Nov.
2018

Water Quality Assessment & Improvement Program Implementation Plan

A ROADMAP FOR MAINTAINING WATER QUALITY

VILLAGE OF MAMARONECK

Contents

Figure 1 Photo Credit: Matt da Silva

1. Introduction & Executive Summary

This report details proposed components of the 2019 Water Quality Assessment and Water Quality Improvement Plan submitted to the Water Quality Advisory Committee and the Board of Trustees. This report draws from the policy goals of the Local Waterfront Revitalization Program, the Waterfront Advisory Committee #4 (WAC4) recommendations and the Stormwater Management Plan (SWMP) to assess and improve water quality in the Village. This report includes the details of a Water Quality Assessment and a Water Quality Improvement Program. The actions recommended in this report are summarized below"

1) **Water Quality Assessment**
   a) Stream Quality Assessment
   b) Harbor Quality Assessment
   c) Aquifer Quality Assessment
2) **Water Quality Improvement Program**
   a) Capital Projects
      i) Develop MS4 Capacity Management, Operations, and Maintenance Program
      ii) Retrofit Stormwater Catch Basin Heads
      iii) Adopt Vegetative Best Management Practices
      iv) Re-evaluate Impaired Riparian Sites
      v) Restore Salt Marsh Sites and Reintroduce Cordgrass
   b) Policy Reforms
      i) Update Master Plan
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      iv) Amend Freshwater Wetland Ordinance
      v) Adopt Tree Ordinance
   c) Public Outreach Campaigns
      i) Healthy Yards Campaign
      ii) Hazardous Wastes Campaign

2. Background & Previous Plans

The Village of Mamaroneck and other parties of interest have published multiple reports and plans in the past that contain recommendations related to water quality. The contents of these plans have been incorporated into the Water Quality Improvement Plan

Watershed Advisory Committee #4 (2001)

In 2001, Westchester County Watershed Advisory Committee #4 (WAC4) published a stormwater management plan for the Mamaroneck and Sheldrake River Basins as well as Mamaroneck Harbor. This plan detailed a series of watershed-wide recommendations as well as specific recommendations for the Village of Mamaroneck.

Stormwater Management Plan (2003)

In 2003, the Village published a Stormwater Management Plan (SWMP) to ensure the Village's municipal storm sewer system (MS4) meets the standards set by State Pollution Discharge Elimination System (SPDES) and the MS4 licensing requirements of the Environmental Protection Agency (EPA). Specific actions are integrated into the Water Quality Improvement Plan to ensure continued MS4 compliance.

Local Waterfront Revitalization Plan (2016)

The Local Waterfront Revitalization Program (LWRP) has been prepared as a comprehensive long-range guide to ensure that local actions are consistent with the Village's vision for protection and enhancement of the quality of Mamaroneck's waterfront community. Included in the LWRP are policies related to ensuring that the waterfront area remains environmentally sound.

3. Program Structure

Program Components

This project will consist of two separate but interrelated components:

Water Quality Assessment – Coordinated studies of the Village's rivers, harbor, and aquifer that provide insight to the water quality improvement needs of the Village.

Water Quality Improvement Program – A battery of actions designed to meet and maintain a high degree of water quality in the Village.

Both programs will commence simultaneously, but the Water Quality Assessment's results will inform further actions taken as part of the improvement program as targeted pollution sources are identified.

Program Management

Given the multifaceted nature of the project, the Office of the Engineer and the Planning Office will collaborate on program management and implementation. Their duties will be divided as follows:

Office of the Engineer

The Village Engineer shall be designated Project Lead. The Project Lead will have the following duties:

- Draft Requests for Proposals for Water Quality Assessment Components
- Manage Water Quality Assessment Operations
- Undertake a Quarterly Review of Water Quality Improvement Program progress
- Provide Staff Guidance to Capital Projects
- Integrate the Water Quality Assessment and Improvement Program with annual MS4 reporting and DPW operational procedures

Planning Office

The Village Planner and Assistant Planner shall provide technical support to the Project Lead. Technical support will consist of the following duties:

- Provide Staff Guidance to Policy Reforms and Public Outreach Campaigns in Water Quality Improvement Program
- Present Quarterly Review of Water Quality Assessment and Water Quality Improvement Program to Water Quality Advisory Committee
- Coordinate with local non-profit environmental organizations like Save the Sound and Sustainable Westchester.
- Integrate Water Quality Assessment and Improvement goals with Comprehensive Plan, the Zoning Code, and day-to-day development applications.

4. Water Quality Assessment

The Water Quality Assessment will consist of three components addressing different aspects of the Village's hydrological resources: the stream quality assessment, the harbor quality assessment, and the aquifer quality assessment. The assessment is designed to complement and build off of data already collected via citizen water quality testing of streams and harborfront locations by *Save the Sound,* a nonprofit organization devoted to protecting the water resources of the Long Island Sound.

