MANHASSET BAY WATER QUALITY IMPROVEMENT PLAN (WQIP)

NPV No.22066

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*Note: NPV has previously consulted with some of the municipal members of the MBPC on the contents presented herein.

ACRONYMS

ADA – Americans with Disabilities Act
AICP – American Institute of Certified Planners
AOP – Advanced Oxidation Process
BMP – Best Management Practice
CBS – Chemical Bulk Storage
CCTV – Closed-Circuit Television
CCMP – Comprehensive Conservation and Management Plan
CFR – Code of Federal Regulations
CFU – Colony-Forming Unit
CHIPS – Consolidated Local Street and Highway Improvement Program
CIPP – Cured-in-Place Pipe
CLIS – Central Long Island Sound
COVID-19 – Coronavirus Disease 2019
CSC – Climate Smart Communities
CWA – Clean Water Act
CZMA – Coastal Zone Management Act
DEM – Digital Elevation Model
DHSES – New York State Division of Homeland Security and Emergency Services
DNA – Deoxyribonucleic Acid
DPW – Department of Public Works
ECHO – Enforcement and Compliance History Online
EFH – Essential Fish Habitat
EPA/USEPA – United States Environmental Protection Agency
EPF – Environmental Protection Fund
ESA – Endangered Species Act
FEMA – Federal Emergency Management Agency
FHWA – Federal Highway Administration
GAC – Granular Activated Carbon
GI – Green Infrastructure
GIS – Geographic Information System
GNWPCD – Great Neck Water Pollution Control District
GP – General Permit
GPD – Gallons per Day
HAB – Harmful Algal Bloom
I/A – Innovative and Alternative
IDDE – Illicit Discharge Detection and Elimination
IEC – Interstate Environmental Commission
IPaC – Information for Planning and Consultation
IPM – Integrated Pest Management
IUP – Intended Use Plan

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LiDAR – Light Detection and Ranging
LID – Low Impact Development
LILCO – Long Island Lighting Company
LIRR – Long Island Rail Road
LIS – Long Island Sound
LISFF – Long Island Sound Futures Fund
LISS – Long Island Sound Study
LISTS – Long Island Sound Trawl Survey
LWRP – Local Waterfront Revitalization Program
MAP-21 – Moving Ahead for Progress in the 21st Century Act
MBPC – Manhasset Bay Protection Committee
MCL – Maximum Contaminant Level
MCM – Minimum Control Measure
MGD – Million Gallons per Day
MLL – Model Local Law
MLWD – Manhasset-Lakeville Water District
MNA – Monitored Natural Attenuation
MS4 – Municipal Separate Storm Sewer System
MSGP – Multi-Sector General Permit
MST – Microbial Source Tracking
NCDH – Nassau County Department of Health
NCSWMP – Nassau County Stormwater Management Program
NEIWPCC – New England Interstate Water Pollution Control Commission
NICE – Nassau Inter-County Express
NLM – Nitrogen Loading Model
NOAA – National Oceanic and Atmospheric Administration
NPDES – National Pollutant Discharge Elimination System
NPS – Nonpoint Source
NPV – Nelson Pope & Voorhis, LLC
NRCS – Natural Resources Conservation Service
NWI – National Wetlands Inventory
NYCRR – New York Codes, Rules and Regulations
NYS – New York State
NYSDAM – New York State Department of Agriculture and Markets
NYSDEC/DEC – New York State Department of Environmental Conservation
NYSDOH – New York State Department of Health
NYSDOS/DOS – New York State Department of State
NYSDOT – New York State Department of Transportation
NYSEFC – New York State Environmental Facilities Corporation
NYSERDA – New York State Energy Research and Development Authority
NYSSWCC – New York State Soil and Water Conservation Committee

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NYMTC – New York Metropolitan Transportation Council
OGS – New York State Office of General Services
OWTS – Onsite Wastewater Treatment System
PAH – Polycyclic Aromatic Hydrocarbon
PBS – Petroleum Bulk Storage
PCB – Polychlorinated Biphenyl
PCE – Tetrachloroethylene
PFAS – Per- and Polyfluoroalkyl Substances
PFOA – Perfluorooctanoic Acid
PRB – Permeable Reactive Barrier
PS – Pump Station
PUD – Planned Unit Development
PWWPCD – Port Washington Water Pollution Control District
QA/QC – Quality Assurance/Quality Control
QAPP – Quality Assurance Project Plan
QR – Quick Response
ROW – Right-of-Way
SBU – Stony Brook University
SCADA – Supervisory Control and Data Acquisition
SDWA – Safe Drinking Water Act
SEMO – State Emergency Management Office
SPDES – State Pollutant Discharge Elimination System
SSA – Sole Source Aquifer
SSO – Sanitary Sewer Overflow
SSURGO – Soil Survey Geographic Database
STP – Sewage Treatment Plant
STS – Surface Transportation System
SUNY – State University of New York
SVOC – Semivolatile Organic Compound
SWMP – Stormwater Management Program
SWPPP – Stormwater Pollution Prevention Plan
TBD – To Be Determined
TDS – Total Dissolved Solids
TMDL – Total Maximum Daily Load
TN – Total Nitrogen
TNC – The Nature Conservancy
TP – Total Phosphorus
TSS – Total Suspended Solids
USACE – United States Army Corps of Engineers
USFWS – United States Fish and Wildlife Service
USGS – United States Geological Survey

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UV – Ultraviolet
VOC – Volatile Organic Compound
WEAG – Waterways and Ecological Advisory Group
WLIS – Western Long Island Sound
WPCD – Water Pollution Control District
WQIP – Water Quality Improvement Plan
WTM – Watershed Treatment Model
WWTP – Wastewater Treatment Plant

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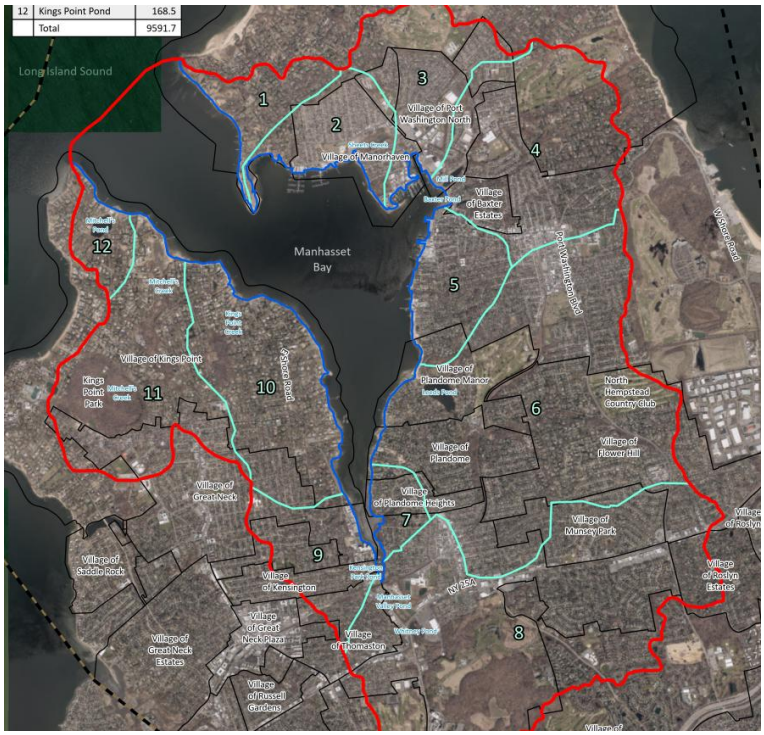
EXECUTIVE SUMMARY

Manhasset Bay ("the Bay") is a significant environmental, recreational, and community resource of the western Long Island Sound. This Manhasset Bay Water Quality Improvement Plan (WQIP) updates the 1999 Plan and provides a watershed-scale coordinated framework for reducing pollutant inputs, restoring natural resources, and improving climate resilience. It is intended to guide municipal decision-making, capital investment, intermunicipal coordination, funding, and long-term watershed stewardship.

The WQIP combines watershed characterization, pollutant-load screening, regulatory review, stakeholder input, and site-specific project concepts. Its central finding is that lasting improvement requires coordinated action on stormwater, wastewater, habitat, municipal practices, and community stewardship.

Watershed Setting and Boundary

Manhasset Bay covers roughly 2,725 acres. Its watershed is about 9,652 acres and contains 12 mapped subwatersheds. Rainfall runs off roofs, streets, parking areas, and lawns into storm drains, outfalls, creeks, ponds, wetlands, and ultimately the Bay. The watershed boundary is important because water-quality sources and solutions cross municipal boundaries. The WQIP therefore evaluates both total pollutant loads and loads per acre, then considers local drainage pathways and project feasibility.



ES Inset Image 1 *:Watershed and subwatershed boundary locator from the report project map sheet. See* ***Figure 4-1*** *in the WQIP for the full watershed and subwatersheds map.*

Water Quality Concerns and Pollutant Sources

The plan identifies elevated nitrogen and indicator bacteria, periodic low dissolved oxygen, sediment, suspended solids, and floatable debris as key concerns. Outer and northeastern Bay segments have fecal-coliform impairments and require a TMDL strategy for fecal coliform; shellfish harvesting is illegal throughout the Bay. The more enclosed inner Bay is vulnerable to nutrient accumulation and low oxygen. Tributaries and Whitney Pond also have low-oxygen concerns. Pollutant load modeling identifies Sheets Creek North and Kensington subwatersheds as generating the largest total pollutant loads per acre, while Sheets Creek East, Mill/Baxter Ponds, Stannard's Brook, Leed's Pond, Plandome Heights, and Whitney Pond exhibit comparatively high loading rates per acre.

