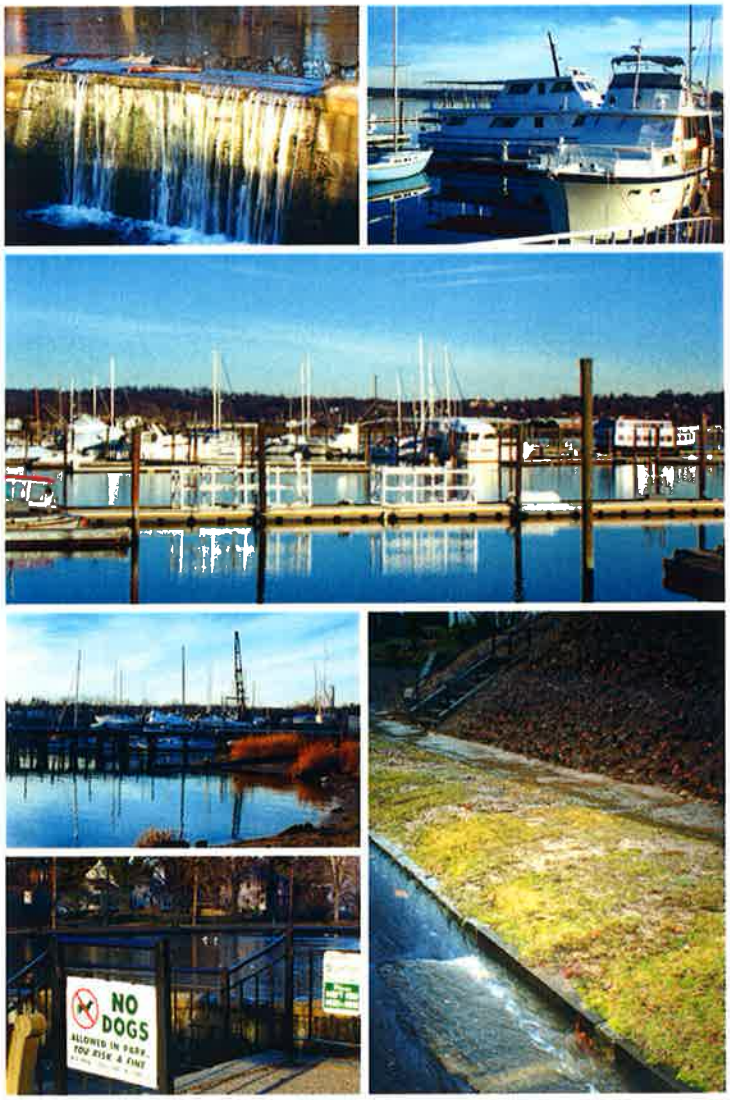
Manhasset Bay Protection Committee

Village of Baxter Estates
Village of Great Neck
Village of Kensington
Village of Kings Point
Village of Manorhaven
Nassau County
Town of North Hempstead
Village of Plandome
Village of Plandome Heights
Village of Plandome Manor
Village of Port Washington North
Village of Sands Point
Village of Thomaston



MANHASSET BAY WATER QUALITY IMPROVEMENT PLAN

MAY 1999

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- FINAL -

MANHASSET BAY
WATER QUALITY IMPROVEMENT PLAN

Prepared for:

MANHASSET BAY PROTECTION COMMITTEE

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Nassau County
Town of North Hempstead
Village of Plandome
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Village of Plandome Manor
Village of Port Washington North
Village of Sands Point
Village of Thomaston

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MAY 1999

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- FINAL -

MANHASSET BAY PROTECTION COMMITTEE
MANHASSET BAY WATER QUALITY IMPROVEMENT PLAN

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PREFACE

In the Spring of 1998 the Manhasset Bay Protection Committee was established with the general goal of improving the quality of Manhasset Bay's waters and its watershed. In order to achieve this goal the Committee applied for and was awarded an Environmental Protection Fund grant from New York State to hire a consultant to prepare a comprehensive nonpoint source pollution management plan (also referred to as a water quality improvement plan) for the Manhasset Bay watershed. The primary aim of the plan is to reduce pollution to preserve and enhance water quality; preserve and protect habitats; and maximize economic uses and recreational enjoyment within the Bay.

The Manhasset Bay Protection Committee (MBPC) comprises a number municipalities in the Manhasset Bay watershed that abut the Bay. These municipalities include Nassau County, the Town of North Hempstead and the Villages of Baxter Estates, Great Neck, Kensington, Kings Point, Manorhaven, Plandome, Plandome Heights, Plandome Manor, Port Washington North, Sands Point and Thomaston. Together these jurisdictions have entered into a intermunicipal agreement to address their concerns about the health and productivity of Manhasset Bay and its watershed. Both the NYS Department of State (DOS) and the Department of Environmental Conservation (DEC) are advisors to this organization. Through their intermunicipal agreement the committee members have established the following goals:

- improve the water quality of Manhasset Bay so that all waters of the Bay will consistently meet water quality standards for bathing, swimming and fishing;
- restore and enhance the surrounding tidal wetlands that serve to cleanse ecosystems; provide marine food production and wildlife habitat; offer opportunities for education, research and recreation; provide flood and storm control; and offer open space and aesthetic appreciation;
- control and reduce point and nonpoint source pollution affecting the Bay and its environs;
- coordinate local coastal regulations so as to maximize protection and enhancement efforts to improve the quality of Manhasset Bay, its tributaries and wetlands;
- improve water quality so that the traditional maritime economic uses of the Bay are protected and enhanced; and
- while not readily achievable improve the water quality of Manhasset Bay so that in a few selected areas it will once again be classified as suitable for the harvesting of shellfish for human consumption.

Following the formation of the Committee and with funding provided by all the municipalities on the Committee with a matching grant from the New York State Department of State under the State's Environmental Protection Fund, a Project Coordinator was hired to direct the day-to-day activities of the planning process. In addition, the firm of Dvirka and Bartilucci Consulting Engineering of Woodbury, Long Island was retained to prepare the plan under the guidance of the Committee. The plan development process involved three general phases of: 1) inventorying natural resources and land uses; 2) assessment of natural features, existing water pollution controls, and existing ordinances; and 3) recommendations

and priorities including costs and sources of funding for restoration and prevention projects, and ordinance revisions.

Public meetings were held on November 12 and December 17, 1998 on a draft of the plan. Verbal and written comments were solicited and received from the public. Copies of the Draft Plan and/or Executive Summary were widely distributed to civic associations, business organizations, public libraries, village halls and interested citizens throughout the watershed.

Summary

S.0 SUMMARY

This section summarizes the draft Manhasset Bay Water Quality Improvement Plan (the Plan) which was prepared under the direction of the Manhasset Bay Protection Committee (hereafter referred to as "the Committee").

S.1 Introduction

The Committee, formed in the Spring of 1998, includes representatives of Nassau County, the Town of North Hempstead, and 11 villages (Baxter Estates, Great Neck, Kensington, Kings Point, Manorhaven, Plandome, Plandome Heights, Plandome Manor, Port Washington North, Sands Point, and Thomaston). In addition, representatives of the New York State Department of State and the New York State Department of Environmental Conservation serve the Committee as technical advisors. The Committee established the following five goals for the Bay:

1. improve water quality so that swimming and fishing standards are consistently met;
2. restore tidal wetlands so that they can serve to cleanse ecosystems and provide for marine food production, wildlife habitat, flood and storm control, and offer opportunities for open space, education, recreation and aesthetic appreciation;
3. control and reduce point and nonpoint sources of pollution to the Bay; and
4. coordinate local coastal efforts to improve water quality.
5. improve water quality so that the traditional maritime economic uses of the Bay are maintained and enhanced.
6. while not readily achievable, improve water quality to allow the harvesting of shellfish for human consumption in a few limited areas of the Bay.

S.2 Characteristics of the Bay

S.2.1 Historical Background

Until the 1600s, the land around the Bay was inhabited by the Matinecock tribe of the Algonquin Indians who used the Bay for fishing and shellfishing. In the 1600s and 1700s, first the Dutch and then the English settled around the Bay and, besides farming, made fishing into a major industry. By the late 1800s and turn of the century, the Long Island Rail Road had begun service to the area and with it came growth and development with fishing and shellfishing continuing as important economic activities. By the early 1900s, the Bay was known as the "shellfish garden of New York City."

From the 1920s to the 1940s, the economic importance of the Bay increased even more with the addition of commercial and recreational boating. Commercial boating involved the shipping of sand and building supplies. Recreational boating included the use of sail boats and pleasure boats belonging to the growing number of residents, and resulted in an increase in the number of marinas and yacht clubs. However, by this time, commercial boating had significantly diminished, while recreational boating increased with the growing population. Between the end of World War II and the early 1970s, the population nearly tripled around the Bay and in the Town and the County.

By the late 1970s, what had once been a shellfish garden for New York City had been shut down for shellfish harvesting because of pollution, and has remained closed for the last three decades. In addition, swimmable water quality was no longer assured on a steady basis. At the same time, from the early 1970s to the present, there has been almost a 10 percent drop in population. However, the Bay has maintained its importance as a major center for marine activity, with dozens of marinas, boat yards and yacht clubs still operating. Today, the Bay provides tremendous economic, recreational and aesthetic benefits - for visitors, tourists and residents.

S.2.2 The Bay at a Glance

At mean tide, Manhasset Bay has a surface area of approximately 2,725 acres with a volume of 9 billion gallons of water. It is approximately 4.5 miles long north to south, and approximately 1 mile wide in the center. Except for the shallow shoreline areas, the water depths in the Bay at mean tide vary from 0 to 3 feet in the lower reaches; 8 to 12 feet in the center; 3 to 6 feet in the area between Thoms Point and the Town Dock; 6 to 8 feet in the area between Plum Point and Toms Point, and 15 to 25 feet in the mouth of the Bay from Plum Point to the Long Island Sound. The movement of water within, into and out of the Bay is heavily influenced by Long Island Sound. A "tidal prism" enters the Bay which at high tide results in an increase in the volume of water of 73 percent over the Bay's low tide water volume. This results in replacement of almost all the water in the Bay every 24 hours.

The Bay's 9-billion gallon volume at mean tide is increased by 0.4 percent with freshwater flows that originate in the Bay's watershed and from direct rainfall. This freshwater flow, which carries with it a variety of pollutants, is comprised of 10 million gallons per day (mgd) of runoff, 11 mgd of groundwater that discharges under the Bay as "underflow," 9 mgd of direct rainfall onto the Bay's surface and 7 mgd from three wastewater treatment plants that discharge into the Bay.

S.2.3 The Watershed at a Glance

The Bay has a drainage area of approximately 10,000 acres that includes the western half of the Port Washington peninsula, the eastern third of the Great Neck peninsula and the area south of Northern Boulevard to just south of the Long Island Expressway between Community Drive and Lakeville Road. The drainage area, referred to as its watershed, has approximately 200 miles of roads and is estimated to be 20 to 25 percent covered with impervious surfaces (roads, roofs, parking lots, driveways, etc.).

To assist in developing the Plan, the 10,000-acre watershed has been divided into 12 subwatersheds based on topography. The watershed includes 19 different communities, 16

Villages, 3 unincorporated areas in the Town of North Hempstead, which are located in parts of one or more of the 12 subwatersheds. The 19 communities, all within the Town of North Hempstead, which are entirely or partially within the watershed are:

- Baxter Estates
- Flower Hill
- Great Neck
- Great Neck Gardens*
- Kensington
- Kings Point
- Lake Success
- Manhasset*
- Manorhaven
- Munsey Park
- North Hills
- Plandome
- Plandome Heights
- Plandome Manor
- Port Washington*
- Port Washington North
- Roslyn Estates
- Sands Point
- Thomaston

* Unincorporated portion of Town of North Hempstead.

There are several different land uses within the watershed, with approximately 67 percent of the land being used for residential purposes. The other land use categories that comprise the remaining 33 percent of the watershed include open space vacant, institutional, commercial, industrial, water/shoreline and transportation/utilities.

The watershed also includes: seven golf courses, that are all private and all or partially located in the watershed; over a dozen public parks; approximately two dozen marinas; yacht clubs; boat yards; private docks; a Town dock; numerous waterfront restaurants; a large mooring field for hundreds of boats, and a number of areas that afford scenic vistas of the Bay, and Long Island Sound.

It has been estimated that the population of the watershed is approximately 43,500 people living in approximately 15,000 households. Given its economic importance as a coastal area, the New York State Department of State has designated an area along the entire coastline of the Bay ranging from a few hundred feet inland from the shoreline to approximately 1 mile as part of its Long Island Sound Coastal Management Program.

S.3 Water Quality Conditions

S.3.1 Classifications and Standards

The New York State Department of Environmental Conservation (NYSDEC) and the Interstate Sanitation Commission (ISC) have responsibility for setting water quality goals which are based on the desired best use of the waters of the Bay. These goals are officially referred to as "use classifications". Simply, they are the official desired uses of the waters. Depending on the use classification, the state sets specific numerical or text standards for those uses. It's important to clarify that a use classification does not necessarily mean that the use is actually being achieved. It may or may not be. The State has put in place different classifications for various sections of the Bay and the ponds, and creeks that discharge to the Bay.

All parts of the Bay and surrounding waterbodies that discharge to it are classified by the State for fishing. In addition, one area of the Bay (which comprises approximately 50 percent of the Bay's surface area) is also classified for shellfishing which is considered a higher use because its has stricter standards for coliform that must be met. This area is located from the mouth of the Bay south to the central part of the Bay, west of a line from Plum Point to the Bay's eastern shoreline north of Leeds Pond and north of an east-west line from Leeds Pond to the western shoreline.

While most of the Bay's waters are classified for swimming by the State, the southern portion of the Bay and all of the ponds, creeks and other tributaries is classified for swimming with a qualifier. This qualifier states that factors may limit this use. In addition to the State and ISC establishing the designated uses of the Bay, the two agencies also set the specific water quality standards that must be achieved in order to deem that the water quality is acceptable for the classified uses.

The shellfishing coliform bacteria standard is straight forward and very strict, requiring that the total coliform level not be greater than 70 MPN (Most Probable Number). On the other hand, the coliform bacteria standard for swimming is not as straightforward. It is based on the

average of the total coliform levels measured in a given month of sampling using a minimum of five samples. Accordingly, for the State's swimming standard to be met, the average total coliform in the water during a particular month cannot exceed 2,400 MPN. Furthermore, no more than 20 percent of the samples collected in that month can be greater than 5,000 MPN.

For other parameters or pollutants such as turbidity, phosphorus and nitrogen that are used to measure the condition of the water's quality, the State does not have specific numerical standards. In these cases, the State has narrative/text standards that in effect say that that pollutants cannot be discharged in amounts which will cause problems such as algae, weeds and slimes. It should be noted that while nitrogen has been of great interest in the last 20 years, the State does not yet have a nitrogen water quality standard for its marine waters. However, in 1979 the Long Island 208 study did recommend that the State establish such a standard. Nationally, USEPA is taking steps towards the development of nutrient criteria for surface waters.

S.3.2 Monitoring and Modeling the Bay's Water Quality

Monitoring

In order to determine the actual water quality in the Bay, the regulatory agencies have routinely collect samples in the Bay and in the waterbodies that discharge to it. Over the years, this sampling has been primarily performed by NYSDEC, ISC and the Nassau County Department of Health (NCDOH). From the early 1970s to 1991, NCDOH had an excellent monitoring program providing an extensive database of actual conditions in the Bay.

Through 1991, the County had a monitoring program that provided a good basis for determining water quality conditions and whether those conditions were acceptable for swimming and other uses. Starting in 1992, because of budgetary constraints, the level of sampling in the Bay has been severely limited both in terms of the parameters that are analyzed and the number of locations where samples are collected. Other sampling in the Bay was

performed by NYSDEC's fisheries group (mostly from 1988 to 1993), and occasionally special sampling is performed by ISC (1997 and 1998, as part of Long Island Sound Study).

Modeling

While sampling of the Bay's waters is used as a way of determining water quality conditions at a specific time, over the years mathematical computer models have been developed and used to evaluate and predict water quality in the Bay to determine the influence of adjacent waterbodies (referred to as boundary conditions) and to predict future water quality.

During the 1970s and in 1982, three mathematical computer modeling studies were performed to evaluate the Bay's relationship to Long Island Sound and to predict water quality in the Bay under various pollutant loadings. All three of these studies found that:

a. the Bay's waters were well mixed but there was a large amount of algal growth because of nutrients;

b. while the nutrients were in part from sources within the Bay they were largely dominated by the water quality in the Sound;

c. the nutrient sources from within the Bay even without the influence of the Sound were sufficient to cause algal blooms in the lower Bay (the shallow southern end) and to a lesser degree in the northeastern part of the Bay; and

d. the Sound's influence alone without any nutrient discharges from within the Bay was sufficient to cause algal blooms in most parts of the Bay.

Newer and more recent mathematical computer models have been developed as part of the Long Island Sound Study. These models, which primarily predict dissolved oxygen levels, have demonstrated that the western part of the Sound (off Manhasset Bay, Hempstead Harbor and Little Neck Bay) has always been naturally susceptible to low dissolved oxygen (known as hypoxia); however, human activity has aggravated this condition.

The LISS, through its assessment of the water quality conditions in the Sound, has concluded that naturally occurring hypoxia is made worse by wastewater treatment sewage

plants and nonpoint sources such as storm water runoff, groundwater underflow and atmospheric pollution. This conclusion has lead the USEPA and the State to the policy decision that all point and non-point nitrogen loads to the Sound contribute to the hypoxia problem and therefore all point and nonpoint sources of nitrogen should be reduced. Accordingly, consistent with this policy decision the USEPA and the States of New York and Connecticut have recommended a three-part phased approach for reducing nitrogen loads to the Sound from the point and nonpoint sources.

The first phase (Phase I) involved freezing the allowable nitrogen loads discharged to the Sound and its coastal embayments. This included freezing the nitrogen loads from the three wastewater treatment plants in the Bay to their 1990 level. All three plants have successfully complied with the Phase II limitations. Phase II recommended low cost retrofit to allow for some initial nitrogen reduction. In order to comply with Phase II, recently, grant funding was approved for two projects that will address nitrogen reductions to the bay from the plants. A demonstration project at the Port Washington plant to reduce nitrogen between 70 to 80% from 25 percent of the flow has been approved by the State. Also, to comply with Phase II, a feasibility study has been approved by the State to evaluate whether the wastewater flow from the two Great Neck treatments plants can be diverted and treated at the Nassau County plants that discharge to the Atlantic Ocean, thus eliminating the discharge from these two plants to Manhasset Bay.

To comply with the recommendations of the Phase III (Action Plans for Hypoxia Management, USEPA, 1997), the representatives of the three wastewater treatment plants (Great Neck Sewer District, The Village of Great Neck and The Port Washington Sewer District) that discharge to Manhasset Bay have applied for State funding assistance for the construction of a total of $30 to 40 million of major capital improvements at the three plants. These improvement would be needed to comply with the targeted long-term 58.5% reduction in nitrogen from their discharges.

It should be noted, however, that because USEPA's 58.5% reduction applies to the total point source and non-point source nitrogen loadings, the representatives of the sewer districts

have been informed that if the non-point sources loads of nitrogen are not reduced by 58.5%, then their plants would have to provide a level of removal greater than 58.5% to offset the non-point shortfall. This would result in the three plants being required to provide additional nitrogen removal beyond the 58.5% thus increasing their capital cost beyond the initial $30 to $40 million estimate and further increasing their associated increase in annual operating expenses.

S.3.3 Water Quality Conditions and Trends

Dissolved Oxygen

Dissolved oxygen in the Bay, which is essential to support fishlife, steadily improved from the early 1980s through the mid 1990s. However, each year, typically in mid to late summer, there have been periods of low dissolved oxygen in the western Sound. At times, during this same period, low dissolved oxygen conditions are also found in parts of the Bay. However, its difficult to establish if the dissolved oxygen conditions improved or worsen from the Sound southward into the bay. For instance, in the summer of 1997, ISC's monitoring of the Bay found dissolved oxygen levels improving as one traveled south into the Bay, while in the summer of 1998 the opposite was true.

The periods of hypoxia during the summer have generally ranged from 5 weeks to 10 weeks with the duration frequently related more to weather conditions than to any increase or decrease in nitrogen discharges from point and nonpoint sources of pollution. In fact, the water quality conditions in the Bay have at times been reported as good to excellent a short time before or after a period of hypoxia without there being any change in nitrogen loadings. One example of this was in the summer of 1998.

There have been some years when the hypoxia periods have also been accompanied with fishkills. These kills, have at times been caused by bluefish chasing menhaden (or bunkers) into shallow waters which are low in oxygen. In such cases, the shallow waters can also become depleted of oxygen because of the large number of menhaden in a school. This causes some of the menhaden to die from the lack of oxygen and some to be killed by the bluefish. In either

case, the result is unsightly and offensive. Another concern with low dissolved oxygen, and which was included in the LISS, is the effects of low dissolved oxygen on living resources.

Coliform Bacteria

The acceptability of a waterbody for swimming or for the consumption of shellfish from those waters is determined by the presence and level of coliform bacteria. With respect to shellfishing, the coliform standard, which is very strict, has been exceeded in the Bay for several years since the early 1970s. Unfortunately, the State has indicated that its ban on shellfishing in the Bay is unlikely to be lifted in the near future. One reason for this is that coliform levels increase when it rains and remain high for approximately 3 to 4 days after that.

Regardless of the above, the State's classifications (intended use goals) still includes shellfishing as a best use for approximately 50 percent of the Bay (the mouth and northwestern portion). A review of the historical coliform data and considering the tidal exchange in this part of the Bay, it would be advisable to retain the shellfishing classification as a goal for the future similar to USEPA's goal for the future of reducing hypoxia in the western Sound. Related to the Protection Committee's desires to have shellfishing as a goal, there are three important points to consider: 1) only the State can set the best-use classification and associated water quality standard; 2) in previous years the shellfishing standard was being met and is therefore attainable; 3) USEPA regulations preclude backsliding (i.e., reducing standards); and the federal Clean Water Act sets as a national goal fishing water quality.

With respect to swimmable water quality, while water quality conditions are not ideal, they are much improved. In fact, they have been much better since 1992 than in the 10-year period from 1982 to 1992. For example, from 1992 to 1997, the swimmable water quality conditions at Manorhaven Beach were at a 94 percent rate of conformance with the State's swimmable standard. This fact may not be well known to residents who generally believe that the water is not safe to swim. This perception may be in part because of the poor clarity of the water caused by algal blooms, weeds or slime resulting primarily from excess nitrogen.

However, this unappealing appearance is unrelated to the coliform bacteria levels of the water which is the indication of acceptable water quality for swimming.

Nitrogen

Excess nitrogen in the Bay, as well as Long Island Sound, causes algal blooms and overgrowth of weeds which in turn decay. At certain times of the year (particularly during the summer), this results in low dissolved oxygen. This low dissolved oxygen can then limit the presence and survival of fish. While this is not a human health concern, it does create ecological and aesthetic problems and affects the ecological health of the Bay and the Sound.

The nitrogen levels in most parts of the Bay have been found to be high with the highest levels in the lower Bay. In the lower Bay algal blooms occur on a somewhat regular basis during the summer. Based on assessments of the water quality conditions, conducted as part of USEPA and State studies (Sec. 208 and 201) it has been determined that the nitrogen in Long Island Sound which is carried into the Bay can result in excess nutrient levels in most if not all parts of the Bay. This is the case even if there were no nitrogen discharged from within the watershed. These assessments also concluded that if there were no nitrogen coming from the Sound and if the nitrogen came only from within-Bay sources, most of the Bay would be free of the excess nitrogen except for the lower Bay and to a small degree, in the northeastern part of the Bay near Toms Point and Baxter Estates Beach.

Floatables

The problem of floatables in and around the Bay is more an aesthetic and safety concern than a water quality concern. Yet the presence of floatables prevents the enjoyment of uses in and around the Bay and, particularly, along beach shoreline areas and enclosed areas. The problem is caused in large part by street litter and deteriorating bulkheads and piers within and outside the Bay. The materials are initially washed into the water by storm water runoff and then moved around by tides and wind, and ultimately deposited on the shoreline.

Sediment

Sediment is similar to floatables in that it does not directly affect water quality standards per se, although it can cause problems with turbidity especially during and after periods of storm water runoff. The buildup of sediments, either in the ponds around the Bay or in the Bay itself, can:

- interfere with navigation and thus require maintenance dredging;
- prevent swimming in shallow parts of the Bay, particularly in the lower reaches; and
- degrade valuable wetlands and special habitats.

A preliminary review of available historical information from the U.S. Army Corps of Engineers and the National Oceanic and Atmospheric Administration of water depths throughout the Bay cannot clearly establish if infilling with sediments is taking place on a baywide basis. However, there is evidence of sediment buildup in the narrow portions of the lower Bay and the areas by the marinas in the northern areas of the Bay. Since the most recent baywide depth survey of the Bay was performed in 1990 and the one before that more than 30 years earlier, it would be advisable to have another survey performed in the year 2000 to allow for a better determination of if, and to what degree, baywide infilling is occurring.

With respect to sediment quality, a limited study of the Bay was conducted by the National Oceanic and Atmospheric Administration (NOAA) that found that based on one grab sample of the bay's sediments at three different locations, there was evidence of toxic contamination. However, under State requirements, any dredging project proposed in any portion of the Bay would require an extensive sediment sampling program in the proposed dredge area. This sediment sampling effort would be performed in accordance with the State's guidance.

Current State guidance for sampling sediments associated with dredging projects is presented in the State's document entitled "Interim Guidance Freshwater Dredging", October

1994. Although the title specifies freshwater it is also the current guidance use by the State for marine waters sediment sampling. The applicant wishing to perform dredging would need to prepare an approvable sampling work plan that includes:

- a field operation plan;
- a field sampling;
- analysis plan; and
- a Quality Assurance and Quality Control Plan (QA/QC).

The sampling plan would include a number of sampling stations (determined by a formula contained in the State's guidance) along the route/footprint proposed to be dredged and include depth composited samples rather than surface grabs (performed by the NOAA sampling effort).

While the specific chemical and physical parameters to be analyzed may vary from one dredging project to another, typically the analysis would include:

- Volatile Organic Compounds
- Semivolatile Organic Compounds
- Pesticides and PCBs
- Dioxin
- Metals and Cyaide
- Toxic Characteristic Leaching Potential (TCLP) Parameters
- Additional Chemical Parameters
- Grain Size Analysis
- Radiological (if deemed necessary)

In addition to the above, at times biological testing/sampling may also be necessary to determine the pressure and diversity of organisms in the sediment (i.e., worms, larvae snails, etc.).

Depending on the sampling results, an applicant for a dredging project would need to evaluate and discuss with the State (and as necessary with the USEPA and the Army Corps of Engineers) alternative dredge material disposal options. In New York, a determination would be made as to whether the dredging project requiring a permit would be considered minor or major project. The State considers minor projects (all other projects are considered major) as those which:

- dispose less than 100 cubic yards in navigable waters;
- involve maintenance dredging at least every 10 years; or
- dredge areas less than 5,000 square feet or less in navigable waters

The applicant for a dredging project would need to have a pre-application meeting with the appropriate regulatory/permitting agencies and begin the preparation of a joint permit application dealing with various environmental permits (Sec. 404, protection of waters, tidal wetlands, etc.).

The dredging project applicant would also need to evaluate available disposal options. These options would be screened and assessed for a variety of factors such as environmental impact, feasibility, costs and public acceptance. Alternative disposal options could include:

- use of dredge sediments to construct berms, or islands;
- ocean/open water disposal;
- borrow; pit disposal followed by clean capping
- land disposed with adequate precautions for contaminated sediments; and
- beneficial use such as mixing with asphalt, concrete or soil amendments.

Depending on the disposal alternative selected and the size scope and location of the dredging project an environmental impact statement and public hearing could be possible.

Recently, sediments were dredged from Glen Cove Creek which were successfully "beneficially" re-used as a mixture with asphalt at an asphalt plant located on Glen Cove Creek. Another local example of beneficial re-use involved the dredging of a trench of a force main approximately 9,000 linear feet across Eastchester Bay just opposite of Manhasset Bay. In this case, the dredged materials received a beneficial used determination (BUD) from New York State Department of Environmental Conservation that allowed portions of the dredge materials to be mixed with other materials to create a marketable manufactured aggregate and portions were used as cover material in the capping of a landfill on the east end of Long Island.

S.3.4 In-Bay Discharges

The Bay receives freshwater discharges from four major sources totaling an average of 37 million gallons per day (mgd), with the pollutants totaling 0.4 percent of its volume. To some degree, boats and marinas have the potential to discharge coliform bacteria and nitrogen. While this may cause some localized problems, the focus for this discussion is on the major sources. These sources, their estimated flow, and nitrogen and coliform loading are:

In-Bay Source	Flow (Percent)	Nitrogen (Percent)	Bacteria[(a)] (Percent)
Groundwater Underflow	11 mgd (30)	709 lbs/day (30)	negligible* (0)
Runoff (wet and dry periods)	10 mgd (27)	377 lbs/day (16)	6×10^{13} (99)
Direct Rainfall	9 mgd (24)	71 lbs/day (3)	negligible (0)
Treatment Plants	7 mgd (19)	1,193 lbs/day (51)	9×10^{11} (1)
	37 mgd (100)	2,350 lbs/day (100)	6.09×10^{13} (100)

[(a)]Organisms/day.

*May not be negligible near shoreline especially in areas with septics/cesspools.

As a result of the LISS, the nitrogen discharges from the wastewater treatment plants were frozen at the 1990 levels. These levels have steadily decreased and are expected to decrease further, as a result of various nitrogen removal/reduction projects. However, there currently are no plans to reduce the significant load of nitrogen from groundwater underflow (30 percent) and in runoff (16 percent).

The nitrogen in groundwater underflow results primarily from fertilizer use over the entire watershed on lawns, parks and golf courses, and from the 70 percent of the watershed where homes do not have sewers but instead have cesspools or septic tanks. These two uncontrolled sources of nitrogen discharged as underflow account for 30 percent of nitrogen to the Bay. In particular, the nitrogen from these sources is an issue in the lower Bay where only 20 to 30 percent of the area is sewered.

Based on the above, if the communities in the watershed wish to reduce or eliminate problems with bathing water quality and shellfishing, as it relates to in-Bay sources, then it is important to reduce the bacterial levels in storm water runoff. If the communities wish to reduce or eliminate problems with low dissolved oxygen and algal blooms, then it is important to reduce the nitrogen levels in groundwater underflow caused by fertilizer use, cesspools, septic tanks, and storm water runoff that recharges the groundwater. Since a long-term program for nitrogen reduction has begun for the treatment plants, it would be advisable to also focus on reducing nitrogen in groundwater underflow and storm water runoff.

S.4 Storm Water Runoff

Storm water runoff generated throughout the 10,000-acre Manhasset Bay watershed is either recharged to the ground (and enters the Bay as underflow), or collected in storm sewers and discharged to the Bay through outfalls or ponds. Most of the runoff in the watershed is collected by storm sewers that are owned and maintained by the County, the Town or one of the villages. The County owns most of the outfalls.

There are approximately 230 outfalls in the watershed, 39 of which are greater than 36 inches in diameter. Of these 39 outfalls, 10 discharge directly to the Bay without an opportunity for reducing their nitrogen, sediment load, or floatables load. Of the remaining outfalls, 5 discharge directly to one of the ponds and 19 discharge to a creek or brook. Thus, for these outfalls there is some degree of reduction in impact on the Bay, albeit at the expense of an impact on the ponds or creeks and brooks.

Impact of Storm Water Runoff

The storm water runoff that originates in the watershed carries a host of pollutants. These pollutants can include coliform bacteria from animal waste and illegal sanitary connections to the storm sewer; sediments and suspended solids from eroded lawns, yards, construction sites, parking lots and streambanks; nutrients from fertilizers and pesticides applied to lawns, gardens and golf courses; and floatables from street litter and trash and from deteriorating streambank shoreline structures. Storm water runoff, particularly in urban areas across the County, has been identified as a major source of pollution, resulting in closed beaches, closed shellfish areas, bans on fish consumption, beaches and shoreline littered with debris, siltation of boating channels, streambank erosion and degraded wetlands and wildlife habitats.

USEPA's New Attempt to Control Storm Water

In an attempt to control the adverse impact on water quality and impairment of uses caused by urban storm water runoff, and in response to federal legislation, USEPA has instituted a two-part program requiring new federal and state permits for storm water discharges, and a program to control or reduce pollution from these discharges. One part of USEPA's program (referred to as Phase II storm water regulations) will apply to all of the communities in the watershed and will take effect in 1999. This new program, as currently envisioned will require a six-part control program that must include:

1. a public education program on the effects of storm water runoff;

2. a public involvement process to control storm water runoff;
3. procedures by the owners of storm sewers to detect and eliminate illegal connections to the storm sewer system;
4. a program for controlling runoff from construction sites greater than 1 acre;
5. a program to control runoff from new developments and redeveloped areas; and
6. pollution prevention and good housekeeping practices for existing storm sewer systems.

Methods for Controlling Storm Water Impacts

Over the last 20 to 30 years, the adverse impacts of storm water on water quality have been recognized nationally, and a number of methods for reducing those impacts have been developed as shown in Tables S-1 and S-2. These methods include two basic categories or practices: "non-structural" that are focused on pollution prevention, and "structural" that involve the installation or construction of devices or facilities that treat or remove varying degrees of pollutants contained in the runoff.

Non-structural methods may include public education, limiting the amount of impervious surfaces, reducing the use of fertilizer and pesticides, performing inspection of storm water systems, conducting site plan reviews focused on proper storm water management or using restrictive covenants.

Various structural methods can be used depending on whether an area is already developed or is to undergo development. In developed areas, examples of measures can include eliminating illicit connections, providing catch basins or sediment traps where they do not exist and removing the accumulated materials, using porous pavement, constructing storm water detention basins, biofiltration ponds or wetlands or retrofitting those that already exist, or installing sand filters and porous trenches.

Table S-1

NONSTRUCTURAL STORM WATER CONTROL MEASURES

Measure	Purpose	Recommendation for Use
Natural Depressions	Collect and detain runoff; slow storm water velocity to allow for recharge; protect low-lying areas and downstream development from flooding.	Upland areas in or adjacent to drainage areas by streams or waterways.
Gutters and Downspouts	Collect and convey runoff from roofs to leaching pools or other stable outlet.	For residential and commercial structures where roof top storage is not feasible; any site development, especially dense development where large volumes of roof runoff are anticipated.
Natural Vegetation	Control runoff and erosion/sedimentation; slow storm water velocity to allow for increased infiltration; trap sediment particles; roots hold soil particles in place.	Upland areas, slopes, land area adjacent to surface waters and bluffs, stream banks, drainageways.
Wetlands	Buffer and stabilize lowland areas; slow runoff velocity and retain runoff, filter and trap suspended debris.	Along rivers, streams, and other surface water systems.
Storm Water Detention (Ponds/Basins)	Temporary detain runoff with gradual release to surface or groundwaters; reduce peak runoff flows; protect downstream development from flood potential.	Upland sites and other sites where there is sufficient distance to seasonal high water table, drainage areas adjacent to streams and waterways; can function as a recreation area when properly vegetated and designed to drain completely.
Surface Drainageway	Direct runoff from areas where it could cause flooding, erosion and/or sedimentation.	Along slopes where soils are exposed during construction; newly constructed fill slopes; and in areas of highly erodible soils.
Grass or Vegetated Waterway	Convey runoff to a stable outlet; grasses can reduce energy of flow, permitting infiltration.	Areas where slopes are moderate and runoff velocities are non-erosive; areas where increased storm water volumes will not exceed the capacity of the channel.
Bare Channel	Convey and/or direct runoff on construction sites.	Areas where the slope gradient is minimal and the runoff velocity is low; avoid use in areas with highly erodible soils.
Manmade Drainage Swales	Convey and/or recharge storm water runoff.	Recommended for most sites where control of low volume storm water flow is required.
Biofiltration Systems	Minimize pollutant loadings carried in storm water runoff to surface waters; aquatic plants absorb contaminants (coliform, metals, nutrients) and trap suspended solids.	Where there is adequate area to construct such a pond; drainage areas that empty into surface waters; where construction of a recharge area is not feasible due to the shallow depth of the water table.
Soil/Slope Stabilization	Protect exposed soils from runoff impacts, erosion and sedimentation; reduce runoff velocities allowing for infiltration; hold vegetation in place until roots are established.	Slopes and other areas where soils are exposed during construction, newly constructed fill slopes; soil stockpile areas.

Table S-2

STRUCTURAL STORM WATER CONTROL MEASURES

Measure	Purpose	Recommendation for Use
Permeable Paving	Reduce the volume and rate of storm water runoff; allow for increased infiltration.	Patios and walkways; use on slopes less than five percent where soils have a moderate to high rate of permeability; adequate depth to seasonal high water table.
In-Line Storage	Collect storm water runoff from parking lots and roadways; allow for percolation of runoff.	In areas where there is adequate depth between the bottom of leaching pools and leaching catch basins and the seasonal high water table.
Perforated Reinforced Concrete Pipe	Allow for recharge of storm water	General use
Gutters and Downspouts	Collect and convey runoff from roofs to leaching pools or other stable outlet.	For residential and commercial structures where roof top storage is not feasible; any site development, especially dense development where large volumes of roof runoff are anticipated.
Sediment Ponds/ Basins	Protect surface waters from increased sediment loads; reduce the potential of flooding for downstream lands.	Construction sites; areas of highly erodible soils and sloped terrain.
Energy Dissipation	Slow storm water velocity to a non-erosive level; trap debris, permit the settling of suspended solids and accompanying contaminants.	Adjacent to culverts, outlets, and drainage channels, and along stream banks; to prevent erosion and/or scouring.
Sediment Filter	Trap suspended particles and debris from storm water runoff.	Adjacent to culverts, outlets, and drainage channels, and along stream banks; to prevent erosion and/or scouring.
Storm Water Retention (Ponds/Basins)	Retain sediments (and runoff) to allow for the die-off of bacteria; reduce peak runoff flows and protect downstream properties from flooding; protect streams from increased sediment loadings.	To receive storm water from drainage channels in areas where recreational and water amenities are desired; (permanent pond) and in areas where heavy sediment loads are not anticipated.
Storm Water Detention (Ponds/Basins)	Temporarily detain runoff with gradual release to surface or groundwaters; reduce peak runoff flows; protect downstream development from flood potential.	Upland sites and other sites where there is sufficient distance to seasonal high water table, drainage areas adjacent to streams and waterways; can function as a recreation area when properly vegetated and designed to drain completely.
Surface Drainageway	Direct runoff from areas where it could cause flooding, erosion and/or sedimentation.	Along slopes where soils are exposed during construction; newly constructed fill slopes; and in areas of highly erodible soils.
Structurally-lined Channel (Riprap, Asphalt, Concrete)	Convey and/or direct runoff; channel outlet must be well-stabilized, there is little or no energy dissipation along an impervious-lined channel.	Drainage areas having a high slope gradient or where runoff velocities are erosive, prohibiting the establishment of vegetation.

Table S-2 (continued)

STRUCTURAL STORM WATER CONTROL MEASURES

Measure	Purpose	Recommendation for Use
Biofiltration Systems	Minimize pollutant loadings carried in storm water runoff to surface waters; aquatic plants absorb contaminants (coliform, metals, nutrients) and trap suspended solids.	Where there is adequate area to construct such a pond; in drainage areas that empty into surface waters; where construction of a recharge area is not feasible due to the shallow depth of the water table.
Soil/Slope Stabilization	Protect exposed soils from runoff impacts, erosion and sedimentation; reduce runoff velocities allowing for infiltration; hold vegetation in place until roots are established.	Slopes and other areas where soils are exposed during construction, newly constructed fill slopes; soil stockpile areas.

Source: Long Island Regional Planning Board, 1983

S.5 Policy Environment

Public policy is shaped by the several levels of governmental involvement concerned with the water quality of Manhasset Bay and its contributing watershed - local, county, regional, state and federal. It is also influenced by the residents of the watershed, either individually or organized into use-related groups, such as boaters or businessmen, and by public interest groups, perhaps environmentally based. Each of these parties can contribute to the policy framework through such means as their ability to regulate or approve, or by public education and political pressure on those who have those regulatory powers. And once policy is established in regulatory law or action program, the continued willingness to enforce or implement those policies will determine the effectiveness of achieving the policy goals.

Water quality standards for Manhasset Bay are established and regulated by the higher levels of government: federal, regional, interstate, state and county. In addition to standard setting, there are several agencies within these sectors that have a regulatory, approval or permitting role over various aspects of land use, infrastructure development, storm and sanitary waste treatment and discharge, and public health. Such agencies include: the USEPA; the US Army Corps of Engineers, the Interstate Sanitation Commission; the governments cooperating in the Long Island Sound Studies; the New York State Departments of State, of Environmental Conservation, and of Health; the Long Island Regional Planning Board; the County of Nassau and its Departments of Health and of Public Works, and the Nassau County Planning Commission.

With the Congressional adoption in 1987 of the amendments to the Clean Water Act of 1972, the federal government entered directly into the mediation and abatement of storm water runoff. Conformance to the federal standards is being phased in; administration will be by the states in a manner similar to that now used for State Pollution Discharge Elimination System permits. All of the villages of the Manhasset Bay watershed qualify under these new standards as a Small Municipal Separate Storm Sewer System ("MS4"), and the unincorporated areas of North Hempstead are included as well by the similar designation of Nassau County.

Municipal governments within the watershed will therefore have the most direct impact on water quality of the Bay and of its tributary ponds and streams, through their local policies, standards and regulatory actions. They have already established a wide variety of land use and other controls through municipal ordinances, including not only zoning and site development policies and procedures, but also, under their general "police" power to control private actions in the interest of the public health, safety and general welfare, matters relating to littering, garbage, rubbish and refuse, soil removal, animal wastes, trees, and the like. The present policies and standards of the municipalities in the Manhasset Bay watershed were examined to determine their scope and extent, as well as their similarities and disparities, and to evaluate those instances where a more uniform approach to water quality and water quantity management would have a salutary effect.

A number of the land use policy elements reviewed are of particular importance in municipalities with significant amounts of vacant, developable land, where land use and density options are still available, and sites are large enough to permit on-site control measures for runoff and water quality control. In the Manhasset Bay watershed, there are 1,070 acres of land in this category; 90% of that land is in the municipalities of Manhasset, Kings Point, North Hills, and Port Washington North. Several communities have virtually no undeveloped land within the watershed (e.g., Roslyn Estates, Munsey Park, Plandome Heights, and Kensington).

Comprehensive Plans

The keystone of municipal land use policy should be its comprehensive plan. State enabling statutes were recently modified to give greater importance and effectiveness to such statements of municipal policy. Only the Town of North Hempstead has an adopted municipal plan; it was prepared prior to the current procedure. Developed or not, all municipalities should adopt some formal policy statement under the new standards.

Zoning Ordinances

All municipalities in the watershed have adopted a municipal zoning ordinance. None have ordinances that control or direct attention to storm water management, erosion and sedimentation, or water-borne pollution on a comprehensive basis. The Town of North Hempstead requires that each site plan has an erosion control plan and landscaping and drainage plans that results in retaining on-site a 2.5-inch rainfall.

Land Subdivision

Most villages have granted plat review authority to their local planning board. Only Plandome includes specifications for planning board review of drains and grades for surface waters. The Nassau County Planning Commission maintains jurisdiction for subdivisions of five or more lots proposed in the Town. Subdivisions of four lots or less which do not include a proposed roadway or roadway extension may be waived for review by the Planning Commission.

Site Plan Review

Site plan review offers the opportunity to recommend or require special design standards that achieve specific municipal objectives, and does for individual uses what subdivision review and approval does for multi-parcel developments. The procedure permits the reviewing agency to regulate the development of single parcels in a manner not covered by the ordinary provision of zoning laws, by the application of planning principles to the proposed use of a parcel of land. Manorhaven requires such review in all zoning districts. Sands Point delegates site plan review to its Board of Zoning Appeals, and requires consideration of storm water and drainage facilities. Several other communities require architectural review of the proposed building and its site.

Under the Town's Chapter 70, site plan review is required for all commercial and multi-residence (three-family dwelling or greater) developments that are larger than one acre. Sites greater than one acre in a Residence District where the principal use of the site is other than a dwelling or a two-family attached residence also requires site plan review.

Alternative Developments

These are non-traditional developments that will assure conservation of land and accomplish the preservation of land for open space and recreation, the protection of natural areas or historic sites, the preservation of wetlands and marshlands or lands with other natural values, and the protection of streams, rivers and ponds and of areas with steep slopes.

In the case of single-family subdivisions, they are sometimes called cluster or conservation developments, and may allow an increase in density of development in one part of a site in order to protect other, more sensitive land while the average density remains the same. The Village of Manorhaven has specific authority for clustering in its R-3 Residence district. Under Chapter 70, the Town requires clustering for new development in a residential zoning within its aquifer Protection Overlay District.

Animal Wastes

The transport by storm water of animal fecal matter, such as dog waste, from the streets of a municipality into Manhasset Bay can adversely affect its water quality. The ordinances were examined to determine the presence of any specific requirement that pet owners be obligated to gather and remove such wastes from the streets and dispose of it in a sanitary manner.

Virtually all the municipalities had adopted a leash law restricting the running at large of dogs; most, but not all, had "pooper scooper" requirements for the removal by the dog's owner of any fecal material deposited on public streets and sidewalks, or the property of another. Under the Town's Chapter 14, a pooper scooper procedure is required.

Aquifer Protection

The Long Island Regional Planning Board has established a special groundwater protection area affecting lands in the unincorporated section of the Town and in the villages of Lake Success and North Hills. The Town has a draft Integrated Pest Management Plan for Town owned lands to minimize the use of fertilizers and pesticides.

Great Neck, Kings Point and Thomaston have ordinance provisions affecting the tapping of ground water within the jurisdiction of the Water Authority of Great Neck North. Manorhaven has health standards relating to discharges from privies and cesspools. Plandome Heights prohibits such discharge into Manhasset Bay, its bordering lands, and streams within the village.

Sands Point prohibits the construction of private water wells. In addition, the Nassau County Department of Health is a major regulator affecting aquifer protection through their authority in terms of septic/cesspools systems and placement near water supply wells/areas.

Buffer Zones

Several municipalities have specific zoning standards requiring the establishment of landscaped buffer zones as screening devices between differing land use types or districts (such as business and residential districts). None were using these buffers specifically for water quality or quantity control purposes. Their use was by no means consistent within or among the municipalities; model design standards and broadened purposes would be appropriate and helpful. The Town requires landscaped buffer areas as part of the standards for most zoning districts. This is usually in cases where o-residential districts abut residential districts or properties I residential use or where visual and noise buffers are necessary.

Critical Environmental Areas

None of the local municipalities had taken advantage of the provisions under the State Environmental Quality Review Act permitting the designation of Critical Environmental Areas. The special groundwater protection area established by the Long Island Regional Planning Board for portions of North Hempstead was reputed to be a CEA, but the records of the NYSDEC were inconclusive as to the completion of the filings required to achieve this designation.

Erosion and Sediment Controls

Kings Point and Sands Point have special procedures governing their Coastal Erosion Hazard Areas mapped and established by the NYSDEC. Manorhaven has erosion performance standards in its zoning ordinance, but only with respect to the R-2 Residence district. Great Neck has comprehensive standards for the reclamation of a site after the stripping of sod, topsoil or subsoil. The Plandome building inspector may require an erosion control plan as part of a building permit application. Thomaston has standards for the maintenance of open areas with respect to surface and sub-surface water drainage, wind blown dust, etc. As previously stated, the Town of North Hempstead requires that each site plan has an erosion control plan and landscaping and drainage plans that result in retaining on-site a 2.5-inch rainfall.

Flood Plain Management

Virtually all of the municipalities have some variation in place of the standard ordinance required for federal flood insurance. Some have tailored and limited the wording to their particular situation, others have simply adopted the federal model. However, the federal ordinance deals with building elevations and not erosion control. Under the Town's Chapter 21, federal flood insurance is required.

Wetlands

Kings Point and Sands Point have specific standards regarding freshwater wetlands, and the activities, such as buildings and filling, that can take place within or adjacent to them. The Town has no one specific ordinance protecting wetlands or maintaining wetland buffers but maintains numerous sections in various ordinances which prohibit infilling, construction, and dumping in public waterways.

The Town regulates structures and bulkheads in or on public waterways and underwater lands within or under the jurisdiction of the town. Town permit applications must include the necessary state and federal permits. These regulations result in the regulation of construction primarily affecting tidal wetlands in the Town.

Open Space Protection Plans and Regulation Requirements

Municipal regulations and polices were reviewed to determine the extent to which they plan for and encourage or require open space dedication to protect natural areas and provide for recreational opportunities or storm water detention facilities. Open space dedication refers to requirements in regulations or municipal policy to set aside a certain amount of land for permanent open space as part of the subdivision or site plan approval process, particularly important in the municipalities with undeveloped land. The Town requires open space protection in the following zones: planned unit development, residence open space and open space recreational districts.

Resource Extraction

Great Neck and Port Washington North have detailed requirements and reclamation standards for soil removal sites. Kings Point requires a permit from its board of trustees for stripping, excavating or mining of any soil, sand or gravel. Flower Hill and Sands Point have more modest standards for such actions.

Under the Town's Chapter 45, a permit is required for more than 75 cu. ft. of topsoil, earth, sand, etc. The permit requires a plan designed to prevent erosion and prepare land by grading, fertilizing and planting. Under Chapter 25, a permit is required for grading or filling of land and top soil removal. In addition, it restricts stripping and removal of topsoil near property lines. Furthermore, topsoil cannot be removed between October 1st and April 1st.

SEQRA Procedures

The New York State Environmental Quality Review Act (SEQRA) requires that any action that is to be undertaken, approved or funded by a public agency must undergo a review process to determine if it will have a potential impact on the environment. The New York State Department of Environmental Conservation is the agency responsible for oversight and facilitation of the process.

NYSDEC has developed extensive regulatory and administrative procedures generally known as the "SEQRA Regulations". These regulations were substantially revised, effective January 1, 1996. None of the municipalities has revised its references to SEQRA in conformance with these amendments. Baxter Estates, Kensington, Plandome Heights and Thomaston have no specific references to SEQRA in the materials furnished. The SEQRA regulations can be used to address the water quality impacts of certain projects or actions as well as non-point pollution sources such as storm water runoff.

Solid Waste Management and Litter Controls

Almost all of the municipalities have regulations in place regarding littering of public areas and properties of others while standards for maintenance of an owner's property and adjacent streets are more rare; Kings Point has such a requirement. No community has a specific requirement regarding the removal of leaves that accumulate in the gutter and curb areas through acts of nature, although Great Neck has a provision that comes close (owner may not allow such materials to accumulate on the sidewalks, streets, highways or public places abutting his property).

Storm Water Management

Almost all communities have standards regarding the hookup and use of sanitary sewers, and the prohibition of storm water into such systems. Several prohibit the discharge of storm waters onto a public street (at least without municipal approval). Sands Point uniquely requires all roof and driveway runoff to be conducted to underground concealed dry wells located entirely on the property. The Town has a requirement under Chapter 70 that all projects subject to site plan review must retain on-site a 25.-inch rainfall. The Town is also attempting to implement storm water controls that are more land use oriented through their zoning. Other than these, general policies on storm water management are lacking.

Streets and Sidewalks

Generally, the same comments as for solid waste and littering. Most communities prohibit the placement of leaves and clippings in the street or gutter; only Great Neck appears to intend for its removal if deposited from natural causes. Under the Town's Chapter 48, the owner or occupant of any house or building to keep the sidewalk in front of the property free from filth, dirt, weeds or other obstructions.

Trees

The density of tree cover is one of the most effective ways to reduce storm water runoff, for trees will absorb far more storm water than will bare lawn. All municipalities have some standards to prevent the reckless destruction of large or significant trees; many are similarly worded. Some, but not all, have requirements (usually at the discretion of the building inspector) to require the replacement of the trees that may be removed, especially those removed during building construction.

Port Washington North requires the planting of street trees as a condition of the issuance of a certificate of occupancy. State law permits a planning board to require street trees as a

condition of subdivision plat approval. Under Chapter 2, the Town has a tree removal permit proves that requires the evaluation of erosion controls that will be implemented during the removal of a tree and the potential erosion related impacts that the removal of the tree could have one neighboring properties.

Swimming Pool Water

Swimming pool water which is typically chlorinated that is discharge to storm drains will eventually runoff into creeks, pods, or directly into the Bay. Several communities have standards regarding the conditions under which swimming pool water may be discharged when pools are emptied. Several restrict such discharge into a public street or onto the property of another.

Plandome Manor specifically requires such discharges into dry wells on the site. Manorhaven requires disposition "on the owner's land". Under Chapter 70, the Town requires a certification approved by a professional engineer licensed in New York State that the drainage of the pool is adequate and well not interfere with the public water supply systems, with existing sanitary facilities and with public highways.

Lawn Watering

Great Neck, Kings Point, Sands Point and Plandome, in their water conservation standards, limit the days on which lawns may be sprinkled, and require rain sensing equipment for automated irrigation systems.

Other

Great Neck and Manorhaven have specific requirements for the operation of boats, and discharges from boats. Sands Point, Port Washington North and Kings Point have specific provision for regulating construction of docks and off-shore structures, and of waterfront land. The Town requires permits under Chapter 42 for the construction of bulkheads and any structure

(including moorings) on public waters or underwater lands within or under the jurisdiction of the Town. Permit applications under Chapter 42 are reviewed for stability and environmental impacts.

S.6 Recommended Plan

In order to achieve the goals set by the committee, the recommendations of this plan are divide identified below into those that are: 1) to be applied throughout the Manhasset Bay watershed (watershed-wide); 2) are to be implemented within each subwatershed; and 3) are site-specific improvement projects.

S.6.1 Watershed-Wide Objectives and Recommendations

In order to achieve the goals set by the Committee below are eight watershed-wide objectives in two categories (pollution control and management/administrative), which are expected to result in a reduction to the adverse impacts to the Bay caused by non-point sources to pollution generated within the watershed. The objectives are presented below and followed by a detailed listing of recommended activities associated with each.

Category A: Pollution Control:

1. Reduce runoff to the Bay.
2. Reduce pollution to the Bay.
3. Detect and eliminate illicit discharge to storm sewers.
4. Implement a storm sewer system pollution prevention/good housekeeping program.
5. Control runoff from new developments and redeveloped areas.

Category B: Management/Administrative:

6. Implement a storm water public education and involvement program
7. Seek funding assistance to implement the watershed-wide plan recommendations and the site-specific improvement projects.

8. Use an intermunicipal approach to improve Manhasset Bay's water quality that addresses both point and non-point sources of pollution.

Objective No. 1: Reduce Runoff to the Bay

Volume Reduction

- Recharge runoff to the groundwater.
- Use depression storage of runoff.
- Use grass buffer strips, swales, porous pavement, dedicated infiltration.
- Use storage basins or percolation trenches.
- Create "no mow" zones around sloped lawn areas.
- Avoid overwatering of lawns.
- Eliminate roof drains that discharge to streets.
- Use shrubs and trees to promote infiltration.
- Use porous pavements, walkways, patios, driveways and parking lots.
- Use vegetative soil berms with gravel/porous trenches.
- Use dry wells for parking lot drainage.
- Use closed system recycling cooling systems.
- Create detention/retention ponds.
- Divert runoff from paved areas to grass and vegetative areas.
- Use constructed wetlands for runoff storage/retention.

Reduction in Runoff Rate

- Use detention basins to slow down runoff rate
- Use grass swales and filter strips instead of curbs
- Increase tree cover and require approval for cutting trees and replanting on a 2 to 1 ratio
- Replace cut sidewalk trees within a 3-month period
- Identify early symptoms of disease to trees and develop protection plan or replacement/replanting program
- Create setbacks or buffers for properties that are developed or redeveloped along or adjacent to the bay, ponds or creeks around the bay.
- Do not construct new outfalls discharging directly to the Bay.
- Use recharge basins or dry wells.
- Any new outfalls should discharge to a pond or a creek or brook that then discharges to the bay.

Objective No. 2: Reduce Pollution to the Bay

Bacteria

- Enforce ordinances against feeding waterfowl and requiring pooper scooping of wastes from pets.
- Plant low but dense vegetative barriers around ponds to deter waterfowl entry to ponds.
- Use biofiltration ponds and constructed wetlands to promote natural die-off of bacteria.
- Prepare an inventory of cesspools and septic systems near the Bay shoreline, ponds and creeks where the depth to groundwater is less than 20 feet.
- Conduct a feasibility study in those areas with larger population densities or within sewered areas to evaluate need to replace cesspools or septic tanks with private treatment systems discharging to the groundwater or connect to a sanitary sewer for treatment at an existing wastewater treatment plant.
- Amend the Town's Chapter 42 to require that houseboats have a permanent connection to a municipal sanitary sewer system.
- Inventory and inspect on a regular basis, houseboats used as living quarters to ensure proper sanitary waste disposal or treatment.