Part I: Stream Quality Assessment

Figure 2 The Mamaroneck River as it winds through Columbus Park. Past Stream Quality Assessments have identified impaired water quality in the river. Photo Credit: Neil Desai

Building off past stream quality evaluations conducted between 2012 and 2016, the stream quality assessment will involve the establishment of a quarterly monitoring program with testing of water samples at key locations for pollutants of concern. Stream quality assessments should be ongoing. Water quality in the stream was last tested in 2016, where conditions have been demonstrated to be improving in the streams in town, but still not enough to be declared unimpaired.

Testing Locations

The four streams in the Village (Mamaroneck River, Sheldrake River, Beaver Swamp Brook/Guion Creek, and Otter Creek) will be tested at the following sites that are key for isolating pollution point sources in the Village:

- boundaries with other municipalities
- stream confluences
- outflows to the harbor

If baseline testing reveals an anomaly, follow-up testing will be undertaken at sites at closer intervals in proximity to the anomaly to isolate and identify the pollution source.

The baseline testing sites can be seen on the below map:

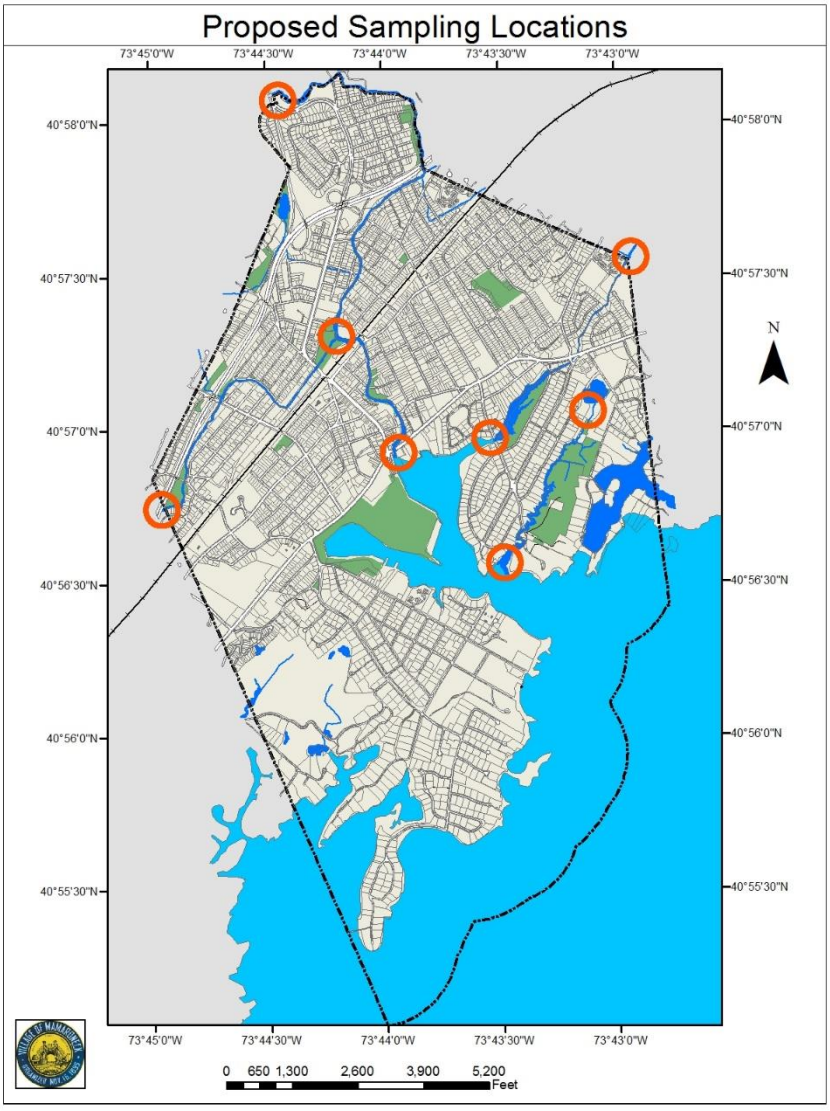

Figure 3 Proposed Stream Quality Assessment Sampling Locations. Map Credit: Greg Cutler

Testing Facilities and Expertise

Sampling and testing stream water requires the facilities of a water quality lab and associated scientific expertise. In the source of scoping the study, Manhattan College's Department of Civil and Environmental Engineering, which has such a lab and has in the past worked with local government, has been identified as a potential technical partner. The Board of Trustees will be required to appropriate funds for an appropriate contribution if such a partnership is undertaken.

Pollutants of Concern

The primary pollutants of concern for the Stream Quality Assessment are:

- fecal coliform bacteria
- *Enterrococcus* bacteria
- fats, oils, and greases from food waste (FOGs)

Fecal coliform and *Enterococcus* indicate runoff from fecal matter and other biological products that make their way through the sewer system and contribute to eutrophication[1] of the harbor's waters. Presence in water can indicate a deficiency in proper wastewater treatment and disposal.

FOGs can build up in sewer pipes, causing pipes to clog and untreated wastewater to make its way into the water supply. It is well within the Village's power to make improvements in the treatment and disposal of wastewater to resolve any deficiencies that may be identified by levels of *Enterrococcus* above NYDEC water quality standards.