Pollutant sources identified or discussed in the WQIP include:

- Stormwater runoff from developed land, roads, parking areas, lawns, and impervious surfaces, conveying nitrogen, phosphorus, bacteria, sediment, oils, metals, road salt, and floatables.
- Aging or failing conventional onsite wastewater treatment systems, including cesspools and septic systems, especially in unsewered neighborhoods with shallow groundwater or close proximity to surface waters.
- Treated wastewater discharges from the Port Washington and Great Neck water pollution control districts, which can still contain nitrogen and other residual contaminants after treatment.
- Pet waste and wildlife waste, including nuisance waterfowl, which contribute pathogens and nutrients to runoff and groundwater.
- Fertilizers and pesticides from residential landscapes, parks, golf courses, and other maintained properties.
- Marina and boating activities, including improper vessel pump-out practices, fuel or oil spills, hazardous materials, and contaminants associated with vessel maintenance and bottom paints.
- Construction-related erosion and sediment; shoreline disturbance and erosion; and litter or other floatable debris entering storm drains, streams, ponds, and the Bay.

Climate Change and Resilience

The WQIP treats climate resilience as part of water-quality protection because sea-level rise, coastal flooding, stronger storms, and more intense rainfall can damage infrastructure, mobilize pollutants, and reduce habitat function. The report cites regional projections of 1 to 8 inches of sea-level rise in the 2020s and 11 to 21 inches by the 2050s; temperature increases of about 1.5 to 3°F in the 2020s and 3 to 5.5°F by the 2050s; and annual precipitation increases of up to 5% in the 2020s and up to 10% by the 2050s, with heavier downpours and more winter precipitation.

- Coastal flooding and storm surge can affect existing homes, businesses, roads, drainage and sewer infrastructure, and other shoreline facilities; flooding of onsite wastewater treatment systems can release pathogens and nutrients.
- More frequent or intense rainfall can increase runoff, pollutant delivery, erosion, sedimentation, and strain on drainage and wastewater systems.
- Coastal wetlands and other habitats face inundation, erosion, and barriers to inland migration; the report identifies opportunities to retain migration space and restore marsh and shoreline functions.
- Saltwater intrusion and changing salinity can stress freshwater ponds, wetlands, and groundwater resources.
- The WQIP recommends incorporating future conditions into project selection and design through green infrastructure, drainage upgrades, living shorelines and other nature-based erosion controls, wetland and stream restoration, native riparian buffers, and protection of flood storage and habitat migration areas.

Regulatory Review and Municipal Assessment

The regulatory review describes the federal and New York State framework for water quality and assesses County and local planning, land-use laws, and municipal stormwater programs. At the federal level, the review addresses the Clean Water Act and NPDES, Safe Drinking Water Act, Clean Water Act

Section 404 permits for dredge or fill in waters and wetlands, Endangered Species Act consultation, and Coastal Zone Management Act considerations. At the State level, it discusses NYSDEC's SPDES permits and water-quality standards, public-health requirements, and related soil and water conservation programs.

For Nassau County, the Town, and Villages within the watershed, the project team reviewed publicly available codes and plans, consulted local officials and staff where available, and applied an EPA coastal Municipal Nonpoint Assessment approach tailored to 29 water-quality-related planning and regulatory tools. The review covered comprehensive plans, zoning, site plan and subdivision review, wetlands, erosion and sediment control, SWPPP requirements, floodplain management, sanitary waste and I/A OWTS, sewers, riparian vegetation, steep slopes, illicit discharges, fertilizers and pesticides, marinas, and other locally relevant topics. The team also reviewed municipal MS4 Stormwater Management Programs and annual reports to assess storm sewer mapping, inspections, illicit-discharge procedures, construction and post-construction controls, public education, and municipal operations.

The assessment found that all applicable municipalities have zoning regulations, but only two had comprehensive plans in place and neither had been updated within the prior ten years. Water-quality protections and code coverage vary across municipal boundaries. The WQIP therefore recommends that municipalities consider coordinated updates for stormwater and wastewater controls, wetlands and buffers, erosion and sediment, fertilizer and pesticide use, vegetation clearing, marina operations, illicit discharges, and development review. These recommendations are advisory; the WQIP does not itself enact local laws or require every municipality to adopt each measure.

Community Outreach and Public Participation

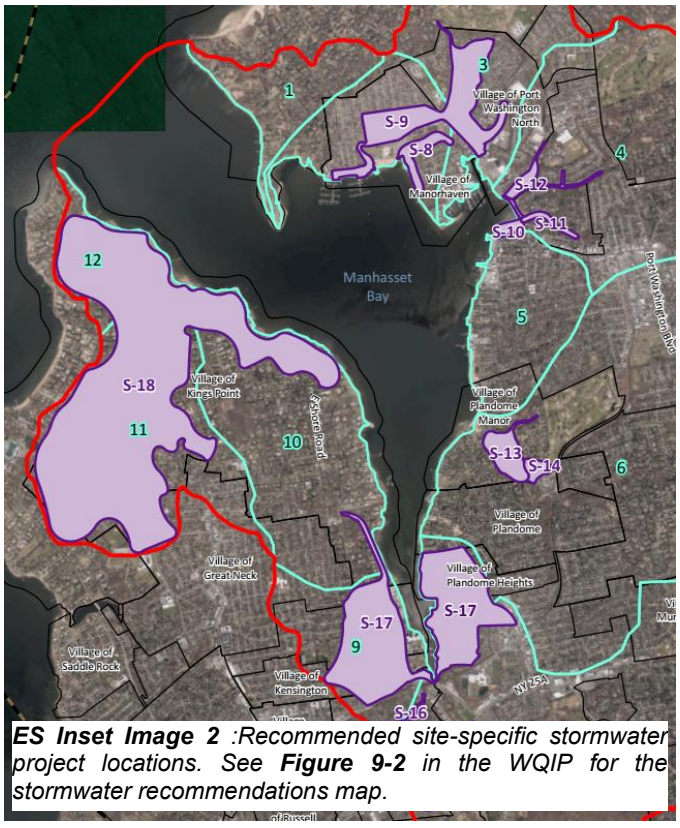
The Manhasset Bay Protection Committee (MBPC) served as the project steering committee, with municipal representatives contributing to plan development. A Community Outreach and Participation Plan guided how community knowledge and concerns would be collected and used. Outreach methods included the MBPC website and email channel for comments, the Town of North Hempstead website and television station, email, press releases, social media, informational fliers, and signage.

Two community outreach meetings were held during the plan process: an initial meeting during watershed characterization and a subsequent meeting to provide a project update. Community members raised concerns and ideas regarding Bay water quality, projects already completed or underway, desired community changes, and potential pollution-reduction solutions. A community survey was completed to collect additional input and help identify concerns and priorities. The MBPC website provided project information and updates and offered a continuing channel for comments. At the time described in the draft, a further public meeting was planned to present the full draft WQIP and receive feedback.

Recommended Improvement Project Categories

The WQIP organizes recommendations under eight codes. The categories are intended to work together, from investigation and prevention to capital improvements, restoration, and long-term stewardship:

- B - General Bay-wide actions: expanded water-quality monitoring; pathogen and pesticide source investigations; septic-system and circulation studies; sediment assessment; shellfish restoration and other bioextraction; nuisance waterfowl and pet-waste management.
- S - Stormwater management: green infrastructure such as rain gardens, bioswales, and permeable pavement; outfall and catch-basin retrofits; drainage and culvert repairs; pretreatment; channel and pond measures; targeted watershed retrofit projects.
- M - Municipal facilities: drainage mapping, inspections, and maintenance; municipal-facility retrofits; road and parking-area runoff controls; improved housekeeping and pollution prevention.
- W - Wastewater management: evaluate sewer expansion and eliminate legacy systems where feasible; promote nitrogen-removing I/A OWTS and regular maintenance where sewering is not feasible; optimize wastewater treatment and consider water reuse.
- N - Natural-resource management: restore streams, ponds, wetlands, shorelines, and riparian corridors; control invasive species; stabilize erosion; improve habitat connectivity and native vegetation.
- R - Water-quality research and monitoring: expand sampling and source tracking; improve data sharing; use citizen science and targeted studies to fill gaps and measure outcomes.
- P - Watershed planning and regulatory measures: coordinate municipal laws and MS4 practices; strengthen development, buffer, fertilizer, pesticide, wastewater, marina, and illicit-discharge requirements.
- O - Public outreach and stewardship: education and signage, cleanups and planting events, litter reporting, responsible recreation, and improved access designed to protect habitat and water quality.