Litter and Floatables Reduction

- Enforce litter ordinances.
- Keep street gutters clean of all debris (litter, grass and leaves, etc.) throughout the year.
- Street sweeping in commercial areas.
- Routine clean out of catch basins.
- Install trash racks at discharges of all ponds.
- Install containment booms, nets and absorbent pads at outfalls to small creek and inlets.
- Provide routine skimming of floatables and other debris at marina slips and docks.
- Retrofit catch basins that drain directly to the Bay with baffles or hoods to trap and settle solids and floatables.
- Remove abandoned boats and other debris in certain areas of the bay.

Nitrogen

- Minimize or avoid use of fertilizers
- Decrease lawn sizes and increase shrubs and wooded areas
- Construct and restore wetlands to provide nutrient uptake
- Seed lawns only from mid August to early October
- Prepare an inventory of the number of cesspools and the number of septic tanks located in areas of groundwater elevation of 10 to 20 feet or less

- Conduct a feasibility study to evaluate the need for replacing cesspools and septic tanks with approved septic systems, small private treatment systems or connection to existing sewer system and the appropriateness of creating special districts
- Conduct a study of treatment technologies for cesspools and septic systems to achieve nitrogen reductions consistent with the recommendations of the Long Island Sound Study.

Pesticides and Toxics

- Minimize or avoid use of pesticides and other chemicals
- Use pest resistant plants
- Use integrated pest management (IPM) on all public parks and private golf courses
- Use household hazardous waste (STOP) days for proper disposal and increase the number of times and places where the public an drop off household hazardous wastes
- Require pollution prevention plans for all industrial type facilities and operations under USEPA's regulations

Sediments

- Regularly clean out catch basins; once every 2 to 3 years for those discharging directly to the Bay and every 3 to 5 years for those discharging through pond systems
- Require a storm water pollution prevention plan for construction sites disturbing more than one acre.
- As appropriate the construction runoff control plans would be required to demonstrate how various pollution prevention/ Best Management Practices will be used to control erosion and the discharge of sediment and pollutants. Depending on site conditions, these practices or actions could:
  - silt fences
  - temporary detention ponds
  - hay bales
  - provisions for pre-construction review of site management plans
  - procedures for receipt and consideration of information provided by the public
  - regular inspections during construction
  - penalties to ensure compliance
- Do not have lawns on moderate to steep slopes that are prone to soil erosion.
- Repair deteriorated asphalt, concrete or gravel driveways on moderate to steep slopes.
- Use energy dissipaters or berms to slow down runoff rates that would cause soil erosion.
- Sod rather than seed new lawns to avoid soil erosion during wet weather.
- Have residential and commercial property owners keep street gutters and any catch basin gratings free of sediment, tree pollen and other debris.
- Restore and stabilize streambanks with mats, blankets or vegetation to keep the soil and sediments from eroding into the creek, stream or pond.
- Plant vegetative access barriers along streambanks and shorelines to prevent pedestrian or waterfowl erosion of the soils.

- Construct forebays or sediment traps at the entrance of the ponds around the Bay.
- Plant vegetative buffers around ponds and along streambanks.

Objective No. 3: Detect and Eliminate Illicit Discharges to Storm Sewer Systems

- Develop a program for identifying/detecting and eliminating illicit and/or inappropriate discharges and connections to the storm sewer systems, sewer lines, outfalls, catch basins, etc.)
- As appropriate, the program would define how the owners or operators of the storm sewer system would:
  - develop and implement an illicit discharge detection and elimination program
  - use maps or other existing documents to identify illicit connections
  - identify the location of major storm water pipes and outfalls
  - use existing or proposed ordinances to effectively prohibit the unacceptable connection; and
  - develop appropriate enforcement procedures or actions to eliminate the unacceptable connections

Objective No. 4: Implement a Storm Sewer System Pollution Prevention/Good Housekeeping Program

- Owners/operators of the storm sewer systems should develop an operation and maintenance program whose ultimate goal is preventing an reducing pollutants from the runoff discharged from the system. This program is to include:
  - a training program;
  - maintenance activities;
  - maintenance schedule;
  - long-term inspection procedures;
  - control measures for reducing or eliminating the discharge of pollutants from areas such as streets, roads, highways, municipal parking lots, maintenance and storage yards, runoff from salt storage facilities; and
  - a program that promote recycling and pesticide use minimization;
  - procedures for the proper disposal of dredge spoil, accumulated sediments, floatables, and other debris;
  - a program for identifying the need for dredging of storm water detention/treatment ponds

Objective No. 5: Control Runoff from New Developments and Redeveloped Areas

- Require new developments and redeveloped areas to compile with NYSDEC's erosion and sediment control guidelines for new development.
- Require site plans (as part of planning and design for sites that disturb land) that minimize to the maximum extent practicable impacts on the Bay from runoff volume, rates and pollutants during and after construction.

- As appropriate site plans for new developments and redevelopment's must demonstrate the use of post-construction storm water management methods and techniques such as:
  - minimization of impervious areas;
  - maintenance or restoration of natural infiltration;
  - wet ponds;
  - extended detention outlet structures;
  - wetland protection;
  - minimize disturbance of soils and vegetation;
  - use vegetation and plantings of notice species; and
  - maintenance of open space.
- Require the site plans for new developments and redevelopment's to include a description of and commitments to ensure post-construction long-term operation and maintenance of the post-construction storm water management methods.
- Require that the site plans identify post-construction storm water management methods that attempt to maintain pre-development runoff conditions

Objective No. 6: Implement a Storm Water Public Education and Involvement Program

- Prepare and distribute education materials on storm water impacts
- Conduct storm drain stenciling and marking
- Establish a "master gardeners" program for homeowners and landscapers
- Train volunteers for adopt-a-pond, creek, beach or a part of the Bay
- Establish a Manhasset Bay "hotline-clearinghouse"
- Hold an annual "Nonpoint Source/Best Management Practices" workshop for municipal officials and employees
- Prepare progress reports on the status of implementation of the Plan's recommendations
- Track USEPA and the State's efforts to clean up western Long Island Sound
- Track the implementation of storm water pollution prevention plans and require compliance with USEPA's Phase I storm water regulations by marinas, industries and commercial establishments.
- Establish a Manhasset Bay web-site to disseminate information and link with other nonpoint source pollution and watershed web-sites.

Objective No. 7: Seek Funding Assistance to Implement the Watershed-Wide Plan Recommendations and the Site-Specific Improvement Projects

- Apply for NYSDEC/NYSDOS Clean Water/Clean Air Bond Act funding
- Apply for NYSDEC/NYSDOS Environmental Protection Fund funding assistance
- Apply for U.S. Army Corps of Engineers funding for dredging, sediment removal and aquatic habitat restoration

- Apply for USEPA funding for storm water controls to reduce nitrogen discharges and wetlands/habitat restoration
- Investigate and apply for funding from other federal sources such as the National Marina Fisheries Service, the U.S. Fish and Wildlife Service, the National Oceanic and Atmospheric Administration, and TEA-21 under the Transportation Equity Act for the 21st Century.
- Apply for funding assistance in the form of grants from private foundations for educational and volunteer activities
- Create a Manhasset Bay Water Quality Improvement Foundation comprised of the participating members of the Committee and appointed members from within the watershed. This foundation would serve as a public advocacy group for the protection of the bay, and to raise private funds from corporations; business, civic and environmental groups; and citizens to be used to provide a portion of the required local match to any federal and state grants used to fund the recommendations in the Plan.

Objective No. 8: Use an Intermunicipal Approach to Improve Manhasset Bay's Water Quality that Comprehensively Addresses Both Point and Non-Point Pollution

- Use the Water Quality Improvement Plan as a guide for the County, the Town and affected communities.
- Prepare Geographic Information Systems (GIS) mapping of outfalls, storm sewer lines and catch basins in watershed
- Use this Water Quality Improvement Plan as an initial storm water pollution prevention/good housekeeping program for owners and users of storm sewers systems in the watershed and update it every 3 to 5 years
- Restore adequate funding to the County's budget to provide the necessary level of effort for water quality monitoring in and around the bay equal to or greater than that provided prior to 1992
- Continue the nonpoint/special sampling initiated in 1998 around the bay on a monthly basis for 3 years to establish a baseline database of existing nonpoint nitrogen loadings, and continue thereafter to track any reductions in nonpoint nitrogen loadings associated with implementation of the plan.
- Request the State to conduct an assessment of the adequacy of pump out facilities in the bay, and to make a determination in consultation with the Manhasset Bay Protection Committee on the appropriateness of designating the Bay as a "no discharge" zone under the federal Clean Water Act.
- Continue the Manhasset Bay Protection Committee as an intermunicipal coordinating and advisory organization dealing with water quality improvement efforts for the bay
- Use the Committee to direct and/or conduct the public education aspects of the Plan
- Use the Committee to direct and/or conduct the public involvement aspect of the Plan
- Expand the Committee's membership to have a fully comprehensive watershed planning process by including the villages in the watershed that are not currently members of the Committee. Opportunities for educational planning, and implementation partnerships should also be explored with the three wastewater treatment plants, civic associations and business groups.

- Use the Committee to establish and/or direct the formation and activities of the proposed Manhasset Bay Water Quality Improvement Foundation to raise corporate and other financial contributions to be used as a portion of the local match required of federal and state grants for the recommendations and projects contained in the Plan
- Use the Committee to direct an update of the Plan every five years (5th year, 10th year and 15th year after the completion of the initial effort)
- Use the Committee to prepare and Plan status of implementation report every two years.
- Review all SEQRA reviews to include the impact of proposed projects on the Bay's water quality from storm water runoff and methods to minimize or reduce those impacts and have the project sponsor demonstrate that the appropriate measures proposed in this Plan are included in the project's scope.
- In order to fund the capital improvements projects defined in the plan, which are expected to have both in-bay and out-of-bay water quality and ecological benefits, the following funding sources are recommended for sharing in the costs of the projects:
  - Federal agencies such as: U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, Long Island Sound Study, U.S. Fish and Wildlife Service, National Marine Fisheries Services,, National Oceanic and Atmospheric Administration;
  - U.S. Department of Transportation (TEA-21 funding for non-point source controls as part of transportation/highway projects);
  - State agencies such as: New York State Department of Environmental Conservation, New York State Department of State, New York State Office of Historic Preservation, Parks and Recreation;
  - New York State Department of Transportation (TEA-21 funding for non-point source controls as part of transportation/highway projects);
  - Local county, town, and village governments;
  - Educational Organizations (Cooperative Extension, etc.); and
  - Manhasset Bay Water Quality Improvement Foundation (Private and Corporate Contributions)
- The Manhasset Bay Protection Committee should petition the USEPA, to establish as part of its National Estuary Program (of which the Long Island Sound Study is a part), a water quality showcase program. As part of this program, USEPA should designate Manhasset Bay, and this Plan, a "National Estuary Showcase Project." This would provide for a federally coordinated effort of targeting federal funding and federal agency staff assistance in the implementation of the BMPs and improvement projects recommended in this Plan. While there are no hazardous waste/brown-fields sites in the watershed. The proposed showcase program would be modeled after USEPA's showcase program for "Brownfields" redevelopment of urban areas that have been adversely affected by actual or perceived hazardous waste contamination, and are currently underutilized, yet are prime candidates for cleanup and renewal. Such an approach could be applied toward water quality improvements in Manhasset Bay and the requisite intergovernmental actions needed to make those improvements a reality. From a national perspective, this proposed Plan is likely to be one of only a few plans, if not the only plan, to provide multiple linkages to various water quality issues. In the case of the Manhasset Bay Plan, these linkages are:

- Improvements to water quality both in the Bay and the Sound;
- Pollutant reductions from both point and non-point sources;
- A focus on multiple pollutants (bacteria, nitrogen, sediment and floatables);
- Multiple governmental responsibilities (federal, state, county, town, village and special districts); and
- Multiple control approaches (structural, treatment, best management practices, wetlands and habitat restoration/creation and pollution prevention.

S.6.2 Site Specific Water Quality Improvement and Wetlands Protection and Restoration Projects

In addition to the objectives identified in S.6.1, below are 12 recommended site-specific water quality improvement and wetlands protection/restoration projects. These are listed and described below in the order of the subwatershed numbering system previously presented (i.e., starting from the northeast to the northwest) and which follows the project descriptions. The recommended order of priority and basis for the priorities are presented at the end of this section.

Site-Specific Water Quality Improvement Projects

Project No. 1: North and East Sheets Creek Water Quality Improvement and Wetlands Restoration Project

This project (or if appropriate managed as two separate projects) will include a feasibility analysis, conceptual engineering, permitting design and specifications, bidding and construction of measures to control sediment and pollutants from storm water runoff entering the two creeks from six outfalls greater than 36 inches in diameter (and over a dozen less than 36 inches). Property and outfalls along Sheets Creek are owned by the Town, Nassau County, Village of Manorhaven as well as private individuals and businesses. Measures to be included are:

- Catch basin retrofits in the drainage area pocket wetlands;
- Booms and nets for floatables;
- Skimming devices;
- Replacement of plants with other less aggressive indigenous plantings;
- Dredging and/or sediment removal; and

- Shoreline stabilization preferably by vegetative measures.

Project No. 2: Mill Pond Water Quality Improvement and Storm Water Control Project

This project will include a feasibility analysis, conceptual engineering, permitting, design and specifications, bidding and construction of measures to control sediment and pollutants from entering the Town of North Hempstead-owned pond from approximately 8 storm water outfalls of which 2 are greater than 36 inches. Measures to be to included are;

- Soil stabilization around the pond
- Planting of vegetative access barriers to deter geese and ducks
- Installing self-closing gates at the steps leading to the shoreline/water's edge
- Excavating and removing accumulated sediments
- Installing signs against feeding wildlife
- Installing water sprays to deter the presence of waterfowl/geese
- Raising the level of the spillway to increase the storage capacity of the pond
- Install a trash rack at the spillway to prevent the discharge of solids and other debris
- Replacing or retrofitting the storm drains directly to the pond
- Constructing a "post" spillway sediment basin to trap sediments and solids that are discharged over the spillway.
- Developing and implementing an erosion and sediment control plan for the sand pit behind Valley Road that runs from Avenue A to Harbor Road.

Project No. 3: Baxter Pond Water Quality Improvement and Wetlands Creation Project

Baxter Pond, a County-owned-park, is heavily silted and is inhabited by a large population of waterfowl. It receives drainage from a brook which has a eroding stream bank and which receives storm water runoff from approximately 10 storm drains at least 3 of which are larger than 36 inches in diameter. The normal background coliform bacteria levels are extremely high (the highest of any other water body in the watershed) to the point that at times rain slightly reduces the level of bacteria. Recently a state grant has been received to control sedimentation of the pond. The project recommended by this Plan includes a feasibility analysis, conceptual engineering, design and specification, bidding and construction of various measures that include:

- Planting a vegetative access barrier around the perimeter of the pond to keep the waterfowl out of the water
- Installing water sprays to discourage waterfowl from entering the pond
- Stabilizing the southern slope of the park with non-grass vegetation to reduce erosion
- Modifying the spillway to eliminate the existing stagnant zone
- Installing a trash rack in the overflow channel beneath Shore Road
- Stabilizing the stream channel
- Creating a small pocket wetland on the bay side of Shore Road downstream of the overflow channel
- Installing either sediment traps in the floor of a new dual chamber forebay or individual sediment traps upstream
- Excavating the sediments that have accumulated throughout the pond

Project No. 4: Stannards Brook Water Quality Improvement and Wetlands Creation Project

This is a brook that runs through County owned property which receives runoff from approximately 8 storm water discharges, two greater than 36 inches in diameter. The project is to include a feasibility analysis, conceptual engineering, design and specifications, bidding and construction to:

- Replace or retrofit catch basins that have outfalls to the Brook with silt and debris traps below the catch basin inverts.
- Identify and eliminate roof leaders discharging directly to curbs in streets draining directly to the Park or the Brook.
- Replace existing child safety rack (to prevent entry into the culvert) at the culvert below the east side of the Carlton Avenue overpass with a new trash rack.
- Install a series of 4 to 6 check dams, and create associated wetland, every 300 to 500 feet in the Brook to hold back runoff and capture sediments.
- Create a wet pond, extended detention basin or wetland, each with a forebay, on the east side of the Carlton Avenue overpass.
- Plant assorted vegetation to stabilize the streambank of the Brook in order to reduce sediments.

- Install catch basins at the ends of Washington, Adams and Jefferson Streets, which are sloped to the Park and have direct runoff through open sluices rather than catch basins. That would decrease the flow rates and trap some sediments and debris.

Project No. 5: Leeds Pond Wetlands Creation and Water Quality Improvement Project

The drainage basin of Leeds Pond, which is located in Plandome Manor, extends to the south and east, and includes large tracts of undeveloped land. The drainage basin has a mix of private and public lands. The public lands include property owned by the Long Island Rail Road, the Town and the County.

Besides residential properties, the private lands in the drainage area includes the Plandome and North Hempstead Country Clubs and Nassau Knolls Cemetery. There are some areas with steep slopes, especially along Stonytown Road and the Long Island Railroad tracks extending in the direction of the Port Washington station.

The drainage arriving to the southeast portion of Leeds Pond from the main portion of the watershed passes through a series of smaller ponds. These upstream ponds act as sedimentation basins for the partial removal of sediments prior to discharge into Leeds Pond. The pond which was dredged in 1997 supports a large population of waterfowl, which serves as a significant source of coliform and nutrient contamination.

The Plandome Golf Course Pond was dredged to a depth of 8 feet in 1998. The tributaries to Leeds Pond receive runoff from over two dozen storm water discharges, two greater than 36 inches in diameter. The recommended project is to include a feasibility analysis, conceptual engineering, design and specification, bidding and construction to include:

Golf Course Pond:

- Plant a vegetative access barrier around the perimeter of the pond to inhibit or prevent the entry of geese and ducks into the pond while not obstructing the view of the water in the pond. Barrier should be 1.5 to 2 feet high and 3 to 5 feet wide.

- Excavate and dredge the pond sediments on a regular basis, using it as a forebay to Leeds Pond.

Stream along LIRR tracks to Leeds Pond:

- Create a large-scale wetlands system along the stream corridor to allow for sediment trapping and nutrient uptake prior to discharge to Leeds Pond.

- Replace or retrofit spillways on detention ponds along the stream in order to increase storage volume and reduce runoff rates.

- Construct a wetland system for reducing pollutant loading, decreasing runoff velocity and providing vegetative nutrient uptake.

- Construct a series of wet ponds to store runoff and intercept sediments and other pollutants in the first flush with a design allowing for the bypassing of large flows.

Stonytown Road Tributary:

- Regrade and stabilize each side of the stream bank to reduce the potential for further streambank erosion.

Plandome Tributary Pond:

- Excavate and dredge the pond sediments on a regular basis, using it as a forebay to Leeds Pond.

Area Surrounding the Pond

- Encourage the creation of a 10- to 20-foot "no mow" zone on the private properties around the pond to allow for reduction in runoff rates and uptake of nutrients.

Project No. 6: Whitney Pond Park and Manhasset Valley Park Water Quality Improvement Project

Whitney Pond is a large pond located within the 24-acre Nassau-County-owned Whitney Pond Park complex. The pond is bordered on the west by Community Drive and the north by Northern Boulevard. It is surrounded on three of its four sides by vegetation. The tributary streams which feed from the south into Whitney Pond are filled with silt and sand collected from off-site runoff. There are 18 to 20 storm water discharges upstream of the Pond and three directly into the Pond.

There are two tributary streams flowing northward into Whitney Pond. Freshwater wetland vegetation has taken root in the accumulated sediments that have been deposited along the western bank of the southern tributary. The eastern tributary feeding Whitney Pond is filled with newly deposited sediment. Vegetation within this wetland includes Willows, Silver Maple saplings, Purple Loosestrife, Jewelweed, Giant Lobelia and Spotted Joe-Pye Weed.

The southern portion of Whitney Pond's eastern tributary will follow the same accelerated process of sediment accumulation, stream widening and revegetation, unless erosion and sediment control practices are implemented within the upstream watershed area.

Whitney Pond drains northward to the County-owned Manhasset Valley Park while an additional 20 storm water discharges enter the creek system before it discharges to the Bay. There are freshwater wetlands in Manhasset Valley Park along a stream segment and a series of small impoundments created by low concrete spillways. Vegetation within the park consists primarily of ornamental shade trees including Sycamore, Pine Oak, White Pine and Willows and extensive lawn areas.

The lawn areas within the park have been heavily grazed and fertilized by the large populations of waterfowl that frequent both Whitney Pond Park and Manhasset Valley Park. A variety of shorebirds and domestic geese and ducks, including Muscovy and Peking White (Long Island) Ducks, Mallards, American Widgeons, Canada Geese, Snowy and Common Egrets utilize this wetland system, and introduce a heavy organic and bacterial load into the stream system in the form of fecal wastes. Large populations of pigeons and waterfowl frequent this park. The congregation of birds creates a heavy nutrient and bacteria input to the stream system, which directly feeds into the head of Manhasset Bay. It has been reported in the Town's draft Local Waterfront Revitalization Plan that unless upstream sources of sediment are controlled, the area will experience excessive erosion and flooding problems in the future.

The proposed project is to include a feasibility analysis, conceptual engineering, design and specification, bidding and construction to include:

- Re-seeding the lawn and other grass areas of the park to improve ground cover, stabilize the soil, and reduce the sediment loadings to the lake, stream and pond.
- Stabilizing the bank of the stream between Whitney Lake and Whitney Pond.
- Installing a trash rack at the spillway of the footbridge of Whitney Pond.
- Constructing a two chamber forebay on each side of the island in the pond in Manhasset Valley Park in order to trap and regularly excavate and remove accumulated sediments.
- Excavating and removing accumulated sediments in Whitney Lake and the pond in Manhasset Valley Park with due consideration of the actual or potential contamination of the sediments and the need for finding a cost-effective disposal solution.
- Providing adequate park maintenance and litter/trash pickup to avoid the attraction of geese to unemptied trash cans.
- Repairing spillway cap at the pond in Manhasset Valley Park and increasing the cap's elevation (1± ft) to provide additional storage.
- Repairing the deteriorated and damaged walkway in the pond along the stream and grade a berm to keep runoff from grass/lawn area from washing sediment onto the walkway.

- Planting a vegetative access barrier along the perimeter of Whitney Lake, Manhasset Valley Park pond and the stream bank to inhibit or prevent the entry of geese and ducks into the water while not obstructing the view of the water. Barriers should be 1.5 to 2 feet high and 3 to 5 feet wide.

- Installing water sprays at one or more locations in Whitney Pond and Whitney Lake to deter geese and ducks from entering the pond.

Project No. 7: Manhasset Bayview Avenue Storm Water Sediment and Erosion Control Project

Bayview Avenue in Manhasset is located along the eastern shoreline of the lower reaches of Manhasset Bay. While Bayview Avenue has a storm sewer where it slopes towards the Bay, there are portions of the Avenue parallel to the Bay which have no curbs or shoulders and where runoff flows directly onto the Bay shoreline and is causing eroded gulley. Furthermore, along this stretch of road for approximately 1500 feet there are also five storm water outfalls (one greater than 36 inches in diameter) that have the potential for discharging sediments, eroding the shoreline and impacting the marshes in this area and causing sediment build-up on the bay bottom. The project would included a feasibility analysis, conceptual engineering, design and specifications, permitting, bidding and construction for:

- Retrofitting the catch basins along Bayview Avenue to allow for sediment trapping and in-line storage to minimize the adverse affect of a storm's "first flush"

- Removing accumulated solids that have built-up in the catch basins along Bayview Avenue.

- Installing a vegetative or concrete curb and/or shoulder on Bayview Avenue to prevent sheet runoff and uncontrolled runoff that results in eroded gullies along the wooded/vegetated areas along the eastern shoreline.

- Install retention chambers or sediment traps at one or in more of the six storm water outfalls.

Project No. 8: Manhasset Bay Dredging and Marsh Restoration Project

Areas of Manhasset Bay have experienced a buildup of accumulated sediments. This is in part due to a number of factors including: the naturally low flushing in some enclosed areas, partially because of the numerous direct storm water discharges/outfalls to these areas; the lack of sediment trapping capabilities (due to design or maintenance problems) of the catch basins that discharge to these outfalls; and finally because of the lack of maintenance dredging of channels (in the northeastern and lower portions of the Bay) that existed in the past that were used for commercial shipping and recreational boating. In addition to the adverse navigational impacts due to the accumulated sediments, the lower

bay's ecosystem, special habitats, and marshes and wetlands may have been adversely affected and their productivity and value diminished. This project would involve:

A. Field Investigations

- Field investigations in the northeastern and/or lower portion of the Bay including a bathymetric survey, to determine the environmental and physical nature and extent of accumulated sediments and their impacts on historical navigational activities, special habitats, marshes and wetlands.

- A sampling program consistent with NYSDEC to determine the chemical and biological characteristics of the sediment along a transect of an area(s) likely to be dredged; and

- A biota/species diversity sampling of the benthic organisms found in the sediments along the transect.

B. Sediment Removal

Conduct a feasibility analysis, conceptual engineering, design and specifications, permitting, bidding and construction (i.e., excavation and appropriate disposal) for the removal of sediments in a the northeastern or lower portion of the Bay assuming an area approximately 3000 feet in length and a width of 50± feet and a depth to be determined based on the findings of the field investigations identified in Part A above.

- Conduct a feasibility study for removal of accumulated sediments in the lower bay to include provisions for chemical and biological sampling of sediments, identification of special habitats and potential beneficial uses, and identification of any possible alternative beneficial reuses of the sediments removed.
- Remove accumulated sediments from the eastern end of Mill Pond and from all priority portions of Baxter Pond, Whitney Pond and the pond within Manhasset Valley Park.
- Conduct a study of priority areas of the Bay needing navigational dredging to maintain and enhance the economic and commercial benefits of boating and barging activities.
- Apply for federal Corps of Engineer funding under Section 206 for sediment removal for restoration and protection of the marsh ecosystem in the lower Bay and Section 107 for studying the feasibility of removing accumulated sediments in the lower bay.
- Implement a sediment removal strategy that involves the activities that follow.
- Define whether the dredging project(s) will be in the Bay or one or more of the ponds surrounding the Bay;
- Define the lead or sole project(s) sponsor(s)/applicant (Corps of Engineers, the County, Town, Village or private/marina owner);

- Define the intended/desired scope of the dredging project(s) (location, length, depth, width of dredging);
- Prepare a preliminary outline of a sediment sampling plan for each project in accordance with the guidelines of NYSDEC or other regulatory agencies (Corps of Engineers, USEPA, etc.);
- Identify potential funding sources to develop and implement the sampling plan;
- Secure funding for the development and implementation of the sampling plan and preparation of the feasibility study/report;
- Hold a pre-application/study meeting with NYSDEC and other involved local, state and federal agencies to discuss the desired scope of each dredging project, the objectives and outline of the sampling programs and the array of reasonable dredge material disposal/re-use options to be considered in the feasibility study;
- Develop the sampling plan for a project and submit to NYSDEC and other involved local, state and federal agencies for review and approval;
- Implement the approved sampling plan with regard to the request sampling, analysis, QA/QC and data validation requirements identified in Section 3.10;
- Compile and assess the sampling results and conduct a screening analysis of the disposal/re-use alternative and whether to proceed with the dredging project. As appropriate refine the evaluation of alternative disposal/re-use options together with an evaluation of their cost-effectiveness and implementability;
- Perform feasibility analysis/study and identify the acceptable disposal/re-use alternatives likely to be agreed upon by all involved parties;
- Prepare a feasibility report for each project for the preferred selected option;
- Prepare the necessary permit applications and submit to the appropriate state, federal and other agencies;
- Identify and/or secure funding to perform the dredging and dispose/re-use the dredge materials;
- File the permit applications and as necessary submit request(s) for a Beneficial Use Determination (BUD) for dredged materials that are intended to be beneficially re-used;
- Upon receipt of required permits from the involved regulatory agencies perform the dredging and disposal/re-use of the dredged sediments in accordance with the permits received.

Project No. 9: Kensington Park Wetlands Creation and Runoff Control Project

This small park on the western shore of the lower reaches of the Bay serves as a waterfront recreational facility for the residents of the Village of Kensington. A storm drain from Shore Road enters the site and discharges into a small brook and pond on the site. This drain contains sediments and related pollutants and degrades the brook and pond. A sediment trap is recommended for the drain followed by a pocket wetland. The project would include a feasibility analysis, conceptual engineering, design and specifications, permitting, bidding and construction.

Project No. 10: Village of Great Neck East Shore Road Storm Water Sediment Control Project

The East Shore Road area in Great Neck along the western shoreline of the lower reaches of the bay has approximately a dozen storm water outfalls discharging directly to the bay (two of which are greater than 36 inches in diameter). These storm sewers collect runoff from fairly steep roadway and residential properties sloping to the east from the area of Station Road. In some parts of the drainage area (particularly along East Shore Road), sand and sediments are often visible in the gutter. In addition, along both sides of East Shore Road, there are a number of commercial and industrial properties that have a large amount of impervious surfaces particularly in the form of large parking lots that result in the discharge of sediments through the outfalls to the lower bay. This project would involve a feasibility analysis, conceptual engineering, design and specifications, permitting, bidding and construction for:

- Retrofitting the catch basins discharging to the outfalls to allow for sediment trapping and in-line storage to minimize the advice impact of a storm's "first flush."

- Removing accumulated solids that have built-up in catch basins along East Shore Road and those in the upstream portion of the collection system.

- Installing sediment traps, sand filters or other retrofit devices in the outfalls along the shoreline.

Project No. 11: Mitchell Creek Wetlands Preservation and Improvement Project

Mitchell Creek discharges directly to Manhasset Bay. Lands along the Creek are owned by the Town of North Hempstead as well as private property owners. It has a tidal portion and a freshwater (non-tidal) portion. The entire Creek is approximately 1.2 miles in length. It is fed by a fresh water stream which has three stream sources that originate in Kings Point Park. The Creek has an upland discharge area of approximately 850 acres (exclusive of the Creek and stream areas). The estimated area of the Mitchell Creek subwatershed is approximately 874 acres.

A portion of the flow in the Creek is from groundwater. The Creek receives storm water runoff from over two dozen storm water outfalls along its length and the tributaries that feed it. Of these, two are greater than 36 inches in diameter.

It is important to protect the Creek and its wetlands and special habitats from any adverse impacts from storm water runoff, particularly sediments from the numerous outfalls that discharges to it, yet still maintain the water flow that is essential to it and prevent stream bank erosion that also adds sediment. This project would include a feasibility analysis, conceptual engineering, design and specifications, permitting, bidding and construction for:

- Retrofitting the storm water outfalls with sediment removal features and providing for in-line storage to reduce the sediment loadings to the Creek and its tributaries.

- The creation of new, or the enhancement of existing, wetlands along the Creek to preserve the biological value of the vegetation present and associated special habitats. This would include determining the appropriateness and feasibility of removing historic fill from wetlands.

Project No. 12: Kings Point Pond Water Quality Improvement Project

Kings Point Pond is located on the northern portions of Kings Point. It is owned by the Nature Conservancy, with various industrial properties having ownership of the pond's shoreline. The pond has an outlet with a gate to the Bay which is operated and maintained by the Village of Kings Point. The shoreline surrounding the pond has a variety of wetland vegetation and except for the 1998 nitrogen sampling of the pond, little is known about its water quality and whether siltation of the pond is occurring. However, the 1998 sampling revealed the highest nitrogen levels of any of the water bodies sampled around the bay. Based on the sampling the average total nitrogen in the pond was found to be 6.59 mg/l which was more than twice the average found at the other sites. In order to determine more accurately the nitrogen levels in the pond, and whether they are causing problems, whether siltation is occurring and what the optimum open/closed gate operations should be in order to have acceptable water quality conditions, an improvement project is recommended which includes:

- Collection of additional water quality data

- Determination of water depths throughout the pond

- Evaluation of the condition of the outlet gate

- Inventory of the extent and nature of wetlands vegetation

- Identification of methods for controlling runoff and sediments from the outfalls/drains to the pond

- Determination of the degree of groundwater flow to the pond and evaluation of the impact on water quality

- Recommending a plan for reducing nitrogen levels and protecting the surrounding wetland.

Recommended Improvement Projects' Order of Priority

All 12 improvement projects described above are important to the improvement of water quality in the Bay, the restoration of beneficial uses of its waters, and the protection and restoration of the wetland, habitat and ecological communities surrounding the Bay. Recognizing, however, the need to set priorities for securing the necessary funding and grant assistance required to implement the 12 improvement projects, it is recommended that the projects be considered in three categories of priority as follows:

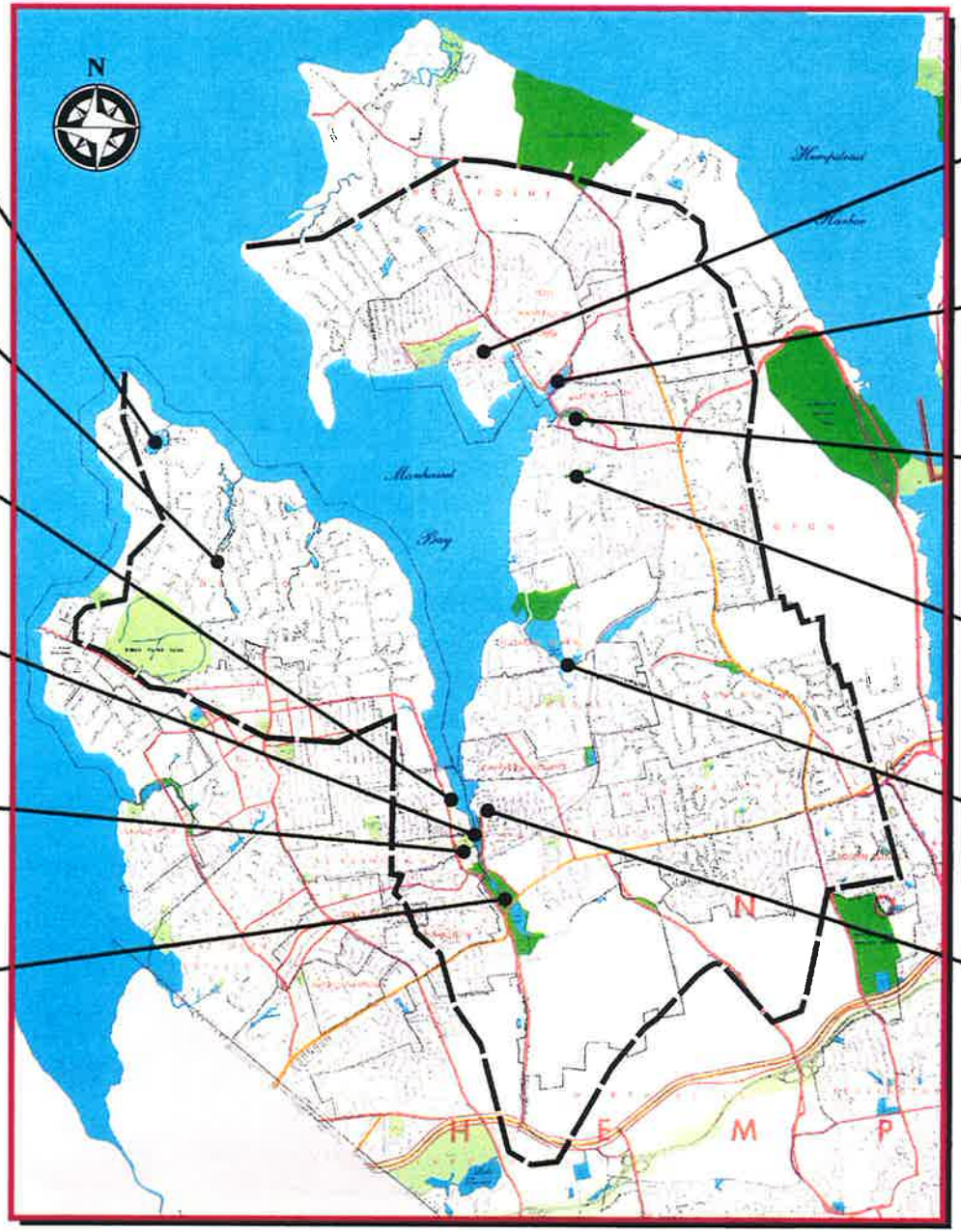
- 1st Level Priority:
  - North and East Sheets Creek Water Quality Improvement and Wetlands Restoration Project
  - Baxter Pond Water Quality Improvement and Wetlands Creation Project
  - Manhasset Bay Dredging and Marsh Restoration Project
  - Mitchell Creek Wetlands Preservation and Improvement Project
- 2nd Level Priority:
  - Mill Pond Water Quality Improvement and Storm Water Control Project
  - Leeds Pond Wetlands Creation and Water Quality Improvement Project
  - Manhasset Bayview Avenue Storm Water Sediment and Erosion Control Project
  - Village of Great Neck East Shore Road Storm Water Sediment Control Project
- 3rd Level Priority:
  - Stannards Brook Water Quality Improvement and Wetlands Creation Project
  - Whitney Pond and Manhasset Valley Park Water Quality Improvement Project
  - Kensington Park Wetlands Creation and Runoff Control Project
  - Kings Point Pond Water Quality Improvement Project

A location map of the recommended projects is provided on Figure S-1, while preliminary cost estimates for the projects are provided in Table S-3.

S.6.3 Subwatershed Specific Recommendations

In addition to, or as appropriate in conjunction with, the watershed-wide recommendations identified in S.6.1 and the 12 specific water quality improvement and wetlands

MANHASSET BAY WATER QUALITY IMPROVEMENT PLAN



Kings Point Pond
Water Quality Improvement Project
3rd Level Priority

Mitchell Creek
Wetlands Preservation
And Improvement Project
1st Level Priority

Village of Great Neck
East Shore Road Storm Water
Sediment Control Project
2nd Level Priority

Lower Manhasset Bay
Dredging and
Marsh Restoration Project
1st Level Priority

Kensington Park
Wetlands Creation
And Runoff Control Project
3rd Level Priority

Whitney Pond And
Manhasset Valley Park
Water Quality Improvement Project
3rd Level Priority

North and East Sheets Creek
Water Quality Improvement
And Wetlands Restoration Project
1st Level Priority

Mill Pond
Water Quality Improvement
And Storm Water Control Project
2nd Level Priority

Baxter Pond
Water Quality Improvement
And Wetlands Creation Project
1st Level Priority

Stannards Brook
Water Quality Improvement
And Wetlands Creation Project
3rd Level Priority

Leeds Pond
Wetlands Creation And
Water Quality Improvement Project
2nd Level Priority

Manhasset Bayview Avenue
Storm Water Sediment
And Erosion Control Project
2nd Level Priority

RECOMMENDED PROJECTS

Figure S-1

Dvirka and Bartilucci Consulting Engineers
A Division of William F. Cosulich Associates, P.C.

Table S-3

ESTIMATED COST OF RECOMMENDED WATER QUALITY IMPROVEMENT PROJECTS

Improvement Project	Estimated Cost[(a)]
1st Level Priority:	
North and East Sheets Creek Water Quality Improvement and Wetlands Restoration Project	$ 850,000
Baxter Pond Water Quality Improvement and Wetlands Creation Project	700,000[(b)]
Manhasset Bay Dredging and Marsh Restoration Project	2,100,000[(b)]
Mitchell Creek Wetlands Preservation and Improvement Project	450,000
2nd Level Priority:	
Mill Pond Water Quality Improvement and Storm Water Control Project	1,100,000[(b)]
Leeds Pond Wetlands Creation and Water Quality Improvement Project	2,050,000[(b)]
Manhasset Bayview Avenue Storm Water Sediment and Erosion Control Project	350,000
Village of Great Neck East Shore Road Storm Water Sediment Control Project	550,000
3rd Level Priority:	
Stannards Brook Water Quality Improvement and Wetlands Creation Project	600,000
Whitney Pond and Manhasset Valley Park Water Quality Improvement Project	850,000[(b)]
Kensington Park Wetlands Creation and Runoff Control Project	100,000
Kings Point Pond Water Quality Improvement Project	200,000
TOTAL	$9,900,000

Note: (a) The estimated costs for the scope included in this plan include the following tasks: feasibility analysis; preliminary engineering; permitting; plans, specifications and bid documents; construction costs; construction administration and observation; and contingencies.

(b) The cost for dredging the ponds/bay assumes the material removed is not hazardous and can be disposed of by normal, legal methods. Should the material be determined to be hazardous during the feasibility analysis, the costs associated with dredging and disposal will increase depending on the type, volume, and extent of contaminants involved.

protection/restoration projects identified in S.6.2, a summary of priority recommendations by subwatershed is presented in Table S-4.

S.6.4 Recommended Ordinances

As described in S.5, there is a wide range of existing authorities to require some of the BMPs recommended in this Plan. However, it may be possible that individual villages or the Town may wish to promote voluntary practices/efforts combined with public education for a given period of time followed by the enactment of local ordinances/codes to require the practices at a later time or a specified date agreed upon by all of the jurisdictions within the watershed. However, eventually it would be advisable to have most, if not all, of the watershed areas covered by similar, or at least consistent, requirements. The areas/topics for which similar or consistent ordinances should be in place throughout the watershed include the following:

- Storm water management
- Sediment and erosion control
- Protection of natural features
- Activities on steep slopes
- Excavations
- Site clearing
- Protection of natural vegetation
- Restriction of fertilized vegetation
- Landscaping
- Preservation of trees

Table S-4

SUMMARY OF PRIORITY BEST MANAGEMENT PRACTICES by SUBWATERSHED

Priority Best Management Practices (BMPs)	SUBWATERSHED											
	Barkers Point 01	Toms & Plums Point 02	Sheets Creek 03	Baxter & Mill Pond 04	Eastern Shore 05	Leeds Pond 06	Southeastern Shore 07	Whitney Pond 08	Southwestern Shore 09	Kings Point Creek 10	Mitchells Creek 11	Kings Point Pond 12
Increased Tree Cover	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓
Smaller Lawns	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
Vegetative Berms	✓			✓		✓	✓		✓	✓	✓	✓
Depression Storage	✓					✓				✓	✓	✓
Reduced Fertilizer Use	✓			✓		✓	✓		✓	✓	✓	✓
Cesspools/Septic Inventory	✓	✓		✓		✓	✓	✓		✓	✓	✓
Street Gutter Cleaning		✓	✓	✓	✓	✓	✓	✓	✓			
Catch Basin Cleaning		✓		✓	✓	✓	✓	✓	✓		✓	
Outfall Nets/Booms		✓	✓		✓							
EPA Storm Water Plans		✓	✓			✓		✓				
Reduced Parking Lot Pavement		✓	✓					✓	✓			
Geese/Duck Control		✓		✓		✓		✓				
Golf Course Ponds/Wetlands			✓	✓		✓		✓				
Golf Course Integrated Pest Mgmt.			✓	✓		✓		✓				
Large Parking Lot Sweeping			✓									
Sloped Landscape Erosion Control				✓	✓	✓	✓		✓		✓	
Shoreline Setbacks/Buffers		✓	✓		✓		✓		✓			
Marina/Houseboat Pump-outs		✓	✓		✓							
Abandoned Boats/Equip./Debris Removal		✓	✓	✓			✓		✓			

✓Indicates recommended practice within the Subwatershed

- Selective clearing
- House boats wastewater connection to a municipal sanitary sewer

Section 1

Hydrodynamics of the Bay

Based on a number of studies (Koppelman, 1976; LIRPB, 1978; Tetra-Tech, 1981) of the Bay, the movement of water within, into and out of it (i.e., its hydrodynamics) is heavily dominated and influenced by the Sound. The Bay's hydrodynamics, primarily influence by tidal action which causes an average change in depth of 7.3 feet in a 12-hour period (one complete tidal cycle).

At high tide, the "tidal prism" that enters the Bay (i.e., the additional water brought into the Bay from low tide to high tide) increases the Bay's mean low water volume by approximately 73 percent. The net effect of this is that every 12 hours approximately 50 percent of the Bay's 9 billion gallons of mean-tide volume is exchanged with the water in Long Island Sound. This corresponds to an average residence/detention time of approximately 12 hours. Therefore, every 24 hours, a volume equal to the Bay's 9 billion gallon mean tide volume is exchanged with the Sound.

Freshwater Discharges to the Bay

On average, the volume of freshwater flows discharged to the Bay from its watershed is approximately 37 million gallons per day (mgd). This flow into the Bay is only 0.4 percent of the Bay's 9 billion gallon total volume at mean tide. The freshwater flow originates from four major sources:

(a) dry and wet weather flow primarily caused by storm water runoff that discharges through ponds, streams and storm water outfalls around the Bay;

(b) direct rainfall onto the Bay's surface;

(c) groundwater underflow that is continually recharged by storm water that infiltrates into the ground in the watershed and which then seeps up through the Bay's bottom; and

(d) the treated discharge (effluent) from three municipal wastewater treatment plants (one in Port Washington and two in Great Neck).

The estimated volumes of these four major freshwater flows are presented below.

Freshwater Sources	Estimated Flow	Percent
dry/wet weather runoff	10 mgd	27
groundwater underflow	11 mgd	30
direct rainfall	9 mgd	24
three wastewater treatment plants	7 mgd	19
	37 mgd	100

mgd = million gallons per day

The Watershed's Size and Boundaries

Approximately 9,947 acres of the watershed's land surface drains to Manhasset Bay. In general, the watershed's approximate drainage area boundaries include the western half of the Port Washington peninsula, the eastern third to one-half of the Great Neck peninsula and the area south of Northern Boulevard extending just south of the Long Island Expressway in the Village of Lake Success.

Overall, the 9,947-acre land area of the watershed covers all, or portions of, 19 different communities that are all in the Town of North Hempstead. The communities include 16 villages and 3 unincorporated areas of the Town of North Hempstead. The entire watershed has approximately 200 miles of roads and is estimated to be 20 to 25% covered with impervious surfaces (roads, roofs, parking lots, driveways, etc.) and 75 to 80% pervious surfaces (lawns, woods, shrubs, grass strips, etc.).

Subwatersheds

For the purpose of this planning effort, and using existing topography as a basis, the Manhasset Bay watershed has been divided into 12 land-based subwatersheds. The delineation of

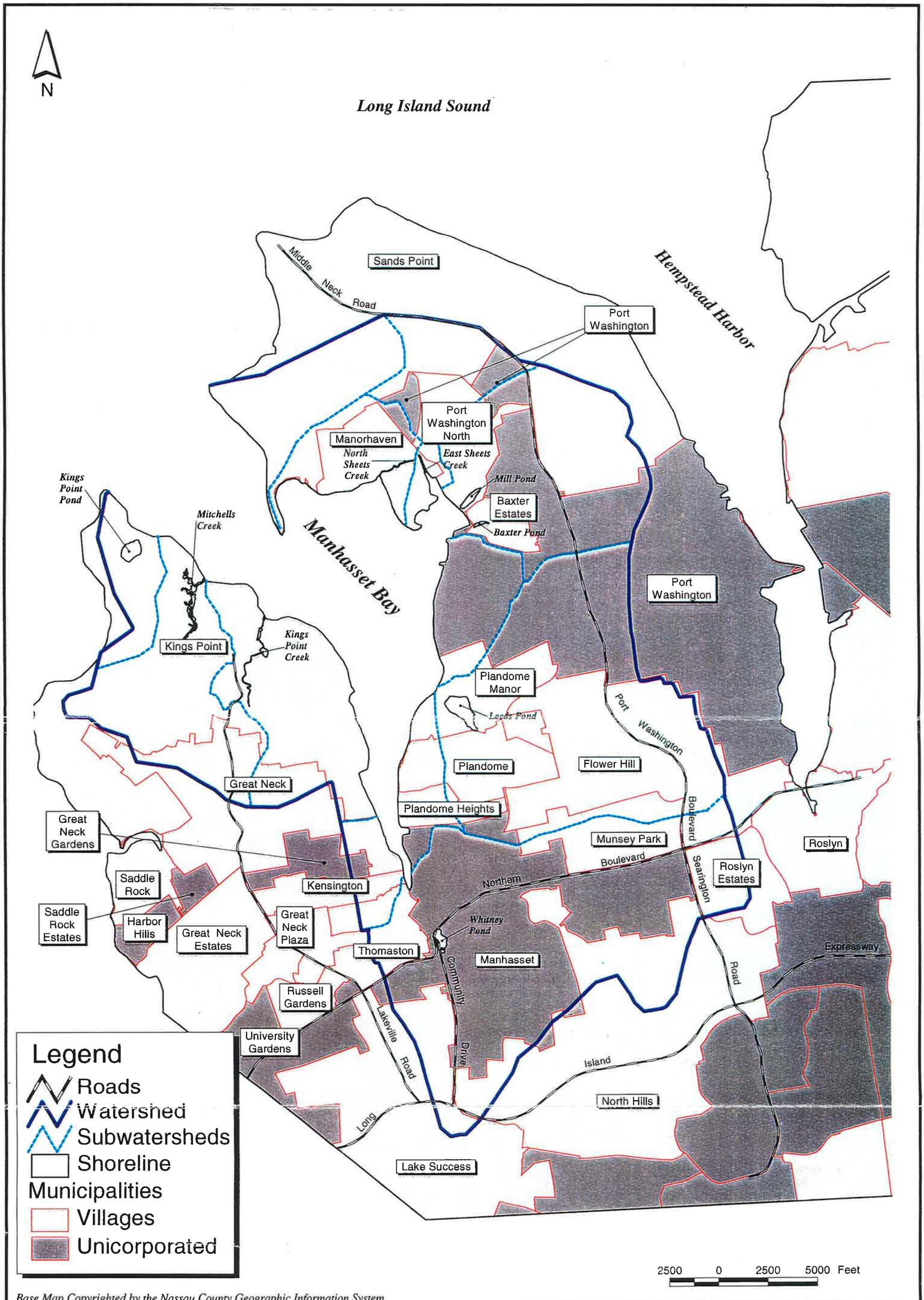
the 12 subwatershed boundaries is based on topography and not manmade storm water drainage. For instance, in a few locations runoff is discharged to storm water recharge basins that recharge the groundwater. However, if these basins did not exist or if they were taken out of service, the drainage in their services area would discharge to the Bay.

The approximate boundaries of the entire watershed, the 19 communities within the watershed, and the 12 subwatersheds are shown graphically on Figures 1.2-1, 1.2-2 and 1.2-3 while the individual communities located within each of the 12 subwatersheds are presented in Table 1.2-1, and the estimated land area within each subwatershed is presented on Table 1.2-2. Furthermore, for the purpose of this planning effort, the 12 subwatersheds have generally been named according to the principal water body or geographic feature within the drainage area, and have been given identification numbers in increasing order moving in a clockwise direction beginning in Sands Point and ending in Kings Point.

If the watershed were divided in a east/west fashion it would have approximately 80 percent of the land area on the east side and 20 percent on the west side and 16 communities on the east side and 6 on the west side. As shown in Table 1.2-2, the three largest subwatersheds (Whitney Pond, Leeds Pond and Baxter and Mill Pond) account for approximately 59 percent of the watershed acreage while the five largest (Whitney Pond, Leeds Pond, Baxter-Mill Pond, Mitchells Creek, and Kings Point Creek) comprise 76 percent of the total watershed acreage.

Land Uses in the Watershed

As with many other areas in the Town of North Hempstead and the rest of Nassau County, the Manhasset Bay watershed contains both a variety of land uses and the majority of the land uses being residential of different densities. Based on information contained in Nassau County's existing computer databases (GIS), there are 11 different land use categories in the Bay's watershed. These different land use categories are shown graphically on Figure 1.2-4. As seen from the figure, the predominate land use in the watershed is residential accounting for approximately 65 percent of the land use in the entire watershed. Although this map is based on



Manhasset Bay - Map

Manhasset Bay Watershed

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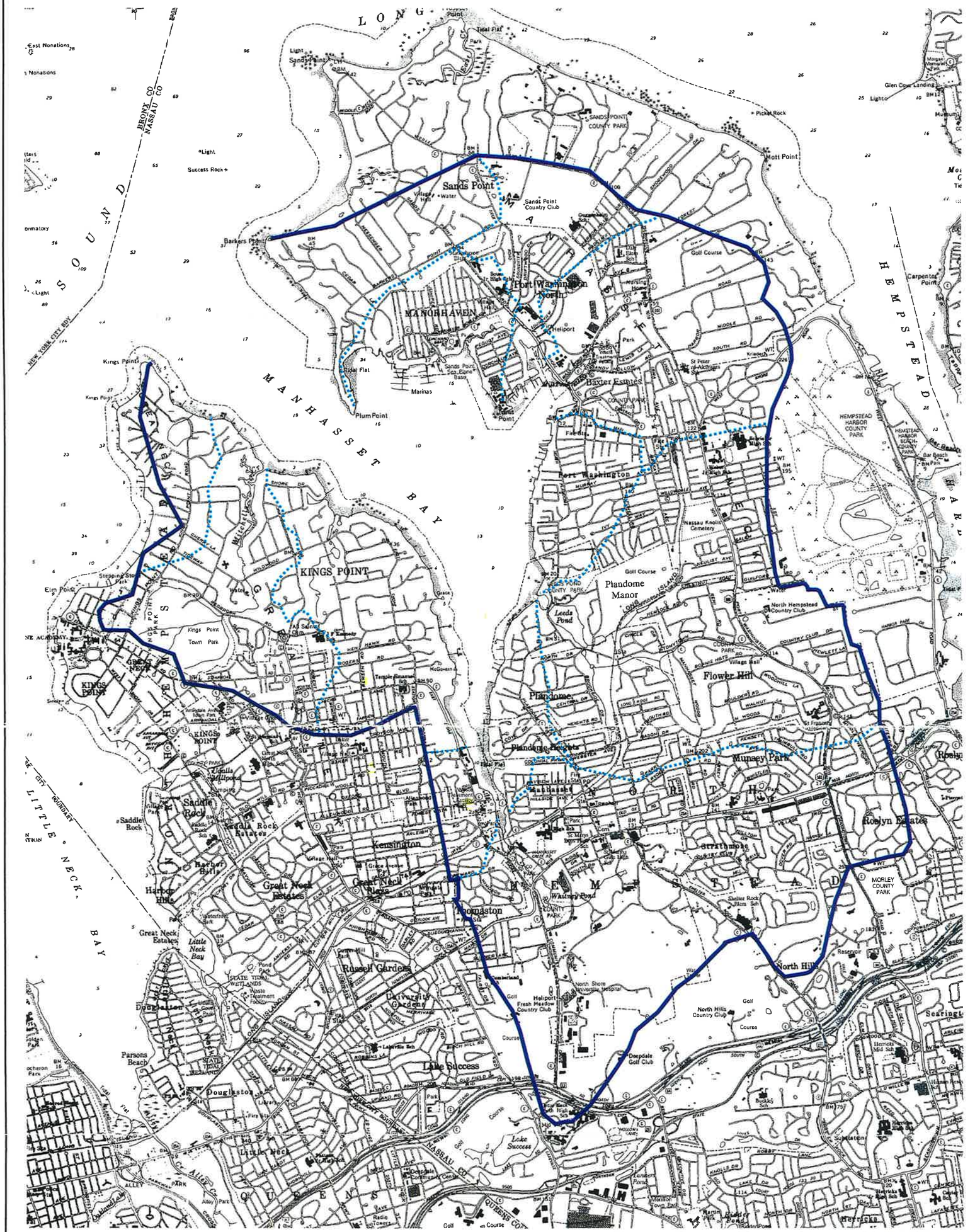
Figure 1.2-1



Source: Watershed boundary delineated using Sea Cliff 7.5' USGS topographic map
:Base map is derived from USGS topographic map produced by the NYS Department of Transportation

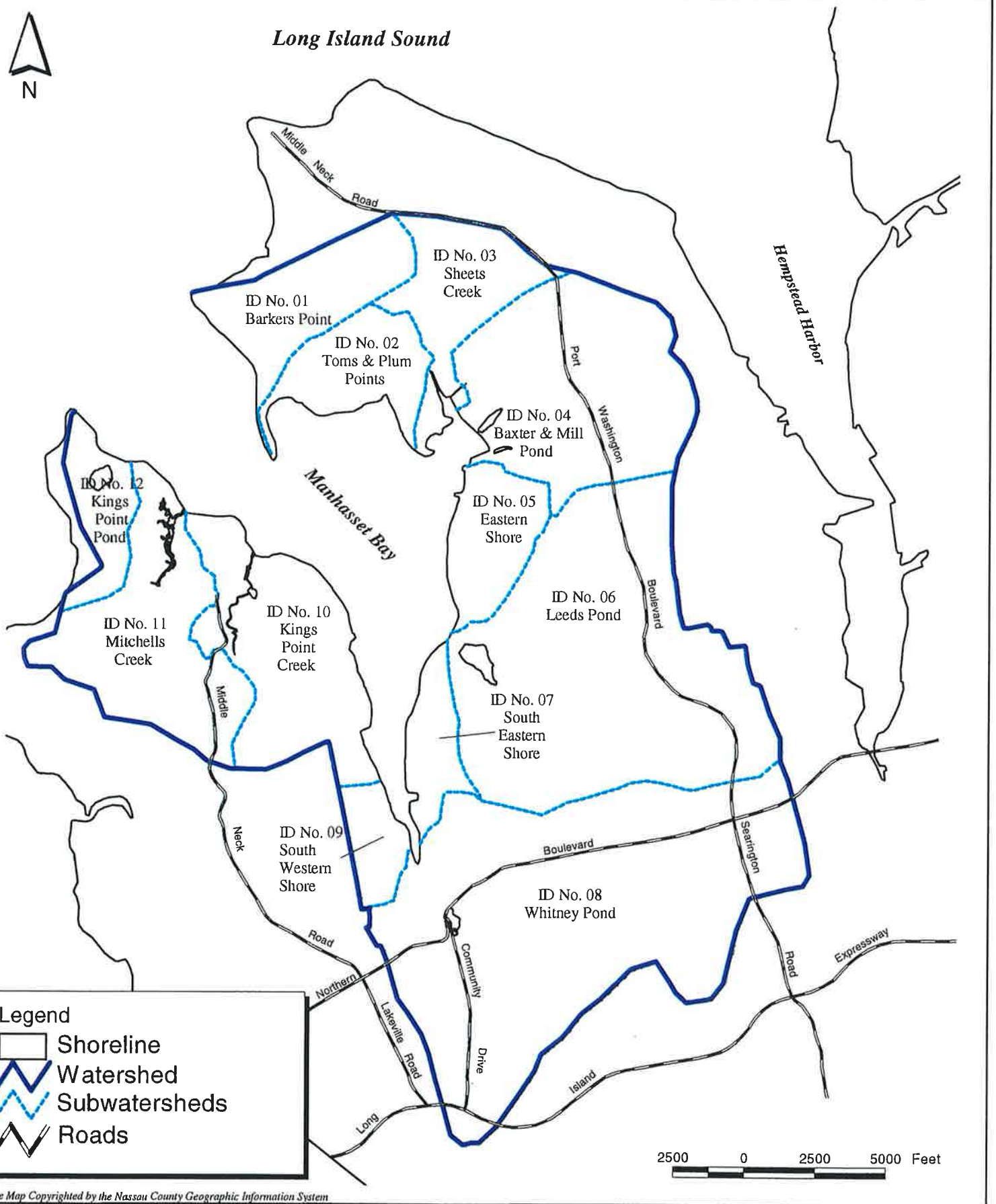
Manhasset Bay Drainage Area

N

Dvirka and Bartilucci CONSULTING ENGINEERS

1:12000

Figure 1.2-2



Manhasset Bay - Map

Watershed & Subwatershed Delineations Map

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Figure 1.2-3

-FINAL-

Table 1.2-1

COMMUNITIES IN THE WATERSHED
(Categorized by Subwatershed)

Subwatershed			Communities																		
Rank by Size	ID #	Name	Baxter Estates (V)	Flower Hill (V)	Great Neck (V)	Great Neck Gardens (U)	Kensington (V)	Kings Point (V)	Lake Success (V)	Manhasset (U)	Manorhaven (V)	Munsey Park (V)	North Hills (V)	Plandome (V)	Plandome Heights (V)	Plandome Manor (V)	Port Washington (U)	Port Washington North (V)	Roslyn Estates (V)	Sands Point (V)	Thomaston (V)
1	08	Whitney Pond		✓			✓		✓	✓		✓	✓						✓		✓
2	06	Leeds Pond		✓						✓		✓		✓	✓	✓	✓				
3	04	Baxter & Mill Pond	✓														✓	✓		✓	
4	11	Mitchell Creek			✓			✓													
5	10	Kings Point Creek			✓			✓													
6	01	Barkers Point																		✓	
7	03	Sheets Creek									✓						✓	✓		✓	
8	02	Toms & Plum Points									✓						✓	✓		✓	
9	05	Eastern Shore	✓													✓	✓				
10	12	Kings Point Pond						✓													
11	07	Southeastern Shore								✓				✓	✓	✓					
12	09	Southwestern Shore			✓	✓	✓	✓													✓

✓ indicates that the Community has acreage within the Subwatershed.