Of reduced concern for water testing are pollutants such as nitrogen and phosphorus which are typically non-point-source runoff from fertilizers and other agricultural products. These products also contribute to eutrophication, but there are few actions the Village can take to reduce the levels of these pollutants. Most of these products have been banned for industrial and agricultural use, but these products are still commonly used as part of home lawn care. At the Village level, little can be done to curb lawncare use aside from continued community education on their potential to harm water quality. In the interest of working on actionable items it is recommended that the Village focus testing on fecal coliform, *Enterrococcus*, and FOGs pollutants. Information on levels of nitrogen, phosphorus, and other pollutants of lesser concern can be acquired via existing data collected by other public agencies. USGS is currently undertaking a Regional Stream Quality Assessment for the Northeast Region. As part of this assessment, USGS gathered data in 2016 over a several month period on the levels of many pollutants in Mamaroneck Harbor, including nitrogen and phosphorus. USGS repeats this assessment regularly.

[1] Eutrophication is a state of excessive nutrient concentration in a body of water, frequently due to runoff from the land and/or sewer discharge. This nutrient excess causes a dense growth of plant life which proceeds to deplete oxygen in the water. This lack of oxygen eventually kills off animal life in the body of water.

Part II: Harbor Quality Assessment

Figure 4 Mamaroneck Harbor East Basin Photo Credit: Matt da Silva

Mamaroneck Harbor's history and present as a working harbor with a considerable amount of marine industry means that ensuring harbor water quality. The quality of the harbor's water should be assessed via a benthic survey of the physical and biological habit on the harbor floor, its suitability for supporting life, and the populations of key organisms that act as indicators for the health of the harbor ecosystem.

Testing Facilities and Expertise

To undertake a benthic survey, the Village will have to retain the services of a harbor biologist to design the study according to the specific needs of the Mamaroneck Harbor environment, perform the study using specialized equipment, and interpret study results with the proper scientific expertise. The Board of Trustees will be required to appropriate the relevant funds for this expenditure.

Testing Components: Macroinvertebrate Survey & Habitat Assessment

The population levels of various aquatic macroinvertebrates[2] on the harbor floor are a useful bioindicator of environmental stress in the harbor. This component of the benthic survey allows areas of concern to be identified as well as water quality trends to be tracked. Macroinvertebrate species of interest to Mamaroneck Harbor's habitat will be identified by the harbor biologist and population levels will be taken.

An assessment of the habitat of the benthic floor allows the results of the macroinvertebrate survey to be contextualized against habitat limitations to ascertain whether shifts in macroinvertebrate populations can be attributed to sedimentation, erosion and other geological processes, as opposed to changes in water quality. Habitat assessment also allows for tracking of future habitat degradation and the identification of habitat restoration sites.

[2]Aquatic macroinvertebrates are organisms without backbones that inhabit the space in under around rocks and sediment on the floor of a body of water (*benthos*). The adult and larval forms of many aquatic insects, crustaceans, arachnids, worms, snails, and leeches are included in this category.