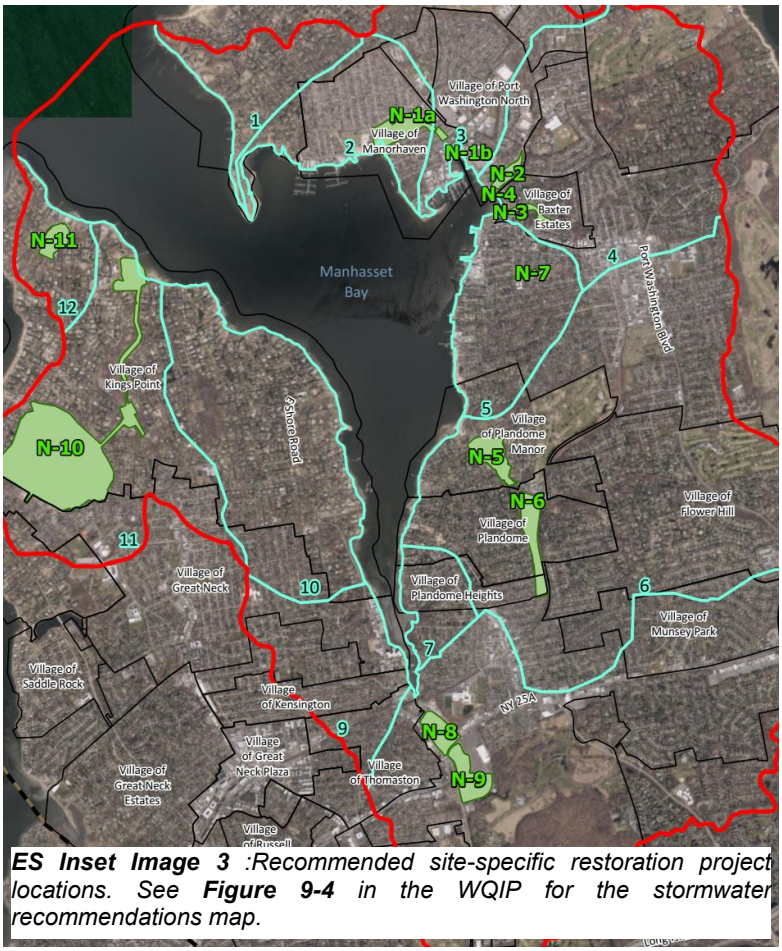
ES Inset Image 2 *:Recommended site-specific stormwater project locations. See* ***Figure 9-2*** *in the WQIP for the stormwater recommendations map.*

Priority Locations And Project Maps

Site-specific actions were selected using modeled loading, drainage and flow accumulation, field reconnaissance, existing infrastructure, coastal risk, habitat value, public and MBPC input, land availability, and implementation feasibility. Priority areas include Leeds Pond, Kensington, Sheets Creek North and East, Stannard's Brook, Mitchells Creek, Kings Point, Whitney Pond, Mill Pond, Baxter Pond, and Manhasset Valley Park. Stormwater recommendations include green infrastructure, outfall retrofits, pre-treatment practices, and culvert and drainage maintenance. **Figure 9-2** identifies stormwater recommendation locations

Natural Resources recommendations include invasive-plant management, native planting, shoreline stabilization, vegetative buffering, feasibility studies for sediment removal, follow-up monitoring, and public education/involvement.

Figure 9-4 identifies natural-resource project locations in the WQIP.



***ES Inset Image 3** :Recommended site-specific restoration project locations. See **Figure 9-4** in the WQIP for the stormwater recommendations map.*

Implementation, Funding, And Accountability

The MBPC is positioned to coordinate a multi-stakeholder Implementation Team with the Town, Villages, Nassau County, State and federal agencies, water pollution control districts, nonprofit and academic partners, property owners, and residents. Each public agency or partner would lead actions within its authority. Implementation tables identify potential leads and supporting entities, relative priority, planning-level cost ranges, likely timeframes, permits, maintenance responsibilities, and funding opportunities. The cost ranges are planning estimates, not final budgets or commitments.

The schedule distinguishes ongoing actions from short-term actions that could begin or finish within one to two years, mid-term actions generally taking two to five years, and longer-term capital or restoration projects. Early work should establish project leads, refine source investigations, maintain outfall and drainage inventories, secure property access and maintenance commitments, pursue grants, and advance feasible projects to engineering and permitting. Major sewer, treatment, drainage, and restoration projects require additional feasibility review, design, environmental review, permits, construction funding, and long-term maintenance.

The Plan calls for public implementation tables to be updated at least annually, annual progress reports, and an Implementation Team meeting at least every six months. Tracking should document project status, permits, schedules, costs, funding, inspection and maintenance, green infrastructure installed, wetland acres restored, outfalls inspected, illicit discharges corrected, catch basins cleaned, debris removed, project acreage treated, estimated pollutant reductions, and public participation.

The WQIP recommends continuing the MBPC summer monitoring program and expanding sampling, as partners and funding allow, to tributaries, ponds, wetlands, beaches, shellfish areas, and priority outfalls. Expanded monitoring should occur at least six to eight times per year and include bacteria,

nutrients, dissolved oxygen, temperature, salinity, clarity, chlorophyll, and cyanobacteria. Microbial source tracking can help distinguish human, pet, and wildlife sources. Restoration projects should include post-construction monitoring and maintenance, typically for at least three years. A shared data and GIS framework, annual reporting, five-year indicator-bacteria trend reviews, and recurring plan evaluations support adaptive management.

Together, the recommendations provide a practical path from watershed assessment to coordinated investment. Measurable progress will depend on sustained intermunicipal cooperation, targeted funding, effective maintenance, and using monitoring results to refine the program as conditions change.

1.0 INTRODUCTION

The Manhasset Bay Protection Committee (MBPC) was established in the spring of 1998 with the goal of improving the quality of Manhasset Bay's waters and its watershed. The Committee's first project was to prepare the original Water Quality Improvement Plan (WQIP) for Manhasset Bay, which was completed in 1999, with an Environmental Protection Fund grant from New York State to the Town of North Hempstead[1]. The Town partnered with the MBPC in this planning process. A WQIP is a tool that identifies potential pollutant sources and activities and provides a series of planning recommendations to help protect and restore water resources, as well as the local economies that rely on these essential coastal resources. The purpose of a WQIP is to provide a comprehensive approach to educate, plan for and implement incremental improvements with a goal of protecting and restoring watershed health.

New York State has awarded a grant under Title 11 of the Environmental Protection Fund to the Town of North Hempstead to work in partnership with the MBPC to prepare an updated WQIP.

1.1 Purpose of Plan

The 1999 WQIP provided a characterization of the Manhasset Bay watershed and outlined projects that could improve Manhass det Bay's water quality and reduce contaminant inputs. This update to the 1999 WQIP seeks to update existing conditions within the watershed boundary, identify progress that has been made through completed projects, investigate projects that have not been completed to determine if they are still suitable, and identify additional projects and other actions that can protect Manhasset Bay and its wildlife and habitats, while also preserving its aesthetic and recreational appeals. The WQIP will include a 20-year vision for projects and activities to improve and protect water quality in Manhasset Bay, and will consider how climate change and sea level rise estimates issued since 1999 may impact habitat loss, pollutant sources and water quality.

The MBPC is building upon the goals and objectives of the 1999 Manhasset Bay WQIP, as well as additional studies that have been completed since the 1999 WQIP, including the results of the Manhasset Bay Water Quality Analysis (2017), which looked at water quality data collected from 2009 through 2015. The WQIP Update will be structured in three phases, as outlined in this document:

1. Updated inventory of natural resources and land uses within the watershed of Manhasset Bay, as well as a summary of current water quality;

[1] The Town of North Hempstead acts as fiduciary agent for the Committee and, therefore, is the official awardee on grants to the Committee.

2. Assessments of natural features, physical conditions, existing water pollution controls, and ordinances pertaining to the Bay and its watershed;
3. Development of a program of recommendations to enhance water quality conditions in the Bay, including an evaluation of the status of projects recommended in the 1999 WQIP. A table summarizing the recommendations from the 1999 WQIP is included in Section 3.1, which includes a status of the recommendations to date.

The WQIP will be used to prioritize projects for grant funding to assist with project implementation and will also be used to support regional projects moving forward, such as the Long Island Nitrogen Action Plan.

1.1.1 Vision and Goals

This WQIP has been developed to advance the goals outlined below to maintain and, where feasible, expand the availability of Manhasset Bay for swimming, fishing, shellfishing, and other human uses, while also concurrently enriching the environmental and maritime quality of the Bay Ecosystem.

The goals of the WQIP include:

1. Minimize impacts to water quality in the Bay from non-point source discharges including, but not limited to, stormwater runoff, on-site wastewater treatment systems (i.e., cesspools and septic systems), illegal hookups to stormwater drainage, fertilizers, pet waste and waterfowl, recognizing that these sources will be worsened by climate change. This can be achieved, in part, by assisting the Manhasset Bay watershed municipalities in preparing strategies for improving water quality in compliance with the NYSDEC MS4 (Municipal Separate Storm Sewer System) permit requirements, and pursuing programs and funding for advanced wastewater treatment.
2. Minimize impacts to water quality in the Bay from point source discharges.
3. Optimize local laws and regulations to ensure that they effectively control water quality impacts in the Bay. This will be accomplished by listing the applicable local laws/regulations and identifying potential enhancements.
4. Ensure that the operations of local governments in the Manhasset Bay watershed are undertaken in a manner that minimizes water quality impacts and considers climate change impacts, while also supporting the MS4 program and municipal housekeeping.
5. Maintain and, where feasible, restore and enhance tidal and freshwater wetlands in the Bay and its watershed so that these resources can support healthy ecosystems, provide flood and stormwater control, and offer opportunities for open space, education, recreation, and aesthetic appreciation.
6. Promote the remediation of contaminated sites to mitigate impacts to the Bay.

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7. Maintain and, where feasible, expand open space lands in the Bay's watershed to ensure the continuing benefits derived from areas of natural cover that promotes water infiltration, among other ecosystem and water quality benefits, especially in the face of climate change.
8. Minimize impacts to water quality in the Bay from marinas, boatyards, and related waterfront uses.
9. Reduce the use of fertilizers in the watershed and encourage the proper disposal of pet wastes in order to reduce this pollution source to the watershed and Bay.
10. Minimize the sedimentation of the Bay and its tributary water bodies. Where feasible and beneficial, consider restoring natural bottom contours in the Bay and its tributary water bodies. Utilize dredging to remove excess sediment and contaminants where required from hindered water flow and quality, while ensuring that dredging activities are environmentally sustainable and minimally disruptive.
11. Continue water quality monitoring in the Bay and expand this program to the degree practicable, so that trends in water quality conditions can be properly tracked, and the program can be tailored to provide data that is maximally useful for characterizing impacts, tracking changes due to climate change, and assisting in formulating strategies for corrective action. Integrate water quality data collected by other entities as feasible.
12. Enhance the coordination of efforts to improve water quality conditions in the Bay, particularly through continuing inter-municipal cooperation by the MBPC, as well as expanded public education initiatives to attain broad-based community support. Tap into the local libraries and public school systems as collaborators in these public education initiatives.
13. Account for sea level rise and other effects of climate change in the design and implementation of projects addressing water quality issues in the Bay to ensure maximum effectiveness over the long term.
14. Maintain the relevance of the WQIP through continuous tracking of progress on the implementation of recommendations and regular plan updates as appropriate.

