS to graphically evaluate data from both Suffolk County LiDAR topographic data and USGS groundwater elevation data.



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treatment units, or fixed activated sludge systems followed by either a traditional type soil absorption field or pressurized drainfields. The University of Rhode Island completed the “National Decentralized Water Resources Capacity Development Project”², which has conducted a number of pilot research projects in Towns and Villages throughout Rhode Island, and showed the effective pollutant removal capabilities of these systems. Suffolk County Department of Health Services has announced its intention to investigate possible alternative systems for use in Suffolk County.

- C. Investigate Community Sewer Systems in Critical Areas within the Lake Montauk Watershed – There are higher density areas and higher intensity land uses within the Lake Montauk Watershed that do not meet current Suffolk County Sanitary Code density requirements (lots less than 20,000 SF in size and uses including restaurants and hotels within the northwest portion of the watershed, Star Island, Ditch Plains neighborhoods, etc.). A study investigating the feasibility of community sewerage would be beneficial in reducing sanitary pathogen inputs to the Lake. Such a study would include an assessment of available parcels/land for siting of a facility, cost of facility construction, cost of landowner connection, and assessment of potential grant funding available. It is noted that the Town is currently conducting a Comprehensive Wastewater Management Plan that will further address the feasibility and needed information to install sewer systems within the Town.
- D. Use of Permeable Reactive Barriers in Proximity to the Shoreline – While the above described systems are most likely to occur over a longer period of time, use of Permeable Reactive Barriers in key areas may aid in reducing pathogen inputs to the Lake in the short term. These barriers are installed in proximity to the shoreline where the groundwater output to surface water is fairly shallow and can intercept pathogens and nutrients carried in groundwater to the Lake. Effectiveness of such barriers have been determined to be better than that of sand filters, as demonstrated by a study performed at the University of Waterloo (Smyth et al., 2004).

W-3: Consider a cost-shared pump-out and water conservation kit program to aid in cost reduction for sanitary system maintenance and/or replacement.

It is recognized that sanitary system maintenance may be an economic hardship for some residents within East Hampton given the cost of transportation and disposal of pumped sanitary waste. As such, a cost-share program would aid in making sanitary system maintenance or replacement more affordable and would facilitate and encourage homeowner compliance. Similar programs have been successful in other communities throughout the country, including a recent program initiated by the Town of Southampton for a septic system rebate program that allows for rebates associated with the upgrade, repair, or replacement of existing septic systems that

² University of Rhode Island Cooperative Extension Kingston, RI, 2004. NDWRCDP Project Number: WU-HT-01-17. (<http://www.uri.edu/ce/wq/nemo/Publications/PDFs/WW.PlanningHandbook.pdf>)



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comply with the Suffolk County Department of Health Services regulations. Case studies for other such programs conducted in Keuka Lake NY, Jamestown RI, and Fairfax Virginia are provided in **Appendix K-3**.

W-4: Provide wetland restoration and water quality improvements within the Lake by reconstructing the wetlands in Ditch Plains to engineered wetlands planted with native species to provide for vegetative pathogen removal of waters seeping from the Ditch Plains area.

Inspection of the wetland system in the Ditch Plains neighborhood that ultimately discharge to the Lake reveals poor quality wetlands dominated by invasive species that are most likely not providing the best possible biological treatment possible within these wetlands. Restoration of these wetlands could include engineering of the inputs to the wetlands, engineering of the soil beneath the wetlands and restoration with native species, all of which would provide enhanced treatment of groundwater and stormwater entering the system. In order to provide further treatment prior to discharge to the Lake, additional land in the vicinity should be acquired for use as a large scale bioretention area if parcels become available (see Recommendation V-8). Coordination with the NYSDEC would be required for any restoration plan as all of the wetlands are regulated by the State.

4.2.4 Regulatory Recommendations

R-1: Establish a Lake Montauk Protection Overlay District for properties located within the watershed.

Review of local laws, programs and practices indicates several regulatory gaps that could be filled through the establishment of a protection overlay district. Some of these gaps include:

- Specific regulations for marinas to ensure use of best management practices;
- Minimization of the creation of impervious area of sites to be developed or redeveloped
- Protection of large trees and native species
- Creation of vegetative buffers around wetlands

Creation of the protection overlay district could allow for regulations targeted specifically to the Lake Montauk watershed thereby specifically addressing pollutants unique to Lake Montauk.