Part III: Aquifer Quality Assessment

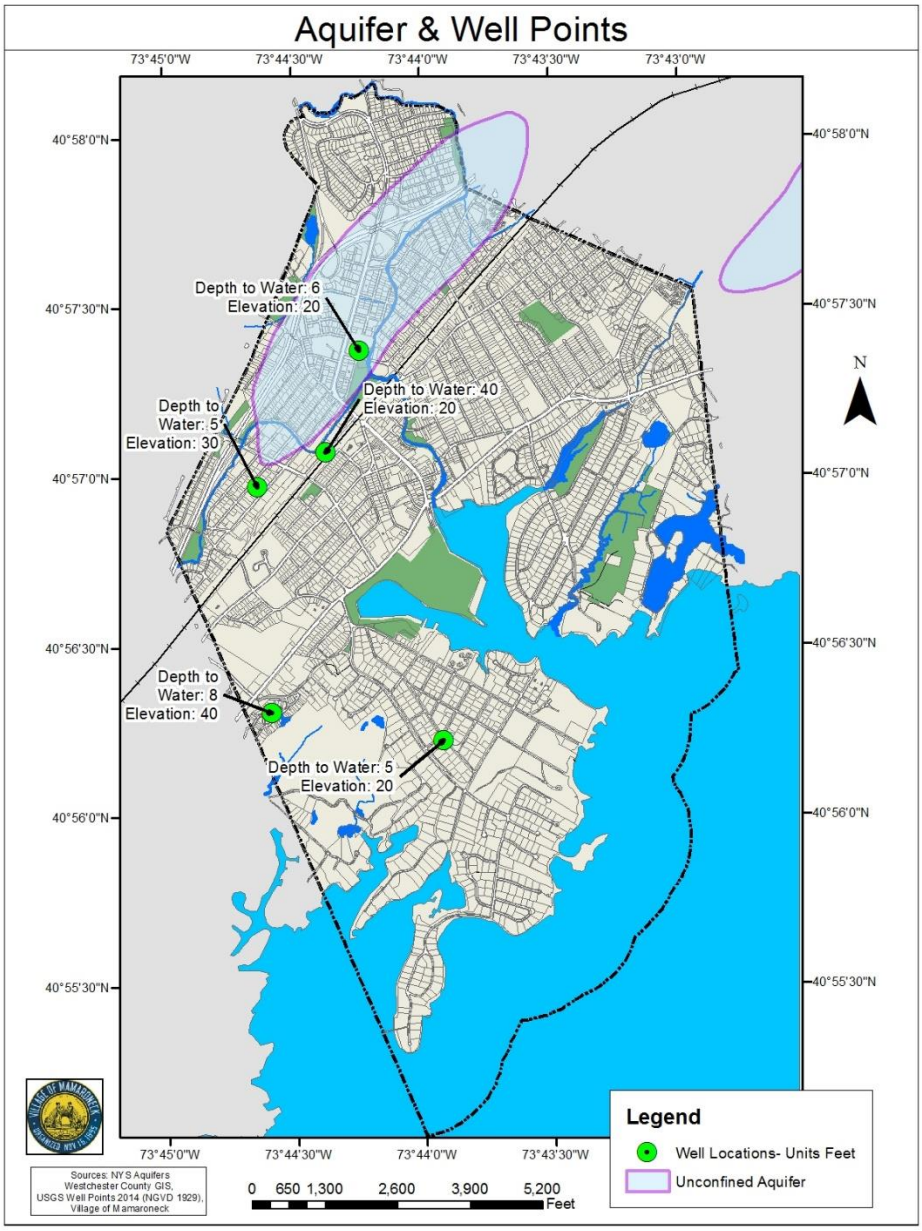

Figure 5 Location of Mamaroneck Aquifer. Map Credit: Greg Cutler

A 280-acre unconfined aquifer exists in the northern portion of the Village beneath Mamaroneck Avenue. As an unconfined aquifer, it is not protected by the water table, and is thus vulnerable to contaminants leaking in from the above soil. This aquifer is a principal aquifer, meaning it is not presently being used for water supply. Nonetheless, the Board of Trustees have recommended an assessment of the quality of the water in the aquifer.

Assessing the quality of the aquifer will require retainer of a consultant to design the aquifer study requirements, identifying which pollutants should be tested for as well as how the aquifer will be tested. Furthermore, the study will require the retainer of a hydrogeologist to undertake

the aquifer study and publish results. An appropriation of funds will be necessary for these services.

5. Water Quality Improvement Program

The Water Quality Improvement Program draws from the Stormwater Management Plan (SWMP), Waterfront Advisory Committee #4 (WAC4), and specific resolutions of the Board of Trustees. The following actions can be taken to improve water quality management in the Village.

Part I: Capital Projects

Capital projects to water quality improvement via improved infrastructure and improved operating practices. The relevant departments must evaluate their capacity to undertake these projects and request the Board of Trustees for additional appropriations if necessary.

Develop a Capacity, Management, Operation, and Maintenance Program

In 2010 and early 2011, USEPA conducted sampling inspections at outfalls and catch basins within the Village, specifically sampling for fecal coliform and total coliform. The samplings indicated that water quality standards were exceeded at all locations, supporting evidence for a high potential of illicit sanitary connections to storm sewers. Based on the samplings, the EPA issued an administrative order in March 2011 finding that the Village failed to comply fully with the requirements of the MS4 permit. The order requires the Village to prepare, implement and enforce a Stormwater Management Program to specifically identify and address illegal connections.

To meet this requirement, the Department of Public Works (DPW) shall develop and implement a Capacity Management, Operation, and Maintenance (CMOM) program that adheres to US EPA CMOM Guidelines and ensure that sewer operations and maintenance conform to such a program. Such a program will include procedures for locating, tracing, and eliminating illicit discharges as well as procedures for preventing and responding to sanitary sewer overflows. USEPA provides a checklist that DPW can utilize to evaluate existing practices and identify necessary reforms[3].

CMOM programs are designed to ensure that sanitary sewer systems are operating as intended, identify capacity constrained areas of the system, and proactively address potential sanitary sewer overflows (infiltration) as well as illicit inflows and discharges. Sanitary sewer overflows have the potential to raise bacteria levels in the Long Island Sound. Illicit inflows and discharges can overwhelm the sanitary sewer system and/or wastewater treatment system beyond capacity as well as contaminate environmentally sensitive sites.

[3] https://www3.epa.gov/npdes/pubs/cmom_guide_for_collection_systems.pdf

Retrofit Stormwater Catch Basin Heads

Figure 6 Example of a Type N catch basin designed to minimize storm sewer infiltration. Photo Credit: Matt da Silva

Catch basins are the common means by which stormwater runoff is collected into the village's storm sewer system. Older catch basin head designs were traditionally open, which maximizes water drainage rates but fails to stop detritus from infiltrating the storm sewer system. Newer designs incorporate grate characteristics that prevent detritus from entering the stormwater sewer while minimally impacting water flow.