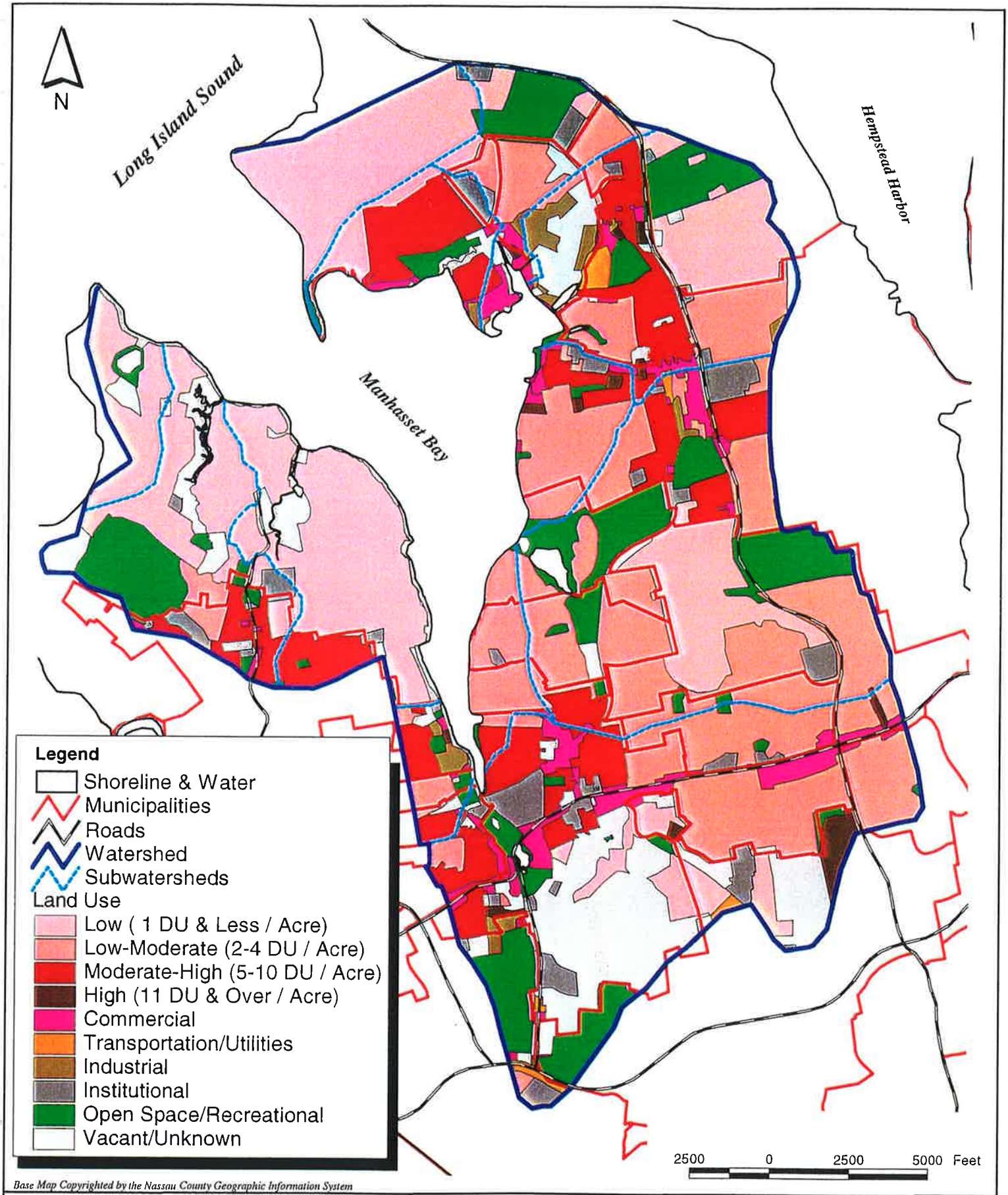
(V) - Incorporated Village

(U) - Unincorporated area of the Town of North Hempstead

Table 1.2-2

MANHASSET BAY WATERSHED/SUBWATERSHED ACREAGE

Rank by Size	ID #	Subwatershed Name	Total Acres	Percent of Total Watershed	Cumulative %
1	08	Whitney Pond	2,596.11	26.10	26.10
2	06	Leeds Pond	2,081.74	20.93	47.03
3	04	Baxter and Mill Pond	1,172.68	11.79	58.82
4	11	Mitchell Creek	873.98	8.79	67.61
5	10	Kings Point Creek	826.30	8.31	75.91
6	01	Barkers Point	524.41	5.27	81.18
7	03	Sheets Creek	473.28	4.76	85.94
8	02	Toms and Plum Points	376.35	3.78	89.73
9	05	Eastern Shore	359.01	3.61	93.34
10	12	Kings Point Pond	250.98	2.52	95.86
11	07	Southeastern Shore	244.44	2.46	98.32
12	09	Southwestern Shore	167.45	1.68	100.00
		TOTAL	9,946.73	100.00	



Manhasset Bay - Map

Land Use & Watershed Delineations

Dvirka and Bartilucci CONSULTING ENGINEERS

Figure 1.2-4

the latest County GIS data, there may be some discrepancy with actual current uses for some locations (e.g., the industrial area shown on Manhasset Isle is currently vacant). However on a watershed-wide basis, it is sufficiently accurate for planning purposes. The percent breakdown for the watershed of each of the 11 categories is presented in Table 1.2-3. A breakdown of acreage by community for each subwatershed is presented in Appendix A.

Areas for Potential New Development

As shown in Table 1.2-3, approximately 90 percent of the watershed's area is currently developed or utilized for one purpose or another, while approximately 10 percent is categorized by the County as "vacant/unknown." Table 1.2-4 presents the acreage of vacant/unknown land use in the 16 communities in the watershed. Based on this table, there is potential for new development in certain subwatersheds. Some examples of these areas include the Whitney Estate, land along Leeds Pond, commercial sites along Northern Boulevard, the Shore Road Main Street area of Port Washington, the Commander Oil and Lewis Oil sites, and the waterfront sites in Manorhaven.

Population and Households

Using 1997 LILCO figures, 1997 population residing in the watershed (shown in Table 1.2-5) has been estimated to be 43,497. Using LILCO's 1997 average household size of 2.9 persons per household for the Town of North Hempstead, this would indicate that approximately 15,000 households are located in the Bay's entire watershed. While Manhasset Bay is important to most of the residents/households in the 19 communities in the watershed, not all 19 communities are located directly on the Bay. Of these, 13 abut the Bay. The 13 communities and their estimated portion of the approximate 12.57-mile long shoreline are presented in Table 1.2-6 in order of size of shoreline on the Bay.

Table 1.2-3

MANHASSET BAY WATERSHED
PERCENT BREAKDOWN LAND USE CATEGORIES*

Rank	Land Use Category	% Total	Cum. % of Total
1	Low-Moderate Residential (2 to 4 d.u./acre)	26.84	26.84
2	Low Residential (less than 1 d.u./acre)	26.27	53.11
3	Open Space/Recreation	12.25	65.36
4	Moderate-High Residential (5 to 10 d.u./acre)	11.53	76.89
5	Vacant/Unknown	10.71	87.60
6	Institutional	4.34	91.94
7	Commercial	3.98	95.92
8	Industrial	1.31	97.23
9	Water/Shoreline Adjustment	1.28	98.51
10	High Residential (greater than 10 d.u./acre)	0.94	99.45
11	Transportation/Utilities	0.55	100.00
		100.00	--

*Part of Nassau County GIS database.
d.u. = dwelling unit

Table 1.2-4
MANHASSET BAY WATERSHED COMMUNITIES
WITH VACANT/UNKNOWN LAND USE*

Rank by Size	Community	Vacant/Unknown Land Use (acres)	% of Total	Cum. % of Total
1	Manhasset (U)	466.29	43.57	43.57
2	Kings Point (V)	238.36	22.27	65.84
3	North Hills (V)	150.48	14.06	79.90
4	Port Washington North (V)	101.37	9.47	89.37
5	Manorhaven (V)	24.64	2.30	91.67
6	Lake Success (V)	18.35	1.71	93.38
7	Great Neck (V)	15.55	1.45	94.83
8	Plandome (V)	12.33	1.15	95.98
9	Thomaston (V)	9.67	0.90	96.88
10	Flower Hill (V)	7.93	0.74	97.62
11	Sands Point (V)	7.69	0.72	98.34
12	Port Washington (U)	7.62	0.71	99.05
13	Baxter Estates (V)	6.67	0.62	99.67
14	Plandome Manor (V)	2.16	0.20	99.87
15	Kensington (V)	0.95	0.09	99.96
16	Plandome Heights (V)	0.03	0.00	100.00
	TOTAL	1,070.09	100.00	--

*As per Nassau County's GIS database
V - Incorporated Village
U - Unincorporated Area of the Town of North Hempstead

Table 1.2-5

MANHASSET BAY WATERSHED
ESTIMATED POPULATION AND HOUSEHOLDS BY COMMUNITY

Rank	Community	Estimated Population	Estimated Households	% of Total	Cum. % of Total
1	Manhasset (U)	7,569	2,610	17.40	17.40
2	Port Washington (U)	7,448	2,568	17.12	34.52
3	Manorhaven (V)	4,487	1,547	10.32	44.84
4	Flower Hill (V)	3,931	1,356	9.04	53.88
5	Great Neck (V)	3,759	1,296	8.64	62.52
6	Munsey Park (V)	2,695	929	6.20	68.72
7	Port Washing North (V)	2,650	914	6.09	74.81
8	Kings Point (V)	2,378	820	5.47	80.28
9	Thomaston (V)	1,481	511	3.40	83.68
10	Plandome (V)	1,336	461	3.07	86.75
11	Baxter Estates (V)	975	435	2.24	88.99
12	North Hills (V)	955	329	2.20	91.19
13	Plandome Heights (V)	825	284	1.90	93.09
14	Sands Point (V)	806	278	1.85	94.94
15	Plandome Manor (V)	709	244	1.63	96.57
16	Roslyn Estates (V)	617	213	1.42	97.99
17	Lake Success (V)	399	138	0.92	98.91
18	Kensington (V)	275	95	0.63	99.54
19	Great Neck Gardens (U)	202	70	0.46	100.00
	TOTAL	43,497	15,098	100.00	--

V - Incorporated Village

U - Unincorporated Area of the Town of North Hempstead

*Based on LILCO's 1997 estimate of 2.9 persons per household.

Table 1.2-6

MANHASSET BAY WATERSHED
ESTIMATED LENGTH OF SHORELINE BY COMMUNITY

Rank	Community	Est. Shoreline Length		% of Total	Cum. % Total
		Feet	Miles		
1	Kings Point (V)	19,219	3.64	29.0	29.0
2	Sands Point (V)	12,461	2.36	18.8	47.8
3	Manorhaven (V)	8,659	1.64	13.0	60.8
4	Port Washington (U)	7,867	1.49	11.9	72.7
5	Plandome Manor (V)	4,699	0.89	7.1	79.8
6	Manhasset (U)	2,904	0.55	4.4	84.2
7	Plandome (V)	2,693	0.51	4.1	88.3
8	Great Neck (V)	2,429	0.46	3.7	92.0
9	Plandome Heights (V)	1,901	0.36	2.9	94.9
10	Baxter Estates (V)	1,162	0.22	1.8	96.7
11	Port Washington North (V)	1,162	0.22	1.8	98.5
12	Kensington (V)	634	0.12	1.0	99.5
13	Thomaston (V)	581	0.11	0.9	100.0
	TOTAL	66,370	12.57	100.0	--

V - Incorporated Village

U - Unincorporated Area of the Town of North Hempstead

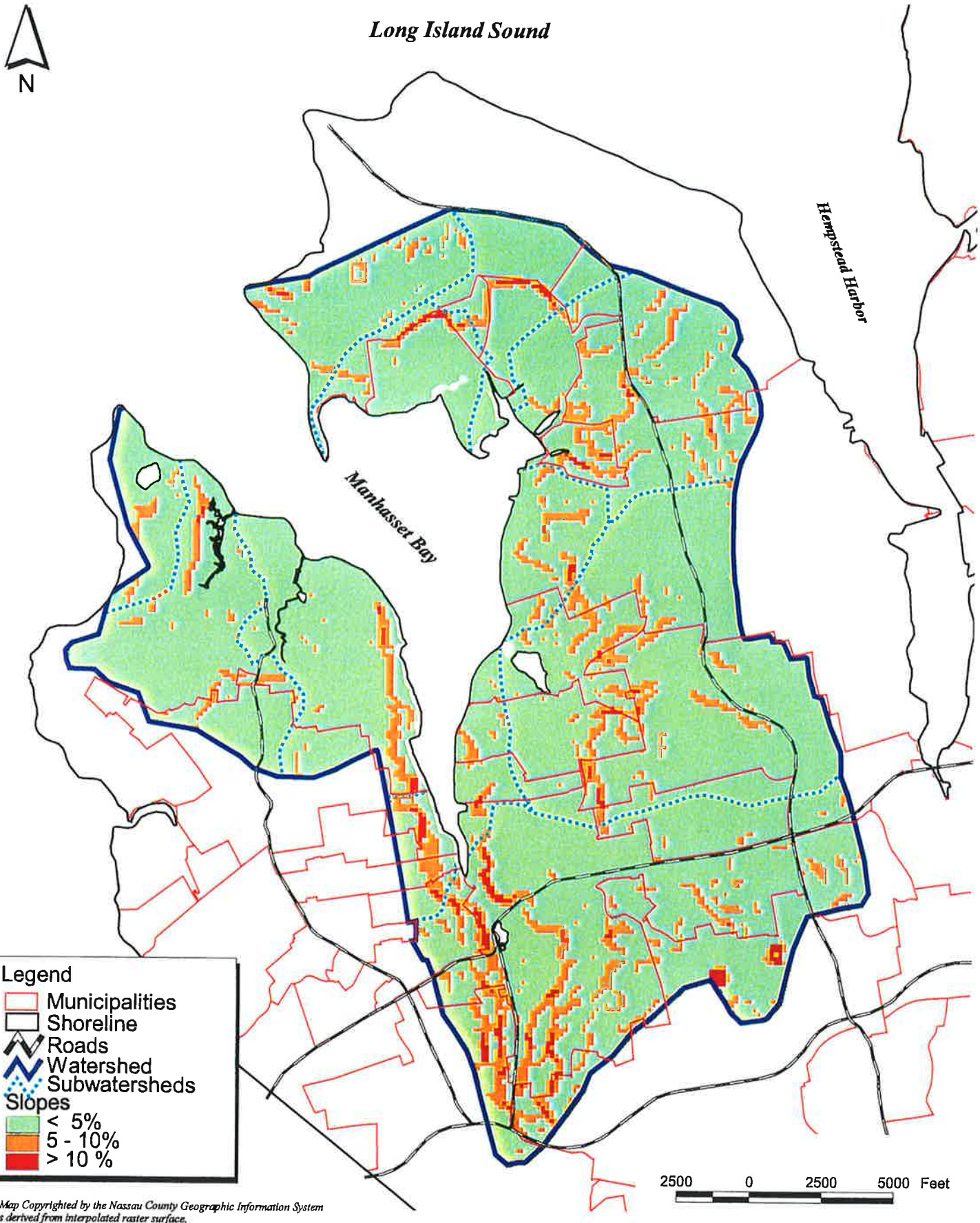
Topography and Slopes

The topography of the Manhasset Bay watershed varies greatly from flat in certain areas of Kings Point, Manorhaven and Sands Point to fairly steep slopes in other areas such as the unincorporated areas of Port Washington and Plandome/Manhasset, and portions of the Villages of Kensington, Thomaston and Great Neck. Ground surface elevations in the watershed range from sea level along the 12 to 13-mile shoreline to over 280 feet above sea level in parts of Port Washington (near Port Washington Boulevard just south of Main Street), 250 feet in parts of Manhasset, and 225 feet in parts of Great Neck area.

Much of the watershed is either flat, or with gentle slopes of less than 5 percent, which tends to be fairly stable with respect to erosion potential. However, there are some areas in the watershed with moderate slopes between 5 and 10 percent, which are more prone to erosion under certain conditions and there are a few areas with moderate to steep slopes greater than 10 percent, which are definitely prone to severe erosion under a number of conditions. A map indicating areas having these various ranges of slopes in the watershed is presented on Figure 1.2-5.

Soils

The most common soil type in the watershed is Urban, Land Montauk - Riverhead. This is a well drained medium to coarse textured soil on low hills. This characteristic lends itself to allowing for good recharge to the groundwater from septic systems, leaching pools, dry wells, etc. Figure 1.2-6 presents the general soil types in the watershed. As shown on the map, there are five different soil types with three of them in over 99 percent of the watershed area. A description of the characteristics of these five soil types (Nassau County Soil Survey, 1987) is presented below.



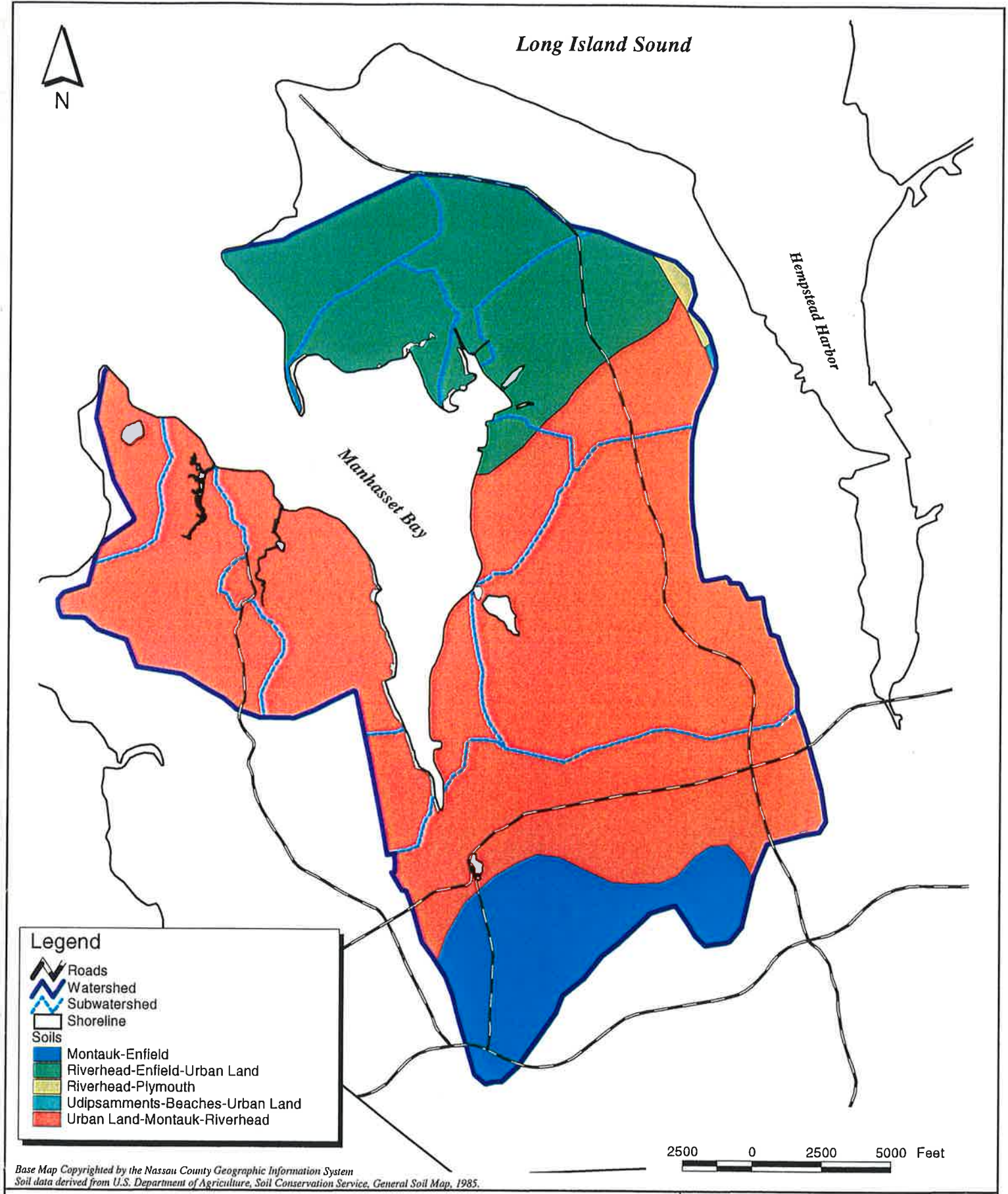
Base Map Copyrighted by the Nassau County Geographic Information System
Slopes derived from interpolated raster surface.

Manhasset Bay - Map

Slope Map

Dvirka and Bartilucci CONSULTING ENGINEERS

Figure 1.2-5



Soil data derived from U.S. Department of Agriculture, Soil Conservation Service, General Soil Map, 1985.

Manhasset Bay - Map

General Soil Map

Dvirka and Bartilucci CONSULTING ENGINEERS

Figure 1.2-6

Type	Characteristics
Montauk-Enfield	Nearly level to strongly sloping, well drained, medium textured and moderately coarse textured soils on knolls and hills
Riverhead-Enfield-Urban Land	Nearly level to strongly sloping, well drained, moderately coarse textured and medium textured soils and urban land on low hills and ridges.
Riverhead-Plymouth	Moderately steep or steep, well drained and excessively drained, moderately coarse textured and coarse textured soils on hillsides.
Udipsaments-Beaches-Urban Land	Nearly level or gently sloping, excessively drained to moderately well drained, coarse textured soils, beaches and urban land on barrier beaches.
Urban Land-Montauk-Riverhead	Mostly urban land and nearly level to strongly sloping, well drained, medium textured and moderately coarse textured soils on low hills.

1.3 Uses and Ecological Importance of the Bay

Based on information contained in the Town of North Hempstead's preliminary draft Local Waterfront Revitalization Plan (Cashin, 1993), Manhasset Bay is used extensively for a variety of recreational activities that include boating, rowing, some limited swimming, water-skiing, wind surfing, jet-skiing, fishing, waterfowl hunting, shoreline walking, waterfront dining, dinner boat cruises and water taxis. The nautical character of portions of the Bay also provides aesthetically pleasing shorefront viewing. The following is a brief discussion of the uses and ecological features of the Bay based on information contained in the preliminary draft Local Waterfront Revitalization Plan.

Boating

Moorings and marinas occupy a large and prominent portion of Manhasset Bay. Recreational boating is the predominant activity with approximately 2,000 boats in the Bay either at marinas or yacht clubs or with beach associations and private moorings permitted by the Town

under Chapter 42. Table 1.3-1 presents an approximate breakdown of an estimated 1,592 boats associated with a number of different boating facilities, yacht clubs and marinas. This estimate is exclusive of private moorings, private docks and visiting boats. While there are no charter fishing boats that operate in the Bay, recently water taxis have become popular as a means of boosting tourism in the Bay and the local economy. The water taxis, which run between various docks are an attempt by local businesses to make it easier for residents and visitors to move between water, land, restaurants and shops.

Fishing and Shellfishing

Manhasset Bay is a productive area for marine finfish with recreational fishing being a popular sport both within the Bay and in the nearby waters of the Long Island Sound. Small boats can be rented on a daily basis from a few private businesses located in the vicinity of the Town of North Hempstead Town dock. The Bay serves as a nursery and feeding area from spring through fall for striped bass, scup, bluefish, Atlantic silverside, menhaden, winter flounder, and blackfish.

The direct harvest of shellfish from Manhasset Bay has been prohibited by the State since the early 1970s due to the bacterial levels in the Bay exceeding the State's water quality standards for shellfishing. Degraded bacterial water quality in the Bay has existed since the 1920s and has been attributed in large part to increased development. In fact, in 1925, the State closed 2,500 acres (essentially the entire Bay) of oyster beds. The closure was due to an outbreak of typhoid that was linked to oysters that had been taken from the Bay. These early problems were experienced in spite of the construction of a wastewater treatment plant in Port Washington almost a decade earlier,

In the early 1990s, the Town conducted a one time clam transplanting/relay program, in cooperation with NYSDEC, for harvest, transport and depuration. The State fisheries group has monitored the Bay for years for bacterial quality. Indications from the State are that it is unlikely to allow harvesting in the near future, because of excessive levels of coliform, particularly after rainfall.

Table 1.3-1

MARINAS AND YACHT CLUBS IN THE MANHASSET BAY WATERSHED

Rank	Name/Location	Estimated Number of Moorings and Slips
1	Manhasset Bay Marina/Port Washington	285
2	Capri Marina West/Manorhaven	220
3	North Hempstead Town Dock*/Port Washington	160
4	Capri Marina East/Manorhaven	140
5	Toms Point Marina/Port Washington	135
6	Knickerbocker Yacht Club/Port Washington	120
7	Sigsbee at North Bay/Port Washington	100
8	W&W Marine White's Marina/Port Washington	94
9	Port Washington Yacht Club/Port Washington	85
10	North Shore Yacht Club/Port Washington	80
11	Haven Marina, Inc./Port Washington	55
12	Shelter Harbor Marina/Yacht Club/Kings Point	37
13	Capri Marina at Inspiration Wharf/Port Washington	35
14	Grace Harbor Yacht Club/Kings Point	16
15	Kings Point House	12
16	Louie's Shore Restaurant/Port Washington	11
17	Kennilworth Yacht Club/Kings Point	7
18	Broadlawn Harbor Yacht Club/Kings Point	NA
19	Manhasset Bay Yacht Club/Port Washington	NA
	TOTAL	1,592

Based on July 1998 telephone contact.

*Public facility; all others are private.

NA = Not available

Wildlife

According to the New York State's Coastal Fish and Wildlife Habitat Rating Form, Manhasset Bay is one of five major waterfowl wintering areas (November through March) on Long Island's north shore. Mid-winter aerial surveys of waterfowl abundance for the 10-year period 1975 to 1984 indicate yearly average concentrations of over 1,100 birds. This includes scaup, canvasbacks and black ducks, along with mallards, Canada goose, common goldeneye, bufflehead, oldsquaw and red-breasted merganser.

The tidal flats and intertidal marsh areas in the Bay support a large summer population of wading shorebirds and waterfowl including: Mute Swans; Common Egrets; Snowy Egrets; Double-crested Cormorants; Great Blue Herons; Least Sandpipers; Sanderlings; Mallards; Laughing Gulls; and Herring Gulls. The entire Manhasset Bay area has been designated by the New York State Department of State (NYSDOS) as a Significant Coastal Fish and Wildlife Habitat. In addition, the area is important for passive recreational use for wildlife/bird watching.

Wetlands and Special Habitats

Wetlands are an important part of the Manhasset Bay ecosystem serving numerous functions. While there are many definitions for what constitutes wetlands, one definition is that of the U.S. Army Corps of Engineers (USCOE, 1995) which states that wetlands are "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adopted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas." In recent years, the importance of the functions and values associated with wetlands have been recognized. See Table 1.3-2.

The degree of public interest in protecting, restoring and creating wetlands has grown significantly in the last decade to the point that today there is a heightened educational awareness of the importance of wetlands through various curricula, posters, videos, slides, magazines,

Table 1.3-2

FUNCTION AND VALUES OF WETLANDS*

Function/Value	Description
Functions:	
Groundwater Recharge/Discharge	This function considers the potential for a wetland to serve as a groundwater recharge and/or discharge area. Recharge should relate to the potential for the wetland to contribute water to an aquifer. Discharge should relate to the potential for the wetland to serve as an area where groundwater can be discharged to the surface.
Floodflow Alteration (Storage and Desynchronization)	This function considers the effectiveness of the wetland in reducing flood damage by attenuation of floodwaters for prolonged periods following precipitation events.
Fish and Shellfish Habitat	This function considers the effectiveness of seasonal or permanent waterbodies associated with the wetland in question for fish and shellfish habitat.
Sediment/Toxicant/Pathogen Retention	This function reduces or prevents degradation of water quality. It related to the effectiveness of the wetland as a trap for sediments, toxicants or pathogens.
Nutrient Removal/Retention/ Transformation	This function relates to the effectiveness of the wetland to prevent adverse effects of excess nutrients entering aquifers or surface waters such as ponds, lakes, streams, rivers or estuaries.
Production Export (Nutrient)	This function relates to the effectiveness of the wetland to produce food or usable products for human or other living organisms.
Sediment/Shoreline Stabilization	This function relates to the effectiveness of a wetland to stabilize stream banks and shorelines against erosion.
Wildlife Habitat	This function considers the effectiveness of the wetland to provide habitat for various types and populations of animals typically associated with wetlands and the wetland edge. Both resident and/or migrating species must be considered. Species lists of observed and potential animals should be included in the wetland assessment report.

Table 1.3-2 (continued)

FUNCTION AND VALUES OF WETLANDS*

Function/Value	**Description**
Values:	
Recreation (Consumptive and Nonconsumptive)	This value considers the effectiveness of the wetland and associated watercourses to provide recreational opportunities such as canoeing, boating, fishing, hunting and other active or passive recreational activities. Consumptive opportunities consume or diminish the plants, animals or other resources that are intrinsic to the wetland, whereas nonconsumptive opportunities do not.
Education/Scientific Value	This value considers the effectiveness of the wetland as a site for an "outdoor classroom" or as a location for scientific study or research.
Uniqueness/Heritage	This value relates to the effectiveness of the wetland or its associated waterbodies to produce certain special values. Special values may include such things as archeological sites, unusual aesthetic quality, historical events, or unique plants, animals or geologic features, etc.
Visual Quality/Aesthetics	This value relates to the visual and aesthetic qualities of the wetland.
Threatened or Endangered Species Habitat	This value relates to the effectiveness of the wetland or associated waterbodies to support threatened or endangered species.

*Based on U.S. Army Corps of Engineers, November 1995.

books and other documents dealing with wetlands (USEPA, 1994) including local environmental groups preparing handbooks on habitat restoration in and around Long Island Sound (Save the Sound, 1998).

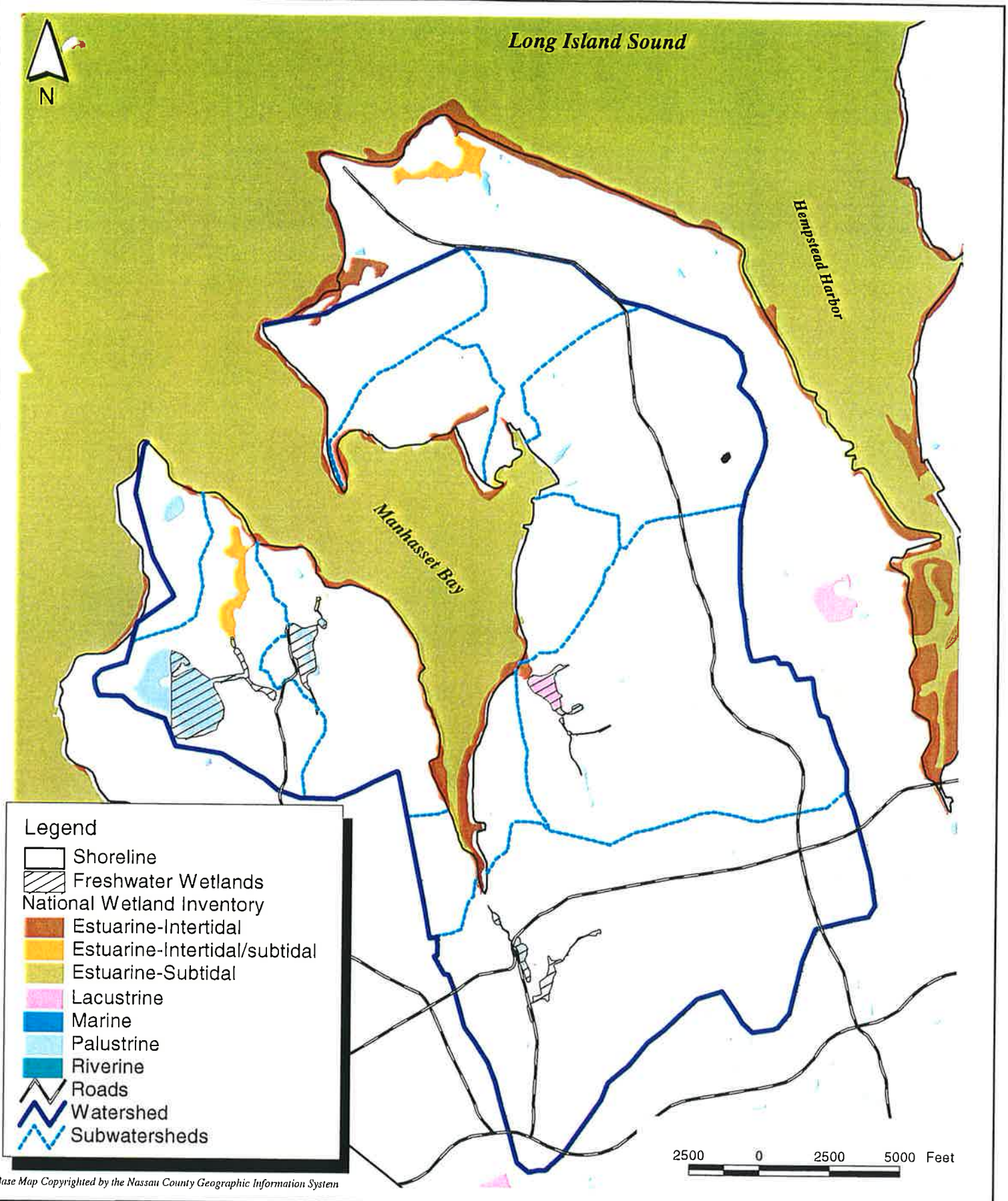
The United States Department of the Interior's Fish and Wildlife Service (FWS) maintains a national wetlands inventory of both freshwater and marine wetlands. Figure 1.3-1 presents a map of the freshwater and marine wetlands in Manhasset Bay and its watershed based on FWS's 1994 map for the area, as well as those wetlands designated by the New York State Department of Environmental Conservation. A review of this information indicates that there are numerous clusters and small patches of wetlands in the watershed. Based on the U.S. Department of the Interior's 1994 National Wetlands Inventory by the Fish and Wildlife Service, Table 1.3-3 indicates the wetland type found in the communities in the watershed. Except for a few isolated patches, most of the wetlands are found clustered in six general areas. These general areas are:

- North and East Sheets Creek, Mill Pond and Baxter Pond
- Leeds Pond and portions of its tributary streams
- Whitney Pond and portions of its tributary stream
- Twin Ponds (South Pond/Mann's Creek)
- Mitchell Creek and Kings Point Park
- Kings Point Pond (Wilson's Creek)

A number of bulkheads, seawalls and revetments have been constructed along certain sections of the Bay's shoreline. In some of these sections, the vegetated areas of intertidal wetland have been reduced to isolated patches and narrow fringes generally bordering the protected southern side of coastal structures.

Visual

The visual quality of the coastal waterfront is a significant attraction of Manhasset Bay to local residents, shoppers, boaters and outside visitors. The scenic quality of the coastal landscape



Manhasset Bay - Map

Department of Environmental Conservation Freshwater Wetland & US Fish & Wildlife Service National Wetland Inventory

Dvirka and Bartilucci CONSULTING ENGINEERS

Figure 1.3-1

Table 1.3-3

WETLAND TYPES FOUND IN THE WATERSHED COMMUNITIES

Types of Wetlands	Communities																		
Types of Wetlands	Baxter Estates (V)	Flower Hill (V)	Great Neck (V)	Great Neck Gardens (U)	Kensington (V)	Kings Point (V)	Lake Success (V)	Manhasset (U)	Manorhaven (V)	Munsey Park (V)	North Hills (V)	Plandome (V)	Plandome Heights (V)	Plandome Manor (V)	Port Washington (U)	Port Washington North (V)	Roslyn Estates (V)	Sands Point (V)	Thomaston (V)
1 Estuarine-Intertidal-Beach Bars	✓		✓			✓			✓			✓		✓	✓			✓	
2 Estuarine- Intertidal-Emergents						✓			✓									✓	
3 Estuarine-Intertidal-Flats						✓		✓				✓	✓						
4 Estuarine-Subtidal-Open Waters						✓									✓				
5 Lacustrine-Limnetic-Open Waters							✓							✓*					
6 Palustrine-Open Waters	✓	✓			✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	
7 Palustrine-Flat											✓	✓	✓						
8 Palustrine Forested			✓			✓*		✓			✓	✓		✓					
9 Palustrine-Emergents								✓						✓					
10 Riverine-Upper Perennials-Open Waters								✓*											
11 Riverine-Lower Perennials-Open Waters								✓*											

✓ Indicates that this type of wetland is found in the Community.

(V) - Incorporated Village

(U) - Unincorporated area of the Town of North Hempstead

Source: U.S. Department of the Interior, Fish and Wildlife Service, National Wetlands Inventory Map, 1994.

* Indicates that the wetland type also corresponds to a NYSDEC designated freshwater wetland in the same general area.

plays a vital part in attracting visitors, residents and businesses to the waterfront areas and restaurants.

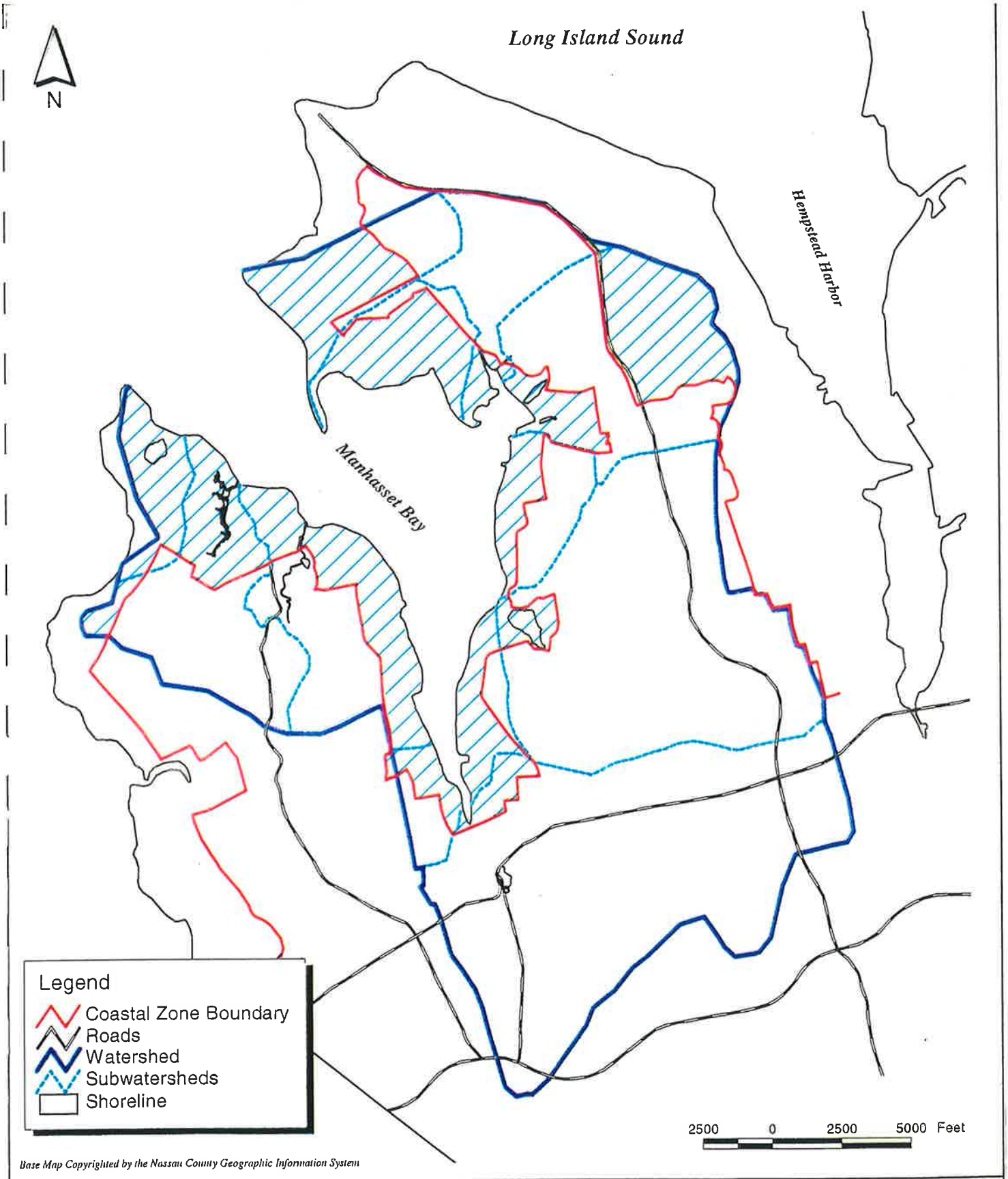
Public Access to the Bay

Manhasset Bay offers opportunities to residents and visitors for public access for boating, fishing, swimming, shoreline walk, docks, restaurants and parks. There are a number of public and private access points around the Bay provided at public parks, public and private docks and numerous private clubs, marinas and homeowner associations. Although access opportunities exist there have been complaints that there should be more public access points that are not limited to residents.

State's Coastal Management Program

The New York State Department of State has prepared the Long Island Sound Coastal Management Program (LISCMP) which is a comprehensive program that identifies policies to reduce, limit or eliminate adverse impacts resulting from actions within the Long Island Coastal area. The boundary of this coastal area as defined by the State within the Manhasset Bay watershed is presented on Figure 1.3-2. This figure differentiates between the boundary set by the State, which is generally based on roadways, and the watershed boundary presented for this planning effort which is based primarily on topography. Accordingly, there are areas of the Manhasset Bay watershed that are in the coastal boundary of Hempstead Harbor. Thus, the cross-hatched areas on Figure 1.3-2 are those areas of the Manhasset Bay watershed which are in the State's Coastal Zone Boundary.

The State's Coastal Program has designated Port Washington as a historic maritime center and Manhorhaven as a center for concentrated development. The draft LISCMP and associated Generic Environmental Impact Statement identified the following beneficial impacts to be expected from the Plan:



Manhasset Bay - Map

NYS Department of State Coastal Zone Boundary

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Figure 1.3-2

- greater protection for sensitive natural areas
- more efficient use of existing infrastructure
- reclamation of underutilized or blighted urban waterfronts
- enhancement of water quality
- protection of landscape and biological diversity
- increased opportunities for public access
- increased clarity and applicability of state coastal policy to the needs of the region
- defined state priorities for public investment and action
- increased predictability in development review

1.4 Parks Around the Bay

There are a number of parks around the Bay that serve various recreational purposes. Some of the key parks are described below. Manhasset Valley Park and Whitney Pond Park are County facilities that provide unrestricted access to Whitney Lake and Whitney Pond, and the streams between them which are tributary to the head of Manhasset Bay. Although direct access to these surface waters for swimming or fishing is prohibited, these parks provide a variety of active and passive recreational uses, including: a swimming pool; ballfields; picnic areas; tennis and basketball courts; public walkways with benches; and winter ice-skating. On the Great Neck Peninsula side of the Bay there are a few parks that are located within the watershed. These include parks in Kensington and Thomaston, a small park in Great Neck (Ravine Park) and Kings Point Park in Kings Point.

Sunset Park in Port Washington provides both passive and active recreation uses. This waterfront park contains a bandshell, an illuminated ballfield, and a shoreline walkway allowing unrestricted visual access to Manhasset Bay. This facility is extensively utilized by the public. The Town dock in Port Washington, located adjacent to and directly southwest of Sunset Park, provides unrestricted public access to Manhasset Bay. The dock is interconnected with Sunset

Park via the public walkway, which continues along the waterfront of the entire dock facility. The dock includes a large parking area and floats to allow for the boarding or discharge of boat passengers. The dock is also used by boaters who moor their vessels in the Bay and access the shore via dinghies. The Town dock also provides a number of public services such as vessel pumpout facilities, restrooms and a Harbormaster's Office. It is used a few times a year for various public functions, including Harborfest.

Manorhaven Park is a Town-owned park located in the Village of Manorhaven. The park, which fronts Manhasset Bay, offers a variety of recreational activities, including: a boat launch ramp (with associated parking for trailers); a swimming pool and bathhouse; platform tennis and regular tennis courts; a beach front area; a picnic area with pavilions; a roller hockey rink; basketball and handball courts; and a softball field. There is also a sandy beach area, facing south, that is not used for swimming in large part due to concerns that the bacterial levels are unacceptable and in part because of the absence of lifeguards. The boat launch provides direct access to Manhasset Bay, while the park provides unobstructed visual access of the Bay and surrounding area. This park is extensively used during the summer season. Outside the park itself there is an area east of the park's parking lot that has been purchased by the Village of Manorhaven to create a nature preserve.

Mill Pond Park is a Town-owned park that offers passive and limited active recreational opportunities. The pond is surrounded by walkways and a small sandy "beach" area to permit viewing and passive enjoyment of the area. Views of Manhasset Bay are available from the southern portion of the park. Mill Pond is also used in the summer months by the Mill Pond Model Yacht Club to sail miniature (model) sailboats. During the winter months, ice-skating is permitted when the pond freezes over. This pond has a large geese and duck population.

Baxter Pond is a County-owned park that is used exclusively for passive recreation. This park has a walkway and benches along the southern and eastern boundaries providing opportunities for viewing and relaxation. Across Shore Road and slightly to the north of the park is a small beach park owned by the Village of Baxter Estates.

The Long Island Science Museum, which is located adjacent to Leeds Pond and which has a beach area provides educational and open space/park type activities to local residents, visitors and school groups. Other parks in the watershed include: Pine Street Park, Plandome Park, Village of Kensington Park, Flower Hill Park, two parks in Munsey park (one between Dogwood Road and Park Avenue and a small one on Abbey Road and a park in Manhasset) west of Plandome Road between Dennis Street and Memorial Park.

1.5 Golf Courses in the Watershed

There are seven golf courses all or partially in the Manhasset Bay watershed. These seven courses occupy a land area of approximately 10 percent of the watershed's total (9,947) area. The golf courses, which are all private courses, are: Sands Point Golf Club, Sands Point Village Club (formerly IBM), North Hempstead Country Club, Plandome Country Club, North Hills Country Club, Deepdale Golf Club and Fresh Meadow Country Club.

Section 2

2.0 WATER QUALITY STATUS OF MANHASSET BAY

This section describes the water quality conditions in Manhasset Bay; the applicable State and Interstate regulatory water use classifications, the water quality standards that must be met to achieve the classified uses; and the historical and current water quality monitoring programs used to assess the conditions of the Bay's waters. The section also summarizes past water quality studies and an assessment of the impact of various pollutant sources. Also included is a summary of past and current water quality conditions and recent trends with respect to bacteria/coliform, dissolved oxygen and nitrogen loadings and sediments which are the primary pollutants of concern related to the water quality problems in the Bay. The estimated breakdown of coliform and nitrogen loads to the Bay from wastewater treatment plants (point sources) and nonpoint/storm water runoff related sources is also described below.

2.1 Water Quality Classifications

New York State Classifications

The New York State Department of Environmental Conservation (NYSDEC) has jurisdiction over the surface waters of Manhasset Bay, tributary waters that discharge to the Bay (streams, creeks, etc.) and the groundwater that seeps to the Bay (i.e., groundwater underflow). NYSDEC classifies the waters of the Bay, including the tributary and groundwaters under its jurisdiction, using a "best use" philosophy in the regulatory approach to managing a particular waterbody or portion of it (referred to as segments).

Specific best use classifications for individual waterbody segments are defined in the NYSDEC regulations for surface waters and groundwaters (6 NYCRR Parts 700-705). These regulations, which under federal law must be reviewed on a regular basis and updated if necessary, form the basis for establishing specific in-stream or ambient water quality standards (numerical or narrative) that must be met to achieve a classified use. The specific standards are the basis for effluent (discharge) permit limits that are imposed on sources that require permits for their discharges.

NYSDEC has established various best use classifications for different sections of the Bay and its tributary ponds, lakes and creeks. These are shown on Table 2.1-1. Under the NYSDEC's Title 6, Chapter X, Part 701 regulations the different classifications portions of Manhasset Bay and its tributaries are defined below:

- Class SA saline surface waters: The best usages of these waters are primary and secondary contact recreation, fishing and shellfishing for market purposes. In addition, these waters are to be suitable for fish propagation and survival.
- Class SB saline waters: The best usages of these waters are primary and secondary contact recreation and fishing. In addition, these waters are to be suitable for fish propagation and survival.
- Class SC saline waters: The best usage of these waters is fishing. In addition, waters are to be suitable for fish propagation and survival as well as primary and secondary contact recreation, although other factors may limit the use for these purposes.
- Class C fresh surface waters: The best usage of Class C waters is fishing. In addition, waters are to be suitable for fish propagation and survival as well as primary and secondary contact recreation, although other factors may limit the use for these purposes.

NYSDEC defines primary contact recreation as activities where the human body may come in direct contact with raw water to the point of complete body submergence. This includes swimming, diving, water skiing, skin diving and surfing. NYSDEC defines secondary contact recreation as recreational activities where contact with the water is minimal and where ingestion of the water is not probable. This includes activities such as boating and fishing.

Interstate Sanitation Commission

The Interstate Sanitation Commission (ISC) which is a Tri-state regulatory agency involving New York, New Jersey and Connecticut also has jurisdiction over the Bay's surface waters, but not its tributary waters. This agency also defines use classifications and associated

Table 2.1-1

NYSDEC CLASSIFICATIONS FOR MANHASSET BAY AND ITS TRIBUTARIES

Water-body	Classification	Intended Best Use
Manhasset Bay:		
• Mouth of Bay between Kings Point and Sands Point, and central portion (west of line from Plum Point to mid-point eastern shoreline north of Leeds Pond.	SA	Swimming, fishing and shellfishing
• Northern Eastern portion of Bay from Plum Point to mid-point of eastern shoreline north of Leeds Pond.	SB	Swimming and fishing
• Southern portion, south of Leeds Pond.	SC	Fishing and swimming* and fish propagation and survival
Ponds and Lakes:		
• Mill Pond	SC	Fishing and swimming* and fish propagation and survival
• Baxter Pond	SC	Fishing and swimming* and fish propagation and survival
• Leeds Pond	SC	Fishing and swimming* and fish propagation and survival
• Whitney Lake	C	Fishing and swimming* and fish propagation and survival
• Kings Point Pond	SC	Fishing and swimming* and fish propagation and survival
Creeks:		
• Sheets Creek	SC	Fishing and swimming* and fish propagation and survival
• Mitchell Creek (tidal portion)	SC	Fishing and swimming* and fish propagation and survival
• Mitchell Creek (non-tidal portion)	C	Fishing and swimming* and fish propagation and survival

Note: All groundwater on Long Island is classified GA.

* NYSDEC's "SC" and "C" classifications state that "water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes."

standards for the waters under its jurisdiction. In addition, like NYSDEC, it also sets discharge limits that are intended to allow for the attainment of its standards and classified uses. ISC's limits on specific discharges in the Tri-State region are incorporated and included in NYSDEC's discharge permits. Under the ISC's water quality classification system all of Manhasset Bay's waters are classified as a Class A. Under this classification, the waters must be suitable for primary and secondary contact recreation, fish propagation and shellfish harvesting. It should be noted that both NYSDEC and ISC requirements must be met, it is not a matter of one having precedence over the other. For this reason, ISC requirements are incorporated into NYSDEC discharge permits.

2.2 Water Quality Standards

As briefly mentioned in Section 2.1, in-stream or ambient water quality standards are established by NYSDEC and ISC and set to achieve the use classification of a particular segment of a waterbody. These standards, which are enforceable, can be either numerical or narrative and form the basis for setting specific permit limits for discharges to the waterbody. For a particular use classification, these can include dozens of physical or chemical parameters. Typically, however, these parameters include dissolved oxygen, which is the mostly commonly used parameter for measuring the acceptability of the water quality of a waterbody and total and fecal coliform which are commonly used to determine the public health acceptable of having human contact with a waterbody or consuming fish or shellfish from that waterbody.

It should be noted that there is no ambient/in-stream water quality standard for nitrogen, although it is a parameter that has received a great detail of attention in the last decade by the Long Island Sound Study and has been the focus of much USEPA and NYSDEC attention in limiting its discharge from point and nonpoint source discharges to the Sound and its surrounding harbors and bays. However, instead of having a specific nitrogen standard, mathematical models have been used to assess the resultant dissolved oxygen levels (for which there are standards) in a waterbody to specific nitrogen loads (or inputs) to that waterbody.

NYSDEC's narrative standards for nitrogen and phosphorus limits them to the degree that they do not result in growths of algae, weeds and slimes that impair the water for their best usages. It should also be noted that for suspended, colloidal and settable solids (which in sufficient qualities can cause in filling of portions of the Bay and its surrounding ponds), the ISC has no water quality standard and NYSDEC has a narrative standard. NYSDEC's narrative standard prohibits these pollutants/materials from sewage, industrial or other wastes if they cause deposition or impair the waters for their best usages.