New York State passed enabling legislation in 2012 which allows local municipalities to establish Watershed Improvement Districts (“WID”). The establishment of a Watershed Improvement District would enable the Town to



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establish specific plans and a dedicated funding mechanism for specific water quality improvements within the watershed area. WIDs have been established successfully in many areas throughout the County, including long running programs in Montgomery MD, Arlington VA and Philadelphia PA. Many function similar to other utility programs, where a basic fee structure is established based on impervious cover and land use to collect funding for critical projects and programs aimed at improving water quality within the watershed. Examples of improvement projects include low interest loan or grant programs offered to home or business owners within the WID to enable sanitary system upgrades and green infrastructure improvements, restoration projects and planning programs. WID have also established incentive programs where property owners are eligible for reductions in the WID fees when they complete property upgrades that have positive water quality benefits, such as installation of green infrastructure improvements or upgrades to sanitary systems (see Recommendation R-4).

R-2: Develop a law and associated signage prohibiting the feeding of waterfowl as they contribute nutrients to surface water and stormwater runoff.

Several studies demonstrate that waterfowl (particularly resident Canada Geese) significantly contribute to nutrient inputs to surface waterbodies from excrement. Feeding of waterfowl encourages long term residence of birds that would otherwise migrate to other areas. As a result, a larger proportion of waterfowl excrement is generated and has potential to enter surface waterbodies directly or during storm events. Prohibition of feeding of waterfowl would discourage long term residence of these birds thus resulting in improved water quality conditions of Lake Montauk.

R-3: Develop and implement programs and policies to aid in enforcement of the Federal No Discharge Zone.

Recommended implementation program elements include:

- Use of dye tablets to ensure boats are in compliance with the law;
- Expand boat pump-out service to seven day per week service until November 1st of each year;
- Provide a backup phone number for boaters to reach the pump out boat.

Current programs and policies do not provide for regular tracking and testing of boats utilizing the Lake and limits pump-out service to the end of September each year. As the Lake is part of a Federal No Discharge Zone, tracking of boat waste and providing enhanced pump-out service would aid in minimizing sanitary discharge from boats to the Lake. Additionally, a back-up phone number would allow for more boaters to reach the mobile pump-out boat during seasons with high boat traffic.



R-4: Encourage and incentivize use of green infrastructure in site and drainage design.

If a protection overlay district is established as described above, consideration should be given to the inclusion of drainage requirements that encourage cost effective runoff reduction techniques and green infrastructure, such as use of grass swales, use of rain gardens in parking lots and on residential properties, and bioretention infiltration areas. Incentives may be provided to further encourage the installation of green infrastructure techniques rather than conventional drainage systems. As described in Recommendation R-1, WID are another mechanism by which incentives can be created to encourage and incentivize the use of green infrastructure.

R-5: As described in Recommendation W-1, create a program to enforce inspection and certification once every three years for sanitary systems. Additionally, as described in W-3, explore the establishment of a cost share program to aid in septic system inspection and certification.

As described in Recommendation W-1 above, implementation of a sanitary inspection and certification program is a method to ensure that sanitary systems in areas with the greatest potential for transport of pollutants to surface waters and groundwater are properly functioning. It is suggested that a program be developed to enforce the existing Town Code requirements of septic system inspection and certification once every three years, particularly in areas identified as potentially having shallow depth (less than eight feet) to groundwater or in areas with known poorly draining soils. **Figure 8** provides a map which depicts areas of potential shallow depth to groundwater and **Figure 4** illustrates areas with potentially poor soils. In order to ensure the licensed sanitary contractor provides accurate assessments, it is recommended that a fine be incorporated into the Code for a contractor providing false information. Certification of the system could also be achieved through proof of maintenance (i.e., pumping of sanitary system) within the three year time frame, proof of a properly designed system (i.e., system meeting SCDHS design requirements), or proof of adequate depth to groundwater or adequate soils through a test boring. Once a system is certified as meeting SCDHS and/or Town Harbor Protection Overlay District design requirements and having adequate depth to groundwater, no further requirement would apply. If inspection reveals a failing system, the system would either have to be pumped or replaced, depending on the severity of the failure. If system replacement becomes necessary, it would be done so in conformance with SCDHS and/or Harbor Protection Overlay District approved design and oversight as required.