DPW currently has a policy of retrofitting catch basins with newer Type N or Type B designs as older heads are due for replacement. The Village also received a $150,000 matching grant from NYSDEC in 2014 as part of their Water Quality Improvement Program (WQIP). This money allowed DPW to replace TK catch basins ahead of schedule. If further grant money, whether from the WQIP or other state and federal sources, can be identified and secured, catch basin retrofits can be further accelerated.

Adopt Vegetative Best Management Practices

WAC4 suggests integrating best management practices for vegetative plantings in public green spaces, beautification operations, development agreements. Integrating these practices enhances the ability of green space to absorb stormwater and filter pollutants before reaching streams and groundwater. The Village should draft and publish a series of guidelines detailing

vegetative best management practices to be used by Parks and Recreation, DPW, and other departments when relevant.

Some vegetative best management practices include

- vegetated filter strips
- grassed swales
- constructed stormwater wetlands
- rain gardens
- irrigation cisterns
- permeable pavement

Early examples of success in incentivizing private developers to utilize such techniques is apparent in the Transit-Oriented Development Overlay, where several new projects, including the multifamily dwellings currently being constructed at 690 Mamaroneck Avenue, have agreed to utilize many of these techniques in their landscaping.

Mamaroneck Town Center, which is in Village limits but not subject to its land use restrictions as a Town of Mamaroneck-owned property, recently completed a sustainable landscaping initiative that included many such elements. Like this Town-owned facility, public Village-owned facilities are a prime target for similar treatments if outside funding could be found, given their large surface area in the downtown, which has a shortage of permeable surface.

Re-evaluate Impaired Sites on the Sheldrake and Mamaroneck Rivers

Figure 7 Since the Sheldrake River through Columbus Park was restored, invasive Japanese Knotweed has reclaimed the banks. Photo Credit: Matt da Silva

WAC4 identifies six impaired sites on the Sheldrake and Mamaroneck Rivers in need of habitat restoration to improve biodiversity and cut down on flooding. One site at Columbus Park was singled out as a model site for priority restoration, given its public ownership and diversity of impaired conditions that would allow for a variety of restoration techniques to be introduced.

In 2002, the Westchester County Department of Planning restored the Sheldrake River at Columbus Park, but since then it has not been actively maintained and has become overgrown. While most of the plantings from 2002 remain, several invasive species, such as porcelain-berry

and Japanese knotweed have started to encroach the site. The embankments on the Mamaroneck River adjacent to the restoration site between the Halstead Avenue Bridge and the Jefferson Avenue bridge have become completely overgrown with Japanese knotweed. Future restoration projects and/or invasive removal projects should seek to minimize the use of herbicides by utilizing alternative methods. One alternative method the Village may consider is the flattening and covering the invasive vegetation with a black geotextile material that heats the soil and eventually kills the vegetation.[4]

The Army Corps of Engineers will be reconstructing several portions of the Sheldrake and Mamaroneck Rivers as part of the Flood Risk Management Project. This project will change the hydrological environment of the Mamaroneck and Sheldrake Rivers, requiring re-evaluation of the habitat restoration needs along the Mamaroneck River. As the Flood Risk Management Project proceeds, riparian restoration opportunities should be identified and funding from state and federal sources sought.