1.2 Watershed Overview

A watershed is the total area of land from the highest elevation capturing water draining to the same basin or lowest elevation such as a stream, river, wetland, estuary, or aquifer. Activities occurring within the watershed contributing area of a waterbody impact the health of the waterbody. A watershed is separated from adjacent watershed areas by a perimeter, the drainage divide, made up of a succession of elevated features, such as ridges and hills. Water in a watershed flows downhill unaware of municipal boundaries; therefore, planning at the watershed level provides an appropriate scale to manage water resources in order to better capture all contributing factors to water quality.

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The Long Island Sound Study recognizes that Manhasset Bay was an important resource for fishing and shellfish harvesting used by the Algonquin Matinecock tribe in the 1600s, and subsequently served as the largest oystering harbor on the North Shore of Long Island in the late 1800s, nicknaming the Bay as "the shellfish garden of New York City."[2] Manhasset Bay continues to support commercial and recreational boating uses today, while being designed as a Significant Coastal Fish and Wildlife habitat, providing significant feeding and nursery habitat for striped bass (*Morone saxatilis*), winter flounder (*Pseudopleuronectes americanus*), bluefish (*Pomatomus saltatrix*), menhaden (*Brevoortia tyrannus*), and other forage species[3]. Additionally, the Bay has been identified by the Long Island Sound Study as a Stewardship area, providing nesting areas for least tern (*Sternula antillarum*)[4], a threatened species in New York, and acting as one of five major waterfowl winter areas on the North Shore of Long Island.

The water quality of Manhasset Bay has been significantly impacted due to polluted stormwater runoff and polluted groundwater discharges generated in the surrounding watershed, along with prevalent recreational boating activities and outdated on-site wastewater treatment systems.

1.2.1 Watershed Boundary

The Manhasset Bay Watershed area is situated in the Town of North Hempstead on the north shore of western Long Island in New York in Nassau County, immediately east of Queens County as shown in **Figure 1-1**. Manhasset Bay, an embayment of the Long Island Sound, forms the northeast boundary of the Great Neck Peninsula and the southwestern boundary of Cow Neck (Port Washington Peninsula or Manhasset Neck). The Manhasset Bay Watershed covers 9,947 acres and discharges about 37 million gallons of freshwater into the Bay every day. The Bay contains approximately 9 billion gallons of water.[5]

1.2.2 Watershed Communities

The Manhasset Bay Watershed is comprised of several villages and portions of villages within the Town of North Hempstead, as shown in **Figure 1-2**, including:

- Village of Baxter Estates
- Village of Flower Hill
- Village of Great Neck
- Village of Great Neck Plaza

[2] Manhasset Bay Protection Committee. (n.d.). *Historical Background of Manhasset Bay*. Retrieved from https://manhassetbayprotectioncommittee.org/historical_background.htm
[3] New York State Department of State. (2020). *Manhasset Bay Significant Coastal Fish and Wildlife Habitat Narrative*. Retrieved from https://dos.ny.gov/system/files/documents/2020/03/manhasset_bay.pdf
[4] New York Natural Heritage Program. (n.d.). *Least Tern Species Guide*. Retrieved from https://guides.nynhp.org/least-tern/
[5] Long Island Sound Study. (2012). *Sound Health 2012: Status and Trends in the Health of Long Island Sound*. Retrieved from https://longislandsoundstudy.net/2012/11/sound-health-2012/

- Village of Kensington
- Village of Kings Point
- Village of Lake Success
- Village of Manorhaven
- Village of Munsey Park
- Village of North Hills
- Village of Plandome
- Village of Plandome Heights
- Village of Plandome Manor
- Village of Port Washington North
- Village of Roslyn
- Village of Roslyn Estates
- Village of Sands Point
- Village of Thomaston

At the time of the 1999 WQIP, there were eleven local municipalities that voluntarily joined the MBPC, which was expanded to fifteen municipal members (including one County, one Town, and 13 Villages) as listed below:

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

Villages partially or fully situated within the boundaries of the Watershed Area that do not participate in the Committee include Great Neck Plaza, Lake Success, North Hills, Rosyln, and Roslyn Estates. In some cases, such as the Village of North Hills, these villages do not participate in the Committee because they have received an exemption from the MS4 requirements by NYSDEC.

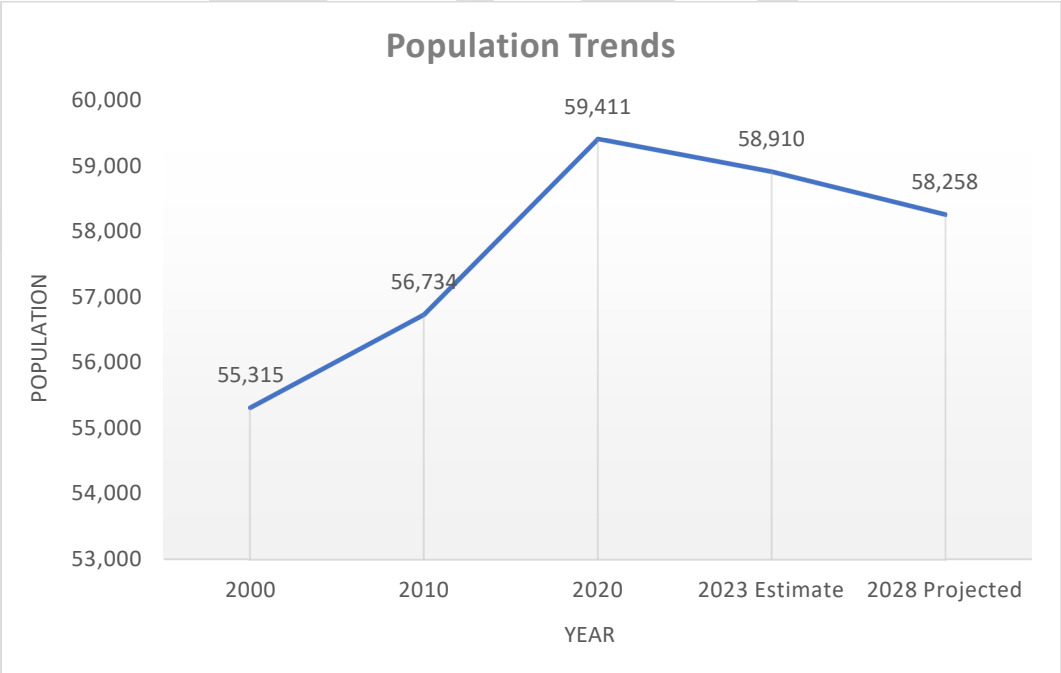
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Population

The 1999 WQIP estimated the population within the Manhasset Bay Watershed to be 43,497, using Long Island Lighting Company's 1997 figures for population.

To analyze population changes in the Manhasset Bay Watershed, Environmental Systems Research Institute (ESRI) Business Analyst data was collected. This includes census data as well as ESRI estimates and projections. Only the ESRI data specific to the geography of the Manhasset Bay Watershed was analyzed. As seen in Image 1-1 below, the overall population of the Manhasset Bay Watershed has increased slightly over the last 20 years. The total population of the watershed in 2000 was 55,315 people according to census data. The 2010 census data reveals a 2.57% increase in population at 56,743 people. By 2020, the population had increased by 2,677 persons or 4.7%. Between the years 2000 and 2020 there has been an overall 7% increase in population. Based on ESRI projections, it is anticipated that 2020's population of 59,411 has peaked and will begin to decrease. ESRI Business Analyst 2023 estimates and 2028 projections represent a slight decrease in overall population. The 2023 estimates represent a 0.84% decrease from 2020 and 2028 projections represent a 1.11% decrease from 2023.