It is recognized that pumping or replacement of sanitary systems can be very costly. As described in W-3, a cost share program could be explored to aide in reducing



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the cost to homeowners, providing further incentive to perform regular maintenance or replacement of failing systems.

R-6: Amend Chapter 255, Article IV of Town Code to include minimum buffer width requirements.

While Chapter 255, Article IV (Zoning: Protection of Natural Resources; §255-4-30, 40) prohibits clearing or establishment of turf or landscaping within 50 feet of a wetland boundary or bluff or dune crest, no specific standard is required for vegetative buffers and there is no code provision requiring the re-establishment of native vegetative buffers that pre-exist §255-4-30, 40. Although buffers should be as wide as possible to protect water quality, requiring the restoration of a minimum buffer width for those parcels where the native vegetation has been removed would provide an established standard to ensure some protection of a waterbody from stormwater runoff generated from site improvements. It is noted that the majority of the Lake's frontage is currently developed, some of which consists of intense maritime uses that present challenges for the establishment of large buffer areas.

Redevelopment provides an opportunity to establish native buffers and provide stormwater treatment. In recognition of potential site constraints, particularly on water dependent uses, the establishment of a 50 foot wide buffer consisting of native plant species is the minimum recommended for redevelopment of residential properties fronting the Lake, while a minimum 20 foot wide buffer is recommended for the redevelopment of existing commercial properties (where parking lots immediately abut the Lake). In recognition of the limitations of some of the commercial uses that abut the Lake, an option to install a permeable reactive barrier (PRB) behind a bulkhead to provide filtration of stormwater contaminants in place of the vegetated buffer could be given to applicants so that loss of waterfront space vital to the commercial use does not occur. An example of a typical installation of a barrier behind a bulkhead is provided in **Appendix L**.



R-7: Provide dedicated funding for enforcement of waterway regulations within the Lake.

Enforcement of regulations that apply to the Lake are currently limited by a lack of available funding for staffing for the Harbormaster patrol and pump out boat. Dedicating funding to provide a full time patrol staff member for the Lake would aid in ensuring boats are using pump out facilities, following speed restrictions for no wake zones, mooring in proper locations, etc. Additionally, residents have



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indicated the need to extend the availability of the pump out facilities until mid-November, when many boats are taken out of the water. Funding could be procured through grants, a dedicated line item in the Town's budget or WID funding (if such a District were formed).

R-8: Work with Suffolk County on tick control measures for areas within the watershed.

As of 2015, Suffolk County Vector Control will be tasked with preparing and implementing a yearly tick control plan as a result in the rise of tick borne diseases, such as Lyme disease. The Town has the opportunity to work with the County to ensure concerns regarding pesticide input into the Lake and best management practices to minimize pesticide impacts are utilized for tick control. Practices could include efforts to control ticks on deer, such as the CCE Four Poster Program (which utilizes a pesticide on an apparatus which a deer rub against while feeding, thereby inoculating the deer with tick repellent).

R-9: Implement a moratorium on the installation of new docks so their impacts on the benthos of the Lake can be studied in greater detail.

The Town has expressed concerns regarding the increase in the number of docks within the Lake and their potential impact to the aquatic bed, particularly impacts to eel grass which is key component to the health of the Lake. To date, two studies have been conducted on dock expansion to which the results were inconclusive as to their impacts. As a result, a moratorium would enable the Town to conduct a comprehensive study on the impacts of docks to both the benthic and pelagic community within the Lake.

4.2.5 Natural Resource & Invasive Species Management

Recommendations N-1 and N-2 below would greatly benefit from an incentive program. Such a program could be modeled after the Peconic Estuary Program's recent successful homeowner incentive program, which provides a cash rebate for property owners to install rain gardens that were a minimum of 50 SF in size and/or install rain barrels. A similar program could be created to include commercial properties within the watershed which would aid in further implementation of the recommendations.

N-1: Encourage and incentivize the use of vegetative buffers on properties that abut the Lake.