Retrofit Stormwater Outfall Pipes

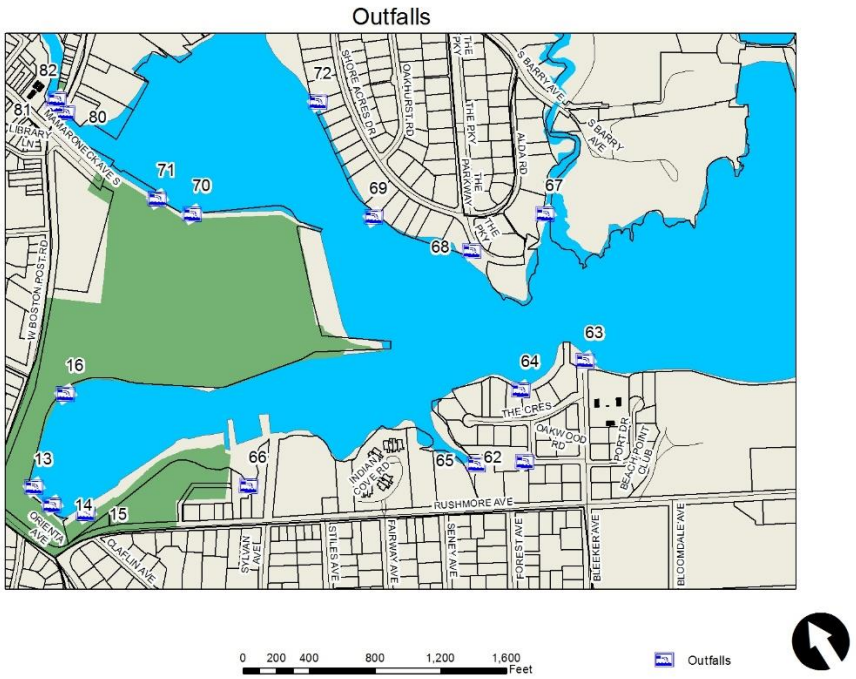

Figure 8 Outfall Pipe Locations in Mamaroneck Harbor. Map Credit: Matt da Silva

A considerable number of stormwater outfall pipes empty stormwater overflow directly into Mamaroneck Harbor, directing untreated or undertreated stormwater directly into the Long Island Sound. In response to this, WAC4 recommends retrofitting stormwater outfall pipes in the East and West Basins of Mamaroneck Harbor to provide filters that effectively eliminate sediment, debris, and oily contaminants from entering the water. Staff will review feasibility and provide cost estimates for stormwater outfall pipe retrofits. This project will proceed as funds become available.

[4] http://constitution.audubon.org/conservation/invasive-species-management

Salt Marsh Restoration & Cordgrass Reintroduction

Figure 9 Restored salt marsh along the West Basin of Mamaroneck Harbor. Restored salt marshes help prevent erosion and filter pollutants Photo Credit: Matt da Silva

Salt marshes along the harbor's edge help prevent erosion and filter pollutants. While the natural salt marsh has been considerably diminished, WAC4 identifies two sites in the Village for salt marsh restoration. One site is along 750 ft. of coastline the western end of Harbor Island Park next to the West Basin on Rushmore Avenue. This restoration was performed in 2007 year. Another site is on privately-owned land at the Indian Cove residential complex opposite Nichol's Boat Yard from the West Basin site. The Village has yet to initiate a restoration project at this site, which would require the cooperation of Indian Cove property-owners. As such, this project is not recommended for the near-term.

Figure 10 Restored cordgrass stand in the West Basin of Mamaroneck Harbor. Photo Credit: Matt da Silva

In addition to salt marsh restoration WAC4 also recommends reintroducing smooth cordgrass at smaller sites in the intertidal zone. Cordgrass also acts to filter pollutants and prevent erosion. The Village of Mamaroneck Coastal Planting Guide currently includes smooth cordgrass as the plant of choice for intertidal the intertidal zone. As a result, cordgrass plantings have become a common agreement between applicants seeking wetlands permits and the Harbor Coastal Zone Management Committee.

Part II: Policy Reforms

Projects in this section require the modification of official village policies in the form of plans and ordinances to be adopted by the Board of Trustees.

Update Master Plan, LWRP, and Harbor Management Plan

WAC4 recommends making changes to the Master Plan, Local Waterfront Restoration Plan, and Harbor Management Plan to include more specific recommendations and policies for improving the quality of the tributaries and embayments of the Long Island Sound.

The Master Plan has already been updated (with a further update ongoing), but updates to the Local Waterfront Revitalization Plan, which will in the future contain the Harbor Management Plan, are still currently ongoing. Policies have been drafted and are currently awaiting on

approval by the New York State Department of Environmental Conservation (NYSDEC) before they can be adopted by the Board of Trustees.

Amend Freshwater Wetlands Ordinance

WAC4 recommends amending the Freshwater Wetlands Ordinance to include an up-to-date wetlands definition, mitigation sequencing requirements, regulation of tidal wetlands, and other provisions that can be adopted from various extant model ordinances. These guidelines and others are summarized in *Section 404(5)(1)* of the federal *Clean Water Act.*

The Harbor Coastal Zone Management Commission has provided the Board of Trustees with a list of elements to be included in a new wetland law. Wetlands ordinance language still needs to be drafted by the Village Planner and adopted by the Board of Trustees.

Amend Zoning Ordinance

WAC4 recommends amending the Village zoning ordinance to include elements related to wetland protection and stormwater management, including lot coverage limits, wetland sensitivities, buffers and setbacks adjacent to water, and parking requirements that minimize impacts on pervious surfaces.

Amendments to the Zoning Ordinance that provide for these elements are currently in progress. Conformity with the updated Master Plan will likely require amending the zoning code to include these items.

Adopt Stormwater Management Ordinance

WAC4 suggests the adoption of a Stormwater Management Ordinance providing for control of both quality and quantity of stormwater in conformity with Westchester County and NYSDEC's guidelines.

This component of the plan is complete. The Board of Trustees adopted an amended stormwater management ordinance in 2010.

Amend Tree Ordinance

WAC4 recommends amending Chapter 318 the Village's Tree Ordinance to regulate tree removal on private property and to provide for tree replacement where possible.

The Village Attorney and the Tree Committee have been collaborating drafting revised language for the tree ordinance to be introduced. Upon introduction, the revised ordinance should be adopted by the Board of Trustees.

Part III: Public Outreach and Education Campaigns

Pursuant to SWMP policy, where shifts in individual and/or business behavior has the potential to assist with improving and preserving water quality, it is advisable to launch public outreach and education campaigns to help incentivize choices beneficial to water quality. Such campaigns should make efforts to be accessible to all Village residents, including recruiting a diverse group of campaign ambassadors and volunteers, publishing written materials in both English and Spanish, and conducting outreach activities in different neighborhoods throughout the Village at a variety of times. These campaigns all fall under the purview of the Committee for the Environment.