Image 1-1: Population trends between the years 2000 and 2028 in the Manhasset Bay watershed



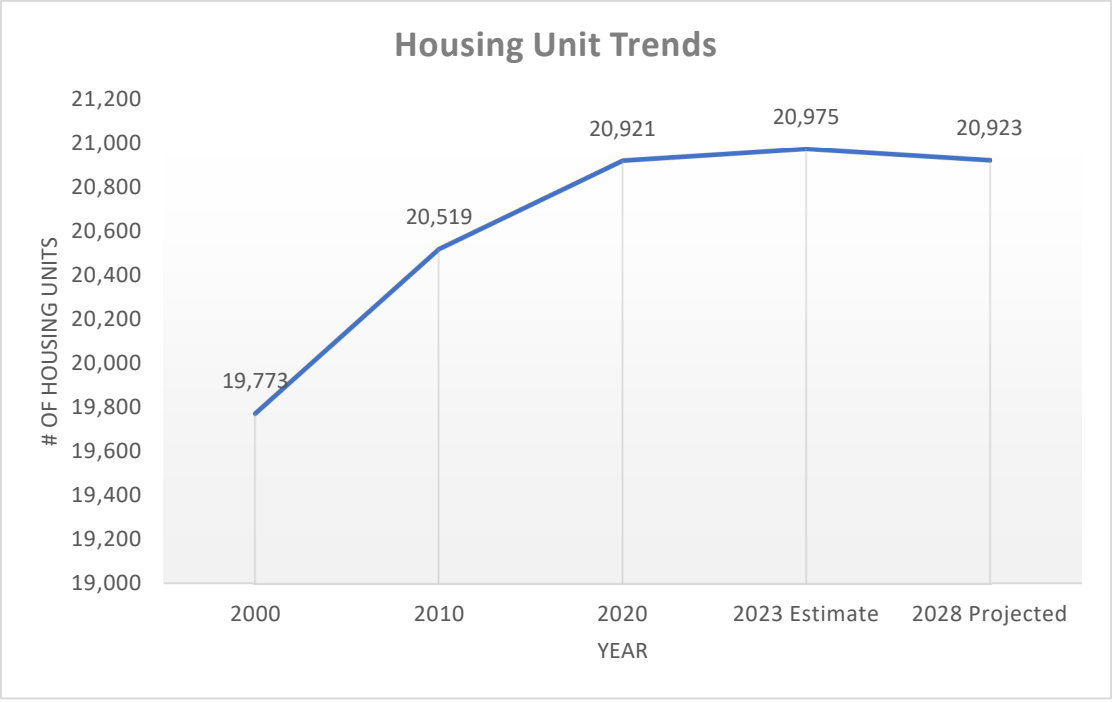
Source: ESRI Business Analyst

Housing

The 1999 WQIP indicated the average household size of 2.9 persons per household and 15,098 households within the watershed area. The largest percentages of households within the watershed area were situated within the Villages of Flower Hill, and Great Neck and the neighboring Census Designated Places[6] of Manhasset and Port Washington. This pattern remains true through the 2020 Census, with Port Washington representing the greatest number of households at 16,753.

Housing data was collected and analyzed using ESRI ArcGIS Business Analyst data and is shown in Image 1-2. Overall, there has been minimal change in the number of housing units within the watershed. Census data indicates there were 19,773 housing units in 2000. The 2010 census data represents a 3.77% increase in housing units with 20,519 total units. The 2020 data includes 20,921 housing units which represents a 1.96% increase. Between the years 2000 and 2020 there has been an overall increase of 1,148 units or 6%. The number of overall housing units is expected to remain relatively constant at the 2020 levels with an anticipated 0.26% increase in 2023 and 0.25% decrease in 2028.

Image 1-2: Housing trends between the years 2000 and 2028



Source: ESRI Business Analyst

[6] CDPs are a statistical geography representing closely settled, unincorporated communities that are locally recognized and identified by name.

2.0 COMMUNITY OUTREACH PLAN

A Community Outreach and Participation Plan was prepared by NPV on behalf of the MBPC, last revised July 2023, which is found in **Appendix A**. As noted in the Plan, community outreach and participation are crucial to the success of the updated Manhasset Bay WQIP, as residents and other community members have local knowledge and insight on issues and potential solutions for the Bay and its watershed.

The purpose of the Community Outreach and Participation Plan is to provide an overview of the outreach methods and protocol standards for obtaining and utilizing input and engagement from community members to assist in the preparation of the WQIP.

The MBPC functions as the Project Steering Committee. Along with the Executive Director, each MBPC member municipality has a representative who participates in MBPC activities on behalf of their respective community and who contributed to the preparation of the updated WQIP as part of the Steering Committee. A subcommittee of the MBPC was responsible for collaborative development of the Community Outreach Plan.

2.1 Summary of Outreach and Public Participation

Key stakeholders and members of the public were invited to participate in the Manhasset Bay WQIP discussion and planning process through outreach meetings, where community members gathered (either in person or through an online forum) and expressed their concerns. Key topics included water quality within the Bay, completed projects, project progress, changes they would like to see in their communities, and other potential solutions they would like to see to reduce pollution within Manhasset Bay and the watershed.

During the preparation of the WQIP Information was shared with and gathered from key stakeholders and members of the public via multiple techniques including:

- MBPC Website, including an email address for the receipt of public comments
- Town of North Hempstead website and television station
- Email
- Press releases
- Social media
- Informational fliers
- Signage

Additionally, interactive techniques including community meetings, surveys, and citizen engagement assisted with gathering community input, information, and ideas for the updated WQIP. Two community meetings with the representatives of the Manhasset Bay Protection

Committee have been conducted to date during the initial characterization of Manhasset Bay and the watershed, and a subsequent meeting to provide an update of project activities. A third community meeting is expected for receiving feedback on the full draft updated Manhasset Bay WQIP.

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3.0 OTHER PLANNING EFFORTS

The Manhasset Bay watershed area has been subject to several studies, data collection efforts pertaining to water quality, and management programs since at least 1994. These previous studies/efforts have been conducted by local agencies, United States Geological Survey (USGS), Stony Brook University, and consultants. The below **Table 3-1** summarizes current and past planning efforts related to the WQIP.

TABLE 3-1
Current and Past Planning Efforts

Plan Title	Date	Author	Purpose/Key Findings
Long Island Sound Study Comprehensive Conservation and Management Plan (which is accessible at longislandsoundstudy.net/our-vision-and-plan/)	March 1994 Revised: 2015, 2025	Long Island Sound Study Management Conference	Characterizes priority problems affecting the Long Island Sound and identifies specific commitments and recommendations for actions to improve water quality, protect habitat and living resources, educate and involve the public, improve the long-term understanding of how to manage the Sound, monitor progress, and redirect management efforts. The Management Conference identified six problems that merit special attention: low dissolved oxygen (hypoxia); toxic contamination; pathogen contamination; floatable debris; the impact of these water quality problems, and habitat degradation and loss, on the health of living resources; and land use and development

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Plan Title	Date	Author	Purpose/Key Findings
			resulting in habitat loss and degradation of water quality.
Manhasset Bay WQIP (manhassetbay.net/wqip.html)	May 1999	Dvirka and Bartilucci Consulting Engineers	Initial WQIP to reduce pollution to preserve and enhance water quality; preserve and protect habitats; maximize economic uses and recreational enjoyment within the Bay.
Sediment Removal & Beneficial Use Feasibility Study of Manhasset Bay	2001	Daniel S. Natchez & associates for the MBPC and the WEAG	Explores sediment removal and beneficial use strategies for Manhasset Bay. Highlights viable relocation options such as Western Long Island Sound (WLIS) and Central Long island Sound Sites (CLIS). One option involves utilizing borrow pits within the bay, which could accommodate over 510,000 cubic yards of dredged material, costing between $200,000 to $500,000. The report also advocates for macro-coordinated dredging projects, which could streamline operations, reduce environmental disruption, and lower costs by consolidating regulatory requirements. However, regulatory restrictions, such as limited dredging windows (October to January), have reduced the availability of small-scale dredge contractors, posing operational challenges.

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Plan Title	Date	Author	Purpose/Key Findings
			Lastly, the report recommends encouraging regulatory changes, including revisiting the Ambro Amendment and extending dredging windows, to facilitate more sustainable and cost-effective sediment management practices in the Bay.
Hydrogeology and Extent of Saltwater Intrusion on Manhasset Neck, Nassau County, New York (which is accessible at pubs.usgs.gov/publication/wri004193)	2002	USGS	Groundwater at several public supply wells has been affected by the intrusion of saltwater from surrounding embayments (Manhasset Bay, Long Island Sound, Hempstead Harbor). The 22 boreholes were drilled from 1992-1996 to delineate the subsurface geology and the extent of saltwater intrusion within the peninsula. Water from 12 public-supply wells screened in the Magothy and upper glacial aquifers contained volatile organic compounds (VOCs) above the New York State Department of Health Drinking Water maximum contaminant levels, as did water from one public-supply well screened in the Lloyd aquifer and two observation wells screened in the upper glacial aquifer. Five distinct areas of saltwater intrusion have been delineated in Manhasset Neck.
Stannards Brook Water Quality Assessment Report – Seasonal Rain Event Study	June 2008	MBPC, EEA Inc.	Study conducted to detect wet weather evidence of nonpoint source pollution and

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Plan Title	Date	Author	Purpose/Key Findings
(which is accessible at manhassetbay.net/PDF_PUBLIC/Water_Quality_Data/)			determine discharges to Stannards Brook that have the greatest need for retrofits. There is no clear-cut location at which nutrient inputs are the greatest. Rises and falls of bacterial counts or nutrient concentrations between first and post-flush events can be attributed to residence time in Stannards Brook or as distance from the source. The major issue elucidated by this study is the significant bacterial loading into Stannards Brook occurring during rain events. All samples collected were above the acceptable standard for bacterial concentrations. The study recommended: a comprehensive water quality sampling program, implementation of dye tracers on septic pipes within the Brook, enforcement of pet waste regulation, public education/outreach, storm drain stenciling, installation of leaching catch basins along the upper reaches of the streets, an ecological inventory and assessment and implementation of an invasives control plan, stormwater control best management practices, mapping, and additional analysis of treatment measures.