For the designated use classifications assigned to the waterbodies in Manhasset Bay, the ponds, creeks and tributaries, (refer to Table 2.1-1), all are assigned one of the following four designated use classifications: SA, SB, SC or C. With respect to the dissolved oxygen water quality standard for these classifications, it is 5 mg/l for all of the water bodies, and it is the same value for both NYSDEC and ISC. With respect to the total and fecal coliform standards, the issue is somewhat more complicated in that compliance with NYSDEC's and ISC's standards is calculated differently. Furthermore, compliance is calculated differently for total coliform in SA waters as opposed to SB and SC, and again calculated differently for fecal coliform, which is calculated the same way for SA, SB and SC waters.

2.3 Monitoring of the Bay's Water Quality

Over the years, water quality monitoring (sampling) programs have been performed to determine the physical, chemical and biological conditions of a particular waterbody. Typically, the sample parameters for include those that correspond to specific numerical standards that are in place for that waterbody or those parameters that reflect the physical, chemical or biological characteristics or condition of a waterbody. The parameters typically analyzed include: dissolved oxygen, water temperature, salinity, pH, total suspended solids, turbidity, nitrogen, fecal and total coliform and heavy metals.

The Bay's water quality conditions and whether the classified uses and NYSDEC's and ISC's water quality standards are being met are determined based on a review of data collected under various ambient water quality sampling programs. In and around Manhasset Bay, this

monitoring has and continues to be performed by local, interstate and State agencies. The three agencies that have performed most of the monitoring in and around the Bay have been the Nassau County Department of Health (NCDOH), ISC and NYSDEC's shellfisheries group. The monitoring performed by these agencies is briefly described below. Additional detail and a summary of historical data collected from these programs is presented in Appendix B.

Nassau County Department of Health

From the early 1970s to 1991, the Nassau County Department of Health (NCDOH) conducted water quality at 135 locations in and around the Bay as well as from a number of discharges. The parameters that were analyzed included dissolved oxygen, ammonia nitrogen, nitrate nitrogen, total phosphates and Kjeldahl nitrogen as well as total and fecal coliform. Until 1992 NCDOH issued an annual surface water quality assessment report, summarizing the NCDOH data and findings as to conformance of the water quality of the Bay to the applicable standards that applied to the designated use classifications.

In 1992, as a result of County budgetary constraints, the NCDOH's Bureau of Water Pollution Control was eliminated, and surface water and wastewater discharge monitoring programs were effectively eliminated. Since 1992, the NCDOH has performed weekly monitoring of total and fecal coliform at only seven locations on a seasonal basis (April through September). These seven locations include two beach/marina areas (Manhasset Bay Estates and Baxter Estates Beach), three ponds that discharge to the Bay (Leeds Pond, Mill Pond and Baxter Pond), and two other locations (Shelter Harbor and Broadlawn Harbor). In addition, the NCDOH monitors Manorhaven Beach twice a week during the bathing season.

Interstate Sanitation Commission

For decades the ISC has monitored water quality in the Tri-state region, including monitoring of municipal and industrial discharges to these waters, and a summer New York Harbor Survey that extended into a portion of western Long Island Sound. ISC's monitoring program also includes the sampling of the three wastewater treatment plants that discharge to

Manhasset Bay plants. In addition, since 1990, ISC has monitored more stations in the upper East River and western Long Island Sound stations as well as selected embayments in support of the Long Island Sound Study (LISS).

ISC also conducts special studies to address particular water quality issues of concern. One of these involves annual sampling in the Sound to document hypoxia (low dissolved oxygen) and chlorophyll. This sampling typically takes place from mid to late summer in the western Sound. This includes two stations that are of interest to the Manhasset Bay Study, since the water quality condition of the Sound influences Bay water quality.

In 1997, ISC also performed a special intensive survey of ten weekly sampling runs. These were conducted from July 1997 through mid-September 1977 at 21 stations in Long Island Sound and a portion of Manhasset Bay. In Manhasset Bay, this included three stations that were previously monitored by Nassau County and were located in the outer, mid and inner sections of the Bay. The results of the sampling in the Bay are summarized in Section 2.5. This monitoring was also conducted in 1998 and is expected to continue in 1999.

NYSDEC'S Fisheries Group

From 1988 through 1993, the NYSDEC shellfisheries group sampled 20 stations in Manhasset Bay and the Port Washington wastewater treatment plant, for total and fecal coliform on a non-specific schedule. A map of these locations is presented in Appendix B.

2.4 Water Quality Modeling Studies

Over the years there have been a number of water quality modeling studies of the Bay. These studies employed mathematical models to simulate the Bay's hydraulics, kinetic reactions and loadings for the purpose of assessing and predicting water quality under difference loadings of various pollutants and evaluate water quality impacts from effluents from the sewage treatment plant's discharge at alternative locations.

Hydroscience Model

In 1973 Hydroscience Inc. conducted a modeling study that evaluated data from stations both within the Bay and in western Long Island Sound which concluded that:

- Because of the significant tidal exchange between Manhasset Bay and Long Island Sound, water quality, including dissolved oxygen, nutrients, and coliform bacteria are influenced by the quality of the adjacent Sound waters.
- The three wastewater treatment plant that discharge to the Bay did not produce a significant dissolved oxygen deficit in Manhasset Bay. The principal causes of Bay dissolved oxygen deficit were found to be the tidal exchange with Long Island Sound, benthal deposits, and the diurnal variations due to algae.
- During the summer, algae in Manhasset Bay were found to have a significant effect on the Bay's dissolved oxygen level. Although the net effect of algae was found to increase the Bay's average dissolved oxygen concentration, the algae also caused vertical stratification and diurnal variations in dissolved oxygen.
- Algal growth in Manhasset Bay was found to be limited by available nitrogen, as demonstrated by the reduction of summertime Bay measured nitrogen concentrations to near zero, concluding that future increases in the Bay nitrogen level would promote the growth of additional algae.

Section 208/201 Models

In the late 1970s and early 1980s, two modeling studies were performed by Tetra Tech, Inc. as part of USEPA's Section 208 and Section 201 planning efforts that were conducted by the Long Island Regional Planning Board and the Nassau County Department of Public Works, respectively. These two models represented the most thorough study of Manhasset Bay performed to date, and represent the most accurate assessment of the variables that affect water quality in the Bay. The conclusions of these two studies, which were similar to the conclusions of the Hydroscience studies, were:

- Manhasset Bay was generally well mixed vertically, supports abundant algal growth, and had high nutrient concentrations and high concentrations of coliform bacteria.

- The nutrient concentrations (and therefore subsequent algal abundance) were largely dominated by Long Island Sound water quality.
- Dissolved oxygen concentrations were primarily controlled by temperature, Long Island Sound water quality, and algal photosynthesis and respiration.
- Discharges of BOD have little effect on oxygen resources in the Bay.
- Concentrations of coliform bacteria were largely affected by ponds, streams treatment plants discharges and storm water runoff.
- Coliform bacteria concentrations could be controlled to some extent, however, receiving water levels would remain marginal as a result of the water quality conditions in western Long Island Sound.
- Even without the three wastewater treatment plant discharges, nutrient concentrations in the Bay were high enough to support large algal blooms.

Long Island Sound Study Modeling

In the late 1980s and early 1990s, extensive monitoring and sophisticated modeling (LIS2.0 and LIS3.0 models) of the entire Long Island Sound were conducted as part of USEPA's Long Island Sound Study (LISS) conducted with the active participation of the New York State Department of Environmental Conservation and the Connecticut Department of Environmental Protection. The evaluations conducted with these models primarily focused on dissolved oxygen. The conclusions drawn from the modeling indicated that excessive nitrogen, in combination with natural physical factors, is the primary cause of the seasonal low dissolved oxygen (hypoxia) problem, which frequently occurs in western Long Island Sound. Hypoxia is defined as dissolved oxygen less than 3.0 mg/l.

New Models Being Developed

Beginning in 1997/1998, the New York City Department of Environmental Protection (NYCDEP) initiated the development of a model more advanced than these two (LIS2.0 and 3.0) prepared as part of the LISS. This newer model, the System-wide Eutrophication Model (SWEM), will integrate Long Island Sound, New York-New Jersey Harbor and the Bight as an interconnected system. Once completed and accepted by the regulatory agencies, the model is

expected to provide an additional tool for understanding and adaptively managing the regional ecosystem. Information from the model has been submitted to LISS participants. The model is currently in the process of peer review.

Long Island Sound Study

Based on extensive sampling in the Sound and the use of the sophisticated models described above, it can be concluded that, although western Long Island Sound is naturally susceptible to hypoxia, human activity aggravates this condition via point sources (wastewater treatment plants), nonpoint sources (primarily storm water runoff and groundwater underflow), and atmospheric deposition from power plants and automobile emissions. As a result of nearly 12 years of studying the problem, USEPA and the two states adopted the LISS recommendations for a three phased approach to reduce nitrogen loadings to the Sound. The phases are described below.

LISS Phase I

Phase I, adopted in December 1990, recommended a freeze on point and nonpoint nitrogen loadings to the Sound at 1990 levels. To date, all three wastewater treatment plants discharging to Manhasset Bay have been in compliance with the freeze imposed on their nitrogen discharge and the trend shows a decrease in their total nitrogen discharge (see Table 2.4-1).

LISS Phase II

Phase II, adopted in 1994, recommended low cost actions to reduce the load of nitrogen below the 1990 freeze baseline. To date, a number of treatment plants in New York and Connecticut have undertaken, or are planning to undertake, demonstration projects or pilot studies to achieve low cost reductions. Consistent with the recommendations for this phase, the Port Washington Wastewater Treatment Plant applied for and was recently awarded a State financial assistance grant to help finance the cost of a demonstration project to reduce nitrogen from 25 percent of the plant's flow by approximately 70 to 80 per cent.

Table 2.4-1

NITROGEN LOADS TO MANHASSET BAY FROM MUNICIPAL WASTEWATER TREATMENT PLANTS

	Load (lbs/day)*			
Month/Year	**V. Great Neck**	**Port Washington**	**Great Neck S.D.**	**Total**
September, 1997	213	589	441	1,243
October, 1997	213	592	433	1,238
November, 1997	213	601	428	1,242
December, 1997	213	595	420	1,228
January, 1998	216	592	412	1,220
February, 1998	220	584	408	1,212
March, 1998	220	577	406	1,203
April, 1998	219	571	400	1,190
May, 1998	224	574	398	1,196
June, 1998	221	574	398	1,193
July, 1998	217	586	398	1,201
August, 1998	216	586	390	1,192

*12-month rolling average from individual Discharge Monitoring Reports.

LISS Phase III

Phase III, adopted in 1998, recommended a long-term 58.5% nitrogen reduction goal from the total point and nonpoint load to the Sound over a 15-year period. Phase III sets three 5-year interim targets (to be reevaluated on a regular basis) for controlling the point and nonpoint sources of nitrogen in each of 11 watershed management zones around the Sound.

Consistent with the recommendations of this phase, all three Manhasset Bay wastewater treatment plants have applied for State funding assistance to construct full-scale nitrogen removal facilities to achieve the 15-year goal. However, they have not yet received State assistance to do this. In the interim, if the Port Washington demonstration project under Phase II is successful, and is converted into a long-term permanent operation, it is possible that it may be able to achieve the first 5-year Phase III nitrogen reduction target and possibly the 10-year (second) Phase III nitrogen reduction target.

In addition to the above, and consistent with the objectives of Phase III, the two Great Neck wastewater treatment plants have applied for and received State assistance to evaluate the technical feasibility and cost-effectiveness of eliminating their discharges to the Bay altogether. This would be achieved by converting one of the plants to a pump station and connecting to the County's sewer system with treatment provided at one of the County's plants, which discharge to the Atlantic Ocean.

2.5 Water Quality Conditions and Trends

Dissolved Oxygen

Dissolved oxygen is an important water quality parameter that indicates to a large degree the acceptability of the water quality condition of a waterbody. For water bodies such as Manhasset Bay and Long Island Sound levels of dissolved oxygen of 5 mg/l and higher are generally accepted as being protective of marine life. Therefore, in Manhasset Bay and Long Island Sound, the State's dissolved oxygen standard is 5 mg/l. Dissolved oxygen levels that are below 3 mg/l indicate a condition referred to as hypoxia (low oxygen), while levels below 1 mg/l

are referred to as anoxia (no oxygen). According to USEPA's 1994 LISS report, anoxia cannot support marine life and hypoxia limits marine life, and has the following negative effects:

- reduced abundance and diversity of adult finfish;
- reduced growth rate of newly settled lobsters and possibly juvenile winter flounder;
- death of species that cannot move or move slowly such as lobsters in pots and starfish, as well as early life stages of species such as bay anchovy, menhaden, cunner, tautog and sea robins;
- possible reduction in the resistance to disease of lobsters and other species; and
- diminished habitat value of Long Island Sound.

USEPA's 1994 LISS documented certain problems in the Sound which also directly or indirectly affect or reflect conditions in Manhasset Bay. These problems are:

- Large areas of the Sound are impaired as habitat for fish and shellfish because of low dissolved oxygen levels, a condition called hypoxia.
- The productivity of many wetlands, intertidal areas and other habitats has been diminished by development and pollution.
- Some bay and harbor bottoms are contaminated with toxic substances.
- Health advisories warn against eating too much Long Island Sound bluefish, striped bass, eels, some types of waterfowl, and lobster and crab hepatopancreas (more commonly known as tomalley) due to elevated levels of toxic chemicals.
- Beaches suffer periodic closures and many of the Sound's prime shellfish beds have been closed for years due to indications of pathogen contamination. People can become sick by swimming in contaminated waters or by eating raw or partially cooked shellfish harvested from contaminated waters.
- Trash and litter mar the Sound's waters and beaches and can pose a hazard to living resources and to navigation.
- Over a billion gallons of treated effluent, which contains oxygen-demanding material and the nutrient nitrogen, are discharged each day from sewage treatment plants to the Sound. The nitrogen overfertilizes the Sound, fueling the growth of marine plants. When the plants die, they sink to the bottom and decay, using up oxygen in the

process. Other sources of nitrogen include runoff from overfertilized lawns and gardens and atmospheric deposition from vehicle and power plant emissions.

- Toxic chemical substances resulting from human activity have found their way into the Sound and persist in elevated levels in some bottom sediments. Examples of these include lead, zinc, etc. In the past, these substances came from industrial sources, but rigorous compliance with pollution control programs has reduced this source substantially. Pollutant sources today include urban runoff, sewage treatment plants, vehicle exhaust emissions, household chemicals and pesticides. The contaminants from these sources affect the health of plants and animals and human consumption of species that concentration these substances can pose significant health risks.

With respect to trends involving dissolved oxygen, the USEPA's LISS's 1997 Phase III Action Plan stated that low dissolved oxygen in the Sound is not a new occurrence but that possibly it may have become more common and severe since the 1950s. Typically, the low dissolved oxygen levels, particularly in the western Sound off Manhasset Bay and within Manhasset Bay to the degree that the Sound interacts with the Bay, cover a period of 40 to 80 days from some time in July to some time in September. Below are the durations of hypoxia in the Sound from 1991 to 1996:

Year	Dissolved Oxygen Hypoxia Duration
1991	41 days
1992	72 days
1993	78 days
1994	74 days
1995	35 days
1996	47 days

While the LISS's focus over the last 12 years has been on the Sound and, particularly, the western Sound, dissolved oxygen conditions within Manhasset Bay were monitored regularly by the Nassau County Department of Health (NCDOH) for a 23-year period from 1968 through 1991. NCDOH's last annual report on its findings was issued in March 1992. This report contained an assessment of the percent conformance of the average dissolved oxygen in the Bay

with standards. Below are the annual percent conformance for the last 10 years that the County monitored dissolved oxygen within the Bay.

Year	Percent Conformance
1982	40
1983	80
1984	40
1985	0
1986	20
1987	0
1988	40
1989	100
1990	100
1991	60

The average for these 10 years was 45 percent, but the last 3 years were clearly better than the previous years.

The ISC monitored surface dissolved oxygen in the Bay in Spring/Summer 1997 as part of a special survey, which also included monitoring of Little Neck Bay and Hempstead Harbor (ISC, 1998). The sampling indicated that dissolved oxygen increased going southward in both Little Neck Bay and Manhasset Bay. The opposite situation was found in Hempstead Harbor. ISC believed that wind velocity and direction had an effect on this, as well as the fact that Manhasset Bay and Little Neck Bay are twice the width of Hempstead Harbor.

In addition, these two bays are shallower in comparison to Hempstead Harbor, thereby removing the possibility of deeper mixing of dissolved oxygen. Another factor believed by ISC to increase dissolved oxygen further into the Bay is the proliferation of algae, which produces greater dissolved oxygen levels but eventually dies, settles to the bottom and results in oxygen-consuming bacteria that lowers dissolved oxygen levels.

Low dissolved oxygen levels in the waters of Long Island Sound and its bays and harbors have, over the years, resulted in fish kills. These kills, at times caused by bluefish chasing menhaden (or bunkers) into shallow waters that are low in oxygen or become depleted of oxygen because of the number of menhaden in a school, cause an unsightly and offensive situation. Yet, not all of the menhaden die from the lack of oxygen; many are caught and chewed or torn apart by the bluefish.

Although the most recent fishkill occurred in August and September of 1998, similar kills have occurred over the years. Yet, despite thorough investigations, these fishkills are not fully understood (see Appendix B, excerpt from Coalition to Save Hempstead Harbor, 1998). Unfortunately, fish kills in Manhasset Bay are made worse by winds blowing from the north and northwest, resulting in dead, smelly fish floating in the water and rotting by the tens of thousands.

The fish kill situation is worsened when the dead fish are not skimmed or removed from the surface, and are washed on the beach or in a cove where they create a greater nuisance to homeowners and residents near the shoreline, boaters using the marinas, and diners using local waterfront restaurants. Although these kills are not unusual occurrences, there is still a lack of a coordinated planning effort and a response plan to prevent the dead fish from being washed ashore where it is more difficult to address and results in an unsightly, odorous and solid waste disposal problem for many shoreline residential property owner, beach and yatch clubs and marinas.

Coliform/Bacteria

Over the years, the Bay's water quality has been impacted by the significant population growth and corresponding development that occurred between the 1950s and 1970s. Over the years and since the 1920s, coliform/bacteria standards for shellfishing in the Bay have been exceeded on and off. However, the shellfish standard has been exceeded on a regular basis since the early 1970s resulting in shellfish areas being effectively closed on a permanent basis.

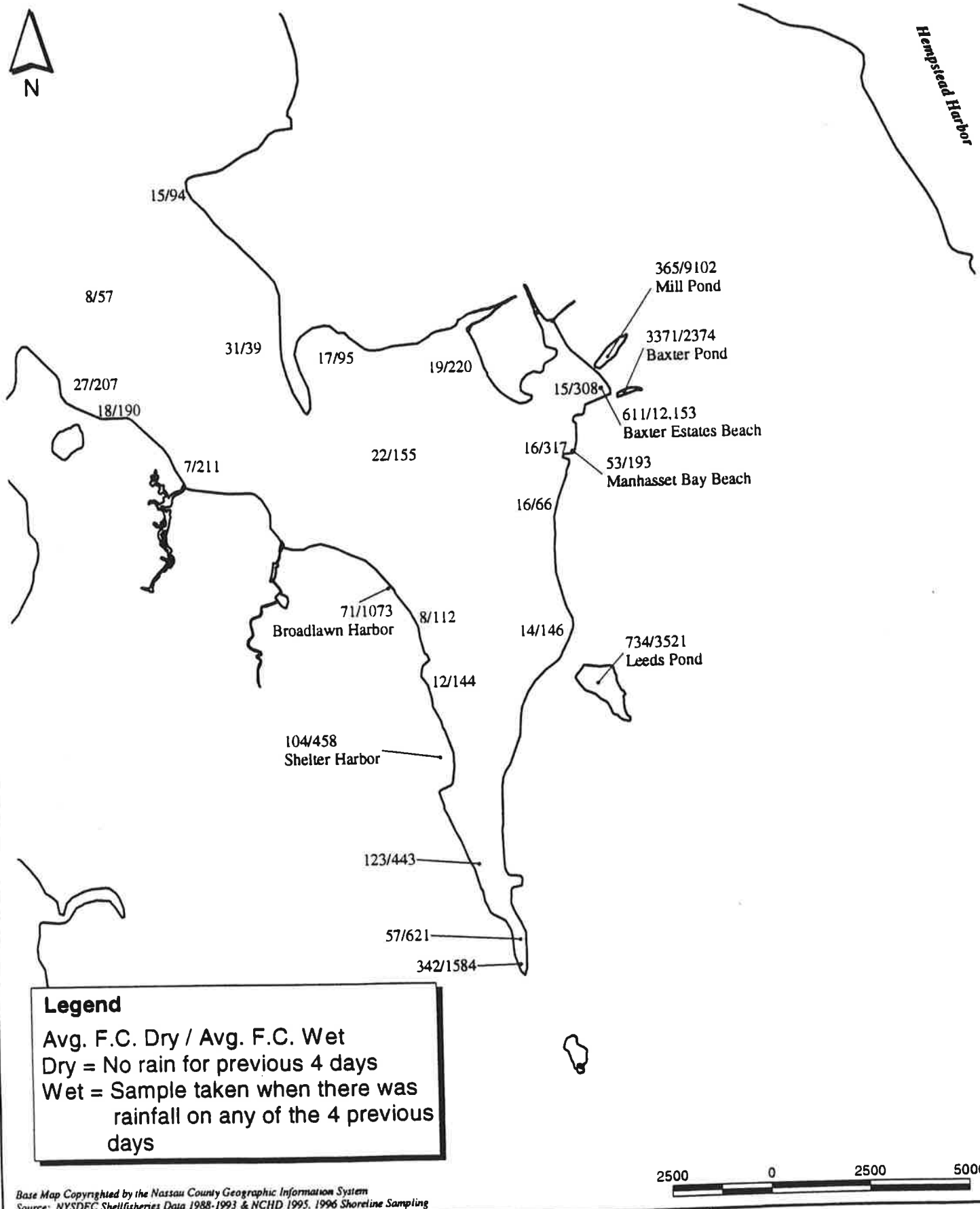
Indications from the State are that these closed shellfish areas are unlikely to be reopened in the near future.

The swimming standard has also been exceeded on and off over the years, resulting in little or no swimming in the Bay. Often the State's coliform standards for swimming are contravened and there are wide fluctuations in the coliform levels observed at same location over a few hours. The Bay-wide levels have tended to fluctuate uniformly but without any apparent seasonal relationship. A review of coliform levels in the Bay indicate they are positively correlated with rainfall runoff. The rainfall runoff carries various pollutants to the Bay that are primarily caused by development.

An analysis was performed of the NYSDEC shellfisheries coliform data from 1988 through 1993 and grouped based on rainfall for the preceding four days prior to the sampling. When the data is grouped into wet (defined by all data when rain has occurred within the previous four days and dry defined as no rain within the previous four days) significant differences are noted among the wet and dry coliform levels throughout the Bay.

Figure 2.5-1 presents a comparison of dry and wet coliform data at different locations in and around the Bay. The comparison at each location demonstrates that the overall coliform concentrations in the Bay are increased on average 10 times due to rainfall and even greater along the shoreline or enclosed areas. This figure shows that when precipitation has not occurred for 4 days or longer, the coliform levels decline. Thus, coliform levels in the Bay can be directly related to rainfall and associated runoff into the ponds, creeks, brooks and storm drains, as well as groundwater in areas with cesspools and septic systems in high groundwater areas.

Besides the bacterial pollution affecting shellfishing, over the last 20 to 30 years, swimming has been adversely affected by the bacterial pollution. Currently, there is little or no swimming in the Bay, either by boaters, beachgoers or by residents with homes directly on the shoreline. Although in the last few years, there has been an improvement in the bacterial conditions as they relate to swimming, part of the public's reluctance to swim in the Bay may be related to algae conditions that make the water unattractive for swimming and part may be due to



Base Map Copyrighted by the Nassau County Geographic Information System
Source: NYSDEC Shellfisheries Data 1988-1993 & NCHD 1995, 1996 Shoreline Sampling

Manhasset Bay - Map

Fecal Coliform Data Influence of Rainfall

Dvirka and Bartilucci CONSULTING ENGINEERS

Figure 2.5-1

the fear of bacterial contamination. High concentrations of coliforms have also been observed at the mouth of the Bay when Long Island Sound values are high (2,400 and 24,000 MPN/100 ml).

Assessments performed as part of the Section 208 effort demonstrated that storm water runoff contributes 95% of the in-Bay sources of total coliform and 99.5% of in-Bay sources of fecal coliform (see table below).

Coliform In Bay Sources				
	Total Coliform		Fecal Coliform	
Source Component	Organisms/day			
Wastewater Treatment Plants	9.3×10^{11}	(1)	2.5×10^{9}	(-neg)
Dry Weather Streamflow	2.4×10^{12}	(4)	1.1×10^{11}	(0.5)
Storm Water Runoff	5.8×10^{13}	(95)	2.1×10^{13}	(99.5)
Total	6.1×10^{13}		2.1×10^{13}	
Source: Tetra Tech 208 Study, 1978 Note: Number in parenthesis is percent of total				

In addition to monitoring the water's dissolved oxygen and other chemical parameters of Manhasset Bay over the years, the NCDOH also monitors coliform levels to determine the acceptability of the waters for swimming. As can be seen on Table 2.5-1 for the years 1982 through 1997, the conditions have dramatically improved since 1992 when compared to the 10 years before then.

The water quality with respect to coliform/bacteria at Manorhaven Beach for the 6-year period from 1992 to 1997 shows that there were four years (1992, 1993, 1995 and 1997) when the water quality met bathing/swimming standards 100 percent of the time. The other two years (1994 and 1996), the standard was met 83 percent of the time.

The bacterial water quality from 1992 through 1997 has been evaluated for its conformance with bathing/swimming standards during warmer months on a monthly basis. This is presented on Table 2.5-2, and it indicates that the water quality conditions at Manorhaven Beach would have been acceptable for bathing for 34 of 36 months. The table indicates a 94%

Table 2.5-1

MANHASSET BAY
PERCENT COMPLIANCE WITH WATER QUALITY
STANDARDS FOR BATHING FOR TOTAL COLIFORM*
1982-1997

Year	Conformance with Standard
1982	67%
1983	67%
1984	67%
1985	67%
1986	67%
1987	67%
1988	67%
1989	67%
1990	78%
1991	78%
1992	100%
1993	100%
1994	83%
1995	100%
1996	83%
1997	100%

Note:

Results reflect sampling from 1982-1991 at nine different locations. For 1992 to 1997, reflects sampling at Manorhaven Beach only.

Table 2.5-2

TOTAL COLIFORM SAMPLING TO DETERMINE COMPLIANCE WITH BATHING STANDARD AT MANHORHAVEN BEACH (1992 - 1997)

Month/Year	No. of Samples	NYSDEC		ISC	Conformance with Bathing Standard
		Monthly Mean MPN[a]	No. of Samples Greater than the Standard[b]	No. of Samples Greater than the Standard[c]	
April 1992	6	15	0	0	Yes
May 1992	8	80	0	0	Yes
June 1992	9	300	0	0	Yes
July 1992	9	30	0	0	Yes
August 1992	8	280	0	0	Yes
September 1992	9	140	0	0	Yes
April 1993	6	22	1	0	Yes
May 1993	7	13	0	0	Yes
June 1993	9	300	0	0	Yes
July 1993	8	95	0	0	Yes
August 1993	6	265	1	0	Yes
September 1993	8	230	0	0	Yes
April 1994	4	15	0	0	Yes
May 1994	7	30	1	0	Yes
June 1994	9	170	0	0	Yes
July 1994	7	1,100	3	1	No
August 1994	9	230	2	0	Yes
September 1994	6	80	0	0	Yes
April 1995	4	17	0	0	Yes
May 1995	9	230	0	0	Yes
June 1995	9	130	0	0	Yes
July 1995	8	650	0	0	Yes
August 1995	9	230	0	0	Yes
September 1995	9	130	1	0	Yes
April 1996	4	55	0	0	Yes
May 1996	10	70	0	0	Yes
June 1996	8	800	1	0	Yes
July 1996	8	600	1	0	Yes
August 1996	9	500	2	0	No[d]
September 1996	7	300	0	0	Yes
April 1997	5	30	0	0	Yes
May 1997	9	30	1	0	Yes
June 1997	8	220	1	0	Yes
July 1997	13	300	0	0	Yes
August 1997	8	230	1	0	Yes
September 1997	5	230	0	0	Yes

Source of Data: Nassau County Department of Health

(a) Must be less than 2,400

(b) No more than 20% can exceed 5,000

(c) Cannot exceed 2,400 in a 30 day period

(d) 22% of the samples exceed the limit as opposed to 20% maximum.

conformance rate over the last six years. This fact may not be well known to residents who may perceive or believe that the water quality is unsafe for swimming. Since 1992, when water quality began to improve, NCDOH has had to reduce its level of sampling due to administrative and budgetary constraints.

Nitrogen

As discussed earlier, since 1990, activities have been underway in New York and Connecticut as part of the LISS effort to control nitrogen from sources within the New York and Connecticut portions of the drainage basin, starting with adoption of the Phase I "freeze" on loadings. The Great Neck Village, Great Neck Sewer District, and Port Washington Plants are subject to "No Net Increase of Nitrogen" under Phase I. Current SPDES permits for these facilities have incorporated the "no net increase" language and their nitrogen load, called the "aggregate" is listed in the permit.

The modeling studies referred to earlier have demonstrated that the Long Island Sound's boundary condition for nitrogen becomes the in-Bay concentration due to the out-of-Bay (western Long Island Sound) nitrogen loads. Figure 2.5-2 shows the average in-bay nitrogen concentrations in mg/l under two conditions:

a) from in-bay sources and the Long Island Sound effect (i.e., out-of-bay sources); and

b) from in-bay sources

The in-Bay sources of nitrogen include:

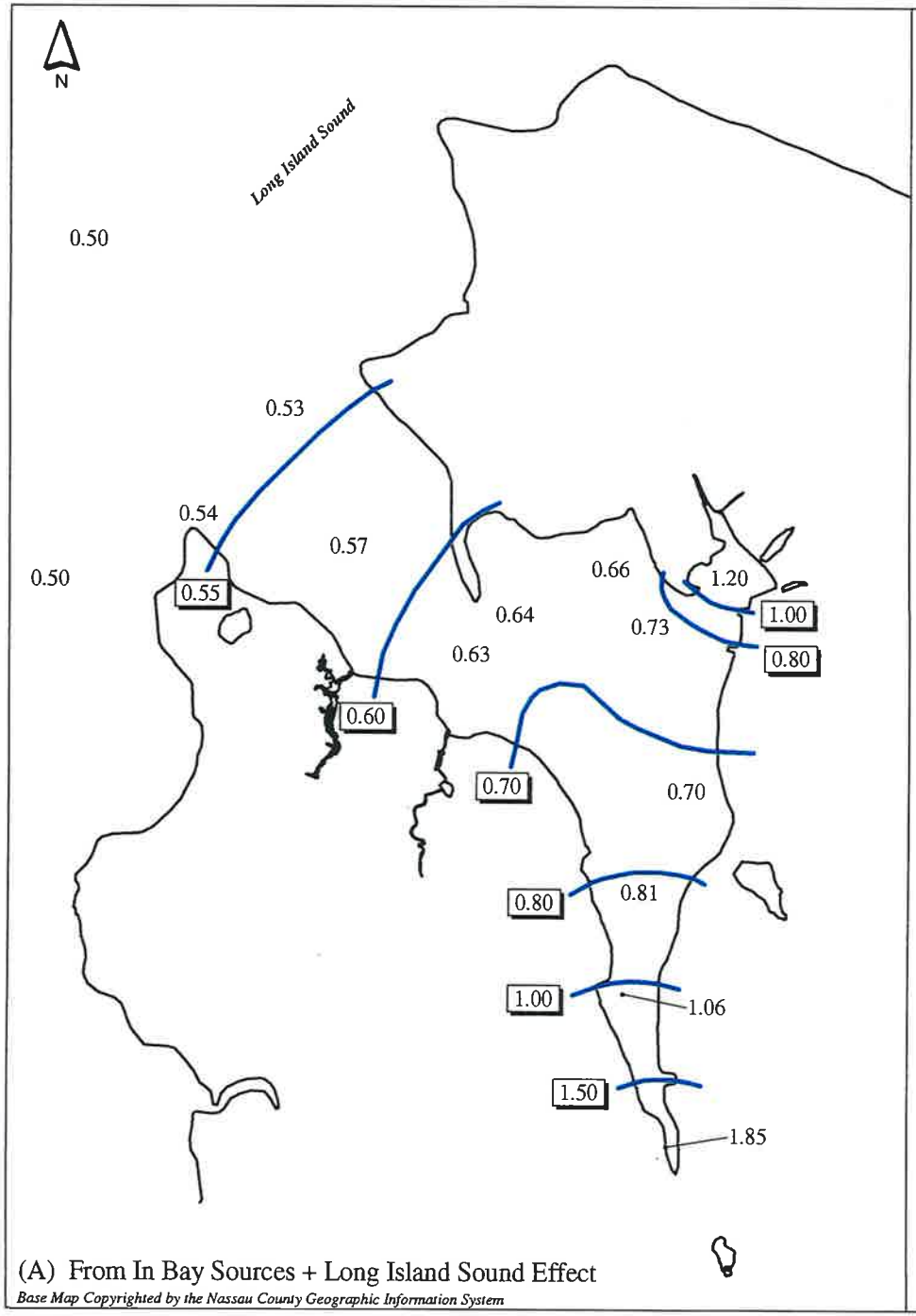
a) dry weather streamflow;

b) nitrogen in the groundwater underflow that feed the ponds and streams;

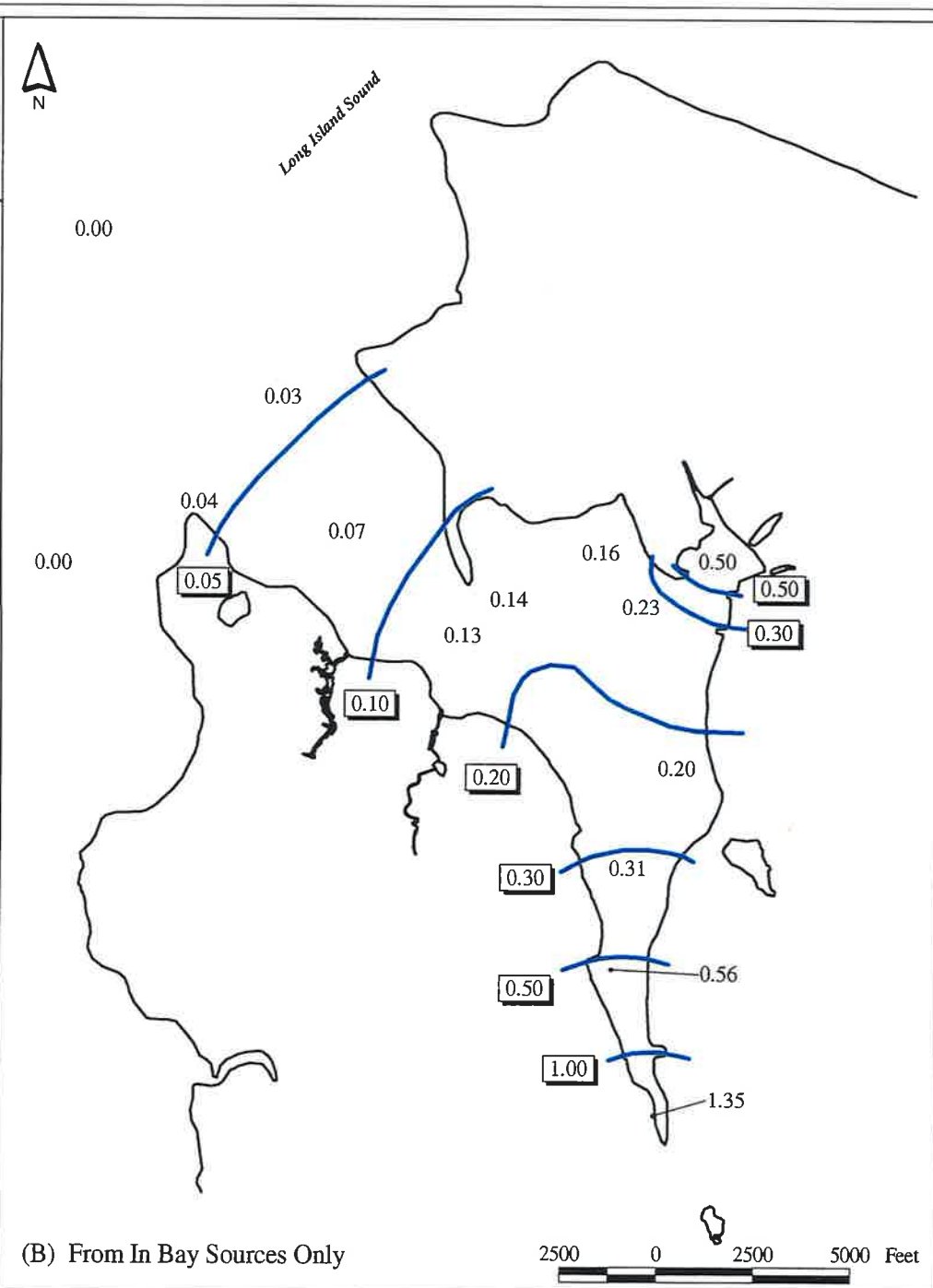
c) nutrients carried to the ponds and streams by surface storm water runoff;

d) three wastewater treatment plants; groundwater underflow to the Bay from cesspools and septic systems that serve; fertilizers that are carried by storm water; and

e) atmospheric/direct rainfall on the Bay.



(A) From In Bay Sources + Long Island Sound Effect



(B) From In Bay Sources Only

2500 0 2500 5000 Feet

Manhasset Bay - Nitrogen from In-Bay and External Sources

Figure 2.5-2

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A tabulation of the estimated nitrogen loading from in-Bay sources is presented on Table 2.5-3.

Out-of-Bay sources of nitrogen include the Sound which besides point source loadings also receives storm water runoff carrying nonpoint pollution from the 16,000-square mile Long Island Sound drainage area.

The Long Island Sound Study (LISS, March 1994) concluded that nitrogen was the limiting nutrient related to the water quality problems of the marine waters in and around the Sound and that phosphorous control did not appear to be an effective management action to reduce hypoxia.

Using the Long Island 208 Study recommended guideline of a maximum nitrogen concentration for Long Island harbors and bays for avoiding dissolved oxygen problems, the two scenarios (refer back to Figure 2.5-2) demonstrate the following important conclusions.

1. Under existing conditions, the recommended 0.4 mg/l guideline is exceeded throughout the entire Bay because of both in-bay and out-of-bay sources of nitrogen.
2. Long Island Sound's effect alone without any in-bay sources would cause the recommended 0.4 mg/l guideline to be exceeded throughout the bay.
3. The in-bay sources only without any influence by Long Island Sound, would cause the recommended 0.4 mg/l guideline to be exceeded in the lower bay (generally south of Leeds Pond) and in the northeastern part of the bay in the area of Thoms Point, the Town Dock and Baxter Estates Beach.

In order to avoid the impacts of the in-bay sources of No. 3 above, the Section 208 Study by the LIRPB in 1978 and, later, the Section 201 Study, Nassau County recommended extended (mid-bay) outfall for the discharges from the three wastewater treatment plants. Unfortunately, under USEPA's policy criteria at the time, this was not considered cost-effective. As a result, the outfalls for the plants were not extended to mid-bay.

Table 2.5-3

IN-BAY SOURCES OF NITROGEN

Source	Load (lbs/day)	% of Total
Dry Weather Streamflow[a]	140	6.0%
Groundwater Underflow[b]	709	30.1%
Surface Water Discharges[c]	237	10.1%
Subtotal	1,086	46.2%
Great Neck Village[d]	221	9.4%
Great Neck S.D.[d]	398	16.9%
Port Washington[d]	574	24.4%
Subtotal	1,193	50.7%
Dry Deposition and Direct Rainfall[e]	71	3.1%
Total	2,350	100%

[a] Long Island 208 Plan; 1978 Tetra-Tech.

[b] Assumes 11 mgd @ 7.73 mg/l TN, NCDPW's 1983 Northwest Nassau County 201 Study.

[c] Special 1998 Sampling Program by D&B/MBPC and Analysis by NCDPW.

[d] June 1998 Discharge Monitoring Reports*: 12-month rolling average[f] of TN.

[e] LISS 1994 Report: LIS 3.0, HydroQual @ 0.69 mg/L TN in rainfall; dry = MB surface area proportioned to total LIS surface area.

[f] The latest month's nitrogen value average together with the nitrogen values from the previous 11 months.

* Discharge Monitoring Reports submitted to USEPA, NYSDEC and ISC monthly by the Village of Great Neck, Great Neck Sewer District and Port Washington Wastewater Treatment Plants are required by their discharge permits.

2.6 NYSDEC's Assessment Report

NYSDEC prepares a biannual list of impaired waterbodies with an assessment as to the causes(s) and the ability to resolve the use impairments. An assessment of Manhasset Bay resulted in the Bay being included on the 1996 Priority Waterbodies List (PWL). The primary use impairment cited by the State for the Bay in the PWL is shellfishing, which is precluded due to high bacterial levels attributed to urban runoff. The bacteria also threatens use of the Bay for bathing. Fishing is cited by the State to also be an impaired use, and priority organics from municipal sources and contaminated sediments are listed as pollutants in the Bay. The NYSDEC's assessment states that "technical, economic and social resources" do not allow for resolution of the impairments.

2.7 In-Bay Discharges

This portion of Section presents a discussion of the point source surface discharge and groundwater discharges to the Bay, while Section 3 presents a discussion of in-bay storm water discharges (considered a nonpoint source for this discussion).

Surface Discharges

There are three municipal wastewater treatment plants which discharge secondary treated effluent directly into the waters of Manhasset Bay. Wastewater flow information for these plants is summarized below.

Plant	Design Capacity (mgd)	Actual Flow (mgd)	Unused Capacity (mgd)
Great Neck Village	1.5	1.0	0.5
Great Neck, SD	3.8	2.8	1.0
Port Washington, SD	4.0	3.2	0.8
TOTAL	9.3	7.0	2.3

mgd = million gallons per day.

Groundwater Discharges

Groundwater elevations in the watershed range from a few feet above sea level (less than 10 feet) along the shoreline and in low lying areas, up to 120 feet above sea level near in Port Washington near the intersection of Port Washington Boulevard and Main Street. In general, the areas with shallow groundwater tend to be in Kings Point, Sands Point, the Plandome areas along or near the shoreline from Leeds Pond to Whitney Pond Park. Most of these areas are fully developed and are outside sewer district boundaries. Sanitary wastes generated here are discharged into cesspools or septic tanks. Additional information on groundwater elevations is provided in Section 2.9.

Shallow groundwater depths can pose significant constraints on the integrity and effectiveness of cesspools and septic systems as acceptable subsurface methods of disposal for sanitary waste. The potential for this problem generally occurs in locations where the depth to groundwater is less than 10 feet, and in soils which exhibit slow percolation rates.

A portion of the groundwater system within the watershed includes the North Hills Special Groundwater Protection Area (SGPA) that was designated as a SGPA in 1992 by the Long Island Regional Planning Board because of its importance for recharging significant quantities of high quality water to the Long Island sole source aquifer system. Approximately half of the 2,900 acre, North Hills SGPA, is in the Manhasset Bay Watershed.

The portion of the SGPA within the watershed is all within the Whitney Pond subwatershed and located primarily in portions of the Villages of Lake Success, North Hills and Munsey Park as well as most of the unincorporated area of Manhasset.

According to the NYSDEC April 1998 annual report on inactive hazardous waste disposal sites in New York State, there is one "Class 2," inactive hazardous waste site located in the watershed area. It is the site of the former Munsey Cleaners located at 1029 Port Washington

Boulevard. A preliminary site assessment (PSA) has been completed and an Interim Remedial Measure (IRM) for soil started in April of 1997.

The IRM consisted of the removal of contaminated soil from the basement of the cleaners, with the remaining soil being remediated by a Soil Vapor Extraction System (SVE). The IRM SVE System operation will be completed this year. Therefore, this site is not expected to impact groundwater resources in the watershed. Besides the formal state hazardous waste classification, there are a number of locations within the 10,000±-acre watershed that may have not been formally classified as hazardous waste but which may have had spills or soils polluted as a result of various industrial or commercial activities.

2.8 Summary of Use Impairments

As a result of the in-Bay point and nonpoint pollutant sources to Manhasset Bay and the influence of Long Island Sound sources, the following use impairments are noted:

- Bathing Restrictions: Due to high total coliform counts, Manorhaven Beach, the only permitted bathing beach on the Bay, has from time to time been closed for swimming, however, because of improvements in bathing water quality, it appears that attainment of acceptable water quality for swimming is possible on a continuous basis.

- Shellfish Bed Closures: Due to high coliform concentrations shellfishing in the Bay has not been permitted by NYSDEC since the 1970s. Because of the strict shellfishing standards, it does not appear to the State that the standard can be met in the near future.

- Fish Survival: For the period 1970 through 1988, there were 14 documented cases of fish kills in the Bay. Most were attributed to low dissolved oxygen conditions. Additional fish kills have occurred through the 1990s of varying degrees with a recent relatively large kill in August-September 1998.

- Fish Bans: A number of fish consumption bans and advisories recommending limits on consumption have been instituted. For instance, the State's 1998-1999 health advisory recommends that because of chlordane, consumption of carp and goldfish from Whitney Lake be limited to one meal per month.

- Siltation: Filling in of portions of mid-bay by the marinas and at the narrow southern end has been noted by many users. In addition, the Manhasset Bay ponds are

experiencing siltation to the point that they no longer provide natural treatment of pollutants and removal of sediment prior to discharging to the Bay.

- Aesthetics: Periodic algae blooms and floatable debris present in the Bay detract from a positive aesthetic experience in viewing the water.
- Nutrient Contribution to Long Island Sound: Point and nonpoint pollutant sources of nitrogen contribute to the overall nitrogen loading to Long Island Sound which has been linked to low dissolved oxygen.

2.9 Summary of Point and Nonpoint Sources

Water quality impacts in Manhasset Bay derive from a combination of pollutant sources which can be divided into in-Bay and out-of-Bay categories. The out-of-Bay source for Manhasset Bay is the Western Long Island Sound.

The in-Bay category of pollutants can be further divided into the following sources:

- wastewater treatment plants
- dry and wet weather stream flow contributions
- direct storm water contributions and overland runoff
- atmospheric
- septic or cesspool loads
- marinas and boating activities
- groundwater underflow to the Bay and seepage along the shoreline

The three wastewater treatment plants that serve the communities located in the Manhasset Bay watershed area are the Port Washington, Great Neck Sewer District and Village of Great Neck facilities. The Port Washington plant discharges into the northeast section of the Bay, while the two Great Neck plants discharge through a common outfall in the southern section of the Bay.

Deposition of nitrogen resulting from direct precipitation to the surface waters of Manhasset Bay is also a source of nitrogen. The total nitrogen concentration in the wetfall is 0.69 mgN/l. Based on the Bay surface area, and an average rainfall of 44 inches per year, the wetfall average nitrogen load is 52 lbs./day. Dryfall nitrogen to the entire Sound (1,862 mi^2) is 8,165 lbs./day. Based on the Bay surface area, dryfall nitrogen to Manhasset Bay is 19 lbs./day for a total nitrogen deposition of 71 lbs./day from the atmospheric source.

The north shore has a groundwater flow from the shallow aquifer with vertical components downward and a horizontal flow component toward the Sound. Toward the coastline, the net flow becomes shallower until it is essentially horizontal until it discharges to streams or the Bay itself. The groundwater flow into the bays can constitute a significant source of nitrogen depending upon the relative magnitude of other in Bay sources. The nitrogen load from this source has been estimated to be 709 lbs./day.

The importance of the groundwater source of nitrogen to surface waters has been re-iterated in the draft Nassau County 1998 Groundwater Study. The report concludes that unsewered residential areas with home densities greater than two to four dwelling units per acre that rely on on-site wastewater disposal systems have a significant effect on local groundwater quality. Groundwater in portions of unsewered communities on the north shore currently exceeds drinking water standards for nitrate in the Upper Glacial aquifer and upper portions of the Magothy aquifer. The groundwater from these portions of the aquifers discharges to the bays and does not reach the deeper aquifers used for public water supply purposes.

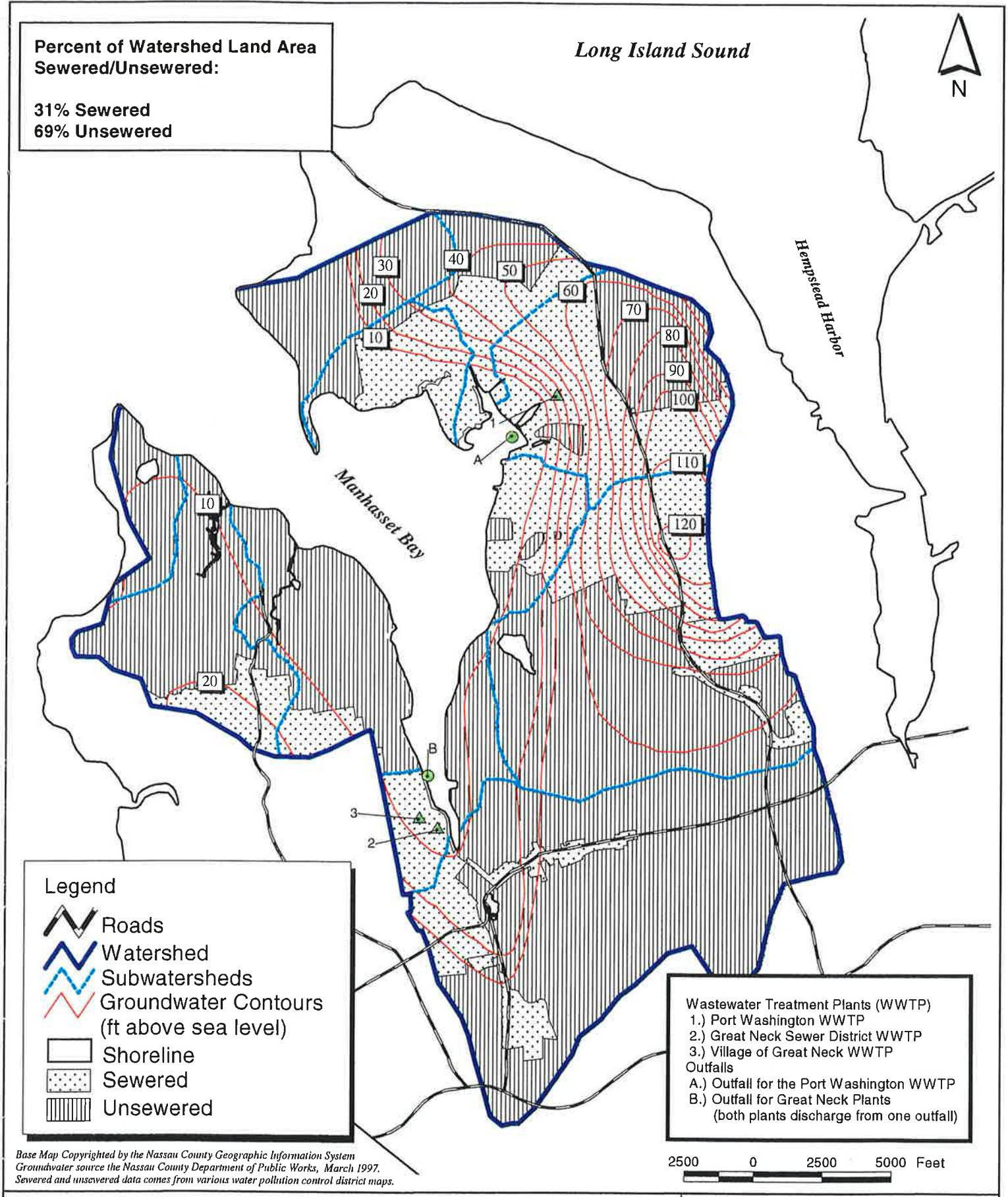
An additional potential nonpoint source of pollutant loading to Manhasset Bay and the Manhasset Bay watershed waterways is on-site wastewater disposal systems. The impact of on-site disposal systems, when it occurs, is primarily associated with the influx of nutrients and bacteria. Septic systems and cesspools are the two types of on-site wastewater treatment most frequently used on Long Island. Sewered and unsewered areas in the Manhasset Bay watershed are shown on Figure 2.9-1 which shows that approximately 70% of the watershed which is not sewered, and is served by cesspools or septic systems while approximately 30% of the watershed's land area is served by sanitary sewers.

Although the installation of new cesspools without a septic tank is no longer permitted in Nassau and Suffolk Counties, many cesspools installed prior to the changes in County Health Department requirements remain as the sole means of waste treatment for residences located in unsewered areas through the Manhasset Bay watershed. Some of the cesspools, primarily those installed prior to 1962, may not function properly due to saturated, clogged or poor soils, fluctuating or rising high water tables, and improper or routine maintenance without a pump-out. If they are functioning properly, its a matter of functioning hydraulically as opposed to providing treatment. This problem may be common along the Bay's shoreline areas and surrounding the various ponds and streams in the watershed, where on-site systems may contribute to surface water contamination.

Another potential source of pollution in terms of coliform, nitrogen and possible floatables are the boats in the marinas around the Bay or at the numerous private moorings. While it is difficult to definitively establish whether there are sanitary discharges from these boats in Manhasset Bay, generally there has been a belief by some that some degree of unallowed discharges takes place. One potential source of pollution could be the boats (dozen or so) that are used as houseboats. However, there is not currently a database from which to draw actual conclusions as to whether there is a problem. As seen on Table 2.9-1, in order to facilitate proper disposal of waste and ensure proper pollution prevention measures, some marinas and/or yacht clubs have pumpouts, dump stations.

The Town and the County have various enforcement powers that can be used to prevent pollution by marinas and boats and the State has boat registration requirements. A related concern with boats and this impact on the Bay directly and indirectly in the form of visual impact is the abandonment of boats in the water or along the shoreline.

The Town has in place Local Law 69 that addresses in part the potential of pollution from boats and marinas. In addition, it has bay constables for enforcing the law and other water-related matters. The key provisions of the law are:



Base Map Copyrighted by the Nassau County Geographic Information System
Groundwater source the Nassau County Department of Public Works, March 1997.
Sewered and unsewered data comes from various water pollution control district maps.

Manhasset Bay - Map

Groundwater Contours & Sewered/Unsewered

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Figure 2.9-1

Table 2.9-1

VARIOUS ACTIVITIES AT MARINAS AND YACHT CLUBS IN THE MANHASSET BAY WATERSHED

Name/Location	Pump Out	Dump Station	Fuel	Repairs	Storm Water Permit*
Capri Marina East - Manorhaven	Yes	No	G/D	Yes	Yes
Capri Marina West - Manorhaven	Yes	No	G/D	Yes	Yes
Capri Marina at Inspiration Warf - Port Washington	Yes (A)	No	No	Yes	No
W&W Marine White's Marina - Port Washington	No	No	No	Yes	Yes
Toms Point Marina - Port Washington	Yes	No	No	Yes	No
Haven Marina, Inc. - Port Washington	Yes	No	No	Yes	No
Manhasset Bay Marina - Port Washington	Yes	No	G	Yes	Yes
North Hempstead Town Dock - Port Washington	Yes	No	No	No	No
North Hempstead Manorhaven Park Manorhaven	Yes**	No	No	No	No
North Shore Yacht Club - Port Washington	No	No	No	No	No
Knickerbocker Yacht Club - Port Washington	No	No	No	No	No
Louie's Shore Restaurant - Port Washington	No	No	No	No	No
Sigsbee at North Bay - Port Washington	Yes	No	No	No	No
Port Washington Yacht Club - Port Washington	No	No	No	No	No
Kennilworth Yacht Club - Kings Point	No	No	No	No	No
Broadlawn Harbor Yacht Club - Kings Point	No	No	No	No	No
Grace Harbor Yacht Club - Kings Point	No	No	No	No	No
Shelter Harbor Marina/Yacht Club - Kings Point	No	No	No	No	No
Kings Point House	No	No	No	No	No

A - Mobil pumpout can be used in a boat or on land
G = gasoline, D = diesel
*Notice of Intent filed for USEPA Phase I Storm Water Permit and Pollution Prevention Plan
**Use of mobile pumpout trailer available

- No person, whether engaged in commerce or otherwise, shall place or throw, deposit or discharge, or cause to be placed, thrown, deposited or discharged into the waters subject to the jurisdiction of the Town, from any vessel, marina or mooring, any sewage or other liquid or solid materials which render the water slightly, noxious of otherwise unwholesome so as to be detrimental to the public health or welfare or to the enjoyment of the water for recreational purposes.

- No person, whether engaged in commerce or otherwise, shall place, throw, deposit or discharge or cause to be placed, thrown, deposited or discharged into the waters subject to the jurisdiction of the Town any litter from any vessel, marina or mooring.

The penalty for violating this law is a fine not to exceed two hundred fifty dollars ($250) or imprisonment for such a period not to exceed 15 days, or both such fine and imprisonment.