Healthy Yards Campaign

Figure 11 Practicing healthy yard care will help maintain the quality of water in the streams, harbor, and aquifer. Photo Credit: Neil Desai

Reducing residential use of chemical fertilizers and pesticides are specific targets of SWMP for public education and outreach. WAC4 additionally recommends certain mowing practices for stormwater management. A Healthy Yards Campaign will educate property-owners and landscape contractors on how to make environmentally sound lawncare choices.

Nutrient-rich fertilizers, particularly those containing nitrogen and/or phosphorus, can enter runoff, oversaturating the nutrient content of local aquatic environment. This causes eutrophication and creates anoxic conditions in the harbor in which flora and fauna struggle. Westchester County, with several exceptions, bans the application of fertilizers containing phosphorus. However, this is only effectively enforced at the level of commercial and public applications. Enforcement of this ban for personal use by individual property-owners is impractical and voluntary compliance by property-owners is essential for improved outcomes. Education on the harmful effects of phosphorus fertilizers on the environment, proper use and non-use of phosphorus fertilizers, and proper time and place of fertilizer use of all types.

Like fertilizers, pesticides can runoff in local stormwater, rendering harbor and stream water toxic to native species. The Healthy Yards Campaign will educate property-owners on selection of hearty native plants, conservatively selecting pesticides designed for identified pests, prioritizing pest removal by hand, and selecting less harmful pesticides.

In addition to wiser use of fertilizer and pesticide choices, changing lawnmowing habits in favor of higher mowing length and preservation of lawn clippings can help result in healthier lawns that better absorb stormwater and grow better without the help of pesticides. This can also be incorporated into the Healthy Yards Campaign.

Given the fact that many property owners in the Village contract out their lawncare to professional landscapers, it is also prudent to work closely with these professional firms to ensure that they too practice environmentally-sound lawncare techniques. A summit should be held with contractors and the Committee for the Environment to come to a mutual understanding on how to ensure professional lawncare in the Village also respects water quality.

Hazardous Wastes Campaign & Chemical Cleanup Days

Figure 12 The Household Material Recovery Facility (H-RMF) in Valhalla is the only drop-off point for hazardous waste in all of Westchester County. Photo Credit: Westchester County

WAC4 highlights the need for all communities in the Mamaroneck/Sheldrake watershed to educate individuals and businesses on the proper disposal of hazardous waste and make efforts to make hazardous waste disposal an easier process.

Many hazardous waste items cannot be disposed via normal trash or recycling channels and must be disposed of at Westchester County's Household Material Recovery Facility (H-MRF) in Valhalla. The considerable distance from the Village and need for scheduled appointments make it difficult for some Village residents, particularly those without cars, to properly dispose of hazardous waste. In addition to educating residents and businesses on the existence of H-MRF

and the proper procedures necessary, the Village can also make efforts to provide other avenues for those who cannot transport their hazardous materials to H-MRF easily. Some communities take part in Chemical Cleanup Days where hazardous waste is dropped off at a community site to be transported in bulk to the recovery facility. CFTE can work with DPW to research available options and use volunteers to mobilize alternate disposal efforts.

Household items that require disposal at H-MRF include:

- pesticides and herbicides
- automotive and pool fluids
- flammable liquids
- expired or unused medications
- fluorescent light bulbs
- propane tanks
- batteries
- tires
- mercury thermometers

Automobile maintenance facilities are additionally identified as a business type in need of targeted outreach. They routinely produce hazardous waste from solvents, antifreeze, brake fluid, batteries, motor oils, motor fuels, and lubricating grease. It is essential CTFE works closely with automobile maintenance facility owners to ensure waste is being disposed of properly in a way that does not harm the Village and its water.

6. Conclusion & Next Steps

Implementing the recommendations contained in this report will continue the Village's long tradition of carefully managing its ample water resources. The below matrix details all of the actions needed to take place to complete this plan. Further analysis alongside Board of Trustee input will determine budget numbers and sources and further refine proposed timeframes.

Water Quality Assessment & Improvement Implementation Matrix

Component	Policy	Actions	Responsible	Timeframe	Status
Water Quality Assessment	Assess Stream Quality	*Finalize Study Parameters*	*Village Engineer*	*Jan-19*	*Not Started*
		Establish Testing Partnership	*Village Engineer*	*Spring 2019*	*Not Started*
		Conduct Testing	*Testing Partner*	*Summer or Fall 2019*	*Not Started*
		Publish Stream Quality Report	*Testing Partner With Village Planner*	*Fall 2019*	*Not Started*
	Assess Harbor Quality	*Issue RFP for Benthic Survey*	*Village Engineer*	*Jan-19*	*Not Started*
		Conduct Benthic Survey	*Consultant*	*Spring 2019*	*Not Started*
		Publish Harbor Quality Report	*Consultant With Village Engineer & Village Planner*	*Fall 2019*	*Not Started*
	Assess Aquifer Health and Quality	*Issue RFP For Aquifer Study Paramaters*	*Village Engineer*	*Jan-19*	*Not Started*
		Issue RFP for Aquifer Study Implementation	*Study Design Consultant With Village Engineer*	*Apr-19*	*Not Started*
		Conduct Aqueduct Assessment	*Study Implementation Consultant With Village Engineer*	*Summer 2019*	
		Publish Aquifer Quality Report	*Study Implementation Consultant With Village Engineer and Village Planner*	*Fall 2019*	*Not Started*