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Plan Title	Date	Author	Purpose/Key Findings
Modeling nitrogen source loads on the north shore of Long Island	March 2016	The Nature Conservancy Long Island	Utilized spatial and tabular data in a Nitrogen Loading Model (NLM) to quantify nitrogen loads from wastewater, fertilizer, and atmospheric deposition sources to the north shore of Long Island from Little Neck Bay to Northport Bay. Wastewater was found to be the largest land-based contributor of nitrogen in the thirteen subwatersheds. In particular, on-site wastewater treatment systems were the major source in all but one watershed.
Manhasset Bay Water Quality Analysis (which is accessible at manhassetbay.net/PDF_PUBLIC/Water_Quality_Data/)	June 2017	Fuss & O'Neill	Report on water quality data collected from summer 2009 through summer 2015. Data demonstrated a link between rainfall, sampling location, and bacteria counts. All the sampling stations are strongly influenced by the input of stormwater runoff. Water quality has not worsened over this sampling time period and given the major storms and growth of population, no discernable pattern of increased bacteria was evident.
Nassau County Stormwater Management Program (NCSWMP) (which is accessible at askarcnassau.com/1876/Stormwater-Management-Program)	June 2019	Gannett Fleming Engineers and Architects, P.C.	Prepared for coverage under the New York State Pollution Discharge Elimination System (SPDES) general permit GP-0-15-003, includes a listing of Best Management Practices (BMPs) that have been implemented by the County and a coalition

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Plan Title	Date	Author	Purpose/Key Findings
			of local municipalities to achieve the regulatory standard of reducing pollutants in the County's stormwater to the maximum extent practicable. The NCSWMP indicated Manhasset Bay is a New York State Department of Environmental Conservation (NSYDEC) 303(d) listed water body for impairment of beneficial use by pathogens. Additionally, Manhasset Bay is classified as a Total Daily Maximum Load (TMDL) waterbody by the USEPA, which designates the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources to that waterbody. Dry weather flow from Manhasset Bay is routinely sampled by Nassau County to identify water quality trends, detect areas for further study, and pinpoint sources of illicit discharges.
Nitrogen Loading Modeling for Nassau County Subwatersheds	February 2020	Stony Brook University, School of Marine and Atmospheric Sciences	The purpose of the study was an attempt to estimate the amount of nitrogen entering Nassau County surface waters from point and non-point sources of nitrogen. Manhasset Bay was found to have the second highest nitrogen load on the north shore on Nassau County (behind Little Neck Bay), and the fifth largest nitrogen load of

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Plan Title	Date	Author	Purpose/Key Findings
			Long Island estuaries. Manhasset Bay's total nitrogen load included 34% from sewage treatment plants and 50% from on-site wastewater treatment systems. The remainder was from fertilizer, atmospheric, and pets.
Nassau County Hazard Mitigation Plan (askarcnassau.com/2813/Hazmit-Plan)	January 2021	Hagerty	The Nassau County Hazard Mitigation Plan was developed for Nassau County to identify and reduce risks associated with natural hazards to increase resilience of the community. The Town of North Hempstead was identified as a jurisdiction interested in participating in the Planning Committee. The assessment found that hazards highly likely to occur include: coastal hazards, flooding, severe winter weather, and straight-line winds. The Plan outlines a mitigation strategy which consists of six goals and defines Nassau County's vision for mitigating risk and reaching resilience. Town of North Hempstead was identified as being situated within 100-year and 500-year floodplains.
Nassau County Nine Key Element Watershed Plan for Nitrogen (askarcnassau.com/5373/Nassau-County-9E-Plan)	September 2022	Stony Brook University, School of Marine and	Identifies approaches needed to achieve reductions in nitrogen and improve water quality across Nassau County coastal waters. Wastewater from on-site wastewater

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Plan Title	Date	Author	Purpose/Key Findings
		Atmospheric Sciences	treatment systems was found to be the largest source of nitrogen to all north shore bays. The Nine Element Plan assigned Manhasset Bay a 38.7% nitrogen load reduction. Best Management Practices for achieving nitrogen load reduction were considered and included upgrading septic systems, reducing fertilizer use, improving stormwater systems, bioextraction via the aquaculture of oysters and seaweeds, sewering, and rerouting sewage outflow.

Additional details pertaining to water quality within the watershed area from the above reports is provided in **Section 5.3.**

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3.1 Status of Implementation of 1999 Plan

A total of 12 site-specific projects were identified from the 1999 WQIP, as shown below in **Table 3-2**. These projects include feasibility analyses, conceptual engineering, permitting, design and specifications, bidding and construction. Priority levels were assigned from the 1999 WQIP, and are indicated in **Table 3-2**, with (1) being the highest priority, (2) being medium priority, and (3) being the lowest priority. As presented in the 1999 WQIP, the priority levels presented were based on the following:

- 1st Level: Represents a geographical area that involves a relatively large degree of actual or impaired beneficial use (swimming, boarding, 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 number of residents in the watershed and visitors.
- 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.

Table 3-2 below provides a summary of the 12 site-specific projects recommended in the 1999 WQIP and the current status of these projects to date, as of the date of this WQIP Update. Updated recommendations associated with these projects will be addressed in Recommended Projects and Actions.

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TABLE 3-2
Summary and Status of 1999 WQIP Recommended Projects

1999 WQIP Project (Name/location)	1999 Priority	Goals of Project per 1999 WQIP	January 2025 Status
North and East Sheets Creek Water Quality Improvement and Wetlands Restoration (Town, Village of Manorhaven)	1	• Catch basin retrofits in the drainage area pocket wetlands • Booms and nets for floatable debris • Skimming devices (for capturing pollutants) • Replacement of invasive/non-native plants with other less aggressive, native plantings • Dredging and/or sediment removal • Shoreline stabilization, preferably by vegetative measures	Most of this work was completed by the Town of North Hempstead and Nassau County: • Shoreline project was completed along the park and parking area, which terminated as it approached into the preserve. • At the preserve, invasive species were removed along the walkway and near the new dog park that was then replaced with native vegetation, signage and long-term maintenance.
Mill Pond Water Quality Improvement and Storm Water Control Project (Town)	2	• Soil stabilization around the pond • Planting of vegetative access barriers to deter waterfowl • Installing self-closing gates at the steps leading to the shoreline/water's edge • Excavating and removing accumulated sediments • Installing signs to discourage the feeding of wildlife • Installing water sprays to deter the presence of waterfowl • 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	Much of this work was completed by the Town of North Hempstead (approximately 2008): • Soil stabilization around the pond completed • Shoreline planting completed in 2019 along the southeast shoreline • Concrete wall placed along most of the north side of the pond.

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1999 WQIP Project (Name/location)	1999 Priority	Goals of Project per 1999 WQIP	January 2025 Status
		• 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.	
Baxter Pond Water Quality Improvement and Wetlands Creation Project (County, Village of Baxter Estates, Baxter Pond Conservancy)	1	• 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.	Components of this project were completed in the early 2000s, but they have since failed or deteriorated. The Baxter Pond Conservancy is no longer in existence.
Stannards Brook Water Quality Improvement and Wetlands Creation Project (County)	3	• 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	Most of this was completed by Nassau County.

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1999 WQIP Project (Name/location)	1999 Priority	Goals of Project per 1999 WQIP	January 2025 Status
		• 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.	
Leeds Pond Wetlands Creation and Water Quality Improvement Project (Town, County)	2	• Golf Course Pond – Plant a vegetative access barrier around the perimeter of the pond to inhibit the entry of waterfowl into the pond while not obstructing views; 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 loadings, 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 streambanks to reduce the potential for further erosion • Plandome Tributary Pond – Excavate and dredge the pond sediments on a regular basis, using it as a forebay to Leeds Pond	This project has not started. Nassau County is not planning to do this work. Town secured funds from FEMA to dredge some of Leeds Pond and Science Museum of LI has recently conducted stormwater work on their property.

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1999 WQIP Project (Name/location)	1999 Priority	Goals of Project per 1999 WQIP	January 2025 Status
Whitney Pond Park and Manhasset Valley Park Water Quality Improvement Project (Town, County)	3	• Re-seed 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 • Stabilize the streambank between Whitney Lake and Whitney Pond • Install a trash rack at the spillway of the footbridge of Whitney Pond • 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 Lake and the pond in Manhasset Valley Park, considering actual or potential contamination of the sediments and the need for finding a cost-effective disposal solution • Repair spillway cap at the pond in Manhasset Valley Park and increasing the cap's elevation (1± ft) to provide additional storage • Repair 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 • Plant 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 waterfowl into the water while not obstructing the views • Install water sprays at one or more locations in Whitney Pond and Whitney Lake to deter waterfowl from entering the pond.	Not Started Ownership of the park was transferred to the Town. Soccer fields were built at Manhasset Valley Park.

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1999 WQIP Project (Name/location)	1999 Priority	Goals of Project per 1999 WQIP	January 2025 Status
Manhasset Bayview Avenue Storm Water Sediment and Erosion Control Project (Town)	2	• Retrofit the catch basins along Bayview Avenue to allow for sediment trapping and in-line storage to minimize the adverse effect of a storm's "first flush" • Remove accumulated solids that have built-up in the catch basins along Bayview Avenue • Install a vegetative or concrete curb and/or shoulder on Bayview Avenue to prevent sheet runoff and uncontrolled runoff that results in erosion gullies along the wooded/vegetated areas along the eastern shoreline • Install retention chambers or sediment traps at one or in more of the six stormwater outfalls.	Not Completed The Town of North Hempstead's Department of Public Works is working on Bayview Avenue stabilization, but this is not associated with water quality improvements; this is strictly a FEMA erosion/scour protection project. In compliance with their DEC permit, some beach grass, cordgrass, perennial plantings are included in scope of work. The work also entails the repair or reconstruction of the stormwater outfall pipe.
Manhasset Bay Dredging and Marsh Restoration Project (Town)	1	• Field Investigations in the northeastern and/or lower portion of the Bay, including bathymetric survey, sediment sampling, biota/species diversity, • Perform dredging feasibility study • Apply for environmental permits (NYSDEC and USACE) • Identify potential funding sources to develop and implement the sampling plan • Secure funding for the preparation and implementation of the sampling plan.	A study was completed in the early 2000s, but nothing further was conducted. Some dredging work is moving forward with Federal Sandy money (Manorhaven Channel was completed and the area around Town Dock and a little north should be completed in the coming years using Federal Sandy dollars from FEMA as well as Town funds), but this is not the same project listed in the original WQIP.
Kensington Park Wetlands Creation and Runoff Control Project	3	• A sediment trap is recommended for the drain followed by a pocket wetland	Completion details are unknown: Nassau County did do a project along Shore Road to address stormwater runoff issues.