The Town has a harbor patrol that includes four bay constables who cover the bay from 10 a.m. to 10 p.m. during the boating season. They are authorized to issue and serve appearance tickets. In addition, the Marine Division of the Nassau County Police Department has the authority to issue and serve appearance tickets. However, the County's Marine Patrol Boat is not docked in Manhasset Bay, rather it is docked in Hempstead Harbor, and the boat is only in Manhasset Bay on a part-time basis. If the marine police are responding to an emergency at Hempstead Harbor, the only coverage on the Bay is by the bay constables.

Boat registration is required by New York State for any boat that has a gas or diesel engine. A boat must be registered with the New York State Department of Motor Vehicles (DMV), the same procedure as in auto registration. The DMV issues a registration, letters and numbers which must be affixed to the front (bow) of the boat. The registration numbers appear on the right and left side of the bow of the vessel. The registration is usually carried by the captain (owner) of the boat.

When boats are at the end of their useful life, they can be disassembled into small pieces and hauled away by the local garbage contractor. Unfortunately, the owner may believe that the boat has no value left in it and, therefore, abandons it at the marine yard because the cost to the owner for winter storage at a marina is higher than the value of the boat. The marina has to

obtain a mechanic's lien to allow the owner of the marina to remove the abandoned boat. When the marina gets the lien approved, they disassemble the boat and dump the pieces of boat into a dumpster. Currently, there are no boat recycling or junk yards for disposal of old boats in the area. In other cases, boats are merely abandoned in the water or on the shoreline, with no method of identifying the owner.

The Town of North Hempstead has a Local Law 69-19 which prohibits the abandonment of vessels. Under this law, no person can cause a boat or vessel to become an abandoned vessel within the waterways of the Town. The penalty for this offense is a fine not to exceed two hundred fifty dollars ($250) and/or imprisonment for a period not to exceed 15 days.

While the 1994 LISS concluded that vessel discharges do not contribute a major percentage of coliform/bacteria to Long Island Sound, it stated that these discharges could cause localized water quality problems, particularly if the discharges occur in the vicinity of shellfish beds or bathing beaches. Accordingly, the LISS recommended:

- creating vessel "no discharge" zone by the State in specific embayments and harbors after ensuring the sufficient availability of pumpout stations and treatment facilities;
- development and implementation of best management practices at marinas; and
- increasing the number of marine pumpout facilities.

The federal Clean Water Act requires all boats with an installed head (toilet) to have one of three types of Coast Guard approved Marine Sanitation Device (MSD) attached to the toilet. These are described below:

- A type I MSD is a flow-through device where sewage is filtered through a treatment system and discharged;
- A Type II MSD is similar to a Type I but is required to produce an effluent with lower fecal coliform bacteria counts and suspended solids;
- A Type III MSD (holding tank) is any equipment or installation on board a vessel that is specifically designed to receive, retain, and discharge sewage.

If a boat has a Type I MSD or Type II MSD, it should not discharge it while in confined, shallow waters, marinas, shellfish beds, or swimming areas. It should be used only away from shore in open, deep waters with strong currents that help disperse the treated waste. Shore side facilities should be used whenever possible.

In a Type III MSD, the waste is not treated, even if odor reducing chemicals are added. It is illegal to discharge or empty the contents of a boat's holding tank in Long Island Sound or coastal bays such as Manhasset Bay, or in the ocean within three miles of shore. Type III MSDs must be emptied at pumpout facilities.

Section 3

3.0 STORM WATER AND SEDIMENT DISCHARGES

3.1 Overview of Storm Sewer Systems

Function of a Storm Sewer

Storm sewers control flooding by transporting storm water runoff directly to surface waters such as brooks, creeks, streams, ponds and portions of the Bay. In most areas of the Manhasset Bay watershed, storm sewers receive runoff from local streets and major roadways, lawns, gutters, parking lots, roof drains, drainage pumps, sidewalks, plazas and other areas.

Flooding is a concern in local streets and major roads in many low lying areas of the watershed. This is particularly true in those portions of the watershed that have extensive paving and other impervious surfaces. In these areas, storm sewers are also needed to prevent street and basement flooding which could result in accidents and property damage as well as cause cars to stall, close roads, and other inconveniences.

Design and Construction

Storm sewers are located throughout most of the Manhasset Bay watershed, and vary in size from 12 to 90 inches in diameter. The design of storm sewers are usually based on the specifications of the owner. For instance, Nassau County has its own specifications which are updated every few years. In general, the municipalities that own their own storm sewers either use the County's specifications or have their own.

Regardless of the detailed specifications governing specific design, storm sewers typically have a series of manholes for access, and receive storm water from smaller lines which receive flow from basins that collect and divert the water into the sewer. These basins are generally referred to as catch basins, although they are not always designed to catch and hold solids and other materials that are carried with the storm water. In some cases the catch basins have hoods that prevent or reduce the discharge of solid materials. Naturally, hoods are desirable

because they trap solids and floatables. However, hoods require periodic clean-out to prevent clogging with debris. Clogging can limit their ability to convey runoff. In most cases, storm sewers are installed along the center of the street, while catch basins are generally installed at the edge of roadway curbs. Catch basins frequently have chambers that are partially under the sidewalk, with a manhole cover in the sidewalk for access, or for removal of sediments and other materials. In most cases, storm sewers are constructed of reinforced concrete.

Catch basins, often located at street corners at intersections, are typically designed to trap sediments and other materials. The discharge pipe from the basin is higher than the flow into the basin. This allows the materials suspended in the storm water to be removed, rather than being carried out to the receiving waters. However, this design results in the catch basin having standing water and being filled with sediment, litter, and other debris. This can cause odor and insect problems, and frequently allows bacteria contained in the materials to multiply.

Catch basins that do not trap materials, and which remain relatively dry, result in the materials being discharged directly to streams, ponds or directly to the Bay during periods of runoff. In these cases, the correct measure is to retrofit the basin to allow for the trapping with a routine clean-out program.

Areas Served by Storm Sewers

The majority of the runoff in the watershed is collected by storm sewers that are owned by the County, the Town or a particular village. Although most storm sewers and catch basins are owned and maintained by the Town or Village, The County owns and maintains most of the outfalls, particularly the larger ones, and those that discharge directly to the Bay.

Various areas around the watershed are sewed by separate municipal storm sewer systems. This includes approximately 230 outfalls that discharge to creeks, brooks and ponds as well as the Bay itself. These outfalls, as large as 90 inches in diameter or more, are located in most of the watershed communities including:

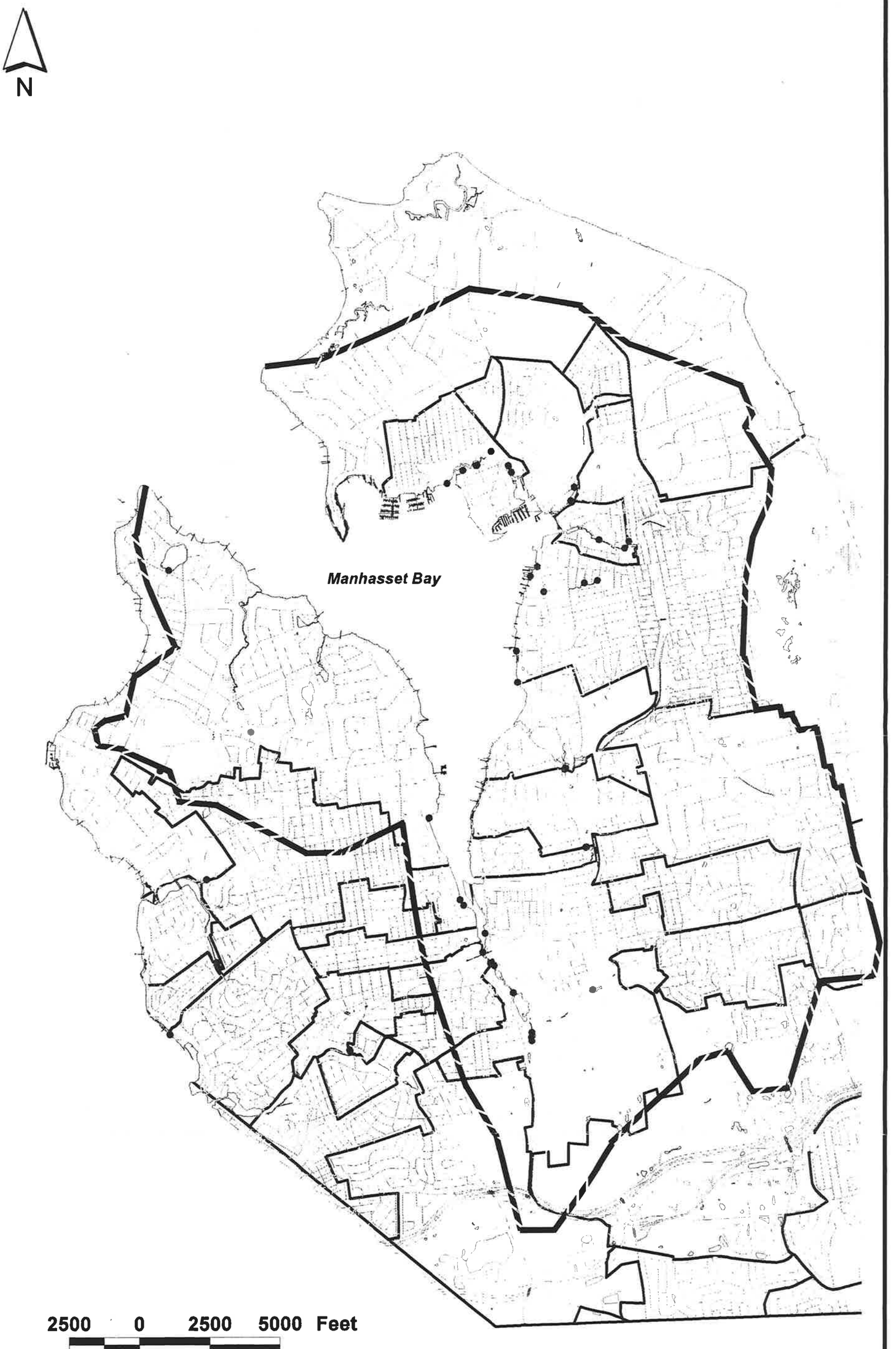
- Sands Point
- Manorhaven
- Port Washington North
- Baxter Estates
- Port Washington (unicorporated)
- Plandome Manor
- Plandome
- Plandome Heights
- Manhasset (unincorporated)
- Thomaston
- Kensington
- Great Neck

Of the approximately 230 outfalls, 39 are greater than 36 inches in diameter (see Figure 3.1-1 and Table 3.1-1). Of these, 10 discharge directly to the bay, 5 discharge to one of the ponds surrounding the bay and the remaining 19 discharge to various creeks or brooks around the bay. Unfortunately, accurate or complete maps of the drainage areas for all of the 39 outfalls are not available.

3.2 Flows to Storm Sewers

Wet-Weather Sources

The most common, and often the largest source of wet-weather flow, is runoff generated by rainfall and snowfall. The majority of this runoff is from impervious surfaces, and is directed to catch basins by drains or laterals that receive runoff from roofs, parking lots, basements, exterior stairways, roadside channels and ditches, retaining walls, parks, lawns, patios, shopping and pedestrian plazas and sidewalks. The catch basins are connected to the storm sewer system for subsequent discharge to a retention or detention structure, or directly to a receiving water body, such as a stream, a pond or the Bay itself.



Storm Water Outfalls Greater Than 36" In The Manhasset Bay Watershed

Dvirka and Bartilucci CONSULTING ENGINEERS

Figure No. 3.1-1

- FINAL -

TABLE 3.1-1

MANHASSET BAY WATERSHED
STORM WATER OUTFALLS GREATER THAN 36-INCHES

No.	NCDPW Outfall No.	Location	Type Board	Size (inches)	Area (acres)
1.	07E0002	Cove on W/Thoms Pt., at E end of cove	R	48	12.57
2.	07E0003	Cove on W/Thoms Pt., N end Sintsink Dr. W	S	36	1.50
3.	07E0004	Cove on W/Thoms Pt., N end Sagamore Hill Dr.	S	48	2.00
4.	07E0005	Cove on W/Thoms Pt., N end Sagamore Hill Dr.	S	48	2.00
5.	07E0014	Cove on E/Thoms Pt., N end Stream 300'S/Pequot Ave.	R	54	15.90
6.	07E0016	Cove on E/Thoms Pt., W end Seaview La.	R	48	12.57
7.	08C0002	Kings Point Pond, SE end, 100'N/Tulip La.	R	48	12.57
8.	08E0003	E/S Manorhaven Beach Park 450'/W Pequot Ave.	R	42	9.62
9.	08F0001	S/Stannards Brook Drain, at North Plandome Rd.	R	36	1.07
10.	08F0009	N/S Stannards Brook, at S. end Adams St.	S	48	2.00
11.	08F0014	Stannards Brook, Start of Flow, 400'E/Van Buren St.	R	36	7.07
12.	08F0015	E/S Manhasset Bay, at W. end Second Ave.	R	48	12.57
13.	08F0016	E/S Manhasset Bay, at W. end Prospect St.	R	36	7.07
14.	08F0022	N/S Baxter's Brook, at Woodcleft Ave.	S	48	2.00
15.	08F0029	S/S Baxter's Brook, at W. end Mullon Ave.	S	36	1.50
16.	08F0031	Baxter's Brook, Start of Flow, 50'W/S. end Hillview Ave.	R	48	12.57
17.	08F0038	S/S Mill Pond, (Pt. Wash.) 150'S/Sandy Hollow Rd.	R	42	9.62
18.	08F0039	NE corner Mill Pond, (Pt. Wash)	R	36	7.07
19.	09C0011	Mitchells Creek E Br., end Bancrof La.	R	36	7.07
20.	09E0007	E/S Manhasset Bay, at W end	S	36	1.50
21.	09E0008	E/S Manhasset Bay, at W end Beachway	R	48	12.57
22.	10C0002	Mitchells Creek W Br., Center Fork, Start of Flow, 650'N/Elm Pt. R.	R	36	7.07
23.	10E0006	W/s Manhasset Bay, 500'S of 90 deg. bend in E. Shore Rd.	R	42	9.62

TABLE 3.1-1 (continued)

MANHASSET BAY WATERSHED
STORM WATER OUTFALLS GREATER THAN 36-INCHES

No.	NCDPW Outfall No.	Location	Type Board	Size (inches)	Area (acres)
24.	10F0001	Flower Hill Drain, S. BR., Start of Flow, at Bournedale Rd. N.	R	54	15.90
25.	10F0002	Flower Hill Drain, S Br., Start of Flow at Bournedale Rd. N.	R	54	15.90
26.	10F0012	S end Leed's Pond at Stonytown Rd.	S	54	2.25
27.	10F0013	S end Leed's Pond at Stonytown Rd.	R	90	44.18
28.	10F0014	S end Leed's Pond at Stonytown Rd.	R	90	44.18
29.	11E0005	W/s Manhasset Bay, 100'S/Wooley La.	BC	48	12.00
30.	11E0007	W/s Manhasset Bay, 250'S/Wooley La.	R	36	7.07
31.	11E0014	W/s Manhasset Bay, 50"N/LIRR	CM	36	7.07
32.	11E0018	W/s Manhasset Bay, at Bay Blvd.	R	36	7.07
33.	11E0027	E/s Manhasset Valley park, at N. Hempstead Tnpk	R	42	9.62
34.	11E0029	E/s Manhasset Valley park, 200's/Bay Blvd.	R	36	7.07
35.	11E0033	E/s Manhasset Bay, 100'S/Manhasset Ave.	R	36	7.07
36.	11F0009	Manhasset Drain, N. Br., at Private rd. at end Brinkerhoff La.	S-CB	48	4.00
37.	12F0001	W/S Manhasset Drain, S. Br., at Spring St.	R	72	28.27
38.	12F0003	W/S Manhasset Drain, S. Br., 100'N/Spring St.	R	72	28.27
39.	12F0004	W/S Manhasset Drain, S. Br., 250'N/Spring St.	R	72	28.27

Type: R = Reinforced Concrete Pipe
S = Sluiceway
BC = Box Culvert
C = Culvert

Source: Nassau County Department of Public Works, 1998

Dry-Weather Sources

Dry-weather flow occurs during dry weather in the form of delayed drainage that was started by the storm event. One common example of a dry-weather flow is basement drainage. This drainage occurs when sump pumps remove groundwater around building foundations. Frequently the pumping or drainage of groundwater around a building or other structure, may need to continue for a number of days or weeks after rain has stopped. Sometimes it is seasonal or continuous.

A second common example of dry-weather flow is from drains in or below retaining walls. These drains release water in saturated soils behind the wall in order to remove the pressure on the wall so that it does not topple. A third example of dry weather flow is groundwater seepage into structures below the groundwater level which are not perfectly tight. This could include storm sewers and manholes that are below the level of groundwater in the surrounding area. This third type also includes groundwater seepage into the Bay bottom and is also referred to as groundwater underflow.

Besides dry weather flow induced by previous precipitation, storm sewers receive a fourth type of dry weather flow. This includes nonstorm water discharges from:

- Water line flushing
- Diverted stream flows
- Rising groundwaters
- Groundwater infiltration
- Discharges from potable water sources
- Foundation drains
- Water from crawl space pumps
- Footing drains

- Lawn watering
- Flows from riparian habitats and wetlands
- Dechlorinated swimming pool water dischargers
- Street wash waters related to cleaning and maintenance

Storm sewers also receive dry weather flow and other materials from illicit discharges. Some examples of illicit discharges to storm sewers are: radiator flushing on sidewalks, driveways or streets, improper motor oil disposal in street gutters or directly into catch basins, throwing litter and garbage in the gutter or a catch basin, roadway accidents that result in fuel spills or spills of truck contents, washing of ready-mix concrete trucks, over-turned trash cans that spill their contents including various household liquids into the street, and disposal of household hazardous substances such as solvents, cleaning fluids, paints, empty or partially empty containers that still contain dangerous chemicals or liquids and illicit connections to storm sewers from sanitary or industrial discharges.

Proposed USEPA Storm Water Regulations Affecting Small Communities

With the Congressional adoption in 1987 of the amendments to the Clean Water Act of 1972, the federal government entered directly into the control of storm water runoff. Following the results of a series of 26 national urban runoff pilot projects conducted earlier in the 1980's (two of which had been in New York, the Long Island and the Irondequoit studies), the amendments laid the ground work for a permitting system for storm water runoff that would be similar to the permits for point sources (cf. NYS SPDES Permits).

Under EPA's two-phase storm water permitting program for municipal storm sewer systems, municipal storm water discharges (Phase I communities over 100,000 people and Phase II for those under 100,000) covered by a federal discharge permit program must develop a storm water pollution prevention program with measures that, among other things, identify, detect and prevent illicit discharges to the storm sewer. The measures could also include

anti-litter programs, educational programs, street sweeping, recycling programs, special garbage pick-ups for hazardous wastes and inspection programs. In addition, any direct connections from sanitary or industrial discharges would have to be eliminated.

Phase I of the Federal Storm Water Regulation process called for the establishment by 1992 and 1993 of a SPDES type permitting system for five different types of discharger, presumably the most flagrant or the easiest to detect. The five types were:

1) discharges for sites with a NPDES (National Pollution Discharge Elimination System) or SPDES permit;

2) discharges from sites engaging in one of eleven different types of industrial activity (e.g., mining and oil and gas operations, hazardous waste disposal facilities, etc.);

3) large Municipal Separate Storm Sewer Systems (MS4) serving areas of greater than 250,000 persons;

4) medium MS4s serving between 100,000 and 250,000 people; and

5) any other storm water discharge that would constitute or contribute to a water quality violation.

USEPA Phase II Storm Water Regulations

The communities around the Bay (villages, unincorporated areas of the Town and the County) are all covered by Phase II of the EPA regulations. The requirements under this coverage are briefly described below.

The proposed rule for the regulations for Phase II of the storm water regulation process was published in January 1998. Having undergone a public review that included public hearings and a comment period in the spring of 1998, it was expected that the regulations would come into effective in March 1999. Following this, the states would have had one year in which to modify their SPDES procedures, if changes are needed.

By March 2001 the states were to have prepared a menu of guidelines for best management practices (BMPs) for small MS4s (those less than 100,000 in population). By May 2002 the small MS4s and other covered sources (including construction activities on sites greater than one acre) would have to submit their permit applications to their states, and once permitted, they would have five years in which to phase in the implementation of their storm water programs.

As of March 1999 the final regulations have not been issued and indications are that they will be issued 6 months later (i.e., October 1999) and that all the deadlines specified in the January 1998 regulations will be pushed back six months. Accordingly, the new target dates are as follows:

Event	Target Date
Phase II Rule Becomes Final	October 1999
States Modify SPDES Program - if Changes Needed	October 2000
States Issue Menu of BMP's for Small MS4s	October 2001
States Issue General Permits	October 2002
Small MS4s Submit General permit Applications	November 2002
Small MS4s Program Fully Developed and Implemented	2007

What is not widely recognized is the number of small municipal separate storm sewer systems (with less than 100,000 population). Automatically included in the storm water regulations definitions are 3,500: urbanized or incorporated areas and urban counties designated by the U.S. Census Bureau. All of the villages in the Manhasset Bay watershed are considered covered as well as the unincorporated area of the Town within the watershed since it is included within the designation of Nassau County on the list.

There are six minimum measures that are proposed to be mandatory in the programs of all MS4s. These are:

- a public education and outreach program on the nature and effects of storm water impacts;
- a process of public involvement and participation in the preparation of the management program;
- a procedure for the detection and elimination of illicit discharges;
- a program for the control of storm water runoff from construction sites greater than one acre;
- a program for post-construction storm water management in areas of new development, or of redevelopment; and
- continued pollution prevention and good housekeeping practices for municipal operations in the affected community.

3.3 Characteristics of Storm Sewer Discharges

Water Quality Impacts

Storm sewer discharges in most urban areas have been found to contain a host of pollutants that are part of the precipitation itself (acid rain or snow), atmospheric deposition, or result from the rain or snow coming into contact with roofs, sidewalks, streets, parking lots, and other areas. These pollutants and parameters can be part of runoff during wet-weather periods, or dry-weather discharges after the precipitation event. In addition, some pollutants and parameters can also be found in the other dry-weather discharges described earlier and which are not related to precipitation.

Typical pollutants found in runoff in urban areas originate on lawns, sidewalks, construction sites, atmospheric fallout, streets and parking lots, and can include suspended solids, bacteria, nitrogen, phosphorus, heavy metals and a variety of organic compounds such as polychlorinated biphenyls, petroleum hydrocarbons, and polyaromatic hydrocarbons. Based on historical and recent water quality assessment reports, NYSDEC has concluded that storm

sewers cause impairments to many of the State's rivers, lakes, bays and estuaries, including Manhasset Bay. Table 3.3-1 presents a list of pollutants of concern from various sources in urban areas. Table 3.3-2 presents a summary of possible sources and potential effects of urban runoff.

Bacteria in Storm Water

Pathogenic or disease-causing bacteria are ubiquitous in nature and are normally associated with human and animal wastes. In many cases where human pollution is suspected on the basis of coliform test results, the actual pollution source may, in fact, be caused by animal wastes generated in the watershed's ponds, streams, streets and yards. Storm water discharges throughout the watershed typically contain these bacteria. Based on numerous studies throughout the country and on Long Island over the last 15 to 20 years, it is not uncommon to find total coliform, fecal coliform and fecal streptococci in storm water runoff at very high concentrations, from hundreds of thousands to over a 100 million colonies per 100 ml (USEPA, 1992).

For example, storm water samples collected in Huntington and Plainview, Long Island, as part of the 1983 Long Island National Urban Runoff Program (NURP) revealed the range of bacterial levels in storm water discharge as follows:

Bacteria	Huntington	Plainview
Total Coliforms	2,400 to 1,100,000 per 100 ml	240 to 1,100,000 per 100 ml
Fecal Coliforms	6 to 240,000 per 100 ml	43 to 43,000 per 100 ml
Fecal Streptococcus	2,400 to 1,100,000 per 100 ml	150 to 2,400,000 per 100 ml

The 1983 Long Island NURP reported that although rainwater itself contains very few bacteria before it reaches the ground, most of the total coliform found in storm water come from the soil, and fecal coliform and fecal streptococci come from warm blooded animals. Typically, in an urban area like Manhasset Bay's watershed, coliform originate from animal sources such as dogs, cats, pigeons, ducks, geese, seagulls, squirrels and raccoons. These number reveal that the magnitude of the bacterial contribution from animals cannot be underestimated.

Table 3.3-1

SOURCES OF URBAN RUNOFF POLLUTANTS

Source	Pollutant of Concern
Erosion	Sediment and attached soil nutrients, organic matter, and other adsorbed pollutants.
Atmospheric Deposition	Hydrocarbons emitted from automobiles, dust, aromatic hydrocarbons, metals and other chemicals released from industrial and commercial activities.
Construction Materials	Metals from flashing and shingles, gutters and downspouts, galvanized pipes and metal plating, paint, and wood preservatives.
Manufactured Products	Heavy metals; halogenated aliphatics; phthalate esthers; PAHs; other volatiles; phenols and oil from automobile use, zinc and cadmium from tire wear, and pesticides and phenols from other uses including industrial.
Landscape Maintenance	Fertilizer and pesticides. Generally as impervious area increases, nutrients build up on surfaces and runoff transport capacities also rise resulting in high loads. Exceptions include intensively landscaped areas (e.g., golf courses, cemeteries).
Plants and Animals	Plant debris, animal excrement.
Septic Tanks	Coliform bacteria, nitrogen/NO_3
Non-Storm Water Connections	Inadvertent or deliberate discharges of sanitary sewage and industrial wastewater to storm drainage systems, including illicit connections, leaking sanitary collection systems, spills, industrial and commercial activities, construction activities, infiltration or contaminated groundwater, and improper disposal.
Accidental Spills	Pollutants or concern depend on the nature of the spill.

Source: USEPA, 1992.

Table 3.3-2

SUMMARY OF POSSIBLE SOURCES AND POTENTIAL EFFECTS OF RUNOFF POLLUTANTS

Category	Parameters	Possible Sources	Effects
Sediments	Organic and Inorganic Total Suspended Solids (TSS) Turbidity Dissolved Solids	Construction sites Urban/agricultural runoff CSOs Landfills, septic fields	Turbidity Habitat alteration Recreational and aesthetic loss Contaminant transport Navigation/hydrology Bank erosion
Nutrients	Nitrate Nitrite Ammonia Organic Nitrogen Phosphate Total Phosphorus	Urban/agricultural runoff Landfills, septic fields Atmospheric deposition Erosion	Surface waters Algal blooms Ammonia toxicity Groundwater Nitrate toxicity
Pathogens	Total Coliforms Fecal Coliforms Fecal Streptococci Viruses E. Coli Enterococcus	Urban/agricultural runoff Septic systems Illicit sanitary connections CSOs Boat discharges Domestic/wild animals	Ear/intestinal infections Shellfish bed closure Recreational/aesthetic loss
Organic Enrichment	Biochemical Oxygen Demand (BOD) Chemical Oxygen Demand (COD) Total Organic Carbon (TOC) Dissolved Oxygen	Urban/agricultural runoff CSOs Landfills, septic systems	Dissolved oxygen depletion Odors Fish Kills
Toxic Pollutants	Toxic Trace Metals Toxic Organics	Urban/agricultural runoff Pesticides/herbicides Underground storage tanks Hazardous waste sites Landfills Illegal oil disposal Industrial discharges	Bioaccumulation in food chain organisms and potential toxicity to humans and other organisms
Salts	Sodium Chloride	Urban runoff Snowmelt	Vehicular corrosion Contamination of drinking water Harmful to salt-intolerant plants

Source: USEPA, 1993

In the Manhasset Bay watershed as well as the rest of Long Island, there has been a dramatic increase in ducks and geese along the shoreline and ponds. In fact, the literature shows that ducks discharge, on a daily basis, over five times the fecal coliform that a human does. Thus, if Whitney Lake, Whitney Pond, Baxter Pond, Mill Pond, Leeds Pond and Kings Point Pond each had 100 geese for a total of 600, this would be equivalent to the discharge of the direct bacterial load from 3,000 persons to these water bodies, which then act as incubators, further multiplying the actual bacterial load to the Bay.

Nutrients

Storm water runoff and discharges to the Bay from groundwater underflow, dry and wet weather discharges, as well as the three wastewater treatment plants, all contain nutrients. Total nitrogen is a particular concern because of the focus and recommendations of the Long Island Sound Study. These nutrients originate from human waste discharged to wastewater treatment facilities and into cesspools or septic systems, particularly in areas of high groundwater around the bay or near ponds and streams. Fertilizers and organic materials such as leaves, grass clippings and other yard waste are also nutrient sources.

Based on a special sampling program conducted July through September 1998 at eight locations in the watershed, the total nitrogen loading discharged to the Bay from nonpoint source discharges that originates in one form or another (under dry or wet conditions) from storm water runoff has been estimated to be approximately 237 lbs/day. The sample locations were: Mill Pond, Baxter Pond, Stannards Brook, Beachway Storm Drain, Leeds Pond, Whitney Pond, Mitchell's Creek and Kings Point Pond.

Based on the results of the special sampling, Table 3.3-3 presents a breakdown of the estimated 237 lbs/day of nitrogen loads from the 12 subwatersheds together with estimates of annual average flow rates from each subwatershed. Table 3.3-3 contains footnotes that indicate how the data from the eight sampling locations was used to estimate the loadings for the 12 sub-watersheds. Data tables for each of the sample locations are provided in Appendix C.

Table 3.3-3

MANHASSET BAY

ESTIMATED NITROGEN LOADS FROM INDIVIDUAL SUBWATERSHEDS BASED ON ACTUAL FIELD SAMPLING AT LOCATIONS THROUGHOUT THE WATERSHED DURING JULY – SEPTEMBER 1998

ID #	Subwatershed	Flow (acre in./yr.)	Flow (cu. ft./sec)	Flow (MGD)	Total Nitrogen (mg/l)	Total (lbs/day)
01	Barkers Point	6,150	0.71	0.46	2.87 (a)	10.94
02	Toms & Plum Points	5,250	0.60	0.39	2.87 (a)	9.34
03	Sheets Creek	6,698	0.77	0.50	2.87 (a)	11.91
04	Baxter & Mill Pond	17,208	1.98	1.28	2.87 (a)	30.60
05	Eastern Shore	6,157	0.71	0.46	3.95 (b)	15.07
06	Leeds Pond	32,278	3.72	2.40	2.70	54.00
07	South Eastern Shore	4,057	0.47	0.30	3.95 (b)	9.92
08	Whitney Pond	35,805	4.12	2.66	2.66	59.02
09	South Western Shore	2,863	0.33	0.21	3.95 (b)	7.01
10	Kings Point Creek	9,995	1.15	0.74	1.54 (c)	9.54
11	Mitchells Creek	9,705	1.12	0.72	1.54	9.26
12	Kings Point Pond	2,616	0.30	0.19	6.59	10.68
	Avg.	---	---	---	**3.20**	---
	Total	**138,782** (d)	**15.98**	**10.32**		**237.29**

Notes:

(a) value is the average of concentrations measured at Baxter Pond and Mill Pond
(b) value is the average concentration measured at Stannards Brook and Beachway Drain
(c) value is the average concentration measured at Mitchells Creek
(d) approximately 63% of surface water flow is discharged to the Bay through ponds, and approximately 37% is discharged directly to the Bay through storm water outfalls

Sediments and Other Debris

Sediments and other debris such as litter and floatables carried by storm water typically originate from construction sites; eroding road banks without curbs; sloped lawns and yards; eroded stream banks; damaged or eroded driveways, parking lots, walks and sidewalks; and roadway sanding for ice and snow.

In essence urban runoff is rainfall washing an urban area. Therefore, whatever materials or substances are on impervious and pervious lands, roof or parking surfaces, or which have been deposited into a street gutter or directly into a catch basin or drop inlet, will be carried to the storm sewer discharge. Examples of these items could include organic materials such discarded food, animal droppings, garbage, eroded soils, leaves, branches and twigs.

Organic materials are trapped or retained in the catch basin, frequently in standing water. These materials tend to discolor the standing water and decompose and, at times, produce odors. This is particularly noticeable when catch basin contents are disturbed or washed out during a storm or by dry weather flows. In some cases, the odors could be similar to sanitary waste odors, since the nature of the materials is similar.

Sediments and associated debris from an urban area have been identified to cause a number of environmental and water quality problems such as:

- Increased turbidity
- Reduced light penetration
- Reduced prey capture for sight feeding predators
- Clogging of gills/filters of fish and aquatic invertebrates
- Reduced spawning and juvenile fish survival
- Reduced success of finfishing

- Smothering of benthic (bay bottom) biological communities
- Changes in the composition of bottom substrate
- More rapid filling of small impoundment (or caves and bays) which create the need for costly dredging
- Reduction in aesthetic values

Frequently, in areas that are undergoing extensive development (as did the watershed from the 1950s through the 1970s), the greatest sediment loads originate from construction runoff. In these cases soils are disturbed, or at other developed sites where the runoff volumes and/or velocities are of sufficient magnitude to erode shorelines, stream banks and unpaved area such as lawns and gardens.

3.4 Areas in the Watershed Impacted by Storm Water Runoff

Many areas of Manhasset Bay and its ponds and creeks are affected by the coliform, nitrogen and sediments carried by storm water runoff generated in the watershed. Table 3.4-1 presents areas in the Bay and its surrounding ponds and creeks that are affected by runoff related pollutants. In addition, because storm water runoff is the vehicle that delivers pollutants to the Bay, Table 3.4-2 presents a "textbook" pollutant loading analysis for the entire watershed by subwatershed under existing conditions that reflect approximately 90 percent of the watershed developed.

Assuming that the vacant undeveloped land watershed is built out, Table 3.4-3 presents a corresponding loading analysis for that condition, while Table 3.4-4 presents the changes by subwatershed by pollutant as a result of theoretical build out. While these tables serve some benefit in this planning process, with respect to nitrogen and coliform, the actual field observations referred to in Section #3.3 for nitrogen, and various subsections in Section 2 for coliform and nitrogen, are more useful in assessing actual conditions and pollutant loads to the Bay.

Table 3.4-1

MANHASSET BAY
AREAS AFFECTED BY RUNOFF RELATED POLLUTANTS

Location	Pollution of Concern	Potential In-Bay Sources in the Area
Mouth of Bay	Nitrogen	Runoff with fertilizer and groundwater underflow with nitrogen flow cesspools/septic tanks from Sands Point and Kings Point.
	Floatables (Beach Area in Kings Point, Sands Point and eastern shoreline)	Street litter and debris and deteriorating bulkheads, piers and docks.
Northern Bay (Plum Point to Toms Point)	Coliform	Storm water runoff bacteria from animal waste.
	Sediments	Sediment (as well as floatables) from runoff from roadways and impervious surface.
	Nitrogen	Runoff with fertilizers.
Northeastern Bay (Toms Point to Baxter Estates Beach to Towns Dock)	Nitrogen	Runoff with fertilizer including two golf courses at Sands Point County Club and Village Club and discharge from Port Washington Wastewater Treatment Plant.
	Coliform	Storm water and overflow from Mill Pond and Baxter Pond with bacteria from ducks and geese.
	Sediment	Runoff with sediment from within the drainage area.
	Floatables	Street litter and debris and deteriorating bulkheads, piers and docks.
Eastern Shore	Nitrogen	Runoff with fertilizer from drainage area.
	Sediments	Runoff with sediments from drainage area.
	Floatables	Street litter and debris and deteriorating bulkheads, piers and docks.
Lower Bay (south of Leeds Pond)	Sediment	Runoff with sediment from three drainage areas (Whitney, South Eastern and South Western) that comprise 30% of the drainage area into a relatively shallow and narrow portion of the Bay.
	Coliform	Runoff from Whitney Pond containing bacteria from geese and ducks.
	Nitrogen	Runoff with nitrogen from fertilizer including three golf courses (Deepdale, North Hills and Fresh Meadow) as well as groundwater underflow with nitrogen from undeveloped areas in Plandome Manor, Plandome, Plandome Heights, Manhasset and Kings Point.

Table 3.4-2

MANHASSET BAY

SUMMARY OF THEORETICAL POLLUTANT LOADINGS* BY SUBWATERSHED UNDER EXISTING CONDITIONS

Subwatershed		Total Nitrogen (TN) lbs/day	Total Suspended Solids (TSS) lbs/day	Total Suspended Solids (TSS) lbs/day	Zinc (Zn) lbs/day	Lead (Pb) lbs/day	Petroleum Hydrocarbons (PHC) lbs/day
I.D. No.	Name						
01	Barkers Point	2.42	0.54	1,241.60	2.20	2.20	3.18
02	Toms & Plum Points	4.11	0.58	1,379.71	1.38	1.38	2.00
03	Sheets Creek	3.85	0.54	1,175.22	1.45	1.45	2.10
04	Baxter & Mill Pond	9.88	1.46	3,323.12	3.95	3.95	5.71
05	Eastern Shore	2.72	0.46	1,059.55	1.43	1.43	2.06
06	Leeds Pond	14.84	2.36	5,284.59	7.28	7.28	10.52
07	South Eastern Shore	1.63	0.27	604.20	0.96	0.96	1.40
08	Whitney Pond	24.19	3.10	6,796.07	7.34	7.34	10.61
09	South Western Shore	1.71	0.25	598.83	0.60	0.60	0.86
10	Kings Point Creek	5.10	0.98	2,248.92	3.34	3.34	4.82
11	Mitchells Creek	7.40	0.94	1,989.28	2.37	2.37	3.43
12	Kings Point Pond	1.39	0.24	505.62	0.88	0.88	1.27
	Total MB Watershed	**79.25**	**11.73**	**26,206.73**	**33.19**	**33.19**	**47.95**

* Based on literature values used in the 1998 Hempstead Harbor Water Quality Improvement Plan.

Table 3.4-3

SUMMARY OF THEORETICAL POLLUTANT LOADING* BY SUBWATERSHED UNDER BUILD-OUT CONDITIONS

Subwatershed		Total Nitrogen (TN) lbs/day	Total Suspended Solids (TSS) lbs/day	Total Suspended Solids (TSS) lbs/day	Zinc (Zn) lbs/day	Lead (Pb) lbs/day	Petroleum Hydrocarbons (PHC) lbs/day
I.D. No.	Name						
01	Barkers Point	2.42	0.54	1,241.60	2.20	2.20	3.18
02	Toms & Plum Points	4.11	0.60	1,442.18	1.45	1.45	2.09
03	Sheets Creek	3.85	0.57	1,276.74	1.57	1.57	2.27
04	Baxter & Mill Pond	9.88	1.59	3,733.08	4.41	4.41	6.38
05	Eastern Shore	2.72	0.46	1,059.55	1.43	1.43	2.06
06	Leeds Pond	14.84	2.39	5,370.48	7.38	7.38	10.66
07	South Eastern Shore	1.63	0.27	604.20	0.96	0.96	1.40
08	Whitney Pond	24.19	3.89	9,290.97	10.15	10.15	14.72
09	South Western Shore	1.71	0.27	657.40	0.66	0.66	0.96
10	Kings Point Creek	5.10	1.07	2,557.37	3.68	3.68	5.32
11	Mitchells Creek	7.40	1.10	2,508.57	2.96	2.96	4.27
12	Kings Point Pond	1.39	0.24	505.62	0.88	0.88	1.27
	Total Pollutant load Buildout Analysis	**79.25**	**12.99**	**30,247.76**	**37.73**	**37.73**	**54.58**

* Based on literature values used in the 1998 Hempstead Harbor Water Quality Improvement Plan.

Table 3.4-4

THEORETICAL INCREASE IN POLLUTANT LOADINGS* BY SUBWATERSHED AS A RESULT OF BUILD-OUT CONDITIONS

Subwatershed		Total Nitrogen (TN) lbs/day	Total Suspended Solids (TSS) lbs/day	Total Suspended Solids (TSS) lbs/day	Zinc (Zn) lbs/day	Lead (Pb) lbs/day	Petroleum Hydrocarbons (PHC) lbs/day
I.D. No.	Name						
01	Barkers Point	0.00	0.00	0.00	0.00	0.00	3.18
02	Toms & Plum Points	0.00	62.47	0.07	0.07	0.10	2.00
03	Sheets Creek	0.00	101.51	0.11	0.11	0.17	2.10
04	Baxter & Mill Pond	0.00	409.96	0.46	0.46	0.67	5.71
05	Eastern Shore	0.00	0.00	0.00	0.00	0.00	2.06
06	Leeds Pond	0.00	85.90	0.10	0.10	0.14	10.52
07	South Eastern Shore	0.00	0.00	0.00	0.00	0.00	1.40
08	Whitney Pond	0.00	2,494.90	2.81	2.81	4.12	10.61
09	South Western Shore	0.00	58.57	0.07	0.07	0.10	0.86
10	Kings Point Creek	0.00	308.45	0.34	0.34	0.50	4.82
11	Mitchells Creek	0.00	519.28	0.58	0.58	0.84	3.43
12	Kings Point Pond	0.00	0.00	0.00	0.00	0.00	1.27
	TOTAL INCREASE	**0.00**	**4,041.04**	**4.54**	**4.54**	**6.63**	**47.95**

* Based on literature values used in the 1998 Hempstead Harbor Water Quality Improvement Plan.

3.5 Methods for Reducing Storm Water Impacts

Over the last 20 to 30 years, a number of methods for reducing the adverse impacts of storm water have been developed. The methods of reducing urban runoff loads and impact are generally either "structural" or "non-structural." These methods are at times further divided into those that apply best to urban areas already developed, and those that apply to new development, or new areas to be built.

Non-Structural Practices

Non-structural practices are primarily focused on pollution prevention measures that do not require construction or maintenance. Generally, these are cost effective in urban areas that have not yet been substantially developed, or in areas that may be undergoing substantial redevelopment. Examples of non-structural practices include:

- Public education
- Minimizing storm water runoff volumes and rates
- Limiting the amount of impervious surfaces
- Fertilizer and pesticide management programs that minimize their use
- Requiring buffers and setbacks from surface waters and wetlands
- Inspecting storm water systems and structures
- Spill control and pollution prevention programs for "industrial" type activities
- Restrictive covenants
- Site plan reviews that include runoff considerations

Table 3.5-1 presents a listing of some non-structural measures identified by the Long Island Regional Planning Board (LIRPB, 1983).

Structural Practices

Structural practices are those that are designed and constructed to reduce storm water impacts and typically involve capital and operation maintenance costs. Below are examples (USEPA, 1992) of structural practices for developing and developed urban areas while Table 3.5-2 presents some of the considerations associated with some of these structural practices.

Table 3.5-1

NONSTRUCTURAL STORM WATER CONTROL MEASURES

Measure	Purpose	Recommendation for Use
Natural Depressions	Collect and detain runoff; slow storm water velocity to allow for recharge; protect low-lying areas and downstream development from flooding.	Upland areas in or adjacent to drainage areas by streams or waterways.
Gutters and Downspouts	Collect and convey runoff from roofs to leaching pools or other stable outlet.	For residential and commercial structures where roof top storage is not feasible; any site development, especially dense development where large volumes of roof runoff are anticipated.
Natural Vegetation	Control runoff and erosion/sedimentation; slow storm water velocity to allow for increased infiltration; trap sediment particles; roots hold soil particles in place.	Upland areas, slopes, land area adjacent to surface waters and bluffs, stream banks, drainageways.
Wetlands	Buffer and stabilize lowland areas; slow runoff velocity and retain runoff, filter and trap suspended debris.	Along rivers, streams, and other surface water systems.
Storm Water Detention (Ponds/Basins)	Temporary detain runoff with gradual release to surface or groundwaters; reduce peak runoff flows; protect downstream development from flood potential.	Upland sites and other sites where there is sufficient distance to seasonal high water table, drainage areas adjacent to streams and waterways; can function as a recreation area when properly vegetated and designed to drain completely.
Surface Drainageway	Direct runoff from areas where it could cause flooding, erosion and/or sedimentation.	Along slopes where soils are exposed during construction; newly constructed fill slopes; and in areas of highly erodible soils.
Grass or Vegetated Waterway	Convey runoff to a stable outlet; grasses can reduce energy of flow, permitting infiltration.	Areas where slopes are moderate and runoff velocities are non-erosive; areas where increased storm water volumes will not exceed the capacity of the channel.
Bare Channel	Convey and/or direct runoff on construction sites.	Areas where the slope gradient is minimal and the runoff velocity is low; avoid use in areas with highly erodible soils.
Manmade Drainage Swales	Convey and/or recharge storm water runoff.	Recommended for most sites where control of low volume storm water flow is required.
Biofiltration Systems	Minimize pollutant loadings carried in storm water runoff to surface waters; aquatic plants absorb contaminants (coliform, metals, nutrients) and trap suspended solids.	Where there is adequate area to construct such a pond; drainage areas that empty into surface waters; where construction of a recharge area is not feasible due to the shallow depth of the water table.
Soil/Slope Stabilization	Protect exposed soils from runoff impacts, erosion and sedimentation; reduce runoff velocities allowing for infiltration; hold vegetation in place until roots are established.	Slopes and other areas where soils are exposed during construction, newly constructed fill slopes; soil stockpile areas.

Table 3.5-2

CONSIDERATIONS ASSOCIATED WITH STRUCTURAL PRACTICES FOR REDUCING STORM WATER RUNOFF

BMP Option	Size of Drainage Area	Site Requirement	Regional Restrictions	Maintenance Burdens	Longevity
Infiltration basins	Moderate to large	Deep permeable soils	Arid and cold regions	High	Low
Vegetated filter strips	Small	low density areas with low slopes	Arid and cold regions	Low	Low if poorly maintained
Filtration basins and sand filters	Widely applicable	Widely applicable	Arid and cold regions	Moderate	Low to moderate
Extended detention ponds	Moderate to large	Deep soils	Few restrictions	Dry ponds have relatively high burdens	High
Wet ponds	Moderate to large	Deep soils	Arid regions	Low	High
Constructed storm water wetlands	Moderate to large	Poorly drained soils, space may be limiting	Arid regions	Annual harvesting of vegetation	High

Source: USEPA, 1992

Developing Urban Areas	Developed Urban Areas
Extended Detention Ponds	Illicit Connection Controls
Storm Water Wetlands	Porous Pavements
Multiple Pond Systems	Storm Water Detention/Wetland Retrofits
Infiltration Basins	Sand Filters
Filter Strips	

It should be noted that some of these measures which have become popular in the last few years (infiltration basins, porous pavement, filter strips, sand filters, etc.) need to have cold weather restrictions considered in their selection. While they may have some value in removing or trapping sediment, there are seasonal limitations with respect to nutrient removal. Table 3.5-3 presents structural measures identified by the Long Island Regional Planning Board and their purpose and recommended use.

Based on the results of the Long Island NURP study, in 1983 the Long Island Regional Planning Board released a Non Point Source Management Handbook (LIRPB, 1984) that focused on storm water runoff controls. Among its recommendations, the LIRPB recommended biofiltration ponds (see Figure 3.5-1) that would provide for sedimentation and pollutant removals. Also recommended were in-line storage systems that include a mix of leaching pools, perforated pipes and leaching catch basins (see Figure 3.5.2).

The two measures identified above lend themselves to: areas yet to be developed in the watershed (approximately 10% of land area); areas subject to be redeveloped; areas where roads and/or storm sewer system need to be reconstructed or repaired; and at the pond and wetlands systems around the Bay. This would include:

- North and East Sheets Creek
- Mill Pond

Table 3.5-3

STRUCTURAL STORM WATER CONTROL MEASURES

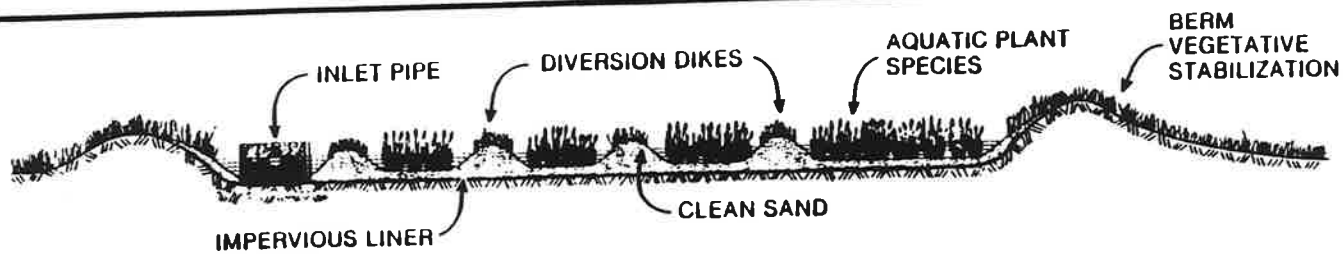
Measure	Purpose	Recommendation for Use
Permeable Paving	Reduce the volume and rate of storm water runoff; allow for increased infiltration.	Patios and walkways; use on slopes less than five percent where soils have a moderate to high rate of permeability; adequate depth to seasonal high water table.
In-Line Storage	Collect storm water runoff from parking lots and roadways; allow for percolation of runoff.	In areas where there is adequate depth between the bottom of leaching pools and leaching catch basins and the seasonal high water table.
Perforated Reinforced Concrete Pipe	Allow for recharge of storm water	General use
Gutters and Downspouts	Collect and convey runoff from roofs to leaching pools or other stable outlet.	For residential and commercial structures where roof top storage is not feasible; any site development, especially dense development where large volumes of roof runoff are anticipated.
Sediment Ponds/ Basins	Protect surface waters from increased sediment loads; reduce the potential of flooding for downstream lands.	Construction sites; areas of highly erodible soils and sloped terrain.
Energy Dissipation	Slow storm water velocity to a non-erosive level; trap debris, permit the settling of suspended solids and accompanying contaminants.	Adjacent to culverts, outlets, and drainage channels, and along stream banks; to prevent erosion and/or scouring.
Sediment Filter	Trap suspended particles and debris from storm water runoff.	Adjacent to culverts, outlets, and drainage channels, and along stream banks; to prevent erosion and/or scouring.
Storm Water Retention (Ponds/Basins)	Retain sediments (and runoff) to allow for the die-off of bacteria; reduce peak runoff flows and protect downstream properties from flooding; protect streams from increased sediment loadings.	To receive storm water from drainage channels in areas where recreational and water amenities are desired; (permanent pond) and in areas where heavy sediment loads are not anticipated.
Storm Water Detention (Ponds/Basins)	Temporarily detain runoff with gradual release to surface or groundwaters; reduce peak runoff flows; protect downstream development from flood potential.	Upland sites and other sites where there is sufficient distance to seasonal high water table, drainage areas adjacent to streams and waterways; can function as a recreation area when properly vegetated and designed to drain completely.
Surface Drainageway	Direct runoff from areas where it could cause flooding, erosion and/or sedimentation.	Along slopes where soils are exposed during construction; newly constructed fill slopes; and in areas of highly erodible soils.

Table 3.5-3 (continued)

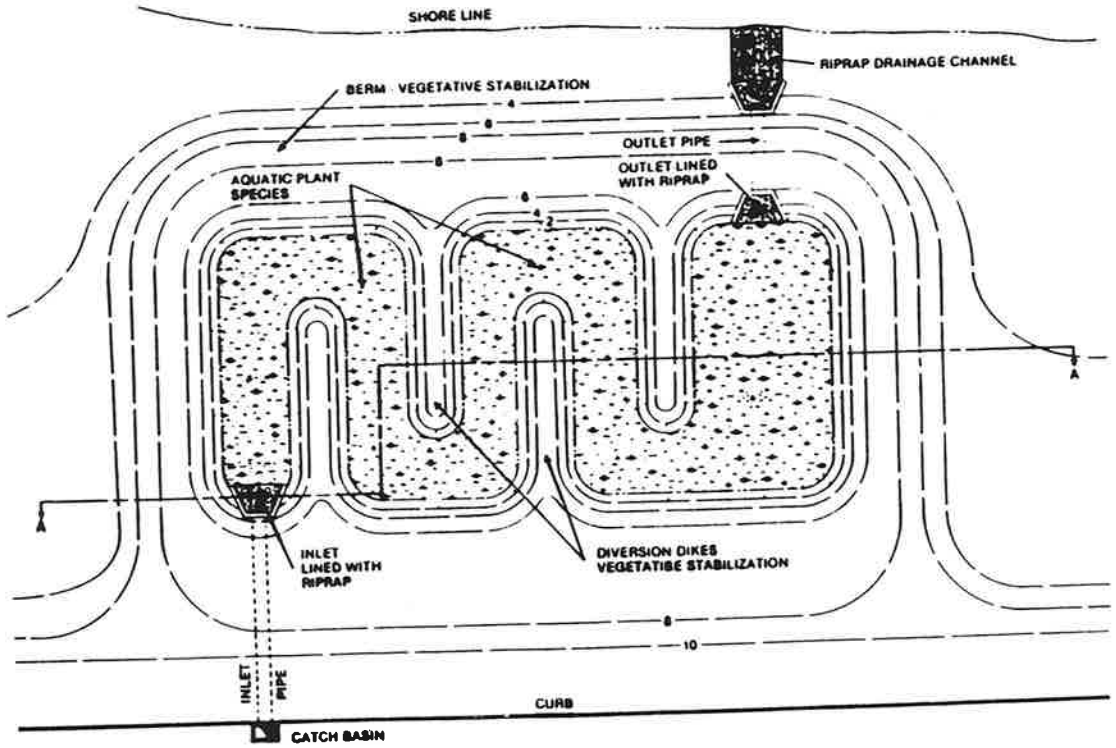
STRUCTURAL STORM WATER CONTROL MEASURES

Measure	Purpose	Recommendation for Use
Structurally-lined Channel (Riprap, Asphalt, Concrete)	Convey and/or direct runoff; channel outlet must be well-stabilized, there is little or no energy dissipation along an impervious-lined channel.	Drainage areas having a high slope gradient or where runoff velocities are erosive, prohibiting the establishment of vegetation.
Biofiltration Systems	Minimize pollutant loadings carried in storm water runoff to surface waters; aquatic plants absorb contaminants (coliform, metals, nutrients) and trap suspended solids.	Where there is adequate area to construct such a pond; in drainage areas that empty into surface waters; where construction of a recharge area is not feasible due to the shallow depth of the water table.
Soil/Slope Stabilization	Protect exposed soils from runoff impacts, erosion and sedimentation (see Table 5); reduce runoff velocities allowing for infiltration; hold vegetation in place until roots are established.	Slopes and other areas where soils are exposed during construction, newly constructed fill slopes; soil stockpile areas.

Source: LIRPB Nonpoint Source Handbook, 1983



PLAN



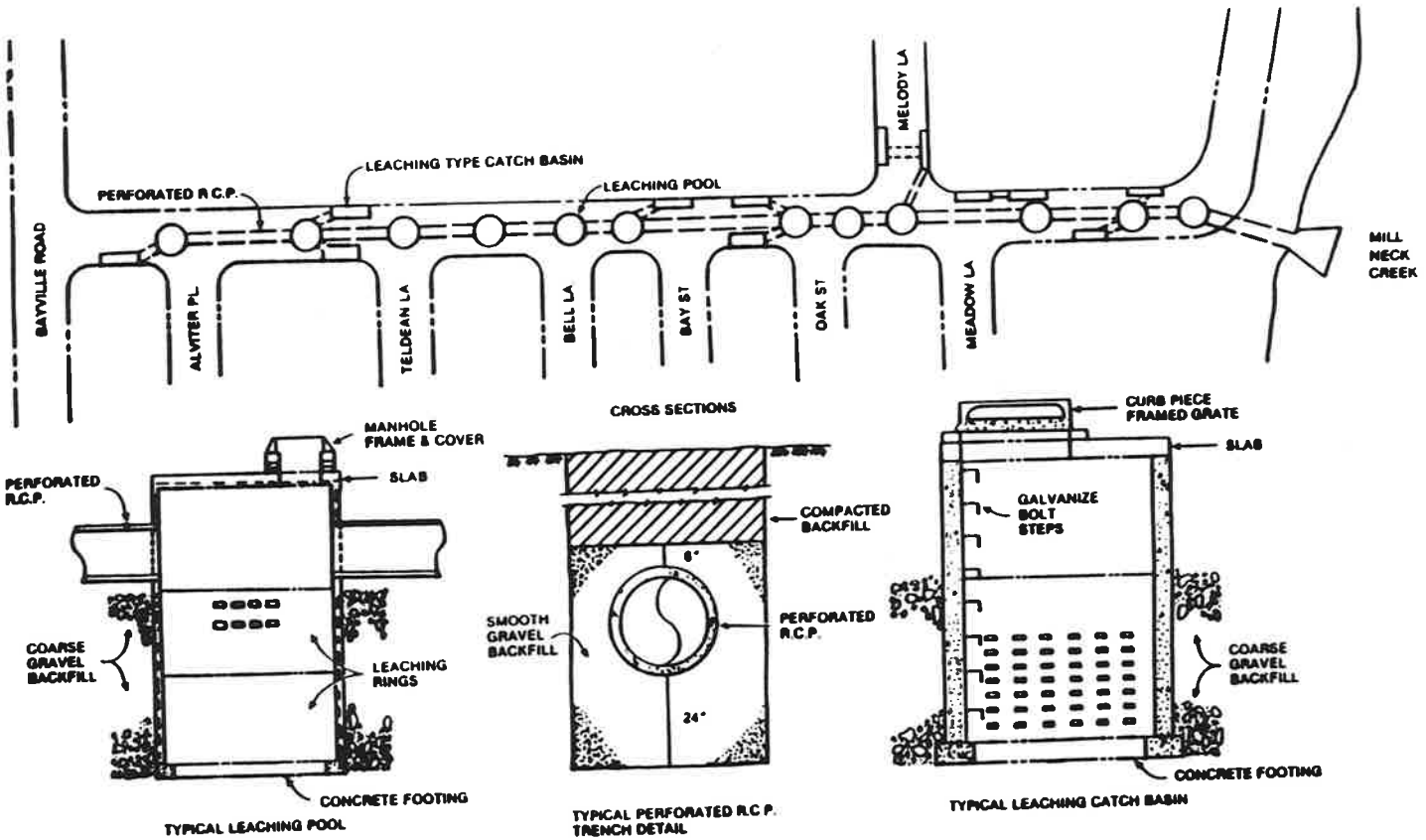
SECTION A-A

SOURCE: NON POINT SOUCE MANAGEMENT HANDBOOK, LIRPB, 1984

TYPICAL BIOFILTRATION POND

Dvirka and Bartilucci
Consulting Engineers
A Division of William F. Cosulich Associates, P.C.