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Encourage the use of vegetated buffers adjacent to the Lake both on public and private lands. Vegetated buffers serve as effective means of stormwater filtration prior to entering the bays, harbors and marine surface waters. Several parcels that directly abut the Lake have lawn that extends directly to bulkheads or other shoreline stabilization structures. As the lawns are generally pitched toward the waterbody, direct discharge from the lawns, which may be fertilized or which may contain goose or pet waste, is entering the waterway. A vegetative buffer created in these areas would provide filtration of pathogens and nutrients prior to overland flow to the Lake. It is noted that these buffer areas could be configured to allow for pathways/walkways to the bulkhead or other dock structures if needed. Educational brochures targeting the benefits of such buffers could be sent to property owners within the watershed, as well as required as a part of any Building Permit, Special Permit, Wetland Permit or variance application review.



N-2: Encourage and incentivize the usage of vegetative buffers and filter strips adjacent to boardwalk areas in industrial and working waterfront areas that abut the Lake.

It is recognized that portions of the Lake (particularly the northwest corner) serve as working waterfronts that depend on the access to the Lake for survival of businesses. Currently, many of these areas have gravel parking lots that may have been installed to serve as pervious surfaces for the business establishment, however, compaction over time has rendered these surfaces as impervious and as such, stormwater will flow directly into the Lake. While limited options for stormwater treatment are available in these areas due to individual site use and shallow depth to groundwater, low growing vegetated filter strips could be installed along boardwalk or bulk headed areas to provide an attractive measure for stormwater filtration while continuing to allow access to the waterfront. Samples of such filter strips are provided in **Appendix L**.



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N-3: Perform regular Early Detection/Rapid Response surveys for highly invasive species approaching the area to aid in prevention of these species becoming established within the watershed.

Invasive species contribute to poor water quality as they do not provide the same ecosystem services that native species provide. As a result, early detection and rapid response to new invasive species within the watershed would provide a means for ensuring that such species do not become established thereby degrading the quality of natural areas within the watershed.

N-4: Work with the County to revise and adopt an amendment to the Open Space Management Plan for Montauk County Park and consider prohibiting pets from being permitted in the park.

Results of CCE's DNA analysis at the outfalls of Big Reed pond identified fecal contamination from dogs. Such contamination is most likely the result of pet owners not picking up pet waste when with their pets in the park. In addition to providing educational material to pet owners, prohibiting pets from the park has the potential to significantly reduce the contribution of pathogens from this area.

4.2.6 Stewardship & Public Education Recommendations

V-1: Develop signage to inform the public regarding laws, public safety and human impacts to the bay.

Many of the signs developed to inform the public regarding the health and welfare of the Lake have been removed, destroyed during storm events or are no longer legible. Repair, replacement and enhancements of such signs would provide the public with better information regarding the importance of best management practices that aid in keeping the Lake clean. Recommendations include:

- Establish attractive and eye catching signage announcing the entrance to the Lake Montauk Watershed in highly visible areas to help increase public awareness of the watershed (i.e., "You are entering the Lake Montauk Watershed").
- Repair/replace Federal No Discharge Zone signs and create new ones indicating strict enforcement of the law.
- Create educational signage indicating the ecological importance of the Lake at key points of public interest/public use.
- Post information signage alerting the public to the reoccurring water quality issue and potential health hazards of swimming at South Lake Beach.
- Create informational signs indicating the location of important destinations, including the pump out boat, fueling stations, restaurants, and mooring areas.



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- Adopt sign standards to ensure visibility to boaters utilizing the Lake utilizing standard color coding.

Signs could be created that had a color coded system for locations of important features, for which the corresponding feature would have a flag that matched the color on the sign, to clearly indicate the location of the feature. For example, the pump out boat could have a designated color of gray on the sign, and the boat would have a flag with the same color to clearly demarcate its location to boaters. Features to consider on the sign include the pump out stations at marinas, fueling stations, boat repair, restaurants, permitted transient mooring and docking areas, public boat launches and recreational points of interest.

Standards regarding sign color, font, letter height, and placement should be adopted to ensure visibility to boaters. The Army Corp of Engineers has developed sign standards for use in waterways which could be utilized as a basis for development of standards for the Lake. A copy of the sign standards can be found in **Appendix N**.

V-2: 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.