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1999 WQIP Project (Name/location)	1999 Priority	Goals of Project per 1999 WQIP	January 2025 Status
Village of Great Neck East Shore Road Stormwater Sediment Control Project	2	• Retrofit 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" • Remove accumulated solids that have built-up in catch basins along East Shore Road and those in the upstream portion of the collection system • Install sediment traps, sand filters or other retrofit devices in the outfalls along the shoreline.	Not completed – work was conducted here, but there are no specifics readily available
Mitchell Creek Wetlands Preservation and Improvement Project (Town and Village of Kings Point)	1	• Retrofit 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 • Create new, or the enhancement of existing, wetlands along the Creek to preserve the biological value of the vegetation present and associated special habitats.	Not Completed Mitchell Creek is under the County jurisdiction.
Kings Point Pond Water Quality Improvement Project	3	Feasibility investigation 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 • Recommendations for reducing nitrogen levels and protecting the surrounding wetland.	Not Completed

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As shown in above **Table 3-2**, several of these projects have been advanced since 1999. This WQIP update will assess these projects and their current status, effectiveness, and applicability to the current vision and goals to determine whether continued or future action is warranted in connection with these projects previously recommended.

3.2 Additional Recommended Area-Wide Recommendations from 1999 Plan

The 1999 WQIP recommended eight watershed-wide objectives and recommendations, which were intended to 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 stormwater runoff on the water quality of Manhasset Bay and its bonds, tributaries, and wetlands. Recommended Bay-wide objectives from the 1999 WQIP include:

- Objective No. 1: Reduce Runoff to the Bay
- Objective No. 2: Reduce Pollution to the Bay
- Objective No. 3: Implement a Program to Detect and Eliminate Illicit Discharge to Storm Sewers
- Objective No. 4: Implement a Storm Sewer System Water Pollution Prevention and Good Housekeeping Program
- Objective No. 5: Control Runoff from New Developments and Redeveloped Areas
- Objective No. 6: Implement a Stormwater Public Education and Involvement Program
- Objective No. 7: Seek Funding Assistance to Implement the Watershed-wide Plan Recommendations and the Site-Specific Water Quality Improvement Projects
- Objective No. 8: Use an Intermunicipal Approach to Improve Manhasset Bay's Water Quality Addressing both Point and Non-point Pollution

The following actions/investigations have been conducted since the 1999 WQIP in response to the above objectives:

- Detection and elimination of illicit discharges to storm sewers are ongoing within MS4 municipalities and are now a part of the MS4 Phase II Stormwater Program, applicable to MS4 communities within the watershed.
- Inventory of on-site wastewater treatment systems, to determine areas with high concentrations of aged systems and/or shallow groundwater (depth of 10-20 feet below grade surface, or less). Per MBPC, Kings Point, Sands Point, Manhasset, the Plandomes, and portions of Port Washington are unsewered and consist primarily of older homes on cesspools. There are initiatives to sewer portions of Manhasset, and the County-wide S.E.P.T.I.C. program is in place to continue to incentivize houses to upgrade cesspools. This remains a priority.
- Promotion of innovative and alternative (IA) onsite wastewater treatment system technology to reduce nitrogen discharges to groundwater. Per MBPC, there are County

grants now available for installation of IA systems (this is possible with funding from both the County and the State); however, the Villages are still allowing in-kind replacement of cesspools. There is a movement encouraging Villages to update their local laws to require I/A systems on certain projects, but no Villages in the watershed have enacted such legislation to date.

- Assessment of the adequacy of vessel waste pump-out facilities in the Bay. Per MBPC, a Town pump-out boat was purchased. Additionally, a back-up pump-out boat was purchased and there is a pump-out station at the Town Dock. All of Long Island Sound has been designated as a Vessel Waste No Discharge Zone.
- Continued refinement of the mapping of stormwater infrastructure. This is also required by the MS4 Phase II permit.
- Investigate the efficacy of trash nets or trash racks at stormwater outfalls to capture floatables.
- Public Education initiatives. Per MBPC, these initiatives are ongoing.
- Restoration of Baxter Beach: The Village of Baxter Estates is nearing completion on a project to implement shoreline stabilization measures to address coastal erosion along the Beach. The erosion concerns include: a failing gabion wall, undermining of the existing sidewalk and roadway, extreme sediment loss, and reductions in vegetation and beach area. The Village is nearing completion on a project to implement living shoreline stabilization, pedestrian sidewalk trail improvements, site furnishings (lighting, educational signage, benches), and native flood resistant landscaping.

Several watershed-wide objectives and recommendations have been advanced since 1999. This WQIP Update will evaluate these objectives and recommendations, examine their current status, effectiveness, and relevance to the current vision and goals.

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4.0 WATERSHED CHARACTERISTICS

4.1 Introduction

Manhasset Bay is a semi-enclosed embayment in Western Long Island Sound that is open to Long Island Sound at its northern extent and bound on the west by the Great Neck Peninsula, and the east by the Port Washington Peninsula. The Bay itself is roughly 2,725 acres and is roughly 4.5 miles long. Depths range from 0 to 3 feet in shallow flats at the southern end of the Bay to as much as 25 feet or more at the mouth of the Bay where it joins Long Island Sound, as well as a 25±-foot deep area off Plum Point. The majority of the open water parts of the Bay are in the 8 to 12 feet depth range during mean tide[7]. These depth and bathymetric data were gathered through hydrographic surveys conducted as part of the original watershed planning effort, and represent the most recent published data.

Tides range on average of 7.5' and can be as great as 9.5' during king tides. This wide range in tides allows for a considerable amount of water being exchanged between the Bay and Long Island Sound. With roughly 75% of the water exchanged per tidal cycle the residence time within the Bay is generally about 24hours[8]. Tidal flushing and residence time estimates were calculated using hydrodynamic modeling combined with field observations of salinity, current velocity, and tidal range.

Freshwater enters the Bay through several main sources including stream flow, direct rainfall, stormwater runoff, wastewater treatment outfalls, and groundwater discharge. While freshwater inputs are critical to maintaining the health of streams, wetlands and the estuary, each one of these sources carries its own pollutant load. Rainfall carries particulate matter as well as pollutants associated with industrial emissions, vehicle exhaust, and fossil fuel combustion (e.g., sulfur dioxide, nitrogen oxides, heavy metals). Stormwater runoff from impervious surfaces typically carries the rainfall constituents but also introduces pathogens associated with fecal waste from wildlife and pets as well as herbicides, pesticides, and fertilizers (specifically, nitrogen and phosphorus) used on landscapes. Additionally, stormwater runoff brings floatable debris like plastics, paper, and other litter, which can harm wildlife and reduce water quality. Floatable debris refers to solid waste materials that float on the water surface and

[7] Manhasset Bay Protection Committee (MBPC). (1999). *Manhasset Bay Watershed Water Quality Improvement Plan (WQIP)*. Prepared by Dvirka and Bartilucci Engineers. Available at: https://manhassetbayprotectioncommittee.org/wqip.html
[8] Manhasset Bay Protection Committee (MBPC). (2023). *Water Quality Monitoring Program Annual Reports*. https://manhassetbayprotectioncommittee.org/water-quality.html

are carried by water flow, contributing to pollution and posing a threat to aquatic habitats[9]. Pollutant loading data were derived from stormwater sampling, land use analysis, and U.S. EPA pollutant export coefficients applied to subwatershed areas.

Despite significant upgrades and full compliance with their permits, wastewater treatment facilities, unfortunately, still discharge nitrogen and other contaminants that cannot be fully removed during the treatment process[10]. Groundwater flow also brings contaminants such as nitrogen from the many aging onsite septic systems and cesspools that were not designed for the removal of these contaminants[11]. Groundwater nitrogen contributions were estimated using groundwater modeling, water table gradient analysis, and septic system density mapping.

Stormwater and groundwater inputs to Manhasset Bay are two key pathways through which water, along with various pollutants and nutrients, enters the Bay's ecosystem. These inputs play critical roles in shaping water quality, salinity, and ecological conditions in the Bay. This WQIP is more focused on the stormwater inputs to the Bay, since stormwater runoff tends to carry a higher concentration of pollutants compared to groundwater. Additionally, stormwater sources are more identifiable and manageable. A discussion on updates to the watershed boundary, delineating the stormwater inputs to the Bay, is provided below. A figure depicting the waterbodies within the watershed area, and the updated watershed and subwatershed boundaries is included as **Figure 4-1**.

While little has changed with regard to the size and structure of the water body itself since 1999, a great deal of progress has been made in our understanding of the watershed and its interactions with the Bay, largely with respect to groundwater flows.

Updated Watershed Boundary

Manhasset Bay opens to Long Island Sound at its northwest. Starting at Barker Point, the eastern most point of that opening, the Manhasset Bay watershed boundary heads at a mainly easterly direction until reaching a point in the eastern half of the Village Club of Sands Point property. Then the watershed boundary heads roughly south, passing through unincorporated areas of Port Washington, the Village of Flower Hill, the Village of Roslyn, and, finally, the Village of Roslyn

[9] Manhasset Bay Protection Committee (MBPC). (2023). *Water Quality Monitoring Program Annual Reports*. https://manhassetbayprotectioncommittee.org/water-quality.html
[10] New York State Department of Environmental Conservation (NYSDEC). *SPDES Permit Discharge Monitoring Reports*. Retrieved from: https://www.dec.ny.gov/chemical/8468.html
[11] NYS Regional Economic Development Council. (2023). CFA Project 287223 – Manhasset Bay Watershed WQIP Update. https://regionalcouncils.ny.gov/cfa/project/287223

Estates, where the boundary heads west into the Village of North Hills and then slightly south again before turning southwest, dipping south of the Long Island Expressway in the Village of Lake Success. The watershed boundary then turns north in the Village of Lake Success near the Great Neck South Middle School. The watershed boundary heads north and slightly west through the Villages of Lake Success, Thomaston, Kensington, Great Neck Gardens, and Great Neck. In Great Neck, the boundary turns northwest to a point on the border between the Villages of Great Neck and Kings Point, where it turns south then seems to follow the general shape of the Great Neck peninsula until reaching the mouth of Manhasset Bay at Hewlett Point. In total, there are 12 subwatersheds in the full Manhasset Bay watershed.