FIGURE 3.5-1



SOURCE: NON POINT SOUCE MANAGEMENT HANDBOOK, LIRPB, 1984

TYPICAL IN-LINE STORAGE SYSTEM

Dvirka and Bartilucci
Consulting Engineers
A Division of William F. Cosulich Associates, P.C.

FIGURE 3.5-2

- Baxter Pond
- Stannards Brook
- Leeds Pond
- Whitney Pond Complex
- Kings Point Creek/Twin Pond
- Mitchell Creek
- Kings Point Pond

Effectiveness of Management Practices

Over the years the effectiveness of various management practices have been evaluated for control of runoff. A table of the removal efficiency for 14 different management practices (USEPA, 1993) is presented in Appendix M.

3.6 Sediment Conditions in the Bay and Ponds

Limited information is available on Manhasset Bay sediments. The bottom has been characterized as ranging from very rocky at Kings Point to black viscous substance at the outer and inner areas of the Bay. The black substance occurs in areas of slower velocity where finer clay-like particles have settled. The substance supports an important community of larval shellfish and numerous other invertebrates.

Past reports (Koppelmen, 1976) have described the Bay bottom as rich in organic debris and fine silt with dissolved nutrients in the water column. In addition, sediments have silted or degraded areas of special habitats, sensitive shallow shorelines and navigational channels. Litter and floatable debris have significantly reduced the visual attractiveness of the Bay's shoreline.

The inland waters of Whitney Pond, the several impoundments within Manhasset Valley Park, Leeds Pond, Baxter Pond and Port Washington Mill Pond have historically functioned as final sedimentation basins prior to discharging surface water into the Bay.

The process of sediment accumulation in the ponds around the bay and the bay itself has taken place due to the lack of effective upland erosion/sediment control measures, maintenance of storm sewer systems (catch basin cleaning, etc.) regulation and enforcement by the various municipalities in the watershed. Implementing restoration plans for the ponds around the bay are expected to involve the implementation of a diversity of practices. These practices could include:

- the reduction of upstream erosion through the use of best management practices;
- catching sediment prior to delivery to the ponds using catch basin silt traps, upstream sedimentation basins, or frequent street sweeping operations; and
- dredging the pond basins to desired depths that correspond to the pond's natural ability to provide some degree of treatment and sediment removal.

A general overview of the origin and movement of sediments in Manhasset Bay and surrounding waterbodies are briefly described in this section (Koppelman, 1976). Sediments are discharged to Manhasset Bay, other embayments and the rest of the Long Island Sound estuary by:

- rivers and creeks;
- wave action along the shoreline;
- tidal action and exchange; and
- storm surges.

These sediments are tapped in estuaries by the natural process of the particles settling out of the water. The sediment particles that are discharged into or carried inside by bay from the

Sound are likely to remain trapped in a bay. As the bay fills with sediment, it tends to create shallow areas that lend themselves to the establishment of salt march vegetation. The ebb currents are not sufficiently strong to scour and resuspend the sediment carried into a bay by a preceding flood current and deposited during slash water.

Most of the bays around the Sound tend to retain sediments. These sediments are typically finer particles at the head of a bay and coarser at the mouth of a bay. Also, bays that are somewhat restricted (examples: Manhasset Bay, Huntington Harbor and Port Jefferson Harbor) tend to trap sediments more than those that are unrestricted (examples: Little Neck Bay and Hempstead Harbor). Furthermore, tidal currents have been thought to be the dominant force controlling sediment distribution in the Long Island Bays. As such, its been reported that the coarsest sediments accumulate where the currents are strongest and the finest sediments accumulate where the currents are weakest. Another important factor are the sources of sediments from within the watershed (eroding hillsides, storm water runoff, construction sites, etc.).

3.7 Potential Impacts of Sediment on Water Depths in the Bay

Based on information from the National Oceanographic and Atmospheric Administration (NOAA), the most recent baywide water depth (bathymetric) survey of the Bay was performed in October 1990 (Hydrographic Survey H-10346). This survey covered the entire Bay. An historical search of NOAA and U.S. Army Corps of Engineers (COE) has revealed that previous surveys were performed for all or parts of the Bay at various times, including 1836, 1837, 1883, 1912, 1927, 1934, 1939, 1946 and 1958 by the various predecessor agencies of the COE. It is unclear if and how many water depth surveys were conducted in the 1960s, 70s and 80s. If no baywide surveys were performed during this period, then the only way to identify any changes in depth would be to compare the depths between the 1958 and the 1990 surveys which would reflect a 32-year period.

However, a number of marinas and docks were constructed during this period which may have required dredging. This would not be reflected in any direct comparison between the two surveys and would possibly result in false conclusions or erroneous information. In order to approximate the change in depth in the lower part of the Bay, a comparison was made of the changes in depth between 1928 and 1990 for a 5,500-foot segment. The results of this comparison at four different transects in the Bay, covering 21,000 linear feet, is shown on Tables 3.6-1 through 3.6-4.

Based on the information on these tables for the 31 locations in the center and northeastern part of the Bay for which approximate and preliminary comparisons were possible between 1939 and 1990, it appears that:

- 2 locations had no change in water depth;
- 16 locations had decreases in water depth ranging from 0.2 ft. to 5.0 ft; and
- 12 locations increases in water depth ranging from 0.1 ft. to 5.5 ft.

In the lower portion of the Bay where there were 11 locations for which comparisons between 1958 and 1990 were possible, six had decreases in depth from 1.0 to 5.5 ft. while five had depth increases from 0.5 ft. to 2.2 ft.

While its not clearly established, from the above preliminary comparisons, that infilling is taking place on a baywide basis, it can be concluded that infilling has taken place in the lower bay. Such infilling has essentially eliminated commercial navigation and recreational boating south of the Kings Point/Great Neck Village border. Furthermore, infilling may have impacted, or continues to impact habitats and vegetative communities. The degree of these impacts and restoration measures have not been evaluated. These impacts need to be evaluated in order for the prior beneficial uses of the lower bay to be restored.

Table 3.6-1

MANHASSET BAY
COMPARISON OF WATER DEPTHS AND DEGREE OF INFILLING
AT SELECTED LOCATIONS THE BAY

From Plum Point to Thoms Point
(West to East)

Location	Distance from Start (feet)	Depths (feet)				
		1928	1939	Change	1990	Change
1	0	4.7	4.7	0	NA	-
2	500	18.0	12.0	-6.0	11.1	-0.9
3	1,000	14.4	10.0	-4.4	8.9	-1.1
4	1,500	8.8	8.7	-0.1	7.5	-1.2
5	2,000	8.7	7.7	-1.0	7.2	-0.5
6	2,500	8.0	7.5	-0.5	7.9	+0.4
7	3,000	8.2	9.2	+1.0	7.8	-1.4
8	3,500	7.8	7.7	-0.1	7.9	+0.2
9	4,000	7.9	7.5	-0.4	7.2	-0.3
10	4,500	8.0	7.4	-0.6	7.5	+0.1
11	5,000	2.1	2.0	-0.1	7.5	+5.5

Notes:

1. +indicates increase in depths; -indicates decrease in depth; NA indicates no depth information at or near this location.
2. Change measured from previous survey for a particular location

Table 3.6-2

MANHASSET BAY
COMPARISON OF WATER DEPTHS AND DEGREE OF INFILLING
AT SELECTED LOCATIONS IN THE BAY

Plum Point to Port Washington Yacht Club
(Northwest to Southwest)

Location	Distance from Start (feet)	Depths (feet) 1928	1939	Change	1990	Change
1	0	4.7	4.7	0	NA	-
2	500	25.0	23.0	-2.0	24.7	+1.7
3	1,000	14.7	13.5	-1.2	16.1	+2.6
4	1,500	11.6	12.5	+0.9	13.8	+1.3
5	2,000	10.5	11.5	+1.0	11.5	0
6	2,500	10.0	10.5	+1.0	10.5	0
7	3,000	10.0	10.0	0	12.1	+2.1
8	3,500	10.0	10.0	0	11.2	+1.2
9	4,000	10.5	10.5	0	9.8	-0.7
10	4,500	10.4	11.5	+1.1	9.2	-2.3
11	5,000	10.3	15.2	+4.9	10.2	-5.0
12	5,500	10.4	10.0	-0.6	11.2	+1.2
13	6,000	10.4	10.0	-0.4	9.8	-0.2
14	6,500	10.2	10.0	-0.2	9.8	-0.2
15	7,000	7.0	8.0	+1.0	9.8	+1.8

Notes:

1. +indicates increase in depth; -indicates decrease in depth; NA indicates no depth information at or near this location.
2. Change reflects change in depth from previous survey.

Table 3.6-3

MANHASSET BAY
COMPARISON OF WATER DEPTHS AND DEGREE OF INFILLING
AT SELECTED LOCATIONS IN THE BAY

Thoms Point to Port Washington Yacht Club
Northwest to Southeast

Location	Distance from Start (feet)	Depths (feet)				
		1928	1939	Change	1990	Change
1	0	2.1	2.1	0	NA	-
2	500	3.7	2.4	-1.3	5.6	+3.2
3	1,000	9.0	7.0	-2.0	3.3	-3.7
4	1,500	10.2	9.5	-0.7	3.3	-6.2
5	2,000	9.9	10.8	+0.9	9.8	-1.0
6	2,500	10.1	10.9	+0.8	9.2	-1.7
7	3,000	9.7	9.7	0	9.8	+0.1
8	3,500	9.2	10.0	+0.8	6.6	-3.4

Notes:

1. +indicates increase in depth; -indicates decrease in depth; NA indicates no depth information at this location.
2. Change reflects difference in depth from previous survey.

Table 3.6-4

MANHASSET BAY
COMPARISON OF WATER DEPTHS AND DEGREE OF INFILLING
AT SELECTED SEGMENTS IN THE BAY

Along the "Proposed" Channel in the Lower Bay
(From South to North)

Location	Distance from Start (feet)	Depths (feet)				
		1928	1958	Change	1990	Change
1	0	4.2	6.5	+2.3	NA	-
2	500	4.5	6.5	+2.3	1.0	-5.5
3	1,000	4.6	4.4	-0.2	6.6	+2.2
4	1,500	4.1	4.9	+0.8	3.3	-1.6
5	2,000	5.3	8.0*	+2.7	7.9	+1.1
6	2,500	4.4	5.2*	+0.8	7.5	+2.3
7	3,000	5.3	6.5	+1.2	7.5	+1.0
8	3,500	6.4	7.0	+0.6	7.5	+0.5
9	4,000	6.8	8.5	+1.7	7.9	-1.0
10	4,500	6.6	8.0	+1.4	6.9	-1.1
11	5,000	7.5	8.9	+1.4	7.5	-1.4
12	5,500	9.0	9.5	+0.5	7.5	-2.0

* Between Location 5 and 6 depth change between 1928 and 1958 was +16.5 indicating substantial dredging, possibly for a marina or sand mining.

Notes:

1. + indicates increased depth; - indicates decreased depth.
2. Change reflects change in depth from previous survey.

The above scenario is true for a) the northeastern portion of the Bay, particularly in the areas of Plums Point, and Thoms Point, East Sheets Creek and North Sheets Creek; b) the cove area off Leeds Pond; c) the area near Shelter Harbor; and d) the area near Broadlawn Harbor. All four areas require further evaluation and possibly a focused depth survey in 1999/2000, in order that comparisons can be made to the depths provided in the 1990 NOAA survey. This would yield more accurate conclusions than the preliminary comparisons that are possible now.

Based on information from the U.S. Army Corps of Engineers and information in the Town's draft local Waterfront Revitalization Plan, Manhasset Bay has never been dredged on an area-wide basis. The largest dredging projects apparently occurred in the 1960s in connection with upland sand mining operations in the vicinity of the villages of Manorhaven and Port Washington North. At that time, water depths in the vicinity of the former barge loading docks were said to have exceeded 20 feet. Subsequent shoaling and sedimentation have greatly reduced the depth and width of the navigable route into that area.

3.8 Navigation

Until the mid-1950s barges routinely shipped sand from Manhasset Bay to New York City and elsewhere. At the present time, there is an oil depot (Lewis Oil) in Port Washington at the southeastern side of Sheets Creek and an oil depot (Commander Oil) in the lower part of the Bay in Great Neck. Portions of a channel in the lower Bay have been dredged from time to time by private parties to facilitate the delivery of petroleum products by barge to the Commander Oil depot located in the Village of Great Neck.

Since the 1920s, land uses surrounding the southern end of the Bay have shifted to non-waterfront related activities because of the significant sediment accumulation on the Bay bottom, which has eliminated any area for navigable uses in that vicinity and also eliminated the possibility of swimming. Currently, most of the navigational activities in the Bay are concentrated in the Plum Point, Toms Point, Town dock area and along the eastern shore from the Town dock to just north of Leeds Pond.

3.9 Status of Dredging in Manhasset Bay

Based on a July 22, 1998 letter, the U.S. Army Corps of Engineers (the Corps) has stated that there are no federal dredging activities planned for Manhasset Bay because there are no active federal navigation projects in the Bay. The Corps has stated that only one federal navigation project was authorized for Manhasset Bay in 1930, but was never constructed (the reason why it was not constructed is not known). According to this letter from the Corps under the provisions of the Water Resources Development Act of 1986, projects that are inactive for more than five years are automatically de-authorized. Therefore, the Corps considers this project to be de-authorized.

The Corps has programs that can help to deal with sediments in the Bay. This includes Section 206 (aquatic ecosystem restoration not linked to past Corps work) and Section 107 (small, shallow draft navigation projects). The process for initiating such work requires a formal request from local government that has the ability to cost-share and acquire necessary real estate in accordance with federal laws and policies. In addition, the Corps' Support for Others (SFO) program can supply planning, engineering and construction services on a reimbursable basis. Currently, there are no active federal navigation projects in Manhasset Bay. Therefore, the Corps' New York District does not routinely survey the Bay, and they do not possess any historic charts of the Bay.

The waters of Manhasset Bay have generally not been used for disposal of dredged spoil materials. Dredge spoils produced by maintenance dredging around yacht clubs, boat yards, private docks and marinas are usually retained behind an adjacent bulkhead, barged to authorized disposal or, occasionally, trucked away to upland disposal sites.

3.10 New Channels and Maintenance Dredging

Construction of new navigation channels involves the removal of materials previously undisturbed while maintenance dredging involve repetitive removal of materials from an existing

navigation channel. In either case, the material removed is naturally occurring or man induced sediments such as sand, silt and clays.

Dredging of navigational channels takes place in five major areas of a waterbody. These are:

- Main approaches to deeper open waters or the ocean;
- Bar channels or sandbars at inlets;
- Entrance channels to harbors;
- Berthing Areas in harbors and ports; and
- Inland waterways such as intercoastal waterways and river channels.

3.11 Required Sampling for Dredging Projects

In order for the State and/or other regulatory agencies to make a determination regarding the appropriateness/acceptability of a dredging project within Manhasset Bay or at any of the Bay ponds surrounding and associated disposal/re-use of dredge materials, it is necessary for the project sponsor to collect representative samples of the sediments to be dredged. The purpose of the sampling is to determine the chemical, physical and biological characteristics of the sediments to be dredged. The sampling effort is to be defined in a sampling plan that is to be approved by the State, and if necessary, by other regulatory agencies such as the U.S. Army Corps of Engineers prior to the sampling being performed.

In New York State dredging sampling plans of sediments are to be prepared in accordance with NYSDEC's current guidance contained in a document entitled "Interim Guidance – Freshwater Navigational Dredging", October 1994. This guidance contains a formula which, in addition to sampling protocols, when applied to a specific dredging scope and specific location defines the requisite number of sediment sampling locations and number of

samples to be collected. Under the state's guidance, the sampling work plan is to contain the following:

a. a field operations plan that includes an operations plan that defines the locations and number of sediment cores to be collected and the depth of the cores. The plan is to also specify the method for compositing the sample, the analysis to be performed, the QA/QC procedures to be followed as well as the parties involved in the sampling and their roles and responsibilities. It is to identify procedures for sample identification, handling, packaging and shipping. In addition, it is to identify the equipment to be used (boat type, core sampler, etc.), field audits, field instrumentation and field contamination procedures.

b. a field sampling and analysis plan that describes how the samples will be collected and how the samples will be prepared. This plan is to include procedures for determining grain size analysis and moisture content of the sediment as well as the specific chemical parameters to be analyzed. While the specific scope is to be negotiated amongst the project sponsor, NYSDEC and other involved agencies, based on the scope of recent dredging projects near the Manhasset Bay, for a dredging project within the Bay (Glen Cove Creek and Eastchester Bay), its expected that the analysis would include the following:

   - TCL + 30 Organic Compounds (VOCs, SVOCs, Pesticides, including Mirex and PCBs)
   - TAL Metals (23 Metals and Cyanide)
   - RCRA Characteristics (Ignitability [Flash Point], Reactivity [Reactive Cyanide and Sulfide] and Corrosivity [pH]
   - TCLP Parameters (40 RCRA Constituents, including VOCs, SVOCs, Pesticides, Herbicides and Metals)
   - TOC and Ammonia
   - Dioxin (2,3,7,8-TCDD) EPA Method 613 (Detection limit in low parts per billion range)
   - Grain Size Analysis (Sieve Only)

c. a Quality Assurance/Quality Control (QA/QC) Plan that describes the data usage, the sampling program design and rationale and the monitoring parameter requirements with respect to such issues as sample fraction, frequency, container type/size/number, sample preservation, maximum holding time and analytical method. In addition, the QA/QC plan will also identify data quality and assessment requirements with respect

to data representativeness, data comparability, precision and accuracy requirements, recovery of surrogate and matrix spike compounds, determination of data completeness, laboratory sample custody procedures, field management documentation, split sampling, calibration procedures and preventive maintenance, data reduction and reporting, data validation and matrix spikes/matrix spike duplicates and spiked blanks.

3.12 Dredging Methods

There are two principal methods for performing dredging to remove accumulated sediments. These are:

- Mechanical dredges that use either a dipper dredge or clam shell dredge. They are useful in tight areas, however, they have difficulty keeping loose, fine materials in the buckets and may require added controls when handling contaminated sediments (curtains, screens, sheeting, etc.). Typically mechanical dredges place the sediments into barges for transport to an off-load location.

- Hydraulic dredges that involve either a cutterhead pipeline dredge or a self-propelled hopper dredge. The cutterhead pipeline allows for excavation with pumping directly to a disposal site (beach, shoreline, behind a bulkhead, etc.). Self-propelled hopper dredges are limited to work in deep waters and can employ dust pans or sidecasters for moving the sediment to an adjacent area to the navigation channel.

3.13 Disposal Considerations for Dredged Materials

Proper disposal of tens of millions cubic yards per year of dredged material is a major management problem faced by municipalities and various state and local regulatory agencies in the coastal areas of the New York metropolitan area. The disposal problem is complicated whenever materials to be dredged are found to be contaminated to such a degree as to prevent open water disposal and the difficulties associated with the intense development in the metropolitan area thereby limiting a number of land-based disposal options.

Key Regulatory Authorities

Disposal of dredge materials is covered by various regulatory authorities. Some of the key ones include:

- Section 10 of the Rivers and Harbor Act of 1899 which delegates to the U.S. Army Corps of Engineers the authority to review and control construction or obstruction, or alternation of, navigable waters in the United States.

- Section 404 of the Clean Water Act (1972 and subsequent by awarded) which established a permit program and guidelines for regulation by the U.S. Army Corps of Engineers and USEPA oversight of the discharge of dredge material (or fill materials) within the waters of the United States.

- Section 103 of the Marine Protection, Research and Sanctuaries Act (1972 and subsequently awarded) authorizes the U.S. Army Corps of Engineers to issue permits for ocean transportation of dredged materials for disposal provided that based on testing criteria specified by the USEPA and the Corps, the disposal material has been deemed to not have an adverse impact on the marine environment. The testing protocols include bulk sediment analysis, grain size analysis, eluviate testing and biological testing. The biological testing includes bioassays for acute toxicity, as well as analysis to determine bioaccumulation of certain contaminants by marine organisms.

- New York State's Tidal Wetlands Act (Article 25, 6 NYCRR 661) whereby, the New York State Department of Environmental Conservation regulates various activities in tidal wetlands including any form of draining, dredging, excavation, or removal (either directly or indirectly) of soil, mud, sand, shells, gravel or other aggregate. The activity must be approved by the State and receive a permit for it to be authorized.

Disposal of dredged materials at the Long Island Sound sites is complicated by the need for review and/or approval from two states (New York and Connecticut) and two federal regions/jurisdictions (USEPA Regions I and II and The Corps of New England and New York Districts) plus interested parties, environmental groups and residents in the two states.

Alternative Disposal/Re-use Options

A variety of disposal/re-use options have been considered over the years in the New York metropolitan area depending on the volume, characteristics and location of the dredge materials, may be viable for a particular dredging project. These include:

- Disposal in Abandoned Piers
- Open Water Disposal (Long Island Sound)
- Ocean Disposal with Other Wastes
- Deep Ocean Disposal
- Containerized Ocean Disposal
- Ocean Spreading
- Subaqueous Barrow Pits
- Incineration
- Fill Behind Bulkheads
- Filling of Mines
- Use as Construction Material (landfill cover, etc.)
- Beach Nourishment
- Wetlands Disposal (applied to existing wetlands or creation of new wetland)
- Confined Upland Disposal

3.14 Open Water Disposal Sites in Long Island Sound

Should the sponsor/applicant of a dredging project in Manhasset Bay want to consider open water disposal in the Long Island Sound area, there are four open-water disposal sites in Long Island Sound (SAIC, 1998) that may be possible. However, such open water disposal is

subject to regulatory approvals from a number of agencies in New York and Connecticut as well as at the federal level covering more than one federal region or jurisdiction. The four Long Island Sound sites are:

- Western Long Island Sound Disposal Site – located in Connecticut waters off of Stamford (also under the jurisdiction of the New England District of the U.S. Army Corps of Engineers).
- Central Long Island Sound Disposal Site – located in Connecticut waters off New Haven (also under the jurisdiction of the New England District of the U.S. Army Corps of Engineers).
- Cornfield Shoals Disposal Site – located on the New York/Connecticut border off of Old Saybrook/Old Lyme opposite Orient, New York.
- New London Disposal Site – located on the New York/Connecticut border off New London and near Fishers Island, New York.

3.15 Strategy for Implementing a Dredging Project

In order for a dredging project(s) sponsor/applicant to proceed with the implementation of a dredging project in or around Manhasset Bay it is necessary to:

- define whether the dredging project(s) will be in the Bay or one or more of the ponds surrounding the Bay;
- define the lead or sole project(s) sponsor(s)/applicant (Corps of Engineers, the County, Town, Village or private/marina owner);
- define the intended/desired scope of the dredging project(s) (location, length, depth, width of dredging);
- prepare a preliminary outline of a sediment sampling plan for each project in accordance with the guidelines of NYSDEC or other regulatory agencies (Corps of Engineers, USEPA, etc.);
- identify potential funding sources to develop and implement the sampling plan;
- secure funding for the development and implementation of the sampling plan and preparation of the feasibility study/report;

- hold a pre-application/study meeting with NYSDEC and other involved local, state and federal agencies to discuss the desired scope of each dredging project, the objectives and outline of the sampling programs and the array of reasonable dredge material disposal/re-use options to be considered in the feasibility study;
- fully develop the sampling plan for a project and submit to NYSDEC and other involved local, state and federal agencies for review and approval;
- implement the approved sampling plan with regard to the request sampling, analysis, QA/QC and data validation requirements;
- compile and assess the sampling results and conduct a screening analysis of the disposal/re-use alternative and whether to proceed with the dredging project. As appropriate refine the evaluation of alternative disposal/re-use options together with an evaluation of their cost-effectiveness and implementability;
- perform feasibility analysis/study and identify the acceptable disposal/re-use alternatives likely to be agreed upon by all involved parties;
- prepare a feasibility report for each project for the preferred selected option;
- prepare the necessary permit applications and submit to the appropriate state, federal and other agencies;
- identify and/or secure funding to perform the dredging and dispose/re-use the dredge materials;
- file the permit applications and as necessary submit request(s) for a Beneficial Use Determination (BUD) for dredged materials that are intended to be beneficially re-used;
- upon receipt of required permits from the involved regulatory agencies perform the dredging and disposal/re-use of the dredged sediments in accordance with the permits received.

Section 4

4.0 THE POLICY ENVIRONMENT

4.1 Objectives

The major determinants of the water quality of Manhasset Bay are: the waters of Long Island Sound; atmospheric deposition; direct rainfall; storm water runoff from ponds and streams; groundwater underflow; discharges from treatment plants; and discharges from the active users of the waterway of the Bay. The aim of the Water Quality Improvement Plan is to reduce pollution in order to preserve and enhance water quality, habitat, economic uses and recreational enjoyment of the Bay through the implementation of the following basic objectives:

- The reduction of the rate of runoff from the land to the harbor and the reduction of the volume of that runoff.
- The reduction of the pollutants borne by that runoff, including bacteria, sediments, floatables, nutrients and toxics.

4.2 Policy Framework

Public Interest

Public policy is shaped by the several levels of governmental involvement concerned with the water quality of Manhasset Bay and its contributing watershed local, county, regional, state and federal. It is also influenced by the residents of the watershed, either individually or organized into use-related groups, such as boaters or businessmen, and by public interest groups, perhaps environmentally based. Each of these players can contribute to the policy framework through such means as their ability to regulate or approve, or by public education and political pressure on those who have those regulatory powers. And once policy is established in regulatory law or action program, the continued willingness to enforce or implement those policies will determine the effectiveness of achieving the policy goals.

Federal Policy

The Congress of the United States has established two major areas of federal policy that affect the Manhasset Bay and its water quality. Under the Clean Water Act, as amended, the Congress has declared its intent that not only shall direct sources of water pollution "point sources" that can be identified as originating at a specific location, but also "non point sources" (NPS) of area-wide origin shall be abated, mitigated or eliminated. Section 319 of the Clean Water Act amendments of 1987 directed the federal agencies to focus attention on the impacts of NPS on surface water quality, and with the state governments, to undertake programs to control and abate NPS pollution.

Federal attention to coastal areas such as Manhasset Bay is also expressed in the Coastal Zone Management Act of 1972, and states such as New York have responded with statewide programs addressing land uses, pollution and shoreline enhancement along both fresh and salt water coastlines throughout the state. Section 6217 of the 1990 reauthorization of the Coastal Zone Management Act directs the state to formulate new CZM programs with the technical guidance of the federal Environmental Protection Agency, with particular attention to critical areas along the coasts where land uses may contribute to future impairment. Municipalities are encouraged to prepare and adopt Local Waterfront Revitalization Plans that address specific local problems and their resolution through improved planning and remediation measures.

Federal policy with regard to water quality and watershed and waterway management is implemented through the U.S. Environmental Protection Agency, the Army Corps of Engineers, and, for the administration of the National Flood Insurance Program, the Federal Emergency Management Agency.

State Policy

As part of its implementational response to these federal policy initiatives, the State of New York utilizes the administrative and regulatory structure of several existing departments: Environmental Conservation, Health, Transportation, and State.

The Department of Environmental Conservation (NYSDEC) has statutory authority for the management of water resources and the control of water pollution in the state. It administers the award of NPS grants from the NYS Nonpoint Pollution Control Program, determines acceptable water quality standards, and administers the State Pollution Discharge Elimination System (SPDES) program. The department plays a significant role in the approval of projects under the Clean Water/Clean Air Bond Act and the Environmental Protection Fund. It also administers the Coastal Erosion Hazard Areas program, which restricts development of natural, protective coastal features, and the regulation by the State of designated freshwater and tidal wetlands.

The Department of Health (NYSDOH) develops statewide specifications and guidelines for septic waste management, and for the monitoring of water quality at public bathing beaches. The monitoring and administration of these programs may also be delegated to or shared by a local agency, such as the Nassau County Department of Health for the Manhasset Bay watershed.

The Department of State has a long tradition of providing technical and advisory assistance to local governments in the areas of planning and public administration, in addition to its statutory functions as a statewide administrative agency. It administers the New York State Coastal Zone Management Program pursuant to both the federal act and the implementing State Waterfront Revitalization and Coastal Resources Act. It provides program grants to municipalities for the preparation of Local Waterfront Revitalization Programs, and is an active participant and funding sponsor of the development of the Manhasset Bay Water Quality Improvement Plan.

The Department of Transportation designs, owns and maintains state highways and arterial routes and their associated storm water drainage. Its transportation related projects are intended to be consistent with local and regional plans, and it has developed guidelines for storm water quality management with regard to these projects. The mitigation measures, however, focus more on volume reduction and flood control than on the improvement of water quality.

Regional Agencies

The Interstate Sanitation Commission was formed by the states of New York and New Jersey under a compact in 1936, which was approved by Congress. Connecticut joined the Commission in 1941. The Commission's responsibilities and programs include investigation and sampling for air pollution, resource recovery facilities and toxics, but the ISC's continuing emphasis has been on water quality. In this area, the Commission is both a regulatory and an enforcement agency. Its area of jurisdiction runs west from Port Jefferson and New Haven on Long Island Sound, from Bear Mountain on the Hudson River down to Sandy Hook, New Jersey (including the Upper and Lower New York Bays, Newark Bay, Arthur Kill and Kill Van Kull), the Atlantic Ocean out to Fire Island Inlet, and the waters abutting all five boroughs of New York City. It can initiate or join lawsuits and administrative hearings to ensure that permits to operate wastewater treatment plants and industrial discharges are stringent enough to deal properly with toxics, sewer overflows, and nutrients, and to prevent untreated wastewater and floatables from emptying into Tri-state waterways.

The Long Island Sound Study (LISS) has been a cooperative effort among the citizens, municipalities and environmental protection agencies of the states of New York and Connecticut, together with the U.S. EPA and the Interstate Sanitation Commission. The LISS has identified numerous threats to the productivity and recreational viability of the Sound. The LISS has focused its efforts and resources on the hypoxia problem, which involves low oxygen levels in the bottom waters of western Long Island Sound in late summer, caused by the over-enrichment of nitrogen. To manage the nitrogen problem the EPA and the states of New York and Connecticut initially agreed to cap point source nitrogen loadings at their 1990 levels. The cap

did not apply to storm water runoff or other nonpoint sources of nitrogen. The 1994 LISS Comprehensive Conservation Management Plan contained commitments to begin to reduce the load of nitrogen to the Sound from both point and nonpoint sources. In 1998, the EPA and the states of Connecticut and New York released a proposal for Phase III Actions for Hypoxia Management, including nitrogen reduction targets for each watershed management zone.

The Long Island Sound Coastal Management Program will eventually replace the New York State Coastal Management Plan along the Sound's New York shoreline. Its policies call for the application of Best Management Policies (BMPs) to control and reduce non point source pollution.

Nassau County

Several Nassau County agencies have active roles in shaping and implementing public policies with respect to planning, conservation, and environmental protection in the Manhasset Bay watershed.

The Nassau County Planning Commission has jurisdictional authority in the unincorporated portion of the Town of North Hempstead (the areas of Port Washington and Manhasset) for land subdivisions of five or more lots or of 4 or less if a roadway is proposed. When the Planning Commission determines that a subdivision requires the approval of the Commissioner of Public Works (as per the Real Property Law §334a), it forwards the plans to the appropriate divisions of the Department of Public Works and the Nassau County Health Department for review and approval. Subdivisions of four lots or less that do not include a proposed roadway that intersects a County road may be waived for review by the Planning Commission. In addition, certain other municipal planning and zoning actions must be referred to the County Planning Commission for approval before they can become effective. The Commission is currently developing a comprehensive master plan of development for the entire county, which it expects to adopt by December 31, 1998.

The Department of Public Works (DPW) is responsible for the design and maintenance of the County roadway system. Upon request by the County Planning Commission or a municipality, it can participate in the review of a land subdivision. Depending on the nature of the request and the specifics of the proposed subdivision, the review may be conducted by any or all of the following DPW Divisions: Water Management; Hazardous Waste; Traffic; Sanitation and Water Supply; and Land Acquisition. The review may include: an assessment of the impacts on County and local roadways; road and lot grading details; storm water management; on and off-site storm water drainage structures and appurtenances; the availability and design of sanitary facilities; and traffic engineering.

The Department must review, pursuant to §239(j) and (k) of the General Municipal Law, any construction for which a municipality is issuing a building permit, if that property fronts on or abuts a County road, County right-of-way, or other County property. This review is similar in context to a subdivision review, but is generally conducted on a smaller scale. Municipal plans for any drainage improvements (e.g., dams, culverts, ditches, or sluices, or overflow protection of the County's lakes, ponds, streams, ditches or water courses) must be submitted to the DPW for review and approval, with regard to the potential impacts of those improvements on County roads and drainage systems. Like the NYSDOT, these reviews have been concerned less with managing the water quality of the flow and more with managing its quantity, to assure that the proposed activity will not result in flooding of properties and roadways. The DPW review also is to determine if the discharge of runoff from a proposed development will adversely affect the collection and conveyance design attributes of the storm water system network.

The County DPW may also provide, either singly or in cooperation with other governments, for the widening, deepening or dredging of bays, harbors, inlets and channels within the County, and for the construction of dikes, bulkheads, seawalls, etc., for the purposes of navigation or for flood or storm water damage protection.

The Department of Health must review and approve residential septic system designs for subdivisions of five lots or greater, both in the unincorporated and in the incorporated areas. It

has general responsibility for the investigation of any illegal sewage or septic discharges, as well as violations of the County public health ordinances. The latter include monitoring of the water quality conditions at the bathing beaches of Nassau County. If the Department finds that bacteria levels at a beach exceed the State's contact recreation standard of 200 colonies/100 ml, it will order the closing of that beach.

The Nassau County Soil and Water Conservation District, which is administered from the offices of the County Planning Department, provides technical assistance and information on land use practices and NPS reduction methods.

Municipal Governments

The most direct and pervasive administrative and regulatory framework over the use of land, and its continued maintenance in the furtherance of pollution control and reduction, is in the hands of the municipal governments within the Manhasset Bay watershed. They have established a wide variety of land use and other controls through municipal ordinances, including not only zoning and site development policies and procedures, but also, under their general "police" power to control private actions in the interest of the public health, safety and general welfare, matters relating to littering, garbage, rubbish and refuse, soil removal, animal wastes, trees, and the like.

Having placed such laws on the books, however, will not achieve the desired objectives of pollution control and water quality enhancement unless there is an equal commitment on the part of those municipal officials to see that they are enforced, uniformly and consistently. Further, with a consortium of municipalities focusing on the water quality problem, there is a need for intermunicipal consistency as well.

4.3 Review of Existing Municipal Policies, Plans and Regulations

The Incidence of Vacant Land

The regulations and procedures for land use management, and for the management and improvement of storm water runoff and water quality, are in many cases designed and intended for imposition on vacant land at the time it is proposed for development by the private sector. Municipal governments are, of course, free to act at any time to construct or install the physical facilities that may be needed; a by-product of the development review process is that facilities which implement area-wide improvements can be installed at the cost of the developer and his customers.

It is appropriate, therefore, to examine the amount of vacant land within the Manhasset Bay watershed, to identify those communities in which the initiation or enforcement of development review techniques are more likely to be needed. The land use information available from the Nassau GIS system includes the category of "Vacant or Unknown" (as contrasted to land in a variety of uses or designated as "open space"). The municipalities and areas are listed in descending order of acres of vacant or unknown land. The specific parcels in this category are not known.

Municipality or *Unincorporated Area* Col. 1	**Unknown or Vacant LU (Ac) Col. 2**	**% of Total Vacant Land in Watershed Col. 3**	**Cumulative Total of Unknown or Vacant Land Col. 4**	**Municipal. Acres in Watershed Col. 5**	**Vacant in W/S as % of Municipal Acres in Watershed Col. 2 ÷ Col. 5**
Manhasset	466.29	43.575%	43.575%	1506.41	30.95%
Kings Point	238.36	22.275%	65.850%	1654.39	14.41%
North Hills	150.48	14.062%	79.912%	442.08	34.04%
Port Washington North	101.37	9.473%	89.385%	317.64	31.91%
Manorhaven	24.64	2.303%	91.688%	310.39	7.94%
Lake Success	18.35	1.715%	93.402%	192.16	9.55%
Great Neck	15.55	1.453%	94.856%	368.61	4.22%
Plandome	12.33	1.152%	96.008%	320.97	3.84%
Thomaston	9.67	0.904%	96.911%	151.49	6.38%
Flower Hill	7.93	0.741%	97.653%	924.00	0.86%

Municipality or *Unincorporated Area* Col. 1	Unknown or Vacant LU (Ac) Col. 2	% of Total Vacant Land in Watershed Col. 3	Cumulative Total of Unknown or Vacant Land Col. 4	Municipal. Acres in Watershed Col. 5	Vacant in W/S as % of Municipal Acres in Watershed Col. 2 ÷ Col. 5
Sands Point	7.69	0.719%	98.371%	1216.02	0.63%
Port Washington	7.62	0.712%	99.083%	1431.70	0.53%
Baxter Estates	6.67	0.623%	99.707%	106.91	6.24%
Plandome Manor	2.16	0.202%	99.908%	367.48	0.59%
Kensington	0.95	0.089%	99.997%	36.91	2.57%
Plandome Heights	0.03	0.003%	100.000%	116.71	0.03%
Great Neck Gardens	0.00	0.000%	100.000%	18.32	0.00%
Munsey Park	0.00	0.000%	100.000%	321.26	0.00%
Roslyn Estates	0.00	0.000%	100.000%	143.28	0.00%
TOTAL	1070.09	100.000%		9946.73	

Column 4 of the table shows that almost 90% of the vacant land in the watershed is located in just four areas: the unincorporated portion of the Town of North Hempstead designated as "Manhasset", and the villages of Kings Point, North Hills and Port Washington North. It will be these communities that will be the major players when it comes to the future use of land. Approximately one-third is in the Vacant category.

Policies and Plans

Policies and plans adopted by a municipality provide the overall guidance to achieve the future vision of the community. Good planning depends on the organization of those policies into a cohesive whole. For effective administration of water quality improvement measures for Manhasset Bay, it is essential that the policies of the participating municipalities be coordinate, rational and consistent. Once the policies for water quality improvement have been set, the various jurisdictions can be encouraged to adopt or amend their regulations that affect water quality so that they can be effectively implemented and enforced without disparity, contradiction or confusion.

Policies for water quality improvement are set within the broader field of municipal policy relating to the direction for the development, preservation, enhancement and improvement

of the municipality and its infrastructure. Municipal governments depend upon the private enterprise system to be the major agent for delivering civic objectives through private investment and through the entrepreneurial role of the developer. Virtually all of our urban development facilities, other than those uses that are patently public, must be provided through the private enterprise process: these include housing, extension of utilities, transportation and parking systems, communications, recreation and other facilities. In guiding that development towards the accomplishment of the municipal objectives, there are four roles that the municipal government may choose for itself, and these are exemplified in the policies, plans, regulations and budgets of the local governments.

1. It can assume a passive role, and simply provide gratuitous advice and guidance as to how others should cause the community to develop.

2. It can assume a regulatory role, through the police power, of controlling the private actions of others. This is most often done through the zoning ordinance, official map, site plan approval procedures, and land subdivision approvals. These are most usually negative procedures, restricting the type of development or activity that can take place: "Thou shall not ...."

3. It can provide incentives in a proactive role to induce the private sector to follow the path that the municipal government believes most appropriate: "We can't make you do it if you don't want to, but if you do it our way, we'll make it worth your while." Inducements take many forms, many of them financial such as tax abatement, or award additional benefits in the form of increased density, or greater intensity of use.

4. It can take on the role of the developer itself, acting as the entrepreneur: obtaining and packaging the land (as in urban renewal), preparing the plans, and if necessary, acting as the prime contractor.

Whatever its philosophical approach to the role of government in development, it is essential and eminent good sense to do so in the context of a comprehensive plan for the community.

Comprehensive Plans

The keystone of municipal land use policy should be its comprehensive plan: a plan comprehensive in its time frame, in its geographical integrity and in its content. For example, as Frederick Law Olmsted Jr., one of the early leaders of the planning profession, defined a municipal plan:

> "We must cultivate in our minds and in the mind of the people the conception of a city plan as a device ...for preparing, and keeping constantly up to date, the unified forecast and definition of all important changes, additions and extensions of the physical equipment and arrangement of the city which a sound judgment holds likely to become desirable and practicable in the course of time, so as to avoid so far as possible both ignorantly wasteful action and ignorantly wasteful inaction in control of the city's physical growth. It is a means by which those who become at any time responsible for decisions affecting the city's plan may be prevented from acting in ignorance of what their predecessors and their colleagues in other departments of city life have believed to be reasonable contingencies.[1]"

Significant changes were made in 1994 in the New York State enabling statutes that permit municipalities to prepare and adopt comprehensive plans. Prior to the adoption of these changes[2], the preparation of a "master plan" was solely within the purview of a community's planning board. Now, however, only the village's board of trustees or the town board is authorized to adopt a municipal comprehensive plan. The legislative board may authorize its planning board (or other "special board" as defined by the statute) to prepare the municipal comprehensive plan or amendments thereto, and to recommend approval of the same to the legislative body. Similarly, the new legislation does not invalidate a community's existing "comprehensive plan", but does give for the first time a specific definition of what a comprehensive plan is to mean and what, in the future, it is to contain. The term "comprehensive plan" means the materials, written and/or graphic, including but not limited to maps, charts, studies, resolutions, reports and other descriptive material that identify the goals, objectives,

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[1] *Proceedings of the Third Conference on City Planning,* Philadelphia, Pennsylvania, May 15-17, 1911 (Boston, 1911), pp. 12-23.

[2] Village Law §7-722 and Town Law §272-a.

principles, guidelines, policies, standards, devices and instruments for the immediate and long-range protection, enhancement, growth and development of the municipality.

Further, the formerly amorphous relationship between the recommendations of a municipal land use master plan and the community's zoning ordinance and other regulations, once a comprehensive plan is adopted under the new statutory language, is now clearly stated in the new legislation: "All [village or town] land use regulations shall be in accordance with the comprehensive plan adopted pursuant to this section. [3]" Under previous case law, the mandate of compliance with a comprehensive plan related only to zoning laws. The term "land use regulation" is defined to include "any zoning, subdivision, special use permit or site plan regulation which prescribes the appropriate use of property or the scale, location and intensity of development."[4] In other words, all municipal regulations that effect land use must consider and be in accordance with the municipality's comprehensive plan.

Practice Commentaries author Terry Rice makes the following point in McKinney's Consolidated Laws of New York (Annotated):

> It is important to emphasize that [Village Law §7-722 and Town Law §272-1] do not require that any community adopt a comprehensive plan pursuant to [these sections] or that a community's existing comprehensive plan, that is, one predating the 1995 amendment to [these sections], must be amended prior to the adoption of a zoning amendment inconsistent with its existing comprehensive plan. The revised statute confirms the legislation's intent to encourage the preparation and adoption of comprehensive plans, but not to mandate such a requirement. Consequently, a [village or town] may continue to operate under the vagaries of existing case law. However, once a [village or town] adopts a comprehensive plan pursuant to [these sections], the revised statutory scheme applies and consistency with its comprehensive plan is required.[5]

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[3] Village Law §7-722(11)(a) and Town Law §272-a(11)(a)

[4] Village Law §7-722(2)(b) and Town Law §272-a(2)(b)

[5] Rice, Terry, in *Practice Notes*, McKinney's Village Law §7-722 and Town Law §272-a

Comprehensive plans that address the location, type and pattern of future development are particularly important in municipalities with significant amounts of vacant land. Communities that are fully developed, however, frequently overlook the importance of having a comprehensive plan that is up to date, perhaps in the belief that there are no development decisions yet to be made. Yet the need for a current comprehensive plan is equally important here, in order to address the opportunities and possibilities of re-development of properties that are inappropriately developed or that have reached the end of their economic useful life. Similarly, new concerns and priorities may arise that were not foreseen at the time of the original development of the community, such as deteriorating infrastructure, environmental protection, and, as in the current study, the protection and enhancement of Manhasset Bay.

A municipality that adopts a comprehensive plan under the new legislation gains new status with respect to the planned activities of other governmental agencies. Provision is made[6] that all plans for capital projects of another governmental agency on land included within the municipal comprehensive plan adopted pursuant to the new legislation shall take such plan into consideration.

The new comprehensive plan statutes for towns and villages provide a list of topics that may be included in such plans; this list is presented in Appendix N-2. In the Manhasset Bay watershed, apparently only the Town of North Hempstead has an adopted comprehensive plan in place.

Zoning Ordinances

Municipal zoning ordinances are the permissive tools that reflect current municipal policy with regard to the present and future use of land. All municipalities in the watershed have zoning ordinances in force, in varying degrees of complexity and sophistication. Ordinances were

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[6] Village Law §7-722(11)(b) and Town Law §272-a(11)(b)

reviewed for specific features that require or promote environmental protection, water quality management, and runoff control. The findings are presented in Appendix N-3.

The basic grant of zoning authority[7] permits municipal governments to regulate private property rights in the interest of the public health, safety, morals and general welfare the "police power" of government. The authority covers the ability to regulate and restrict the height, number of stories and size of buildings and other structures, the percentage of a lot that may be occupied, the size of yards, courts and other open spaces, the density of population, and the location and use of buildings, structures and land for trade, industry, residence, or other purposes. Such regulations must be made in accordance with a comprehensive plan and shall be designed to achieve one or more of the following purposes[8]:

Lessen congestion in the streets	Provide adequate light and air
Secure safety from fire, panic, floods and other dangers	Avoid undue concentration of population
Promote health and the general welfare	Prevent the overcrowding of land
Make provision for the accommodation of solar energy systems and access to sunlight necessary thereof	Facilitate the adequate provision of transportation, water, sewerage, schools, parks

The regulations shall be made with reasonable consideration, among other things, as to the character of the district and its peculiar suitability for particular uses, and with a view to conserving the value of buildings and encouraging the most appropriate use of land throughout the municipality. Where a municipality attempts to use the zoning ordinance as the vehicle for regulations and procedures for water quality controls, it must do so within the rubric of the table above, the statutory purposes of zoning.

One of the drawbacks to zoning is that it frequently uses a series of *minimum* standards, and therefore allows a *minimum* community to be created. Because of the equal protection requirement of the enabling statutes and the U.S. Constitution, zoning standards must be equally

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[7] Village Law §7-700 and Town Law §261

applicable to all properties in the same zoning district. Although the statutes provide that boards of zoning appeal may be created, there are stringent requirements as to what form and what amounts of relief can be granted to a property owner who can show that he suffers from unusual hardship or practical difficulty because of the strict application of the zoning ordinance. A zoning board is a board of relief and not a board of privilege; it has a responsibility to see that landowners are restored to the same level of enjoyment of the use of their property as is accorded to their neighbors who do not suffer the hardship.

Recent changes (1992) in the state enabling statutes have made it possible for a municipality to use its zoning authority in creative, proactive ways. For example, §7-703 of the Village Law provides for "incentive zoning", which allows it to combine the municipal control function with the incentive function in order that specific physical, social or cultural benefits or amenities would inure to the community (please see Appendix N-5).

The opportunity to use this new power creatively in the interests of water quality improvement in the Manhasset Bay watershed should be fully explored. It would have greatest potential in those communities with significant amounts of vacant land at the time of the development of those lands, and in those municipalities where brownfield or other properties that have reached the end of their useful life in their present uses are presented for reuse, redevelopment, and rezoning.

Planning Boards and Land Subdivision Regulations

Both the Town and Village Laws of New York permit municipalities to establish planning boards.[9] Once established, a planning board has the authority to make such investigations, maps, reports, and recommendations in connection therewith, on any matter relating to the planning and development of the municipality that it deems desirable.[10] It may

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[8] Village Law §7-704 and Town Law §263

[9] Village Law §7-718 and Town Law §271

[10] Village Law §7-718(14)(b) and Town Law §271(14)(b)

review and make recommendations on a proposed municipal comprehensive plan, or an amendment thereto. The municipal legislative body may provide for the reference to the planning board of any matter or class of matters before final action is taken by the legislative body or any other municipal official or board that has approval jurisdiction over the matter.[11] This referral procedure may also stipulate that final action not be taken on the matter until the planning board has submitted, or has had a reasonable time to submit, its report thereon. With respect to planning board rules and procedures, a planning board may recommend to the municipal legislative body such rules and regulations relating to any matter over which the planning board has jurisdiction; adoption of those recommendations by the legislative body shall be by local law.[12]

New York State permits municipalities to require municipal review of the subdivision of land, prior to the filing of a plat showing lots, blocks or sites, with or without streets or highways. Such authority is usually granted to the municipal planning board by the municipal legislative body.[13] In Nassau County, the Nassau County Planning Commission has approval jurisdiction in the unincorporated area (e.g., the Port Washington and Manhasset areas of the Town of North Hempstead) for all subdivisions of 5 lots or more and of four or less lots if a roadway is proposed. Within incorporated villages, the municipality usually delegates this approval authority to its planning board or commission.

Please see Appendix N-6 for a tabulation and discussion of the status of planning boards and their subdivision review authority in the Manhasset Bay watershed. Pertinent approval elements relating to the Manhasset Bay Water Quality Improvement Plan are also identified.

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[11] Village Law §7-718(14)(a) and Town Law § SSSSS

[12] Village Law §7-718(13) and Town Law §271(13)

[13] Village Law §7-728(1) and Town Law §276(1)

Site Plan Review

Municipalities may require that the applicant for a proposed land use seek the advice and approval of a municipal official or review board before approval is granted, even where such use may be permitted under zoning as a matter of right. Site plan review procedures have been developed over the years to fill a void in planning review that was not covered by subdivision review. The review permits the reviewing agency to regulate the development of single parcels in a manner not covered by the ordinary provision of zoning laws, by the application of planning principles to the proposed use of a parcel of land. Site plan review offers the opportunity to recommend or require special design standards that achieve specific municipal objectives, and does for individual uses what subdivision review and approval does for multi-parcel developments. Although used for many years by progressive municipalities who adopted such procedures within the texts of their zoning ordinances, the site plan review procedure was codified formally into the enabling statutes for villages and towns in 1992.[14] Whereas subdivisions are reviewed by local planning boards, site plan review procedures may call for the review the planning board or by any of several other municipal agencies, such as the legislative body, the zoning board of appeals, or an architectural review agency. The planning agency is the most commonly used, however.

Site plan reviews are most often required for new uses in the non-residential districts of a community, such as the business or industrial zones; new structures in multi-family residential districts may also be included. Site plan review procedures are usually not required for single-family residences, but may be required of other uses permitted by right or special permit in single-family zoning districts (e.g., religious structures, educational facilities, and the like).

A site plan, at its minimum, is a rendering, drawing or sketch prepared to specifications and containing necessary elements, as set forth in the applicable zoning ordinance or local law, that shows the arrangement, layout and design of the proposed use of the single parcel shown on

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[14] Town Law §274-a and Village Law §7-725-a

the plan. Local laws may be even more specific as to plan content, particularly as to such elements as parking, means of access, screening, signs, landscaping, architectural features, location and dimension of buildings, adjacent land uses and physical features.

The need for using this procedure, and the complexity of the review process, in the Manhasset Bay watershed should be related to the size of the community, its types of land use and zoning districts, the amount of vacant land that remains, and the likelihood of reuse and redevelopment of blighted properties or those on which the present use has reached the end of its useful life. The municipal ordinances of the Manhasset Bay communities were reviewed for the presence of site plan procedures; the results are tabulated in Appendix N-7. Relatively few communities have specific procedures for this type of review; fewer still are those that include elements that relate to the control and improvement of storm water runoff and surface and ground water quality.

Alternative Developments

These are non-traditional developments that will assure conservation of land and accomplish the preservation of land for open space and recreation, the protection of natural areas or historic sites, the preservation of wetlands and marshlands or lands with other natural values, and the protection of streams, rivers and ponds and of areas with steep slopes. In the case of single-family subdivisions, they are sometimes called cluster or conservation developments, and may allow an increase in density of development in one part of a site in order to protect other, more sensitive land while the average density remains the same. Cluster developments had been permitted for a number of years in individual communities by virtue of specific authorization in their zoning ordinances. The procedure was formally recognized by New York State by the enactment of Village Law §7-728 and Town Law §278, which linked the approval of the cluster development to the simultaneous approval of a subdivision plat. Not only may the planning board permit increased density on lots within certain portion of the subdivision, but it may also, at its discretion, permit the dwelling units to be in detached, semi-detached, attached, or multi-story structures.

The regulations are particularly suitable for application in communities with significant amounts of vacant land and with desirable opportunities for open space preservation and environmental protection, where potential densities are large enough to result in meaningful conservation accomplishment. In general, the municipalities tributary to the Manhasset Bay do not have such standards in place. For a tabulation, please see Appendix N-8.

Animal and Pet Waste

The transport by storm water of animal fecal matter, such as dog waste, from the streets of a municipality into Manhasset Bay can adversely affect its water quality. The ordinances were examined to determine the presence of any specific requirement that pet owners be obligated to gather and remove such wastes from the streets and dispose of it in a sanitary manner. All municipalities were found to have substantially similar regulations in place; please see Appendix N-9 for a full tabulation. For example, the Flower Hill code provides[15]:

> **§13-7. Nuisances prohibited**. No person who owns, possesses, harbors or controls a dog, cat or other animal shall cause, suffer, permit or allow such dog, cat or other animal to soil, deface, defecate, urinate or otherwise commit a nuisance on:
>
> a. Any public highway, street or road or any public thoroughfare or walkway used by the public, except that dogs, cats and other domestic animals may be permitted to urinate or defecate on that portion of a public highway or road between the curblines if any such feces or other solid materials so deposited by such dog, cat or other domestic animal is [sic] immediately removed and disposed of in a safe and sanitary manner.
>
> b. Any private property, other than the property occupied by the owner, possessor, harborer or controller of such dog, cat or other animal, without the consent of the occupant thereof.

[15] Flower Hill Code, Chapter 13, Article III

Aquifer Protection

An aquifer is a geological unit that is capable of yielding usable amounts of potable water. The Long Island Regional Planning Board has established special groundwater protection districts in several areas of the county, including the Town of North Hempstead and the Villages of Lake Success and North Hills. In Great Neck, Kings Point and the Town of North Hempstead, where public water is supplied by the Water Authority of Great Neck North, specific restrictions are in place, the authority of others to tap into the water strata below those areas is restricted and subject to municipal review. The Town's Aquifer Protection Overlay District requires clustering of new residential development, sewering of nonresidential lands, and strict clearing and erosion control practices. In other communities, the right to discharge into the areas that may percolate into the aquifer is limited or fully restricted. Only in Plandome Heights was there a specific restriction about the discharge of garbage or sewage into Manhasset Bay itself (see Appendix N-10 for the full tabulation).

Buffer Zones

Buffer zones are areas of land without structures that are left in their natural state or landscaped to serve as visual or natural barriers between different land uses, or between a natural resource, such as a stream, and developed areas. Such natural areas can provide opportunities for runoff control, as well as providing screening or habitat protection. Many of the Manhasset Bay municipalities require buffer zones under certain circumstances (see Appendix N-11 for this tabulation). None, however, were specifically utilizing these buffer areas for drainage control, recharge, or pollution abatement purposes. This is a missed opportunity; it is recommended that standards and best management practices for these purposes be developed for the benefit of storm water control in the watershed.