Component	Policy	Actions	Responsible	Timeframe	Status
Capital Projects	Develop CMOM	*Collection System Management Evaluation*	*Village Engineer & DPW*	*TBD*	*Not Started*
		Collection System Operation Evaluation	*Village Engineer & DPW*	*TBD*	*Not Started*
		Equipment and Collection System Maintenance Evaluation	*Village Engineer & DPW*	*TBD*	*Not Started*
		Implement Illegal Discharge Detection Procedures	*Village Engineer*	*TBD*	*?*
		Sewer System Capacity Evaluation	*Village Engineer & DPW*	*TBD*	*Not Started*
	Retrofit Stormwater Catch Basin Heads	*Adopt New Catch Basin Model for Replacement*	*DPW*	*TBD*	*Complete*
		Identify and apply for grants to accelerate Catch Basin Retrofits	*Grant Writer with Village Planner*	*TBD*	*Not Started*
	Adopt Vegetative Best Management Practices for Wetlands	*Draft BMP Guidelines Document*	*HCZMC, Village Planner*	*TBD*	*Not Started*
	Re-evaluate Impaired Riparian Sites	*Identify restoration opportunities post-Flood Management Project*	*Village Planner, WQAC*	*TBD*	*Not Started*
		Apply for Restoration Grants	*Grant Writer with Village Planner*	*TBD*	*Not Started*
	Restore Salt Marsh Sites and Cordgrass Stands	*West Basin Salt Marsh Restoration*	*Westchester County*	*2007*	*Complete*
		Incorporate Cordgrass Reintroduction into Wetland Permit Process	*HCZMC*		*Complete*

Component	Policy	Actions	Responsible	Timeframe	Status
Policy Reforms	Update Master Plan	*Draft Revised Master Plan*	*Village Planner, Planning Board & Contractor*		*Complete*
		Adopt Revised Master Plan	*Board of Trustees*		*Complete*
	Update LWRP & Harbor Management Plan	*Draft Updated LWRP*	*Village Planner, Planning Board, HCZMC*		*Complete*
		Receive State Approval	*NYSDEC*		*In Progress*
		Adopt Updated LWRP	*Board of Trustees*	*Upon State Approval*	*In Progress*
	Amend Zoning Ordinance	*Draft Zoning Ordinance Language*	*Village Planner, Planning Board*	*Mid 2019*	*In Progress*
		Adopt Zoning Ordinance	*Board of Trustees*	*Mid 2019*	*Not Started*
	Amend Freshwater Wetland Ordinance	*Draft wetlands ordinance language*	*Village Planner, HCZMC*	*Early 2019*	*In Progress*
		Adopt Wetlands Zoning Ordiance	*Board of Trustees*	*Earily 2019*	*Not Started*
	Adopt Stormwater Management Ordinance	*Draft Stormwater Management Ordinance*	*Planner, Water Quality Advisory Committee*	*2010*	*Complete*
		Adopt Stormwater Management Ordinance	*Board of Trustees*	*2010*	*Complete*
	Amend Tree Ordinance	*Draft Tree Ordinance*	*Tree Committee, Village Attorney*	*Early 2019*	*In Progress*
		Adopt Tree Ordinance	*Board of Trustees*	*Early 2019*	*Not Started*

Component	Policy	Actions	Responsible	Timeframe	Status
Public Outreach Campaigns	Healthy Yards Campaign	*Draft Communications Strategy*	*CFTE, Assistant Planner*	*Jan-19*	*Not Started*
		Conduct Public Outreach Campaign	*CFTE with non-profit organizations*	*Spring 2019 (Repeat every Fall and Spring)*	*Not Started*
		Publish Informational Materials	*CFTE*	*Spring 2019*	*Not Started*
		Hold Summit with Landscape Contractors	*CFTE*	*Spring 2019*	Not Started
	Hazardous Waste Campaign	*Draft Communications Strategy*	*CFTE with Assistant Planner*	*Summer 2019*	*Not Started*
		Publish Informational materials	*CFTE with non-profit organizations*	*Fall 2019*	*Not Started*
		Organize Alternate Waste Disposal Options	*CFTE, DPW, non-profit organizations*	*Fall 2019*	*Not Started*
		Conduct Public Outreach Campaign	*CFTE with non-profit organizations*	*Fall 2019*	*Not Started*
		Hold Summit with Waste Producing Industries	*DPW, CFTE*	*Fall 2019*	*Not Started*