A public outreach program would provide additional pathways to inform members of the community regarding the importance of the health of the Lake and what they can do to aid in improving the health of the Lake. Such a program could include organized volunteer events (e.g. trash removal events, invasive species removal events, wetland plantings/restoration events), and kits/pamphlets providing details regarding homeowner good housekeeping measures (such as correct fertilizer application, planting of native species, reducing lawn area, not feeding waterfowl, and picking up pet waste) that would reduce pollutant inputs into the Lake.

V-3: Seek local partners to fund the development of public education materials.

A map of the overall watershed area could be created outlining all of the important watershed features and attractions. Items to display on the map could include eel grass sanctuary areas, marinas, pump out stations, restaurants, recreational areas, transient mooring and slip areas, and fueling stations. A phone number for the pump out boat should be clearly provided on the map. Such a map could be made available on the Town’s website and at marinas and restaurants.

It is recognized that funding for educational signs and kiosks is limited by the Town’s budget. While grant opportunities for such educational materials exist, local business and organizations provide an alternative venue for the creation and



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construction of these valuable educational materials. Local partners could include local businesses, the local chamber of commerce, scouting groups and other environmental groups. Funding from a WID could also be used for public education efforts.

V-4: Develop informational brochures summarizing the Watershed Management Plan.

As the Watershed Management Plan provides a comprehensive assessment of sources of pollution to the Lake, a summary brochure could be developed to inform landowners regarding key issues and potential remedies within the Lake. Such information could be provided on the Town's website or on public information documents that contain "QR" codes that would direct the public to the Town's website.

V-5: Develop educational materials providing information on green infrastructure (e.g., rain gardens, rain barrels) and its benefits to homeowners.

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

V-6: Obtain funding for a "Septic System Pumpout, Water Conservation and Education program."

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

V-7: Utilize existing public information documents available through Long Island Invasive Species Management Area (LIISMA) group and Cornell Cooperative Extension to provide public information regarding the harmful effects of invasive species.

Both LIISMA and Cornell Cooperative Extension have educational materials available regarding the impacts of invasive species and the benefits of native



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species, as well as literature outlining alternatives to invasive species commonly used in landscaping. Town participation in LIISMA and coordination with Cornell could provide a cost effective means of distributing materials to local residents and business owners to assist with the control of invasive species. Such information could be provided on the Town's website or on public information documents that contain "QR" codes that would direct the public to the Town's website.

V-8: Develop educational materials detailing the benefits of natural buffers along shorelines.

As indicated in Recommendation N-1, vegetative buffers provide for biological and physical filtration of stormwater prior to runoff reaching waterbodies. Encouraging the installation and maintenance of natural buffers could be fostered through educational materials demonstrating the benefits and aesthetic appeal of such buffers. Such information could be provided on the Town's website or on public information documents that contain "QR" codes that would direct the public to the Town's website.

V-9: Continue to acquire parcels for preservation identified in the Town Community Preservation Project Plan.

Vacant land availability is patchy within the watershed, however, acquisition of parcels for preservation and/or stormwater improvements is essential to the health of the Lake. As a result, it is recommended that the Town continue to acquire properties identified in the Town Community Preservation Project Plan. This plan identified parcels most appropriate for acquisition given their size, location and current use. Parcel acquisition and prioritization should consider the potential for installation of stormwater improvements on a parcel, as a factor in determining whether or not to acquire a given parcel of land.

Currently, the Torr property (0300-320-03-13.5) is situated adjacent to the west of the discharge point of the swale that traverses the Ditch Plains neighborhood. As the Town currently owns the parcel on the east side of this discharge point, acquisition of the parcel on the west side (if it becomes available) would provide further opportunities for an improvement project (bioretention or creation of vegetated wetlands) that could improve the quality of the water discharging to the Lake. The suggested improvement project that could be beneficial and result in pathogen reduction is described in Recommendation W-4.

V-10: Develop a universal communications plan to provide important information to the public in a direct, concise and meaningful way.

Public understanding of the importance of water quality and human actions that impact water quality is key to enabling long term change in actions and public



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support of improvement initiatives. Establishment of a universal communications plan to clearly and effectively deliver information regarding water quality and human actions that impact water quality could increase public understanding and draw meaningful public attention to this issue. This message applies Town-wide, as well as universality to the East End communities. Therefore pooling efforts and resources to develop a well thought out and properly funded communications program could significantly improve dissemination of information and provide broader exposure of this information.