Critical Environmental Areas

The SEQRA regulations[16] permit the municipality, county or state to identify and establish and map specific geographic areas as Critical Environmental Areas, wherein assiduous environmental review is to be called for. To be designated by an agency as a critical environmental area, an area must have an exceptional or unique character covering one or more of the following: (a) a benefit or threat to human health; (b) a natural setting, such as a fish or wildlife habitat, or a forest or other vegetation, or open space, or important aesthetic or scenic quality; (c) agricultural, social, cultural, historic, archaeological, recreational, or educational value, or (d) an inherent ecological, geological or hydrological sensitivity to change that may be adversely affected by any change.[17] The area designated must be within the jurisdictional boundary of the agency, and to be so designated by a state agency, the area must either be owned or managed by that state agency, or under its regulatory authority. Designation must be preceded by written public notice and a public hearing. The notice must identify the boundaries and the specific environmental characteristics of the area warranting CEA designation. Notification of CEA designation, to become effective, must be given to the commissioner of the NYS Department of Environmental Conservation (NYSDEC), to the appropriate regional office of the NYS DEC, and to any other agency regularly involved in undertaking, funding or approving actions in the municipality in which the CEA gas been designated.

Formerly, the effect of creating a Critical Environmental Area was to make any Unlisted Action affecting property therein a Type I action automatically, making it subject to the full Environmental Assessment Form and with a presumption that an adverse environmental impact might occur. Under the current SEQRA procedures (q.v.), this has been modified and softened, to reduce the administrative activity that would otherwise be triggered. Under the new procedures, the lead agency in a SEQRA review of a Type I or Unlisted Action must make a determination of the potential for that action to create at least one significant adverse environmental impact, and

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[16] 6 NYCRR §617

[17] 6 NYCRR §617.14(g)

among the criteria for determining significance is "the impairment of the environmental characteristics of a Critical Environmental Area."[18]

According to the list of Critical Environmental Areas promulgated by the Division of Environmental Permits of the NYS Department of Environmental Conservation, there are no Critical Environmental Areas in the Town of North Hempstead or any of its villages. Special Groundwater Protection Areas filed by the Long Island Regional Planning Board in the Spring of 1993 are listed by the DEC as CEAs only in Suffolk County. There is a Special Groundwater Protection Area in the Town of North Hempstead and the villages of North Hills and Lake Success. According to Bill Spitz at DEC (444-0419) all of the SGPAs were designed by State Legislature as CEAs.

Erosion and Sediment Controls

An erosion and sediment control policy contains the proper provisions to control adequately erosion and sedimentation from a land use, a subdivision, or other development, both during and after construction, and to reduce the potential damage from storm water runoff therefrom. The policy may also address the amount of impervious cover permitted for various uses, as a means of limiting the amount and rate of storm water surface runoff. The installation of hay bales or sediment control fences to trap runoff on the site during construction, and the seeding of areas of disturbed earth that will remain for more than seven days are other measures that can be required to prevent siltation from construction from leaving the site. Provision is usually made to exclude usual landscaping, gardening and maintenance of lawns of private residences and those of commercial or industrial structures, or golf courses. Municipalities may also have specific regulations and procedures governing the excavation of natural materials (q.v.), which may involve extensive reclamation requirements.

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[18] 6 NYCRR §617.7(c)(1)(iii)

The regulations of the Manhasset Bay municipalities were reviewed to identify requirements for erosion and sedimentation controls, and the results are presented in Appendix N-12. None of the municipalities had a community-wide ordinance in place, however, for the purposes of general erosion control and the reduction of the sedimentation of Manhasset Bay. see also Appendix N-13 for an example from the Village of Great Neck of well-conceived standards for the stabilization and reclamation of disturbed soil areas.

Flood Plain Management

Flood plains are the relatively flat areas adjoining streams and coastal areas that can flood and which when built upon can be a hazard to life and property. All of the watershed municipalities have extensive ordinances in place regarding flood damage prevention as a result of their actions to qualify for Federal flood insurance. Few of these ordinances go beyond the basic structure of the federal model ordinance, however, nor do they address other issues of water quality, land use and pollution protection (but cf. Flower Hill!). Please see Appendix N-14 for a tabulation of the regulations in force.

Wetlands

Freshwater and tidal wetlands in New York can be subject to special protection procedures, either at the initiation of the State or local governments, by virtue of their size, location, and importance. The regulations were reviewed to determine which municipalities had made special recognition of wetlands, and to determine the presence or absence of buffer or setback requirements from such identified wetlands, or from wetlands in general. (See Appendix N-15.)

Open Space Protection Plans and Regulation Requirements

Municipal regulations and polices were reviewed to determine the extent to which they plan for and encourage or require open space dedication to protect natural areas and provide for

recreational opportunities or storm water detention facilities. Open space dedication refers to requirements in regulations or municipal policy to set aside a certain amount of land for permanent open space as part of the subdivision or site plan approval process. Specific provisions were found for the Town of North Hempstead, which imposes requirements in its Residential Open Space and Open Space Recreation Districts, and encourages the preservation of open space in its PUDD Planned Unit Development District. (See Appendix N-22 for these requirements.)

Resource Extraction

Resource extraction refers to the excavation and removal of earth materials from a parcel of land. Zoning regulations were reviewed to identify any special permit or other requirements or prohibitions for the removal of earth materials, including sand and gravel mining. In addition, the ordinances were reviewed to determine the extent of standards or requirements for the stabilization and reclamation of disturbed areas to control erosion and sedimentation. The results are tabulated in Appendix N-16.

SEQRA Procedures

The New York State Environmental Quality Review Act [19](SEQRA) requires that any action that is to be undertaken, approved or funded by a public agency must undergo a review process to determine if it will have a potential impact on the environment. The New York State Department of Environmental Conservation is the agency responsible for oversight and facilitation of the process; NYS DEC has developed extensive regulatory and administrative procedures generally known as the "SEQRA Regulations."[20] Local governments may develop their own procedures within the frame work of those of the State. In the event that no local procedures are established, the local government automatically must operate under the state procedures and definitions. There are extensive procedures providing for coordinated review

[19] NYS Environmental Conservation Law, Article 8 – Environmental Quality Review

[20] 6 NYCRR Part 617

when several agencies have "yes/no" authority over the action, and for selecting which of these "involved" agencies shall be the "lead agency," *primus inter pares,* and have the administrative responsibility to assure the regulations are complied with.

Three types of action are of major concern: Type I, Type II, and Unlisted. Type I actions are those determined by the State, perhaps as augmented by the local government, that are more likely to require the preparation of an Environmental Impact Statement (EIS) than are Unlisted Actions, because they are more likely to create a significant adverse environmental impact. (Type I actions do not create such an impact by definition, but the burden is on the reviewer to prove that they *don't.*). Type II actions have been determined by the State *not* to have a significant impact on the environment, and therefore are not subject to any further review under SEQR. Unlisted Actions are those that are neither Type I or Type II. (There is also a class of Exempt Actions, which are deemed not to be "actions" within the meaning of the SEQRA statute: enforcement proceedings or the exercise of prosecutorial discretion determining whether or not to institute such proceedings; official acts of a ministerial nature, involving no exercise of discretion; maintenance or repair involving no substantial changes to an existing structure or facility.)

To help it determine significance, the lead agency causes to be completed an Environmental Assessment Form (EAF). There are two types of EAFs: the full EAF and the short EAF. The full EAF is prescribed by the SEQRA Regulations, and must be used for any Type I action. The short EAF can be used for Unlisted Actions, although the lead agency may require that a full EAF be prepared instead. A local agency, if it adopts its own SEQRA procedures, may adopt or modify the environmental assessment forms contained in the State's SEQRA regulations, provided that the individual agency modifications are no less protective of environmental values and the scope of the modified form is as comprehensive as the model form. Where a significant detrimental impact is found by the lead agency, the agencies involved may impose mitigation measures, or may deny the action.

The state enabling statutes for planning and zoning authority have been modified to permit local governments to coordinate their planning and zoning actions with the SEQRA

requirements, particularly with regard to public hearings and time windows for approval or disapproval. It is important, therefore, that the municipal governments take similar steps to assure the two processes are compatible at the local level, to avoid confusion and any embarrassing inconsistencies.

The regulations of the watershed communities were reviewed to determine the enforcement practice and local procedures of the municipalities. In many cases, the local regulations have not been modified to conform to the major revisions of 6 NYCRR Part 617, the State's SEQRA regulations, as modified by the State for actions for which a determination of significance had not been made prior to January 1, 1996. Where these incongruities were determined, they are identified as *Out of Date*. Please see Appendix N-17 for a tabulation of the status of SEQRA regulations in the Manhasset Bay communities.

Because changes in State procedures can cause local laws to become inconsistent, unless there is a compelling local reason to adopt special municipal procedures, tighter thresholds, or other elements, environmental review specialists are recommending with increasing frequency that municipal governments rescind any existing procedures, and simply adopt the State regulations and standards by reference. In this way, local procedures will "float" with any changes in the State regulations.

Solid Waste Management and Litter Controls

The manner in which a municipality regulates and enforces the management of trash, rubbish, refuse and yard wastes can have a significant effect on the pollution of the Bay with floatables, organic materials, and other debris that is borne into the bay by its tributaries and storm drains. Specifically, the municipal regulations were reviewed to determine the extent of current controls and practices with regard to the dumping of leaves and other organics on the streets and highways, where they can be discharged into the Bay. Also identified, where possible, were parallel types of waste control measures that might be broadened to include removal of dead leaves from the streets and gutters in front of private properties (e.g., the code of Baxter Estates, Section III.3(d)). The results are tabulated in Appendix N-18.

Storm Water Management

This refers to the combination of practices or actions taken to control the quantity, rate of flow, and quality of surface runoff resulting from rainfall. Storm water management is the planned control of storm water runoff to prevent flooding, erosion and sedimentation, water quality degradation, and to promote groundwater recharge and minimize the impact of developments on adjacent or downstream land or water courses.

Municipal documents were reviewed to identify provisions for management of storm water, and for specific design or construction standards, including prohibition of connection to sanitary sewer systems. The results are tabulated in Appendix N-19. In no case were there any specific reference to a municipal storm water management plan.

Streets and Sidewalks

One of the problems of Manhasset Bay that has been identified is the adverse effect of the direct deposit of organic material carried in by the storm drainage system from the adjoining streets and highways, or of the organic compounds that may be created when this material decomposes in the bay or en route to the bay. The study is investigating the feasibility of requiring property owners to remove fallen leaves and other decomposable organics from the streets and gutters abutting there property; or of increased municipal activity to remove such materials throughout the year by increased street sweeping activities. The municipal regulations were reviewed to identify noteworthy examples of existing municipal policy consistent with such measures, or opportunities to broaden existing measures, and the results are presented in Appendix N-20. Almost all the communities go part way toward this goal, thereby providing a basis for broader municipal action. Concomitant with that effort, however, would be a broader program of municipal pickup and disposal of the diverted materials.

Trees

The density of tree cover is one of the most effective ways to reduce storm water runoff, for trees will absorb far more storm water than will bare lawn. The ordinances were examined to determine the extent to which municipalities may have established procedures to regulate the clearing or removal of large trees, and to which they require replacement. The results are tabulated in Appendix N-21.

The principal concern of these regulations has to do with the provision of trees as an esthetic element in the suburban landscape. The Village of Great Neck, however, in its Chapter 197, Trees and Shrubs, gives a valuable expression of municipal policy in its *Legislative Intent, Policy and Findings* statement with respect to the importance of trees as soil stabilization and water pollution control elements:

§197-2. Legislative intent, policy and findings:

a. The Board of Trustees of the Incorporated Village of Great Neck hereby finds that there is a direct relationship between preservation of and the planting of trees, shrubs and associated vegetation in sufficient number in the Village of Great Neck and the health, safety and welfare of village residents, and that trees, shrubs and associated vegetation are related to the natural, scenic and aesthetic values and the physical and visual qualities of the environment which the village is obligated to protect. Trees and such vegetation reduce noise, provide welcome shade to village residents, preserve the balance of oxygen in the air by removing carbon dioxide and fostering air quality and create a bucolic and rural atmosphere in the village, especially along the roads. *Trees also stabilize the soil and control water pollution by preventing soil erosion and flooding, yield advantageous climatic effects and provide a natural habitat for wildlife.*

b. *The destructive and indiscriminate removal of trees and related vegetation causes increased village costs for proper drainage control*, impairs the benefits of occupancy of existing residential properties and impairs the stability and value of both improved and unimproved real property in the area of the destruction, and adversely affects the health, safety and general welfare of the residents of the Incorporated Village of Great Neck. *[Emphasis supplied.]*

Other

A number of the Manhasset Bay communities have other regulations that may affect or be useful in moderating or enhancing the quality and quality of water that enters Manhasset Bay. Among these are the procedures for filling and draining private swimming pools, regulation of lawn irrigation systems, special regulation of shore and waterfront areas and the waterways. These are presented in Appendix N-22, and should be evaluated for their applicability and utility in the other Manhasset Bay municipalities.

4.4 An Action Plan for Improving the Municipal Policy Environment

The following suggestions are based on our tabulation and analysis of the various elements of municipal planning and land use policy, with particular emphasis on the objectives of the Manhasset Bay Water Quality Improvement Program.

Expand the Membership of the Protection Committee

Make every effort to include the Villages of North Hills and Lake Success in the work of the Manhasset Bay Protection Committee. North Hills, in particular, has an extensive amount of vacant, developable land within the watershed – over 14% of all the vacant land in the watershed.

Undertake a More Detailed Land Use Analysis

The land use information presented in this study was obtained from the geographic information system files of Nassau County, and are not lot-specific. Because of the small size of many of the participating villages, and the relatively small amount of vacant developable land, it is not easy to determine which improved land use and pollution control measures are needed in each one. A better evaluation and determination could be made, if a existing land use analysis of each municipality were made on large scale maps, and lot-by-lot tabulations and analyses were made. This would provide valuable information about: the amount and location of vacant land;

the amount of land in use by detailed land use type; municipally owned land; and the location of specific problematic uses such as dry cleaning establishments, auto service stations and repair shops, and the like.

An evaluation in conjunction with the municipal planning boards or other knowledgeable local officials should be made of the location and ownership of under-developed lands, i.e., those properties that can be further subdivided or that can have significant increase in density of use. Similarly, these officials can help identify properties that are ripe for redevelopment, having reached the end of the their useful economic life, or which are so out of character with their areas as to have a blighting influence. Knowledge of these data is essential to determine the level, scope and sophistication of improved land use, runoff and pollution controls that are needed and appropriate, and which the municipal government will be comfortable in adopting and enforcing.

Where there are significant amounts of vacant, under-developed or redevelopable land, a more detailed identification, on large scale contour maps, of areas of steep slopes should be undertaken.

Encourage Municipalities to Prepare Comprehensive Plans under the New State Statutes

The almost universal absence of municipal comprehensive plans in the study area identifies a very fertile area for policy development. Under the new statutes, these are not the more limited land use plans of 30 years ago, but should be far-reaching in their scope and much more indicative of official municipal policy. It is tempting to suggest that each municipality should adopt the tightest possible restrictions on storm water management, for example, but unless such a policy fits within the concept of the role of municipal government of the elected leaders of that community, it is not likely to happen, or if it happens, to be enforced. The comprehensive planning process allows for a full assessment of the broad issues of municipal life, not just land use, and for the selection of the means by which that community intend to address them. The reinforced linkage between the comprehensive plan and new zoning regulations, however, provides additional strength and validity to the latter.

The Town of North Hempstead, which has the only comprehensive plan in place, should reexamine the Plan of 1989 to identify: those sections that are out of date or no longer applicable (e.g., because they have been implemented, or because policies or funding opportunities have changed, or the regulatory framework is different). It should add those areas of desirable municipal policy not originally included, and develop a revised and expanded town plan. Particular emphasis should be given to storm water management and the control of pollution, for example. Once prepared, it should be adopted under the new provisions of the NYS Town Law. Changes and improvements in the zoning ordinance should be proposed in accordance with the plan, as well as areas where other local laws may provide better vehicles for implementation of water quality improvements.

The Villages, which are apparently uniform in *not* having prepared such plans, need to follow the same procedure, but from a step farther back: the appointment of an appropriate study group to make the initial investigations leading to a draft plan.

Revise Zoning in Accordance with the New Comprehensive Plans

The Town and the Villages should then take the necessary steps to bring their zoning into conformance with the adopted plans. Where the zoning ordinance provides the best means for implementing the water quality improvement program, these features should be included.

Tailor the Land Development Regulations to the Local Conditions and Policies

Based on the studies of existing land use and the amount of remaining developable or redevelopable land, the municipalities with the smaller amounts of acreage in these categories can determine whether it is appropriate and effective to adopt more sophisticated land development regulations than those they already have in place. Villages in this smaller available land category (in the Manhasset Bay watershed) include: Baxter Estates, Flower Hill, Great Neck, Manorhaven, Plandome, Sands Point and Thomaston.

The municipalities with larger amounts of land in the watershed should review their present procedures and adopt more rigorous standards for storm water management and pollution control. These include: Kings Point, Town of North Hempstead, North Hills, and Port Washington North. Great Neck should start by revising its ordinance to reflect the changed role of the village planning board with respect to the "master plan"; Plandome Manor also uses language no longer correct.

Prepare and Map Municipal Storm Water Management Plans

The storm water management plan should be both the physical description of the system of drains and inlets, catch basins, detention and recharge areas, and all the other infrastructural elements, together with the policy and regulatory controls to make it work effectively and efficiently. The policies and plan could well be expressed as a chapter in the municipal comprehensive plan.

Many suggestions and procedures for drainage management exist in the present policy environment, but there was no evidence in any community that there was a detailed plan for the routing and management of storm water runoff, or for the conscious improvement of its quality before it is discharged into Manhasset Bay. By developing this plan to the same comprehensive level as we have discussed for the municipal comprehensive plan, it will be possible for the municipal leadership to determine more precisely and clearly what additional regulatory or design elements need to be added to the zoning, site plan review, and SEQRA arsenal. It will then be possible to develop the specific retention and discharge standards for specific properties, particularly in those communities with the larger amounts of land available for new development.

Although the drainage systems are designed on a natural watershed drainage basis, it is the municipal governments that will fund their installation and management through the capital and operating budgets. It is appropriate, therefore, that this policy element be included in the

broader comprehensive planning process, and not be limited to engineering drawings and budget estimates.

Broaden and Extend Site Plan Review Processes, In Accordance with Local Need

Site plan review, coupled with SEQRA, offer the best opportunities to implement the storm water management plan and its related reduction in pollution of the Bay in the day-to-day courses of municipal business. Of the municipalities with the larger amounts of developable land and with site plan review procedures in place, Manorhaven and Sands Point have the most comprehensive standards. Those of the Town of North Hempstead are also good, but are not as comprehensive in the uses and areas covered. The procedures of Baxter Estates, Flower Hill and Plandome should be expanded and strengthened.

It is critical that the storm water elements of a site under development be keyed to the layout and capacity of the storm drainage system, or to the absorption capacity of the soils on site. This is why we have recommended that the municipalities develop their storm water management plans *first*, so that the remedy can be fitted to the problem and the system.

The review process of the municipalities pursuant to the State Environmental Quality Review Act can certainly be tailored to complement the site plan review process, and if well crafted, might even serve as a surrogate in those municipalities that may elect not to add another bureaucratic element to the development process. Few municipalities use SEQRA for its maximum effectiveness, unfortunately.

Provide for Alternative Development Options in the Undeveloped Lands

Clustering is more likely to be an option in communities with larger amounts of vacant land, or with very sizable vacant parcels. Manhasset Bay communities with more than 10 acres of vacant land (according to the Nassau County GIS) are Plandome, Great Neck, Lake Success, Manorhaven, Port Washington North, North Hills, Kings Point, and the Manhasset area of the

Town of North Hempstead. The last four have 90% of all the vacant land in the watershed. Of these, only Manorhaven and the Town have limited cluster procedures on their books (although it is possible to approve cluster development under general zoning authority, with the approval of the local legislative body, on a case by case basis).

Based on the recommended land use survey and its analyses, each municipality should determine if the option of permitting cluster development on its remaining vacant land is an appropriate way to implement the water quality improvement program *and* its municipal planning and development objectives. If so, each should make formal provision in its zoning and land development approval processes. Manorhaven and the Town should investigate, in this same process, whether the areas of the community in which clustering is permitted should be increased.

Enforce Animal Waste Control Measures

Every municipality has comparable animal waste control ordinances in place, and all seem suitable to the problem. It would be interesting to learn, however, how effectively these are followed, and enforced. If the answer is "fully," then the problem of pollution of the Bay by animal wastes from domestic animals no longer exists. Baxter Estates and Sands Point should add "pooper-scooper" provisions to their ordinances to keep pace with the others.

Determine the Need to Expand Aquifer Protection and Anti-Pollution Measures

The municipalities served by the Water Authority of Great Neck North each have comparable standards to limit withdrawals from the aquifer to protect its capacity. Sands Point and Thomaston have taken independent action similarly to restrict aquifer withdrawals. Only the Town, Plandome Heights and Manorhaven have provisions in place to prevent pollutants from getting *into* the aquifer, however!

Since properties in so much of the watershed are allowed to have on-site disposal of sanitary sewage and are served by public water supplies, the degradation of the ground water in these areas is apparently not considered a problem. Unless and until public sewers are similarly provided to these areas, however, regular monitoring of groundwater quality should be undertaken.

Key the Provision and Use of Buffer Zones to the Storm Water Management Plan

The buffer zones required by the zoning in many of the communities can offer useful areas for storm water detention and on-site recharge in addition to their visual screening and esthetic enhancement functions. This best management practices opportunity should be factored into the recommended municipal storm water management plans, the site plan review processes, and the SEQRA evaluations.

Evaluate the Need to Extend Erosion and Sedimentation Controls;

The need for improved erosion and sedimentation control procedures is primarily a function of the availability of land for development, particularly when that land is disturbed for construction and not properly stabilized at completion. Where resource extraction is likely to occur, the municipalities have basic procedures in place. The Town has particularly strong standards for erosion and sedimentation management during the review and construction process; a post-construction plan is also required. It is not clear in any of the procedures, however, as to who has primary responsibility for assuring that the control measures are actually installed and maintained, particularly after a certificate of occupancy has been issued.

Based on its land use, soil, slopes and erosion potential studies, each municipality should determine the extent of the hazard in its community, and establish review and control measures similar to those of the Town of North Hempstead, with appropriate follow-up and enforcement provisions.

The Village of Manorhaven has useful standards for on-site grading and vegetative cover, but they apply only on a limited basis within that community. Broader application, and emulation in the other communities, is warranted.

Make Greater Use of the Federal Flood Plain Ordinances

Each municipality, with slavish devotion, has adopted the standard model ordinance to qualify for federal flood insurance. Rare, however, is the departure from the model (except please see the ordinance for Flower Hill, which has proscribed *all* development in the flood hazard area!) None of the municipalities has taken the opportunity to amplify these procedures to institute non-point source pollution controls, storm water runoff management concepts, or similar proactive elements. The Manhasset Bay Protection Committee should develop model procedures for how these ordinances can be improved to include these broader functions.

Evaluate the Need to Extend Wetland Protection Procedures

As is illustrated on Figure 1.3-1 earlier in this report, large scale wetlands occur infrequently within the watershed. It is not surprising, therefore, that few communities had adopted any special procedures for wetlands management or protection or had opted to impose stricter standards that those of New York State. Nonetheless, more detailed land use analyses may identify smaller wetlands sites than those depicted on the map where more stringent local control is appropriate.

On the basis of these studies, each municipality should then determine what manner and means of wetland protection are warranted, compare them to the procedures that may exist, and enact those changes or additions necessary to bring the regulatory measures up to the level of the need. This should be followed up with continuing monitoring and enforcement.

Provide More Detailed Standards for Resource Extraction and Rehabilitation

Several of the municipalities have extensive standards covering the review and approval of applications for the extraction of topsoil, sand and gravel resources; presumably these are in communities where such actions are likely to be a commercial activity. It is our understanding that the right to extract the mineral resources of real property is an inherent property right, and although it can be regulated to protect the health and safety interests of the public, it cannot be prohibited. Rehabilitation planning and stabilization are required in each case, but some Manhasset Bay agencies go farther than others in providing standards for such work. The rehabilitation standards of Great Neck are provided in Appendix N-13 as a useful model.

Improve the Understanding and Use of SEQRA; Update Local Procedures

The rules and regulations of the State of New York for its State Environmental Quality Review Act were extensively revised and recodified by the Department of Environmental Conservation, effective in 1996. The fact that so many of the Manhasset Bay communities' SEQRA ordinances do not reflect these changes three years after they went into effect may be an indication of a casual attitude toward the environmental review process. At the very least, the tardy municipalities should revise their codes to be consistent with those of the State.

Some New York municipalities ignore SEQRA, and others use it only to slow down, discourage or block new development. If it is well understood by the local officials, it can be an extremely useful local development policy implementation tool. Even where extensive local review standards are not in place, a municipality can use the SEQRA review, and the opportunity to request mitigation measures for adverse impacts and conditions, as a positive element in local development. As suggested above, a carefully crafted SEQRA review process can be a useful surrogate for more extensive site plan review regulations in those communities that have infrequent need for development reviews.

It is recommended that the Manhasset Bay Protection Committee act as the catalyst to initiate sensitivity and training sessions for officials in the Bay municipalities on the law and art of the SEQRA process. Experienced staff from the Town of North Hempstead, the County of Nassau, and the NYS Department of Environmental Conservation can provide the expertise for these sessions.

Solid Waste and Littering; Regular Removal of Floatable Organics from Gutters

Every municipality in the watershed study, with the apparent exception of Plandome Heights and Sands Point, have regulations in place governing littering and solid waste removal. It is a recommendation of this study that property owners be made responsible for the *removal* of organic materials from the street gutter area in front of their property; none of the communities presently impose this requirement. Several do fix on the abutting owner the responsibility for maintaining in a clean condition the verge between the property line and the travel way, however. Concomitant with this additional maintenance responsibility would be a municipal program of more frequent pick-up and disposal of the wastes collected by the property owner. Alternatively, more regular street sweepings by municipal or contract forces would probably obtain the same objective.

Municipalities should evaluate these recommendations, and determine which procedure is more consistent with their municipal governmental philosophy.

Develop and Implement Planting of Trees and Installation of Vegetative Cover

All of the municipalities have regulations that restrict the damaging of trees in public spaces, and several impose procedures for the permitting of tree removal and replacement in kind on private property. All are negative in tone; only Port Washington North has a requirement that trees be *added* to the municipal landscape. That village ties the provision of the required planting of new street trees (30 feet on center along the roadway) as a condition for a certificate of occupancy for new construction.

Because trees are more effective in the absorption of storm water runoff than are lawns, it is recommended that the municipalities promote tree planting programs throughout their areas, on both public and private properties. This is not likely to be done well through regulation, but rather through publicly and privately sponsored "forestation" programs, with the aid of garden clubs, commercial garden centers, civic organizations, youth groups and the like. The NYS Department of Environmental Conservation or the Office of State Parks may be able to provide access to sources of low-cost seedlings and young trees.

Only the Village of Manorhaven addressed the installation of ground cover through its zoning standards (as contrasted to a special erosion control ordinance). In its R-2 Residence district it requires, a generic way, that "the grade of all terrain around hillside structures shall be covered with landscaping and other ground covers to prevent erosion of the slope." This is a positive way to approach the issue – no measurement of grade, no penalty for building on hillsides, but simply, whatever it takes to stabilize that particular slope. Similar language should be used in all districts in all municipalities.

Section 5

5.0 RECOMMENDED PLAN

5.1 Goals

The goals to be achieved by implementing the recommendations of the Manhasset Bay Water Quality Improvement Plan are those adopted by the municipalities that comprise the Manhasset Bay Protection Committee. These goals are:

- Improve the water quality of Manhasset Bay so that all waters of the Bay will consistently meet water quality standards for bathing, swimming and fishing;
- Restore and enhance the surrounding tidal wetlands that serve to cleanse ecosystems; provide marine food production and wildlife habitat; offer opportunities for education, research and recreation; provide flood and storm control; and offer open space and aesthetic appreciation;
- Control and reduce point and non-point source pollution affecting the Bay and its environs; and
- Coordinate local coastal regulations so as to maximize protection and enhancement efforts to improve the quality of Manhasset Bay, its tributaries and wetlands.
- Improve water quality so that the traditional maritime economic uses of the Bay are maintained and enhanced.
- Although not readily achievable, improve the water quality of Manhasset Bay so it will once again be classified as an area (within the 50% of the Bay north/northwestern portion that is classified) for shellfishing by suitable for the harvesting of shellfish for human consumption;

5.2 Objectives

In order to achieve the goals set by the committee, the objectives and associated recommendations of this plan are divide identified below into those that are: 1) to be applied throughout the Manhasset Bay watershed (watershed-wide); 2) are to be implemented within each subwatershed; and 3) are site-specific improvement projects.

Watershed-Wide Objectives and Recommendations

In order to achieve the goals set by the Committee below are eight watershed-wide objectives in two categories (pollution control and management/administrative), which are expected to result in a reduction to the adverse impacts to the Bay caused by non-point sources to pollution generated within the watershed. The objectives are presented below and followed by a detailed listing of recommended activities associated with each.

Category A: Pollution Control:

1. Reduce runoff to the Bay.
2. Reduce pollution to the Bay.
3. Detect and eliminate illicit discharge to storm sewers.
4. Implement a storm sewer system pollution prevention/good housekeeping program.
5. Control runoff from new developments and redeveloped areas.

Category B: Management/Administrative:

6. Implement a storm water public education and involvement program
7. Seek funding assistance to implement the watershed-wide plan recommendations and the site-specific improvement projects.
8. Use an intermunicipal approach to improve Manhasset Bay's water quality that addresses both point and non-point sources of pollution.

5.3 Watershed-Wide Objectives and Recommendations

Below are a number of best management practices (BMPs) for individual plan objectives that have some applicability in all 12 subwatersheds, and which can be used by municipalities within the watershed as guides for incorporating measures in their site plan review project approvals and other activities to reduce the adverse impacts of storm water runoff on the water quality of Manhasset Bay and its ponds, tributaries and wetlands.

5.3.1 Objective No. 1: Reduce Runoff to the Bay

Volume Reduction

- ❑ Recharge runoff to the groundwater.
- ❑ Use depression storage and storm water recharge in areas planned for redevelopment or new development.
- ❑ Increase vegetative cover on public and private properties in order to increase evapotranspiration.
- ❑ Increase the volume of runoff recharged or infiltrated into the ground through the use of grass buffer strips, swales, porous pavement, "no mow zones," dedicated infiltration basins and percolation trenches.
- ❑ Prevent overwatering of lawns that can cause shallow roots, invite crabgrass, encourage disease, and results in unnecessary dry weather flow to the Bay.
- ❑ Establish a watershed-wide ongoing program to identify and eliminate illicit connections that convey runoff from roof drains to street gutters or storm sewers using the following methods as appropriate:
  - public education and/or outreach notices
  - notification with a grace period followed by fines and/or municipal disconnection
  - random review or review in conjunction with building modifications of existing maps and house plans
  - field screening to detect suspect premises
  - field sampling
  - smoke tests
  - dye tests
- ❑ Use shrubs and trees to promote infiltration.
- ❑ Use pervious pavements, walkways, patios, driveways and parking lots.
- ❑ Use automatic or manual shut-off of lawn irrigation systems during and shortly after periods of rain.
- ❑ Use perimeter vegetated soil berms with gravel/porous trenches on the uphill side of moderate and steep slope lawns and yards.
- ❑ Use dry wells for new commercial parking lots in order to increase storm water recharge.

- ❑ Establish a program to inspect, clean out and restore percolation efficiency of existing dry wells in public and private parking lots.

- ❑ Use closed recycling cooling systems rather than "once-through" cooling discharges to storm sewers.

- ❑ Use retention ponds (also referred to as wet ponds or wet detention basins) to continuously store a specific volume of runoff.

- ❑ Use of constructed wetlands for storing runoff.

- ❑ Use "lush" and dense vegetation that has a high potential for evapotranspiration rates.

- ❑ For new developments, or areas to be redeveloped, provide for:
  - narrow road widths
  - shorter road lengths
  - hourglass streets
  - cluster development
  - shared driveways
  - smaller parking stalls
  - lower parking space ratios
  - reduced cul-de-sac radii
  - vertical parking structures
  - indoor parking
  - porous driveways
  - use catch basins that function as dry wells with no overflows
  - grass swales
  - sand filters
  - filter strips
  - infiltration basins
  - infiltration trenches

- ❑ Divert runoff from paved surface to grass and other vegetative areas.

- ❑ Do not construct any new storm water outfalls that discharge directly to the Bay.

- ❑ New storm sewers within the watershed should discharge to recharge basins or dry wells.

- ❑ As part of any redevelopment projects that involve existing direct storm water discharges to the Bay and/or its ponds or tributaries, include modifications or retrofits to include devices to trap or separate sediments, floatables and debris, and to the maximum extent possible, reduce bacteria and nutrients through the use of created wetlands or a combination of wetland grasses and structural devices that can capture first flushes.

Reduce Rate of Runoff

- ❑ Use detention basins to decrease the rate of runoff.
- ❑ Use grass swales, filter strips or other vegetative measures as an alternative to using curbs and piped drainage.
- ❑ Use constructed wetlands to retain and decrease the rate of runoff after a storm event.
- ❑ Increase the amount of tree cover in the watershed by requiring prior municipal approval for cutting down trees and requiring a 1 to 1 or 2 to 1 tree replanting ratio for every tree that is cut down.
- ❑ Replant sidewalk trees that have been cut or blown down within a 3-month period.
- ❑ Identify the early symptoms of diseases to trees, and develop a response strategy to save or extend the life of the trees and prepare a plan for the expeditious replacement of trees that need to be cut.
- ❑ Protect established/mature trees against damage in order that the trees can help minimize and reduce storm water runoff rates.

5.3.2 Objective No. 2: Reduce Pollution to the Bay

Bacterial

- ❑ Control or reduce the population of geese and other waterfowl at the various ponds, creeks and shoreline of the Bay by enforcing existing ordinances against the feeding of these animals.
- ❑ At ponds around the Bay that have geese and other waterfowl, plant or install access barriers sufficiently high to deter their entry to the waterbody, yet sufficiently low to maintain a view of the waterbody. Barriers adequate for this purpose could include wide shrubs, bushes, plants or special fencing that are visually appealing and compatible with the viewshed of the pond.
- ❑ At ponds around the Bay that have geese and other waterfowl, install devices that deter the presence of existing geese or frighten them away from the area. These devices could include:
  - water fountains/aerators at one or more locations in a pond which spray water and operate either continuously or at fixed time intervals
  - figures of animals that are known to be threatening to the geese
  - sounds of animals known to frighten them

- ❑ Strictly enforce pooper scooper regulations and increase public awareness of the water quality importance of complying.

- ❑ Use biofiltration ponds or constructed wetlands to provide for bacterial reduction and natural die-off.

- ❑ Prepare an inventory of areas served by cesspools or septic systems close to the Bay or individual ponds and creeks in areas of 10- to 20-foot groundwater elevations with an identification of those areas that are prone to failure and followed by an evaluation of alternatives and conduct a feasibility study to evaluate the need for replacing the disposal system and cost of replacing cesspool with an approved septic system, private treatment system or tie into a sewer system that accept the additional flow and nitrogen load.

- ❑ Inventory and inspect on a regular basis houseboats at the marinas to ensure that they have an adequate arrangements for sanitary disposal, and have either a manifest system to document proper disposal or include the cost of proper disposal in the cost of their use of the marina.

Reduce Litter and Floatables

- ❑ Enforce existing litter ordinances, particularly in areas served by storm sewers that discharge directly into the Bay.

- ❑ Enforce existing Town ordinance against placing flyers on utility poles, which can be blown by wind and rain into gutters and catch basins, and ultimately to the Bay.

- ❑ Enforce existing ordinances or pass new ordinances requiring pick-up of litter and other debris in the street gutter in front of residential, commercial and other properties.

- ❑ Provide or continue to provide mechanical street sweeping in the commercial areas, including shopping centers and parking lots that are prone to the buildup of litter and debris.

- ❑ Provide routine cleanout of catch basins, particularly in areas with storm sewers that do not discharge to one of the ponds around the bay.

- ❑ Install trash rack at the inlet and/or the outlet/spillway of each of the ponds around the Bay.

- ❑ Install containment booms, nets and use absorbent pads in or around outfalls to small creeks or inlets.

- ❑ Encourage or require routine skimming of floatables and clean up with absorbent pads of slicks that are trapped by marina slips.

- ❑ Require a Best Management Practices (BMPs) program for near-shoreline, land-based and water/marina-based fueling stations to include:
  - spill and overfill prevention equipment
  - oil/water separators or oil and grease traps installed in the storm drains in the fueling area
  - the use of dry cleanup methods
  - employee education of the potential water quality impacts to the Bay
  - proper storage and recycling or disposal of greasy rags, oil filters, air filters, batteries, spent coolants and degreasers.

- ❑ Replace or retrofit catch basins that do not trap sediments with features that allow for settling of litter, floatables and other debris, prior to the discharge of the runoff.

Reduce Nitrogen

- ❑ Encourage or require the public employees (parks, public works, highway and related departments) and private landscapers to avoid the indiscriminate or careless overuse of lawn fertilizers.

- ❑ Encourage or require alternatives to lawns, such that fertilizer use is eliminated or reduced, and grass clippings are not produced which could be blown off the site and carried into the gutter. These alternatives could include:
  - low ground covers
  - masses of low shrubs
  - perennials
  - gravel and stone
  - mulches
  - wood chips.

- ❑ Promote or require the use of constructed wetlands to reduce the nitrogen content in storm water runoff.

- ❑ Encourage or require smaller lawn areas, coupled with planting of trees, shrubs and ground cover.

- ❑ Promote the establishment of grass with a well-developed root system by encouraging seeding to restore lawns from mid August to early October, thus lessening the need to fertilize.

- ❑ Encourage or require that fertilizers be applied according to the rates stated in manufacturer's instructions. Undertake a watershed-wide educational program informing residents, golf courses and landscapers that "more is <u>not</u> better."

- ❑ Encourage or require the proper spreading of fertilizers on lawns such that it does not fall on sidewalks, driveways and in the street where it can be transported by runoff to ponds or into a recharge/infiltration basin to the groundwater which would ultimately discharge to the Bay.

- ❑ Prepare an inventory of areas served by cesspools or septic systems close to the Bay or individual ponds and creeks in areas of 10- to 20-foot elevations with an identification of those areas that are prone to failure and followed by an evaluation of alternatives and conduct a feasibility study to evaluate the need for replacing the disposal system and cost of replacing cesspool with an approved septic system, private treatment system or tie into a sewer system that accept the additional flow and nitrogen load.

- ❑ Evaluate the available or evolving treatment technologies and systems that can be used in conjunction with or as modifications to existing septic tank systems or as replacements to existing cesspools for reducing the nitrogen discharged to the watershed groundwater system which ultimately is discharged as groundwater underflow to the Bay and then to Long Island Sound and determine whether these new septic systems can reduce their nitrogen loads by the 58.5% goal set by the Long Island Sound Study.

- ❑ Evaluate the need and feasibility of creating one or more municipal septic districts that establish fees, and make arrangements for routine pump-out and maintenance of existing systems and provide for phase-out and replacement of cesspools.

- ❑ Amend the Town's Chapter 42 to require houseboats to have a permanent connection to a municipal sewer system.

- ❑ Inventory and inspect on a regular basis houseboats that are docked at marinas in the Bay to ensure that they have an adequate sanitary disposal system.

Reduce Pesticides and Toxics

- ❑ Encourage or require the minimum use of pesticides to residential, commercial and public properties.

- ❑ Encourage or require the use of pest-resistant plants

- ❑ Encourage or require the use of integrated pest management (IPM) on all public lands (parks, golf courses, facilities, etc.).

- ❑ Widely publicize the schedule and locations of STOP events planned for the proper disposal of household chemicals.

- ❑ Encourage or require storm water pollution prevention plans for industrial and commercial activities involving "industrial activities" that comply with USEPA's

Phase I storm water regulations and which require the use of best management practices for activities involving:

- fueling stations
- vehicle and equipment maintenance
- painting operations
- vehicle and equipment washing
- loading and unloading materials
- liquid storage in aboveground tanks
- industrial waste management areas
- outside storage of raw materials by-produces, or finished products

Sediments

- ❑ Use biofiltration ponds or constructed wetlands to provide sedimentation.
- ❑ Provide routine mechanical sweeping of commercial parking lots to reduce sediments in storm water runoff.
- ❑ Undertake a regular/on-going catch basin cleanout and maintenance program for the removal of sediment and other debris prior to discharge of the runoff to a creek, pond or directly to a bay. Those catch basins whose runoff discharges directly to the bay should be cleaned every 2 to 3 years while those that discharge to creek and ponds should be cleaned every 3 to 5 years.
- ❑ Require a storm water pollution prevention plan for controlling and preventing erosion and sediment runoff construction sites that disturb more than one-half acre. Through routine and random inspections, track the implementation of the associated pollution prevention plan through the construction period. In addition, perform pre-construction reviews of construction site management plans.
- ❑ Use sediment traps or basins and sediment removal or screening devices to prevent the discharge of sediments from dewatering activities at construction sites.
- ❑ Discourage or limit the use of turf lawns on moderate to steep slopes that are prone to soil erosion. Encourage or require a specific percentage of a lot's open space to be set aside as a "no mow zone."
- ❑ Repair deteriorated asphalt, concrete or gravel driveways especially those on moderate (5 to 10%) to steep slopes (greater than 10%).
- ❑ Use of storm water runoff devices or practices that will decrease runoff velocities on developed or landscaped areas prone to erosion.

- ❑ Encourage or require individual property owners to clean and remove sediments and other debris from the street gutter or curb area for the length of the front of their properties.

- ❑ Promote or require the sodding of new lawns rather than seeding as a way to eliminate the need for a grow-in period and thus prevent soil erosion.

- ❑ Encourage or require property owners near storm water catch basins to keep the basin gratings clean of any solid materials, sediments, floatables, vegetative matter, leaves and debris.

- ❑ Encourage or require local, Town or County public works or highway departments and any associated contractors to remove accumulated road sand on a regular basis but within a specified period after applications during winter storms or ice events.

- ❑ Restore, reconstruct or protect stream banks from natural erosion or erosion caused by storm water runoff.

- ❑ Remove obstructions or debris from creeks, marshes and ponds in order to maintain adequate flow and prevent the build-up of sediments.

- ❑ Plant vegetative access barriers along stream banks or pond shorelines to prevent pedestrian or waterfowl erosion of the stream bank and shoreline.

- ❑ Provide buffer setbacks from watercourses in order to retain, increase, or revegetate plants that can trap sediments and take-up pollutants.

- ❑ Reduce the discharge of sediments into the ponds by constructing sediment forebays that are readily and efficiently accessible for routinely removing accumulated sediments. Whenever possible, construct a two-chamber forebay system that allows for maintenance of flow and the use of soil berms to create the separation between the forebays.

- ❑ Minimize the potential adverse impact on freshwater and tidal wetlands caused by sand/salt mixtures used during winter deicing periods by targeting priority catch basins and other sediment trapping devices for the removal of accumulated sediments that contain the salt mixture prior to the spring growing season. These priority areas would be:

    - North and East Sheets Creek
    - Baxter Pond
    - Leeds Pond
    - Whitney Pond/Manhasset Valley Park
    - Mitchell Creek

- ❑ Excavate and remove accumulated sediments from Mill Pond, particularly in "beach" area at the eastern end of the pond in order to restore the pond's natural detention and treatment capabilities.

- ❑ Excavate and remove accumulated sediments from Baxter Pond, particularly in the areas adjacent to the Island and before the foot bridge at the eastern end of the pond in order to restore the pond's natural detention and treatment capabilities.

- ❑ Excavate and remove accumulated sediments from the "golf course" pond and "twin ponds" that discharge into Leeds Pond in order to restore the pond's natural detention and treatment capabilities.

- ❑ Excavate and remove accumulated sediments from Whitney Pond in order to restore the pond's natural detention and treatment capabilities.

- ❑ Excavate and remove accumulated sediments in the pond located in Manhasset Valley Park in order to restore the Lake's natural detention and treatment capabilities.

- ❑ Excavate and remove accumulated sediments in the Lower Bay particularly in the "mud flats" in order to restore historical water depths, restore and rehabilitate the grass marsh areas and allow for a navigational channel. The navigational channel would allow small pleasure boats to reach parks in this area (such as Kensington's waterfront park) during low tide. Furthermore, the visual appearance of the shoreline at low tide would be improved for adjacent residences and travelers on both sides of the Bay.

- ❑ Petition the federal government to perform navigational dredging in the lower bay for the economic and commercial interests associated with the oil barge traffic and the economic benefits associated with increased tourism and recreational use of the Bay.

- ❑ Petition the federal government to perform navigational dredging in the northern part of the Bay, from Plum Point to Sheets Creek for the economic and commercial interests associated with oil barge traffic and the economic benefits associated with the use of numerous marinas and yacht clubs in this area by residents and tourists.

- ❑ Apply for federal funding under Section 206 of the Water Resources Development Act of 1996 to increase habitat opportunities in the lower Bay. The funding would be used to remove the sediments, rehabilitate the area and the shoreline, plant wetland grasses, create and restore the biological ecosystem in the area, and maintain the restored area such that it is protected against future degradation.

- ❑ Apply for federal funding under Section 107 to study the feasibility of creating a small, shallow draft navigation channel in the lower Bay. The study would also evaluate the recreational benefits to have the channel serve the Kensington Park and Manhasset Valley Park.

- ❑ Conduct a feasibility study for removal of accumulated sediments in the lower bay to include provisions for chemical and biological sampling of sediments, identification

of special habitats and potential beneficial uses, and identification of any possible alternative beneficial reuses of the sediments removed.

- ❑ Remove accumulated sediments from the eastern end of Mill Pond and from all our priority portions of Baxter Pond, Whitney Pond and the pond within Manhasset Valley Park.

- ❑ Conduct a study of priority areas of the Bay needing navigational dredging to maintain and enhance the economic and commercial benefits of boating and barging activities.

- ❑ Using funds from a recent application for federal Corps of Engineer assistance under Section 206 for sediment removal for restoration and protection of the marsh ecosystem in the lower Bay and Section 107, study the feasibility of removing accumulated sediments in the lower bay for the purpose of creating a small, shallow draft navigational channel in the lower bay.

5.3.3 Objective No. 3: Implement a Program to Detect and Eliminate Illicit Discharges to Storm Sewers

- ❑ Encourage the State and EPA to make their top priority in the metropolitan area the cleanup of western Long Island Sound.

- ❑ Encourage the State and EPA to require compliance with the Phase I and Phase II storm water regulations such that affected marinas, industries and commercial establishments in the watershed that are covered by the regulations perform and implement the activities described in their storm water pollution prevention plans.

5.3.4 Objective No. 4: Implement a Storm Sewer System Water Pollution Prevention and Good Housekeeping Program

- ❑ Perform an inventory of existing municipal storm sewers and prepare a GIS mapping and database system.

- ❑ Develop a cost-effective operation and maintenance (O&M) program and associated training program.

- ❑ For each municipal owner of a separate storm sewer system (MS4) develop a pollution prevention and good housekeeping program that includes:
  - maintenance activities for storm sewers, catch basins, outfalls, trash racks, forebays, etc.
  - maintenance schedules for the above
  - long-term inspection procedures
  - controls for reducing floatables and other pollutants

- controls for reducing discharges from streets, roads, highways, parking lots, etc.
- program for pesticide use minimization
- plan for proper disposal of waste from cleaning various storm water structures
- incorporating water quality in flood projects
- program for adequate repair of storm water-related structures and facilities

- ❑ For projects needing an environmental review, require that environmental assessment forms and EISs provide specific information on potential nonpoint source pollution contributions to particular watercourses and information on pollutant loadings such as nitrogen and phosphorus, assimilation rates based on conditions and identification of site design and best management practices to prevent and/or reduce the anticipated nonpoint source pollution.

5.3.5 Objective No. 5: Control Runoff from New Developments and Redeveloped Areas

- ❑ Require new developments and redeveloped areas to compile with NYSDEC's erosion and sediment control guidelines for new development.

- ❑ Require site plan (as part of planning and design for sites that disturb a land area) that minimize to the maximum extent practicable impacts on the Bay from runoff volume, rates and pollutants during and after construction.

- ❑ As appropriate site plans for new developments and redevelopment must demonstrate the use of post-construction storm water management methods and techniques such as:
  - minimization of impervious areas;
  - maintenance or restoration of natural infiltration;
  - wet ponds;
  - extended detention outlet structures;
  - wetland protection;
  - minimize disturbance of soils and vegetation;
  - use vegetation and plantings of notice species; and
  - maintenance of open space.

- ❑ Require the site plans for new developments and redevelopment to include a description of and commitments to ensure post-construction long-term operation and maintenance of the post-construction storm water management methods.

- ❑ Require that the site plans identify post-construction storm water management methods that attempt to maintain pre-development runoff conditions.

5.3.6 Objective No. 6: Implement a Storm Water Public Education and Involvement Program

- ❑ Prepare educational materials on impacts of storm water, and distribute to residential, industrial, and commercial establishments.

- ❑ Inform the public on steps to reduce storm water pollution:
  - septic system maintenance
  - use of garden chemicals
  - proper disposal of motor oil and household hazardous waste
  - ways to get involved in the Bay cleanup and protection efforts

- ❑ Obtain education/outreach assistance from:
  - marina operators
  - business improvement districts/groups
  - youth service organizations in local high schools in the area
  - school districts
  - yacht clubs
  - boating club/groups
  - conservation corps
  - recreational/hobby groups
  - sewer districts
  - garbage districts
  - sportsman/fishing clubs
  - citizen groups

- ❑ Implement roadside litter pickup programs by volunteer groups.

- ❑ Target the educational and outreach program to those affected by storm water impacts - beach clubs, marinas, restaurant, owners of waterfront properties.

- ❑ Establish a program of "master gardeners" that provide assistance to homeowners and landscapers in complying with the recommendations of the plan dealing with gardens and lawns.

- ❑ Provide training to volunteers for an "adopt a program" for stream, pond or creek to include volunteers to clean trash racks, notify or warn people to not feed geese and remove litter from public areas and flyers from utility poles, which would become litter.

- ❑ Establish a Manhasset Bay watershed web-site to disseminate the Plan's Findings, provide updated information on watershed activities, and to link with other State and National nonpoint source pollution web-sites.

- ❑ Establish a Manhasset Bay Water Quality Protection hotline-clearinghouse - where residents and businesses could call to report a water quality or pollution problem and obtain information.

- ❑ Establish an intermunicipal GIS and database which includes up to date information on development proposals, local ordinances, capital improvements related to water quality, and similar data and information developed as part of this Plan.

- ❑ Hold an annual "Nonpoint Source Pollution Best Management Practices" Workshop for municipal officials and employees. This could be done in conjunction with the Hempstead Harbor Committee in order to maximize exchange of information and ideas, and getting outside experts.

- ❑ Prepare an annual, or at least 5-year, progress report on the Plan recommendations, implementation success, and water quality improvements.

- ❑ Solicit the participation of various local civic, recreational, business, environmental and educational organizations and institutions in the cleanup of Manhasset Bay. Possible options could be having them adopt specific ponds, streams, parks, creek, inlets or sections of the Bay for the purpose of cleaning and maintaining them on a regular basis and reporting to the appropriate level of government water quality issues related to the particular water body that they have adopted. The individual water bodies to be adopted could include the following 31 potential areas:
  - Sheets Creek by Manorhaven Park
  - Manorhaven Park Beach and Shoreline
  - Shoreline between Plum Point and Toms Point
  - North Sheets Creek
  - East Sheets Creek
  - Mill Pond
  - Baxter Pond
  - Baxter Estates Shoreline/Beach to Toms Point
  - Sunset Park Seawall Area
  - Town Dock – North and South Sides
  - Shoreline along Eastern Shore (by individual yacht clubs and beach associations)
  - Stannards Brook
  - Bay by Leeds Pond
  - Leeds Pond
  - LIRR Leeds Pond Tributary Corridor
  - Golf Course Pond before Leeds Pond
  - Twin Ponds before Leeds Pond
  - Southeast Shoreline and the "park" area by Bayview Avenue
  - Whitney Pond
  - Manhasset Valley Park Stream and Pond
  - Kensington Village Park
  - Southwest Shoreline Area in Great Neck
  - Shelter Bay Marina Area

- Broadlawn Harbor Area
- Twin Ponds in Kings Point
- Mitchells Creek
- Kings Point Pond (Wilson Pond)
- Lower Bay from Kings Point/Great Neck Border South
- Mid Bay Leeds to Town Dock to Broadlawn
- Upper Bay – entrance to Bay and north of Town Dock and Plum Point

❑ Use volunteers to perform storm water drain/catch basin stenciling to warn that materials entering these locations may end up in the Bay.

❑ Use volunteers to monitor ponds or other areas that are frequented by geese and remind visitors not to feed them and that it is illegal to do so.

❑ Use volunteers to perform selected water quality sampling and monitoring activities in the Bay or in the ponds and creeks that discharge to the Bay.

❑ Create a Bay-wide storm water pollution prevention team of volunteers to advise the County, Town and Villages on the effectiveness of the adopt-a-waterbody volunteer program and conditions in the Bay.

❑ Obtain corporate institutional contributions from companies in the watershed to assist in match local funds to state and federal funds. Examples are:
- Publishers Clearinghouse
- Macy's
- Thompson's Industries
- Lord and Taylor
- Americana Shopping Center
- Honda
- North Shore University Hospital
- Barnes and Noble
- Mitsubishi
- Individual County Clubs
- Individual Yacht Clubs
- Port Washington, Great Neck and Manhasset Chambers of Commerce

5.3.7 Objective No. 7: Seek Funding Assistance to Implement the Watershed-wide Plan Recommendations and the Site-Specific Water Quality Improvement Projects

❑ Apply for New York State Department of Environmental Conservation Clean Water/Clean Air Bond Act funding assistance for the BMPs and water quality improvement and wetlands restoration/creation projects identified in the Plan.

- ❑ Apply for New York State Department of State funding assistance for the BMPs and capital projects identified in the Plan.

- ❑ Apply for U.S. Army Corps of Engineers for funding assistance for the sediment/dredging and aquatic habitat restoration activities proposed in the Plan.

- ❑ Apply for USEPA Long Island Sound study funding assistance for the BMP practices and water quality improvement and wetlands restoration/creation projects identified in the Plan.

- ❑ Apply for funding assistance from private foundations for the public education and public participation/involvement activities proposed in the Plan.

- ❑ Create a Manhasset Bay Water Quality Improvement Foundation comprised of the participating members of the Committee for the purpose of raising private funds and contributions from corporations, business, civic and environmental groups and citizens to be used in providing a portion of the required local match to any federal and state grants to be used for funding the recommendations and projects contained in the Plan and to assist in volunteer and educational activities.

5.3.8 Objective No. 8: Use an Intermunicipal Approach to Improve Manhasset Bay's Water Quality Addressing both Point and Non-point Pollution

- ❑ Develop a comprehensive strategy to guide the villages, the Town of North Hempstead and Nassau County to collectively develop and implement a unified approach to cost effectively comply with the current Phase I USEPA and the proposed Phase II storm water regulations.

- ❑ Restore adequate funding to the County's budget to provide the necessary level of effort for water quality monitoring in and around the bay equal to or greater than that provided prior to 1992.

- ❑ Continue the nonpoint/special sampling initiated in 1998 around the bay on a monthly bases for 3 years to establish a baseline database of existing nonpoint nitrogen loadings, and continue thereafter to track any reductions in nonpoint nitrogen loadings associated with implementation of the plan.

- ❑ Request the State to conduct an assessment of the adequacy of pump out facilities in the bay, and to make a determination in consultation with the Manhasset Bay Protection Committee on the appropriateness of designating the Bay as a "no discharge" zone under the federal Clean Water Act.

- ❑ Continue and expand the Manhasset Bay Protection Committee as an intermunicipal coordinating and advisory organization dealing with water quality improvement efforts for the bay.

- ❑ Use the Committee to direct and/or conduct the public education aspects of the Plan.

- ❑ Use the Committee to direct and/or conduct the public involvement aspect of the Plan.
- ❑ Consider expanding the Committee's membership to include the five villages in the watershed that are not currently members of the Committee.
- ❑ Use the Committee to establish and/or direct the formation and activities of the proposed Manhasset Bay Water Quality Improvement Foundation to raise corporate and other financial contributions to be used as a portion of the local match required of federal and state grants for the recommendations and projects contained in the Plan.
- ❑ Use the Committee to direct an update of the Plan every five years (5th year, 10th year and 15th year after the completion of the initial effort).
- ❑ Use the Committee to prepare and Plan status of implementation report every two years.
- ❑ Review all SEQRA reviews to include the impact of proposed projects on the bay's water quality from storm water runoff and methods to minimize or reduce those impacts and have the project sponsor demonstrate that the appropriate measures proposed in this Plan are included in the project's scope.

5.4 Site-Specific Water Quality Improvement and Wetlands Protection and Restoration Projects

In addition to the objectives recommendations presented in Section 5.2 and Section 5.3 to be implemented on a watershed-wide basis below are 12 specific improvement projects that involve physical alterations and improvements to storm sewers and associated structures and the creation of wetlands and associated structures that will, to the maximum extent practicable, restore, enhance and protect the ecological functions of wetlands and nearby ponds and creeks.

The recommended projects would be both to improve water quality through the use of natural treatment systems that trap sediments and take up nutrients and which also restore and create habitats that are important as nursery, breeding and feeding areas for fish and wildlife. In addition, the restored and enhanced wetlands and those newly created by some of the measures identified in the projects below would also provide flood and erosion control.

5.4.1 Project No. 1: North and East Sheets Creek Wetlands Restoration and Water Quality Improvement Project

This project will include a feasibility analysis, conceptual engineering, permitting design and specifications, bidding and construction of measures to control sediment and pollutants from storm water runoff entering the two creeks from six outfalls greater than 36 inches in diameter (and over a dozen less than 36 inches) land and outfalls are owned by Village of Manorhaven and Nassau County as well as private individuals and business. Measures to be included are:

Recommendations

- ❑ Catch basin retrofits in the drainage area pocket wetlands;
- ❑ Booms and nets for floatables;
- ❑ Skimming devices;
- ❑ Replacement of plants with other less aggressive indigenous plantings;
- ❑ Dredging and/or sediment removal; and
- ❑ Shoreline stabilization by vegetation measures.

5.4.2 Project No. 2: Mill Pond Water Quality Improvement and Storm Water Control Project

Located in Port Washington North, and owned by the Town of North Hempstead, Mill Pond is a small pond that acts as a drainage basin drainage from street runoff originating to the north and east. Storm water is discharged into Mill Pond. There are no upstream settling ponds, and storm drains do not appear to possess sedimentation capabilities. The shoreline of Mill Pond has been stabilized with concrete and stone retaining walls. There is no emergent wetland vegetation.

The pond supports a large waterfowl population, augmented through artificial food supplies delivered by humans, due in part to the ready access provided by easy parking along Mill Pond Road. As a result of these circumstances, Mill Pond has suffered degraded water quality due to bacteria and nutrients. It has been reported that the pond is presently near its

sediment storage capacity and, therefore, does not effectively prevent sediments from being discharged into Manhasset Bay by storm water.

Recommendations

- ❑ Stabilize the grass area between the stone wall along the pond's perimeter and the concrete sidewalk.
- ❑ Plant vegetative access barrier around the perimeter of the pond (except near the steps and benches) to prevent the entry of geese and swans while not obstructing the view of the pond. Barrier should be 1.5 to 2 feet high and 4 to 8 feet wide, and could consist of low junipers or hedges.
- ❑ Install self closing gates at the steps leading to the edge of the pond to block the geese and swans, yet allow entry by the members of the model boat club.
- ❑ Excavate and remove the accumulated sediment at the eastern end of the pond in order to restore the water surface and/or increase the pond's natural capacity to trap sediments and provide some treatment.
- ❑ Install signs warning of regulations against feeding the wildlife.
- ❑ Install water sprays at one or more areas of the pond and the sand bar area to deter the geese and swans from entering the pond.
- ❑ Raise the level of the weir (spillway) in order to increase the pond's ability to hold the first flush from a storm event, and also increase the pond's capacity to provide additional detention time while ensuring that the potential for flooding adjacent properties is not increased.
- ❑ Remove the cyclone/chain link fencing around the weir (spillway), and install new trash racks to capture small sized materials below the street level.
- ❑ Replace or retrofit the nine storm water outfalls flowing into the pond with impoundment chambers below the inverts in order to trap and hold sediments, trash and other debris.
- ❑ Construct a "post" spillway sediment bay in the outlet structure to catch any debris that passes through the new trash racks in order to facilitate removal from the street/sidewalk level.
- ❑ Develop and implement a sediment control plan for the sand pit behind Valley Road that runs from Avenue A to Harbor Road.

5.4.3 Project No. 3: Baxter Pond Water Quality Improvement and Wetlands Creation Project

Baxter Pond, located in Baxter Estates and owned by Nassau County, has a shoreline that has been stabilized with wooden bulkhead and in some sections with a concrete wall. There is no emergent wetland vegetation. Baxter Pond supports abundant waterfowl, which are partly drawn by artificial food supplies. The pond's watershed extends mostly to the east, and comprises areas of steep slopes to the north and south of Central Drive.

Drainage is derived from both the street runoff system and from the brook that enters at the eastern end of Baxter Pond. As a result of these conditions, Baxter Pond suffers from many of the same bacteria and nutrient conditions that occur in Mill Pond. Baxter Pond has a more rapid flushing rate than Mill Pond and is surrounded with a dense growth of woodland.

Recommendations

- ❑ Plant vegetative access barrier around the perimeter of the pond and around the island (except near the steps and benches) to prevent the entry of geese and swans while not obstructing the view of the pond. Barrier should be 1.5 to 2 feet high and 4 to 8 feet wide, and could consist of low junipers or hedges.
- ❑ Install water sprays at one or more areas of the pond to deter the ducks and geese from entering the pond.
- ❑ Stabilize the south slope along the south side walkway with non-grass vegetative cover such as ivy, to reduce erosion and deter geese and ducks from the slope.
- ❑ Modify the existing spillway cap such that the overflow takes place at the southern end of the spillway into a new trough prior to overflowing into the overflow channel in order avoid the "dead" stagnant zone that currently exists and which results in a layer of floating vegetative debris or green/brown slick.
- ❑ As part of the spillway modification, install a trash rack in the overflow channel beneath Shore Road, such that the materials held by the rack are not readily visible and can be easily removed.
- ❑ Create a small pocket wetland on the west side of Shore Road beyond the overflow structure.
- ❑ Trap sediments by either:

a) Installing an underwater earth or non-engineering type berm on each side of the island in the pond and from the center of the bridge/overpass to the island to serve as the "walls" of shallow two chamber forebay feeding the pond to trap sediments for routine removal which would allow for serving one chamber at a time by diverting the follow with sand bags, or

b) Constructing a series of sediment traps upstream either in the stream channel or individual storm outfalls and catch basins.

- ❑ Excavate and remove the excessive sediment and debris that has accumulated through the pond.

- ❑ Regrade and stabilize each side of the stream bank feeding the pond for a 300 to 500 ft. sequence upstream. Beyond this distance, install stepped check dams, and create associated wetland, every 100 feet to reduce the stream velocity, thus reducing the potential for further streambank erosion and additional sediments discharged to the pond.

- ❑ Replace or retrofit existing catch basins to the stream feeding the pond with silt and debris traps below the catch basins inverts or catch basins.

5.4.4 Project No. 4: Stannards Brook Water Quality Improvement and Wetlands Creation Project

This is a brook that runs through County owned property which receives runoff from approximately 8 storm water discharges, two of which are greater than 36 inches in diameter. The project is to include a feasibility analysis, conceptual engineering, design and specifications, bidding and construction.

Recommendations

- ❑ Replace or retrofit catch basins that have outfalls to the Brook with silt and debris traps below the catch basin inverts.

- ❑ Identify an eliminate roof leaders discharging directly to curbs in street draining directly to the Park or the Brook.

- ❑ Replace existing security rack at the culvert below the east side of the Carlton Avenue overpass with a new trash racks.

- ❑ Install a series of (4 to 6) check dams, and create associated wetland, every 300 to 500 feet in the Brook to hold back/detain runoff and capture some sediments.

- ❑ Create a wet pond, extended detention basin or wetland each with a forebay on the east side of the Carlton Avenue overpass.
- ❑ Plant assorted vegetative materials to stabilize the streambank of the Brook in order to reduce the loss of sediments.
- ❑ Install catch basins at the ends of Washington, Adams and Jefferson which are sloped to the Park and have direct runoff through open sluices rather than catch basins. That would decrease the flow rates and trap some sediments and debris.

5.4.5 Project No. 5: Leeds Pond Wetlands Creation and Water Quality Improvement Project

The drainage basin of Leeds Pond, which is located in Plandome Manor, extends to the south and east, and includes large tracts of undeveloped land. The pond system is a state regulated freshwater wetland system. There are some areas of very steep slopes, especially along Stonytown Road and the Long Island Railroad tracks extending in the direction of the Port Washington station. The drainage arriving to the southeast portion of Leeds Pond from the main portion of the watershed passes through a series of smaller ponds. These upstream ponds act as sedimentation basins for the partial removal of sediments prior to discharge into Leeds Pond. The pond which was dredged by the Town in 1997, supports a large population of waterfowl, which serves as a significant source of coliform and nutrient contamination. The Plandome Golf Course Pond was dredged to a depth of 8 feet in 1998.

Golf Course Pond:

- ❑ Plant a vegetative access barrier around the perimeter of the pond to inhibit or prevent the entry of geese and ducks into the pond while not obstructing the view of the water in the pond. Barrier should be 1.5 to 2 feet high and 3 to 5 feet wide.
- ❑ Excavate and dredge the pond sediments on a regular basis using it as a forebay to Leeds Pond.

Stream along LIRR tracks to Leeds Pond:

- ❑ Create a large-scale wetlands system along the stream corridor to allow for sediment trapping and nutrient uptake prior to discharge to Leeds Pond.
- ❑ Replace or retrofit spillways on detention ponds along the stream in order to increase storage volume and reduce runoff rates.

- ❑ Construct a wetland system for reducing pollutant loading, decreasing runoff velocity and providing vegetative nutrient uptake.

- ❑ Construct a series of wet ponds and/or pocket wetlands to store runoff and intercept sediments and other pollutants in the first flush with a design allowing for the bypassing of large flows.

Stonytown Road Tributary:

- ❑ Regrade and stabilize each side of the stream bank to reduce the potential for further streambank erosion.

Plandome Tributary Pond:

- ❑ Excavate and dredge the pond sediments on a regular basis, using it as a forebay to Leeds Pond.

Area Surrounding the Pond

- ❑ Create a 10- to 20-foot "no mow" zone to allow for reduction in runoff rates and uptake of nutrients.

5.4.6 Project No. 6: Whitney Pond Park and Manhasset Valley Park Water Quality Improvement Project

Whitney Pond is a large pond located within the 24-acre Nassau County owned Whitney Pond Park complex. The pond is bordered on the west by Community Drive and the north by Northern Boulevard. It is surrounded on three of its four sides by vegetation. The tributary streams which feed from the south into Whitney Pond are filled with silt and sand collected from off-site runoff.

There are two tributary streams flowing northward into Whitney Pond. This is a state freshwater wetland system that contains vegetation that has taken root in the accumulated sediments that have been deposited along the western bank of the southern tributary. The eastern tributary feeding Whitney Pond is filled with newly deposited sediment. Vegetation within this wetland includes Willows, Silver Maple saplings, Purple Loosestrife, Jewelweed, Giant Lobelia and Spotted Joe-Pye Weed.

The southern portion of Whitney Pond's eastern tributary will follow the same accelerated process of sediment accumulation, stream widening and revegetation, unless erosion and sediment control practices are implemented within the upstream watershed area.

Whitney Pond drains northward to Manhasset Valley Park. The freshwater wetlands in Manhasset Valley Park consist of a stream segment and a series of small impoundments created by low concrete spillways. Vegetation within the park consists primarily of ornamental shade trees including Sycamore, Pin Oak, White Pine and Willows and extensive lawn areas.

The lawn areas have been heavily grazed and fertilized by the large populations of waterfowl that frequent both Whitney Pond Park and Manhasset Valley Park. A variety of shorebirds and domestic geese and ducks, including Muscovy and Peking White (Long Island) Ducks, Mallards, American Widgeons, Canada Geese, Snowy and Common Egrets utilize this wetland system, and introduce a heavy organic and bacterial load into the stream system in the form of fecal wastes. Large populations of pigeons and waterfowl frequent this park. This congregation of birds creates a heavy nutrient and bacteria input to the stream system, which directly feeds into the head of Manhasset Bay. It has been reported by previous studies performed for the Town that unless upstream sources carrying sediments are controlled, the Whitney Pond Park area will experience excessive erosion and flooding problems in the future. In addition, with respect to sediment quality in Whitney Pond, the County has found through a preliminary investigation that mercury, cadmium and other toxics exist in the sediments. A determination has not been made with respect to proper disposal of this sediment if it is removed.

Recommendations

- ❑ Re-seed the lawn and other grass areas of the park to improve ground cover and stabilize the soil and reduce the sediment loadings to the lake, stream and pond.
- ❑ Stabilize the bank of the stream between Whitney Pond in Manhasset Valley Park.
- ❑ Install a trash rack at the spillway of the footbridge of the pond in Manhasset Valley Park.

- ❑ Construct a two chamber forebay on each side of the island in the pond in Manhasset Valley Park in order to trap and regularly excavate and remove accumulated sediments.

- ❑ Excavate and remove accumulated sediments in Whitney Pond and the pond in Manhasset Valley Park with due consideration of the actual or potential contamination of the sediments and the need for finding a cost-effective disposal solution.

- ❑ Provide adequate park maintenance and litter/trash pickup to avoid the attraction of geese to unemptied trash cans.

- ❑ Repair spillway cap at the pond in Manhasset Valley Park and increase the cap's elevation (1± ft) to provide additional storage.

- ❑ Repair the deteriorated and damaged walkway in the pond in Manhasset Valley Park along the stream and grade a berm to keep runoff from grass/lawn area from washing sediment onto the walkway.

- ❑ Plant a vegetative access barriers along the perimeter of the lake, the pond and the stream bank to inhibit or prevent the entry of geese and ducks into the water while not obstructing the view of the water. Barriers should be 1.5 to 2 feet high and 3 to 5 feet wide.

- ❑ Install water sprays at one or more locations in Whitney Pond and Whitney Lake to deter geese and ducks from entering the pond.

5.4.7 Project No. 7: Manhasset Bayview Avenue Storm Sewer Sediment and Erosion Control Project

Bayview Avenue in Manhasset is located along the eastern shoreline of the lower reaches of Manhasset Bay. While Bayview Avenue has a storm sewer where it slopes towards the Bay, there are portions of the Avenue parallel to the Bay which have no curbs or shoulders and where runoff flows directly onto the Bay shoreline and is causing an eroded gully. Furthermore, along this stretch of road for approximately 1,500 feet there are also five storm water outfalls (one greater than 36 inches in diameter) that have the potential for discharging sediments, eroding the shoreline and impacting the marshes in this area and causing sediment built on the bay bottom. Recently, the Town and the County issued a Request for Proposals for engineering services to design a path/walkway in this area with some consideration of the drainage in this general area. The project identified below would include a feasibility analyses, conceptual engineering, design and specifications, permitting, bidding construction for:

Recommendations

- ❑ Retrofitting the catch basins along Bayview Avenue to allow for sediment trapping and in-line storage to minimize the adverse affect of a storm's "first flush".
- ❑ Removing accumulated solids that have built-up in the catch basins along Bayview Avenue.
- ❑ Installing a vegetative or concrete curb and/or shoulder on Bayview Avenue to prevent sheet runoff and uncontrolled runoff that results in eroded gullies alone the wooded/vegetated areas along the eastern shoreline.
- ❑ Install retention chambers or sediment trap at one or more of the six storm water outfalls.

5.4.8 Manhasset Bay Dredging and Marsh Restoration Project

Areas of Manhasset Bay have experienced a build-up of accumulated sediments in part due to the naturally low flushing in some enclosed areas, partially because of the numerous direct storm water discharges/outfalls to these areas, the lack of sediment trapping capabilities (due to design or maintenance problems) of the catch basins that discharge to these outfalls and finally because of the lack of maintenance dredging of channels (in the northeastern and/or lower portion of the Bay) that existed in the past that were used for commercial shipping and recreational boating. In addition to the adverse navigational impacts due to the accumulated sediments, the lower bay's ecosystem, special habitats, and marshes and wetlands may have been adversely affected and their productivity and value diminished. This project would involve:

A. <u>Field Investigations</u>

- ❑ Field investigations to determine the nature and extent of accumulated sediments and their impacts on historical navigational activities, special habitats, marshes and wetland.
- ❑ A sampling program consistent with NYSDEC to determine the chemical and biological characteristics of the sediment along a transect of an area(s) likely to be dredged; and

- ❑ A biota/species diversity sampling of the benthic organism found in the sediments along the transect.

B. Sediment Removal

Conduct a feasibility analyses, conceptual engineering, design and specifications, permitting, bidding and construction (i.e., excavation and appropriate disposal) for the removal of sediments in the northeastern or lower portion of the Bay assuming an area approximately 3,000± feet in length and a width of 50± feet and a depth to be determined based on the findings of the field investigations identified in Part A above.

- ❑ Conduct a feasibility study for removal of accumulated sediments in the lower bay to include provisions for chemical and biological sampling of sediments, identification of special habitats and potential beneficial uses, and identification of any possible alternative beneficial reuses of the sediments removed.

- ❑ Remove accumulated sediments from the eastern end of Mill Pond and from all priority portions of Baxter Pond, Whitney Pond and the pond within Manhasset Valley Park.

- ❑ Conduct a study of priority areas of the Bay needing navigational dredging to maintain and enhance the economic and commercial benefits of boating and barging activities.

- ❑ Apply for federal Corps of Engineer funding under Section 206 for sediment removal for restoration and protection of the marsh ecosystem in the lower Bay and Section 107 for studying the feasibility of removing accumulated sediments in the lower bay.

- ❑ Implement a sediment removal strategy that involves the activities listed below:

- ❑ Define whether the dredging project(s) will be in the Bay or one or more of the ponds surrounding the Bay;

- ❑ Define the lead or sole project(s) sponsor(s)/applicant (Corps of Engineers, the County, Town, Village or private/marina owner);

- ❑ Define the intended/desired scope of the dredging project(s) (location, length, depth, width of dredging);

- ❑ Prepare a preliminary outline of a sediment sampling plan for each project in accordance with the guidelines of NYSDEC or other regulatory agencies (Corps of Engineers, USEPA, etc.);

- ❑ Identify potential funding sources to develop and implement the sampling plan;
- ❑ Secure funding for the development and implementation of the sampling plan and preparation of the feasibility study/report;
- ❑ Hold a pre-application/study meeting with NYSDEC and other involved local, state and federal agencies to discuss the desired scope of each dredging project, the objectives and outline of the sampling programs and the array of reasonable dredge material disposal/re-use options to be considered in the feasibility study;
- ❑ Develop the sampling plan for a project and submit to NYSDEC and other involved local, state and federal agencies for review and approval;
- ❑ Implement the approved sampling plan with regard to the request sampling, analysis, QA/QC and data validation requirements identified in Section 3.10;
- ❑ Compile and assess the sampling results and conduct a screening analysis of the disposal/re-use alternative and whether to proceed with the dredging project. As appropriate refine the evaluation of alternative disposal/re-use options together with an evaluation of their cost-effectiveness and implementability;
- ❑ Perform feasibility analysis/study and identify the acceptable disposal/re-use alternatives likely to be agreed upon by all involved parties;
- ❑ Prepare a feasibility report for each project for the preferred selected option;
- ❑ Prepare the necessary permit applications and submit to the appropriate state, federal and other agencies;
- ❑ Identify and/or secure funding to perform the dredging and dispose/re-use the dredge materials;
- ❑ File the permit applications and as necessary submit request(s) for a Beneficial Use Determination (BUD) for dredged materials that are intended to be beneficially re-used;
- ❑ Upon receipt of required permits from the involved regulatory agencies perform the dredging and disposal/re-use of the dredged sediments in accordance with the permits received.

5.4.9 Project No. 9: Kensington Park Wetlands Creation and Runoff Control Project

This small park on the western shore of the lower reaches of the Bay is as a waterfront recreational facility for the residents of the Village of Kensington. A storm drain from Shore Road enters the site and discharges into a small brook and pond on the site. This drain contains sediments and related pollutants and degrades the brook and pond. A sediment trap is recommended for the drain followed by a pocket wetland. The project would include a feasibility analysis, conceptual engineering, design and specifications, permitting, bidding and construction.

5.4.10 Project No. 10: Village of Great Neck East Shore Road Storm Sewer Sediment Control Project

The East Shore Road area in Great Neck along the western shoreline of the lower reaches of the Bay has approximately a dozen storm water outfalls discharging directly to the bay (two of which are greater than 36 inches in diameter). These storm sewers collect runoff from fairly steep roadways and residential properties slopes primarily to the east of Station Road. In some areas of the drainage area to these outfalls (particularly along East Shore Road at the foot of these slopes) sand and sediments are often visible in the gutter. In addition, along both sides of East Shore Road, there are a number of commercial and industrial properties that have a high degree of impervious surfaces, mostly in the form of large parking lots, that result in the discharge of sediments through the outfalls discharging to the lower bay. The project prepared for this area would involve a feasibility analysis, conceptual engineering, design and specifications, permitting, bidding and construction for:

Recommendations

- ❑ Retrofitting the catch basins discharging to the outfalls to allow for sediment trapping and in-line storage to minimize the advice impact of a storm's "first flush".
- ❑ Removing accumulated solids that have built-up in catch basins along East Shore Road and those in the upstream portion of the collection system.
- ❑ Installing sediment traps or other retrofit devices in the outfalls along the shoreline.

5.4.11 Project No. 11: Mitchell Creek Wetlands Preservation and Water Quality Improvement Project

Mitchell Creek discharges directly to Manhasset Bay. It has a tidal portion and a state regulated freshwater (non-tidal) portion. The entire Creek is approximately 1.2 miles in length. It is fed by a fresh water stream which has three stream sources that originate in Kings Point Park. The Creek has an upland discharge area of approximately 850 acres (exclusive of the Creek and stream acres). The estimated area of the Mitchell Creek subwatershed is approximately 874 acres.

A portion of the flow in the Creek is from groundwater flow. The Creek receives storm water runoff from over two dozen storm water outfalls along its length and the tributaries that feed it. Of these, two are greater than 36 inches in diameter.

It is important to protect the Creek and its wetlands and special habitats from any adverse impacts from storm water runoff, particularly sediments from the numerous outfalls that discharges to it, yet still maintain the water flow that is essential to it and prevent stream bank erosion that also adds sediment. This project would include a feasibility analysis, conceptual engineering, design and specifications, permitting, bidding and construction for:

Recommendations

- ❑ Retrofitting the storm water outfalls with sediment removal features and providing for in-line storage to reduce the sediment loadings to the Creek and its tributaries.
- ❑ The creation of new, or the enhancement of existing, wetlands along the Creek to preserve the biological value of the vegetation present and associated special habitats. This would include determining the appropriateness and feasibility of removing historic fill from wetlands.

5.4.12 Project No. 12: Kings Point Pond Water Quality Improvement Project

Kings Point Pond is located on the northern portions of Kings Point. It is owned by the Nature Conservatory, with various industrial properties having ownership to the pond's shoreline. The pond has an outlet with a gate to the Bay which is operated and maintained by the Village of Kings Point. The shoreline surrounding the pond has a variety of wetland vegetation and except for the 1988 nitrogen sampling of the pond, little is known about its water quality and whether siltation of the pond is occurring. However, the 1998 sampling revealed the highest nitrogen levels of any of the water bodies sampled around the bay. Based on the sampling the average total nitrogen in the pond was found to be 6.59 mg/l which was more than twice the average found at the other sites. In order to determine more accurately the degree of nitrogen levels in the pond, and whether they are causing problems, whether siltation is occurring and what the optimum open/closed gate operations should be in order to have acceptable water quality conditions, an improvement project is recommended which includes:

Recommendations

- ❑ Collects additional water quality data
- ❑ Determines water depths throughout the pond
- ❑ Evaluate the condition of the outlet gate
- ❑ Inventories the extent and nature of wetlands vegetation
- ❑ Identifies methods for controlling runoff and sediments from the outfalls/drains to the pond
- ❑ Determines the degree of groundwater flow to the pond and evaluates the impact on water quality
- ❑ Recommends a plan for reducing the nitrogen levels and protecting the wetland surrounding it.

Recommended Order of Priority

All 12 improvement projects described above are important to the improvement of water quality in the bay, the restoration of beneficial uses of its waters, and the protection and

restoration of the wetland, habitat and ecological communities surrounding the bay. Recognizing, however, the need to set priorities for securing the necessary funding and grant assistance required to implement the 12 improvement projects, it is recommended that they be considered in three categories of priority as follows:

- ❑ 1st Level Priority:
  - North and East Sheets Creek Water Quality Improvement and Wetlands Restoration Project
  - Baxter Pond Water Quality Improvement and Wetlands Creation Project
  - Lower Manhasset Bay Dredging and Marsh Restoration Project
  - Mitchell Creek Wetlands Preservation and Improvement Project
- ❑ 2nd Level Priority:
  - Mill Pond Water Quality Improvement and Storm Water Control Project
  - Leeds Pond Wetlands Creation and Water Quality Improvement Project
  - Manhasset Bayview Avenue Storm Water Sediment and Erosion Control Project
  - Village of Great Neck East Shore Road Storm Water Sediment Control Project
- ❑ 3rd Level Priority:
  - Stannards Brook Water Quality Improvement and Wetlands Creation Project
  - Whitney Pond and Manhasset Valley Park Water Quality Improvement Project
  - Kensington Park Wetlands Creation and Runoff Control Project
  - Kings Point Pond Water Quality Improvement Project

Rationale for Recommended Priorities

The priority levels presented above are based upon the following:

Priority	Rationale
1st Level	Represents a geographical area that involves a relatively large degree of actual or impaired beneficial use (swimming, boating, etc.) or ecological value of the Bay, its surrounding ponds or special habitat. This level assumes that if the area of the Bay or habitat is protected or restored, it would result in significant enjoyment of the resource by a large number of residents in the watershed and visitors.

Priority	Rationale
2nd Level	Represents a geographical area where there is either less use by residents or visitors when compared to the 1st Level Priority and where water quality improvements would result in a lesser beneficial use than 1st Level Priority.
3rd Level	Represents a geographical area where which relative to the 1st Level and 2nd Level Priorities have the least use by residents or visitors and which compared to the other two levels would result in a lesser improvement to the water quality of the Bay or to a special ecological habitat.

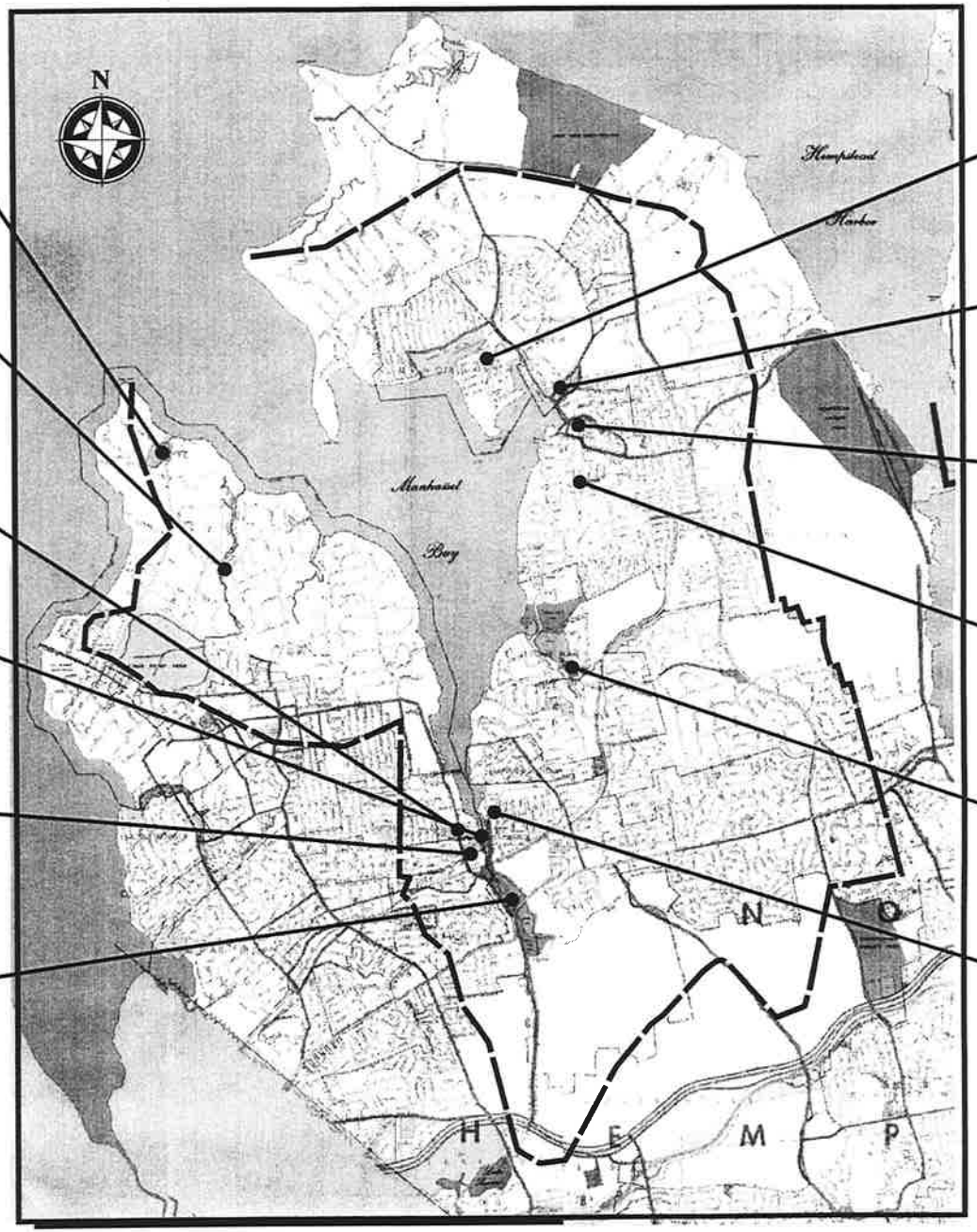
A summary of the recommended projects is provided on Figure 5.4-1. The estimated costs for the recommended projects are provided in Table 5.4-1.

Financing of Capital Improvement Projects

In order to fund the above capital improvements, which are expected to have both in-bay and out-of-bay water quality and ecological benefits, the following funding sources are recommended for sharing in the costs of the projects:

- Federal
  - U.S. Environmental Protection Agency
  - U.S. Army Corps of Engineers
  - Long Island Sound Study Office
  - U.S. Fish and Wildlife Service
- State
  - New York State Department of Environmental Conservation
  - New York State Department of State
  - New York State Department of Transportation (TEA-21 funds)
- Local Governments
  - County
  - Town
  - Villages
- Educational Organizations (Cooperative Extension, etc.)

MANHASSET BAY WATER QUALITY IMPROVEMENT PLAN



Kings Point Pond
Water Quality Improvement Project
3rd Level Priority

Mitchell Creek
Wetlands Preservation
And Improvement Project
1st Level Priority

Village of Great Neck
East Shore Road Storm Water
Sediment Control Project
2nd Level Priority

Lower Manhasset Bay
Dredging and
Marsh Restoration Project
1st Level Priority

Kensington Park
Wetlands Creation
And Runoff Control Project
3rd Level Priority

Whitney Pond And
Manhasset Valley Park
Water Quality Improvement Project
3rd Level Priority

North and East Sheets Creek
Water Quality Improvement
And Wetlands Restoration Project
1st Level Priority

Mill Pond
Water Quality Improvement
And Storm Water Control Project
2nd Level Priority

Baxter Pond
Water Quality Improvement
And Wetlands Creation Project
1st Level Priority

Stannards Brook
Water Quality Improvement
And Wetlands Creation Project
3rd Level Priority

Leeds Pond
Wetlands Creation And
Water Quality Improvement Project
2nd Level Priority

Manhasset Bayview Avenue
Storm Water Sediment
And Erosion Control Project
2nd Level Priority

RECOMMENDED PROJECTS

Figure 5.4-1

Dvirka and Bartilucci CONSULTING ENGINEERS
A DIVISION OF WILLIAM F. COSULICH ASSOCIATES, P.C.

Table 5.4-1

ESTIMATED COST OF RECOMMENDED WATER QUALITY IMPROVEMENT PROJECTS

Improvement Project	Estimated Cost[a]
1st Level Priority:	
North and East Sheets Creek Water Quality Improvement and Wetlands Restoration Project	$ 850,000
Baxter Pond Water Quality Improvement and Wetlands Creation Project	700,000[b]
Manhasset Bay Dredging and Marsh Restoration Project	2,100,000[b]
Mitchell Creek Wetlands Preservation and Improvement Project	450,000
2nd Level Priority:	
Mill Pond Water Quality Improvement and Storm Water Control Project	1,100,000[b]
Leeds Pond Wetlands Creation and Water Quality Improvement Project	2,050,000[b]
Manhasset Bayview Avenue Storm Water Sediment and Erosion Control Project	350,000
Village of Great Neck East Shore Road Storm Water Sediment Control Project	550,000
3rd Level Priority:	
Stannards Brook Water Quality Improvement and Wetlands Creation Project	600,000
Whitney Pond and Manhasset Valley Park Water Quality Improvement Project	850,000[b]
Kensington Park Wetlands Creation and Runoff Control Project	100,000
Kings Point Pond Water Quality Improvement Project	200,000
TOTAL	$9,900,000

Note: (a) The estimated costs for the scope included in this plan include the following tasks: feasibility analysis; preliminary engineering; permitting; plans, specifications and bid documents; construction costs; construction administration and observation; and contingencies.

(b) The cost for dredging the ponds/bay assumes the material removed is not hazardous and can be disposed of by normal, legal methods. Should during the feasibility analysis the material be determined to be hazardous, the costs associated with dredging and disposal will increase depending on the type, volume, and extent of contaminants involved.

- ❑ Manhasset Bay Water Quality Improvement Foundation (Private and Corporate Contributions)

In addition to funding from the various above funding sources, it is recommended that the USEPA, as part of its National Estuary Program (of which the Long Island Sound Study is a part of), create a water quality showcase program. As part of this program, USEPA should designate Manhasset Bay, and this Plan, a "National Estuary Showcase Project." This would provide for a federally coordinated effort of targeting federal funding and federal agency(ies) staff assistance in the implementation of the BMPs and improvement projects recommended in this Plan.

The proposed showcase program would be modeled after USEPA's showcase program for "Brownfields" redevelopment of urban areas that have been adversely affected by actual or perceived hazardous waste contamination, and are currently underutilized, yet are prime candidates for cleanup and renewal. Such an approach could be applied toward water quality improvements in Manhasset Bay and the requisite intergovernmental actions needed to make those improvements a reality. From a national perspective, this proposed Plan is likely to be one of only a few plans to provide multiple linkages to various water quality issues. In the case of the Manhasset Bay Plan, these linkages are:

- ❑ Improvements to water quality both in the Bay and the Sound;
- ❑ Pollutant Reductions from both point and nonpoint sources;
- ❑ Focused on multiple pollutants (bacteria, nitrogen, sediment and floatables);
- ❑ Multiple governmental responsibilities (federal, state, county, town, village and special districts); and
- ❑ Multiple control approaches (structural, treatment, best management practices, wetlands and habitat restoration/creation and pollution prevention.

5.5 Subwatershed Recommendations

In addition to, or as appropriate in conjunction with, the watershed-wide recommended BMPs identified in Section 5.3 and the 12 specific water quality improvement and wetlands protection/restoration projects identified in Section 5.4, the subwatershed specific recommendations identified on Table 5.5-1 should be implemented.

5.6 Recommended Ordinances

As described in Section 5.4, there is a wide range of existing authorities to require some of the BMPs recommended in this Plan. However, it may be possible that individual villages or the Town may wish to promote voluntary practices/efforts combined with public education for a given period of time with regulations to require the practices at a later time. However, eventually it would be advisable to have most, if not all, of the watershed areas covered by similar, or at least consistent, requirements. The areas/topics for which similar or consistent ordinances should be in place are listed below, while example model ordinances, actual ordinances and guidelines are presented for these areas/topics in Appendix N and Appendix O.

- ❑ Storm water management
- ❑ Sediment and erosion control
- ❑ Protection of natural features
- ❑ Activities on steep slopes
- ❑ Excavations
- ❑ Site clearing
- ❑ Protection of natural vegetation
- ❑ Restriction of fertilized vegetation
- ❑ Landscaping
- ❑ Preservation of trees
- ❑ Selective clearing
- ❑ House boats wastewater connection to a municipal sanitary sewer

Table 5.5-1

SUMMARY OF PRIORITY BEST MANAGEMENT PRACTICES BY SUBWATERSHED

Subwatershed	Major Recommendations	Municipalities
Barkers Point - ID #01	a. Promote the increase of tree cover. b. Minimize or reduce the size of lawn areas. c. Use vegetative berms to reduce runoff and eroded sediments to roadways. d. Use dense vegetative strips to create on-site wet depression storage. e. Reduce or minimize fertilizer use. Inventory cesspools and septic systems and determine the number, age, condition, depth to groundwater and the need for alternative treatment.	Sands Point (V)
Thoms and Plum Points - ID #02	a. Minimize or reduce the size of lawn areas. b. Keep street gutter clean of vegetative debris, leaves, trash, litter, etc. c. Clean out catch basins of accumulated debris at least every 2 to 3 years. d. Install nets and/or booms at storm water outfalls to the bay and North Sheets Creek to trap floatables. e. Develop storm water pollution prevention plans and obtain USEPA Phase I or Phase II storm water permit coverage for marinas, boat repair yards and other commercial or industrial establishments. f. Minimize or reduce areas of pavement in underutilized parking lots. g. Create a protection set-back along both sides of North Sheets Creek. h. Control the waterfowl population at Manorhaven Park. i. Provide lifeguard service at Manorhaven Beach and track the water quality sampling results in order to make determinations regarding acceptability of water quality for swimming. j. Evaluate the feasibility of reducing the size of the Manorhaven Park parking lot to match actual use and convert the excess area to "overflow" parking surfaces and/or groundwater dry well discharge of the runoff. k. Establish a manifest system to document regular and proper pump out of house boats to the local sewer system or other approved pump-out facility.	Manorhaven (V) Sands Point (V) North Hempstead (T)

Table 5.5-1 (continued)

SUMMARY OF PRIORITY BEST MANAGEMENT PRACTICES BY SUBWATERSHED

Subwatershed	Major Recommendations	Municipalities
Sheets Creek - ID #03	a. Implement an Integrated Pest Management Program at Sands Point Golf Club. b. Create pocket or ponded wetlands or detention ponds to retain and reduce the volume and rate of runoff from the Sands Point Golf Course. c. Provide regular/routine street sweeping of large parking lot areas at various shopping centers and industrial parks along Shore Road. d. Keep street gutters clean of vegetative debris, leaves, trash, litter, etc. e. Provide adequate trash receptacles and other litter control measures at large parking lot along Shore Road. f. Clean catch basins every 2 to 3 years. g. Evaluate the feasibility of retention/detention basins/chambers or devices to reduce runoff volumes and rates from large parking lots along Shore Road. h. Install nets or booms to trap floatables by storm water outfalls to East Sheets Creek. i. Develop storm water pollution prevention plans and obtain USEPA Phase I or Phase II permit coverage for marinas, boat repair yards and other commercial or industrial establishments. j. Provide a set-back from the East Sheets Creek shoreline to active parking or other areas. k. Develop and implement storm water pollution prevention plans for areas subject to new development or redevelopment and include provisions for on-site retention/detention of runoff with provisions for creating wetlands and/or wet ponds. l. Establish a manifest system to document regular and proper pump out of house boats to the local sewer system or other approved pump-out facility.	Manorhaven (V) Port Washington North (V) Sands Point (V) North Hempstead (T)

Table 5.5-1 (continued)

SUMMARY OF PRIORITY BEST MANAGEMENT PRACTICES BY SUBWATERSHED

Subwatershed	Major Recommendations	Municipalities
Baxter and Mill Pond - ID #04	a. Minimize or reduce the size of lawn areas. a. Keep street gutters clean of vegetative debris, leaves, trash, litter, etc. b. Clean catch basins every 3 to 5 years. c. Control the waterfowl population at Mill Pond Park and Baxter Pond Park. d. Inventory cesspools and septic systems and determine the number, age, condition, depth to groundwater, and the need for alternative treatment. e. Increase amount of shrubs on residential properties and create vegetative berms to reduce runoff rates and reduce sediment in runoff. f. Implement an Integrated Pest Management Program at the Sands Point Village Club Golf Course. g. Create pocket or ponded wetlands or detention ponds to retain and reduce the volume and rate of runoff from the Sands Point Village Club Golf Course.	Baxter Estates (V) Port Washington (V) Sands Point (V) North Hempstead (T)
Eastern Shore - ID #05	a. Clean catch basins of accumulated debris every 2 to 3 years. b. Keep street gutters clean of vegetative debris, leaves, trash, litter, etc. c. Minimize or reduce the size of lawn areas. d. Install nets or booms to trap floatables at storm water outfalls discharging directly to the bay. e. Provide a focused public education effort for landscapers and residents on the control of sediment runoff from residential properties/yards/gardens in moderate to steep slope areas.	Baxter Estates (V) Plandome Manor (V) North Hempstead (T)

Table 5.5-1 (continued)

SUMMARY OF PRIORITY BEST MANAGEMENT PRACTICES BY SUBWATERSHED

Subwatershed	Major Recommendations	Municipalities
Leeds Pond - ID #06	a. Develop storm water pollution prevention plans for construction sites for new development or redevelopment. b. Minimize or reduce the size of lawn areas. c. Clean catch basins of accumulated debris every 3 to 5 years. d. Control the waterfowl population at the ponds in the subwatershed. e. Create "no mow" zones around the ponds in the watershed. f. Promote the increase of tree cover. g. Use vegetative berms to reduce runoff and eroded sediments to roadways. h. Provide a focused public education effort for landscapers and residents on the control of sediment runoff from residential properties/yards/gardens in moderate to steep slope areas. i. Implement an Integrated Pest Management Program at the North Hempstead County Club and the Plandome Country Club. j. Create pocket or ponded wetlands or detention ponds to retain and reduce the volume and rate of runoff from the North Hempstead Country Club and the Plandome Country Club. k. Keep street gutters clean of vegetative debris, leaves, trash, litter, etc. l. Inventory cesspools and septic systems and determine number, age, condition, depth to groundwater and the need for alternative treatment.	Flower Hill (V) Munsey Park (V) Plandome (V) Plandome Heights (V) Plandome Manor (V) North Hempstead (T)

Table 5.5-1 (continued)

SUMMARY OF PRIORITY BEST MANAGEMENT PRACTICES BY SUBWATERSHED

Subwatershed	Major Recommendations	Municipalities
Southeastern Shore – ID #07	a. Minimize or reduce the size of lawn areas. b. Keep street gutters clean of vegetative debris, leaves, trash, litter, etc. c. Clean catch basins of accumulated debris every 2 to 3 years. d. Promote the increase of tree cover. e. Use vegetative berms to reduce runoff and eroded sediments to roadways. f. Provide a focused public education effort for landscapers and residents on the control of sediment runoff from residential properties/yard/gardens in moderate to steep slope areas. g. Inventory cesspools and septic systems and determine the number, age, condition, depth to groundwater and the need for alternative treatment with a special focus on the unsewered areas in the residential/commercial/business area along the Plandome Road corridor.	Plandome (V) Plandome Heights (V) Plandome Manor (V) North Hempstead (T)

Table 5.5-1 (continued)

SUMMARY OF PRIORITY BEST MANAGEMENT PRACTICES BY SUBWATERSHED

Subwatershed	Major Recommendations	Municipalities
Whitney Pond - ID #08	a. Minimize or reduce the size of lawn areas. b. Keep street gutters clean of vegetative debris, leaves, trash, litter, etc. c. Clean catch basins of accumulated debris every 3 to 5 years. d. Implement an Integrated Pest Management Program at the North Hills County Club, the Deepdale Golf Club and the Fresh Meadows Country Club. e. Create pocket or ponded wetlands or detention ponds to retain and reduce the volume and rate of runoff from the North Hills Country Club, the Deepdale Golf Club and the Fresh Meadows Country Club. f. Control the waterfowl population at Whitney Pond and the pond in Manhasset Valley Park. g. Inventory cesspools and septic systems and determine the number, age, condition, depth to groundwater and the need for alternative treatment with a special focus on two areas: (1) the residential and commercial corridor area along Plandome Road including Town Hall and Manhasset High School, and (2) any unsewered areas along Northern Boulevard/"miracle mile." h. Develop and implement storm water pollution prevention plans for areas subject to new development or redevelopment and include provisions for on-site retention/detention of runoff with provisions for creating wetlands and/or wet ponds. i. Minimize or reduce areas of pavement in underutilized parking lots.	Flower Hill (V) Kensington (V) Lake Success (V) Munsey Park (V) North Hills (V) Roslyn Estates (V) Thomston (V) North Hempstead (T)

Table 5.5-1 (continued)

SUMMARY OF PRIORITY BEST MANAGEMENT PRACTICES BY SUBWATERSHED

Subwatershed	Major Recommendations	Municipalities
Southwestern Shore – ID #09	a. Minimize or reduce the size of lawn areas. b. Keep street gutters clean of vegetative debris, leaves, trash, litter, etc. c. Clean catch basins of accumulated debris every 2 to 3 years. d. Promote the increase in tree cover. e. Provide a focused public education effort for landscapers and residents on the control of sediment runoff from residential properties/yard/gardens in moderate to steep slope areas. f. Minimize or reduce areas of pavement in underutilized parking lots. g. Create a protection set-back along the western shoreline of the lower bay parcel to East Shore Road.	Great Neck (V) Gardens (V) Kensington (V) Kings Point (V) Thomston(V) North Hempstead (T)
Kings Point Creek – ID #10	a. Promote the increase of tree cover. b. Minimize or reduce the size of lawn areas. c. Use vegetative berms to reduce runoff and eroded sediments. d. Use dense vegetative strips to create on-site wet depression storage. e. Reduce or minimize fertilizer use. a. Inventory cesspools and septic systems and determine the number, age, condition, depth to groundwater and the need for alternative treatment. f. Clean out catch basins every 2 to 3 years.	Great Neck (V) Kings Point (V)
Mitchell Creek - ID #11	a. Promote the increase of tree cover. b. Minimize or reduce the size of lawn areas. c. Use vegetative berms to reduce runoff and eroded sediments. d. Use dense vegetative strips to create on-site wet depression storage. e. Reduce or minimize fertilizer use. f. Inventory cesspools and septic systems and determine the number, age, condition, depth to groundwater and the need for alternative treatment. g. Clean out catch basins every 2 to 3 years.	Great Neck (V) Kings Point (V)

Table 5.5-1 (continued)

SUMMARY OF PRIORITY BEST MANAGEMENT PRACTICES BY SUBWATERSHED

Subwatershed	Major Recommendations	Municipalities
Kings Point Pond - ID #12	a. Promote the increase of tree cover. b. Minimize or reduce the size of lawn areas. c. Use vegetative berms to reduce runoff and eroded sediments. d. Use dense vegetative strips to create on-site wet depression storage. e. Reduce or minimize fertilizer use. f. Inventory cesspools and septic systems and determine the number, age, condition, depth to groundwater and the need for alternative treatment. g. Clean out catch basins every 2 to 3 years.	Kings Point (V)

Section 6

6.0 GLOSSARY AND BIBLIOGRAPHY

6.1 Glossary of Terms

Aesthetic Value: The increase in value of a property derived from such intangible factors as its inherent attractiveness, its access to attractive views, or its general appeal to the sense of beauty of the owner or purchaser.

Algae: Simple rootless plants that grow in sunlit waters in relative proportion to the amounts of nutrients available. Most forms can provide food and habitat. They can affect water quality adversely, however, by lowering he dissolved oxygen in the water when they decompose.

Algal Blooms: Sudden spurts of algal growth, which can affect water quality adversely. Often, excessive blooms indicate nutrient enrichment.

Ambient: Referring to average concentrations of substances in the surrounding media (water, air, or sediment).

Anoxia: An environment with very little or no free oxygen. Oxygen may be available in association with other elements, e.g., nitrate.

Aquifer: An underground geological formation, or group or formations, containing usable amounts of groundwater that can supply wells and springs.

Atmospheric Deposition: Emissions of sulfur and nitrogen compounds and other substances including heavy metals and toxic organic compounds that are sometime transformed by complex chemical processes in the atmosphere, and deposited often far from the original sources, and then deposited on earth in either a wet or dry form.

Bacteria: Disease-causing bacteria in soil, water, or air can also cause health problems for humans, animals, and plants.

Base Flow: The stream discharge from groundwater runoff.

Berm: A shelf that breaks the continuity of a slope.

Best Management Practice (BMP): A method of preventing or reducing the pollution resulting from an activity.

Biological Nutrient Removal (BNR): A wastewater treatment process in which biological organisms, primarily bacteria, are used to remove nutrients such as nitrogen and phosphorus from wastewater.

Bloom: A proliferation of algae and/or higher aquatic plants in a body of water; often related to nutrient pollution.

BNR Retrofit: Institution of minor mechanical and operational changes at a wastewater treatment plan for the purpose of removing nitrogen.

Channel Stabilization: Erosion prevention and stabilization of velocity distribution in a channel using jetties, drops, revetments, vegetation and other measures.

Coastal Runoff: Storm water and the materials it carries contributed t the Sound from coastal lands surrounding the Sound.

Coastal Zone: Lands and waters adjacent to the coast that exert an influence on the uses of the sea and its ecology, or, inversely, whose uses and ecology are affected by the sea. Legally the definition varies from state to state.

Coliform Bacteria: Widely distributed microorganisms found in the intestinal tract of humans and other animals and in soils. Their presence in water indicates fecal pollution and potentially dangerous contamination by disease-causing microorganisms.

Contaminant: Any physical, chemical, biological, or radiological substance or matter that has an adverse affect on habitats or organisms.

Designated Uses: Those water uses identified in state water quality standards that must be achieved and maintained as required under the Clean Water Act. Uses can include cold water fisheries, public water supply, agriculture, etc.

Detention Dam: A dam constructed for the purpose of temporary storage of streamflow or surface runoff and for releasing the stored water at controlled rates.

Dissolved Oxygen (DO): The oxygen freely available in water. Dissolved oxygen is vital to fish and other aquatic life. Traditionally, the level of dissolved oxygen has been accepted as the single most important indicator of a water body's ability to support desirable aquatic life.

Drainage Area: The area draining into a stream at a given point. The area may be of different sizes for surface runoff, subsurface flow and base flow, but generally the surface runoff area is used as the drainage area.

Dredged Sediments: Bottom sediments associated with estuarine water, removed usually for navigational purposes, by mechanical means such as a bucket or hydraulic dredge.

Dredging: Mechanical removal of sediment from the bottom of waterbodies. This disturbs the ecosystem and causes silting that can have adverse impacts on aquatic life.

Effluent: Wastewater-treated or untreated- that flows out of a treatment plant, sewer, or industrial outfall. Generally refers to wastes discharged into surface waters.

Emission: Pollution discharged into the atmosphere from smokestacks, other vents, and surface areas of commercial or industrial facilities; from residential chimneys; and from motor vehicle, locomotive, or aircraft exhausts.

Fecal Coliform Bacteria: Specific coliform bacteria associated with the digestive track of warm-blooded animals. (Also, see Coliform)

Fertilizer: Materials such as nitrogen and phosphorous that provide nutrients for cultured plants. Commercially sold fertilizers may contain other chemicals or may be in the form of processed sewage sludge.

Filter Strip: Strip of permanent vegetation above ponds, diversion terraces and other structures to retard flow of runoff water causing deposition of transported material, thereby reducing sediment flow.

Finfish: Term used to distinguish fish (with fins) from shellfish.

Freshwater: A term applied to water with salinity less than 0.5 parts per thousand (National Wetlands Definition).

General Permit: A permit applicable to a class or category of regulated activities.

Geographic Information System: A computerized database of land use, land cover and many other types of information that can be statistically analyzed and graphically displayed using maps.

Groundwater: The supply of freshwater found beneath the Earth's surface (usually in aquifers) which is often used for supplying wells and springs.

Habitat: The place where a population (e.g., human, animal, plant, microorganism) lives and its surroundings, both living and non-living.

Hydrodynamic: Concerning the forces, energy and pressure of water in motion.

Hypoxia: Low concentrations (e.g., less than 3 ppm) of dissolved oxygen in water.

Integrated Pest Management (IPM): Application of biological pest (and physical) controls; an alternative to synthetic chemical pesticides.

Land Use: Refers to the ways in which a community or area makes use of its natural resources.

Modeling: An investigative technique using a mathematical or physical representation of a system or theory, usually on a computer, that accounts for all or some of its known properties.

Monitoring: Periodic or continuous surveillance or testing to determine the level of compliance with statutory requirements and/or pollutant levels in various media or in humans, animals, and other living things.

Nitrogen: Nitrogen is an element that is present as organic nitrogen or in inorganic forms of ammonia, nitrite, and nitrate.

Nonpoint Source: Pollution sources that are diffuse or are not introduced into a receiving stream from a specific outlet. The pollutants are generally carried off the land by storm water runoff.

Nutrient: Any substance assimilated by living things that promotes growth. The term is generally applied to nitrogen and phosphorus, but is also applied to other essential and trace elements including carbon and silica.

Outfall: The place where an effluent is discharged into receiving waters.

Oxygen Demand: Consumption of oxygen by bacteria to oxidize organic matter.

Pathogens: Microorganisms that can cause disease in humans, animals, or plants. They may be bacteria, viruses, or parasites and are found in sewage, in runoff from animal farms or rural areas populated with domestic and/or wild animals, and in water used for swimming. Fish and shellfish contaminated by pathogens, or the contaminated water itself, can cause serious illnesses.

Point Source: A stationary location or fixed facility form which pollutants are discharged or emitted.

Pollutant: Generally, any substance introduced into the environment that adversely affects the health of plants and animals, or the usefulness of a resource.

Retention: The amount of precipitation on a drainage area that does not escape as runoff. It is the difference between total precipitation and total runoff.

Runoff: That part of precipitation, snow melt, or irrigation water that runs off the land into streams or other surface-water. It can carry pollutants from the air and land into the receiving waters.

Salinity: The amount of solid material contained in seawater once the organic matter has been completely oxidized; reported in grams of material to kilogram of seawater (i.e., part per thousand or pt). The salt or chlorine content of the water can be used to determine the salinity. More simply, the amount of salt in water.

Sanitary Sewers: Underground pipes, that carry only domestic or industrial waste, not storm water.

Secondary Treatment: The second step in most sewage treatment plants in which bacteria consume the organic parts of the waste. It is accomplished by bringing together waste, bacteria, and oxygen in trickling filters or in the activated sludge process. This treatment removes floating and settleable solids and about 90 percent of the oxygen-demanding substances and suspended solids. Disinfection is the final stage of secondary treatment.

Sediment: Solid material, both mineral and organic, that is in suspension, is being transported or has been moved from its site of origin by air, water, gravity or ice and has come to rest on the earth's surface either above or below sea level.

Sediment Basin: A basin or pond designed to store a calculated amount of sediment being transported on the site.

Septic Tank: An underground storage and treatment tank for wastes from homes having no sewer line to a treatment plant. The waste goes directly from the home to the tank, where the organic waste is decomposed by bacteria and the sludge settles to the bottom. The effluent flows out of the tank into the ground through drains; the sludge is pumped out periodically.

Sewage: The waste and wastewater produced by residential and commercial establishments and discharged into sewers.

Sewer: A channel or conduit that carries wastewater and storm water runoff from the source to a treatment plant or receiving stream. Sanitary sewers carry household, industrial, and commercial waste. Storm sewers carry runoff from rain or snow. Combined sewers are used for both purposes.

Shellfish: An invertebrate having a rigid outer covering, such as a shell or exoskeleton; includes clams and lobsters; term is the counterpart of finfish.

Spillway: An open or closed channel, or both, used to convey excess water from a reservoir. It may contain gates, either manually or automatically controlled, to regulate the discharge of excess water.

Standards: Prescriptive norms that govern action and actual limits on the amount of pollutants or emissions produced. The EPA, under most of its responsibilities, establishes minimum standards. States can issue stricter standards if they choose.

Storm Sewer: A system of pipes (separate from sanitary sewers) that carry only water runoff from building and land surfaces.

Storm Water: Runoff caused by rain or snow storms.

Stream: A body of water, including brooks and creeks, that moves in a definite channel in the ground driven by hydraulic gradient.

Surface Water: All water naturally open to the atmosphere (rivers, lakes, reservoirs, streams, impoundments, seas, estuaries, etc.);

Swale: A linear but flattish depression in the ground surface which conveys drainage water but offers no impediment to traffic as do ditches or gutters.

Trash Hoods: Apparatus inside a catch basin of a storm sewer which traps large objects (i.e., floatable debris).

Tributary: A stream, creek, or river that flows into a larger stream, creek, or river.

Wastewater Treatment Plant: A facility containing a series of tanks, screens, filters, and other processes by which pollutants are removed from water.

Water Quality Standards: State-adopted and EPA-approved ambient standards for water bodies. The standards cover the use of the water body and the water quality criteria which must be met to protect the designated use or used (e.g., drinking, swimming, fishing).

Watershed: The land area that drains into a stream, river, estuary, or other waterbody.

Wetland: An area that is regularly saturated by surface or groundwater and subsequently is characterized by a prevalence of vegetation that is adapted for life in saturated soil conditions. Examples include: swamps, bogs, fens, and marshes. Often defined based on soil characteristics.

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