One of the most striking changes since 1999 is the updated watershed boundary. It appears that much of the original watershed boundary, as described in Section 1 of the 1999 WQIP and shown on Figure 1.2-1 of the 1999 WQIP, was delineated based upon roadways and jurisdictional boundaries, which doesn't represent the true contribution to the watershed. The widespread availability of high-resolution LIDAR mapping alongside GIS processing has produced a much more accurate Manhasset Bay watershed boundary that is based upon elevation. This new watershed boundary was produced by Fuss and O'Neill in 2017 for the Manhasset Bay Water Quality Analysis report.

A comparison of the two watershed boundaries shows some gains in acreage and some losses in acreage depending upon subwatershed. The boundaries of the subwatersheds themselves have also slightly changed with the new analysis. While the new watershed boundaries provide a more accurate depiction of where water will likely travel across the surface, it will not allow for a direct comparison of land use from 1999 to the current day unless the original watershed boundaries are utilized. A figure depicting the updated watershed and subwatershed boundaries is included as **Figure 4-1**.

Groundwater Contributing Area

Separate from stormwater runoff, there is a groundwater contributing area published by USGS in 2020 to delineate groundwatersheds. While groundwater largely follows topography, the interaction between pumping by drinking water supplies and redistribution of that water throughout the watershed has yielded a new understanding of how water flows throughout the groundwater systems and ultimately to the coastline where it enters the Bay. These new groundwater delineations were then incorporated into the modeling of nitrogen discharges to Manhasset Bay and other water bodies throughout Nassau County, which has been published in

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the 2022 Nassau County Nine Element Watershed Plan for Nitrogen conducted by the SUNY Stony Brook School of Marine and Atmospheric Sciences. This new analysis will not be utilized to discuss land use or watershed characterization purposes, which are more focused on the stormwater contributing areas, but will be discussed in **Section 4.5.3** where wastewater pollution is discussed.

Subwatersheds

There are 12 subwatershed areas within the overall Manhasset Bay watershed, based on LIDAR mapping alongside GIS processing in the Fuss and O'Neill 2017 analysis (see **Figure 4-1**). A breakdown of acreage by community for each subwatershed is presented in **Table 4-1**, ranked according to size, with the largest subwatershed as 1, and the smallest subwatershed as 12. Names have been assigned to subwatershed areas according to defining surface water features or municipal boundaries within the subwatersheds (see **Figure 4-1**). Additionally, it was estimated that approximately 245.32 miles of roadway are present within the watershed area.

TABLE 4-1
MANHASSET BAY SUBWATERSHED ACREAGE

Rank	Subwatershed Name	Total Acres	Percent of Total Watershed
1	Whitney Pond	2,388.6	24.75
2	Leeds Pond	2,169.3	22.47
3	Mill/Baxter Ponds	1,052.9	10.91
4	Mitchell Creek	946.6	9.81
5	Kings Point Creek	826.7	8.57
6	Sheets Creek E	543.4	5.63
7	Kensington	389.7	4.04
8	Stannard's Brook	374.3	3.88
9	Sheets Creek N	357.9	3.71
10	North East Shore	239.3	2.48
11	Kings Point Pond	168.5	1.75
12	Plandome Heights	134.5	1.39
	Total	9,651.69	100%

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4.2 Historic, Current and Projected Land Use and Zoning

1999 WQIP Land Use

In the 1999 WQIP, it was reported that approximately 67% of the land within the watershed was being used for residential purposes. The remaining categories that comprised the remaining 33% of the watershed included open space, vacant, institutional, commercial, industrial, water/shoreline and transportation/utilities. The watershed was also reported to include seven golf courses, 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.

In the 1999 WQIP, it was estimated that the population of the watershed was approximately 43,500 people living in approximately 15,000 households.

Current Land Use

Per the most recently available 2018 Nassau County parcel data, the land uses within the watershed are similar to the 1999 data. Land use data is shown in **Figure 4-2**. Currently, approximately 62.4% of the land within the watershed is being used for residential purposes at varying densities, followed by approximately 19.5% being used for open space/recreational purposes (e.g., green space, parks, golf courses). Approximately 13.6% of the watershed area is comprised of institutional uses (7%), commercial uses (5%), industrial uses (<0.2%), and transportation/utility uses (1%). The remaining approximately 4.5% consists of vacant or unknown land uses that are unclassified based on the Nassau County parcel data or desktop audit of uses via Google Earth imagery. The percent breakdown for the watershed of each of the land use categories, as compared to the 1999 WQIP data, is presented in **Table 4-2**. The land use categories presented in **Table 4-2** are ranked according to size, with 1 being the most prominent land use type identified within the watershed, and 10 being the least prominent land use type identified within the watershed. Additionally, **Table 4-2** offers a comparison between the 1999 data and the most current data.

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TABLE 4-2
LAND USE CATEGORIES OF MANHASSET BAY WATERSHED

Rank	Land Use Category	Current % Total	1999 % of Total	Difference since 1999
1	Low-Moderate Residential (2-4 Dwelling Units [DU]/acre)	26.06	26.84	-0.78%
2	Open Space/Recreational	19.47	12.25	+7.22%
3	Moderate-High Residential (5-10 DU per acre)	16.98	11.53	+5.45%
4	Low Residential (<1 DU per acre)	16.03	26.27	-10.24%
5	Institutional	7.30	4.34	+2.96%
6	Commercial	5.14	3.98	+1.16%
7	Vacant/Unknown	4.48	10.71	-6.23%
8	High Residential (>10 DU per acre)	3.36	0.94	+2.42%
9	Transportation/Utility	1.02	0.55	+0.47%
10	Industrial	0.16	1.31	-1.15%
11	Water/Shoreline Adjustment	N/A	1.28	-1.28%

As shown in the table above, while little has changed in the type of land use since 1999, the quantity of high-density and moderate-high-density residential has increased by approximately 8% since 1999, while the quantity of low-density and low-moderate-density residential has decreased by approximately 1% since 1999. It is noted that parcel size was used to calculate density; therefore, these values are estimated. Thus, the watershed area appears to be trending towards higher density residential development.

Open Space/Recreational area (e.g., green space, parks, golf courses) has notably increased by approximately 7% since the 1999 WQIP, which is largely due to redefining the vacant area in the southwest portion of the watershed as open space which includes green space, golf clubs, and parks. The remainder of the categories have remained relatively consistent since 1999. It is noted that the Vacant/Unknown parcels have decreased by approximately 6% since 1999. This is partially due to a desktop characterization of undefined parcels as part of this assessment, and assigning applicable categories to undefined parcels where possible, based on available data from desktop reconnaissance of the Nassau County parcel data.

To aid in the analysis of land use change, aerial images from the year 2000 and 2023 were analyzed via Discover GIS Data NY, Ortho imagery[12], which can be seen in **Appendix B**. Aerial images are presented in the appendices for Sands Point in **Appendix B-1**, Port Washington in **Appendices B-2 B-3,** and **B-4**, Kings Point in **B-5**, Great Neck in **B-6** and **B-8**, and Lake Success in **B-7**. Although the Manhasset Bay Watershed had been predominantly built out in 1999 when the original WQIP was drafted, there are noticeable increases in density between the years 2000 and 2023. One large development that was built post 2000 includes Mill Pond Acres, shown in **Appendix B-2**, a community of approximately 200 condos located in Port Washington. Additionally, a commercial shopping center was also developed in Port Washington during this period, shown in **Appendix B-3**. Another large development includes Avalon in Great Neck, a six-story 191-unit apartment building directly adjacent to the Bay, shown in **Appendix B-8**. In addition to these larger developments, aerial images depict an increased number of large single-family homes, particularly located along the coast in Sands Point, shown in **Appendix B-1**, Kings Point, shown in **Appendix B-5**, and Great Neck , shown in **Appendix B-6** and **B–8**. It is important to highlight that the filling in of Manhasset Bay is also evident in Great Neck, shown in **Appendix B-8**. There is also a noted increase in the number of pools built in the watershed. Other large developments that have been constructed between the year 2000 and 2023 include: The Bristal at Lake Success, a memory care center located on Horace Harding Boulevard, and North Shore Hebrew Academy high school located adjacent to The Bristal At Lake Success, shown in **Appendix B-7**. It is also visible at the site of the former Thypin Steel Plant that the site has been cleared of industrial debris and is undergoing revegetation. Images depicting these noted differences between the 2000 and 2023 aerial photographs are included in **Appendix B**.

As shown in above **Table 4-2**, approximately 96% of the watershed's area is currently developed or utilized for one purpose or another, while approximately 4% is categorized by the County as "vacant/unknown", that are unclassified based on the Nassau County parcel data or desktop audit of uses via Google Earth imagery. **Table 4-3** below indicates the approximate vacant/unknown areas situated in each subwatershed, ranked by the amount of area classified as "vacant/unknown" with (1) being the subwatershed with the greatest acreage of "vacant/unknown parcels" and (12) being the least acreage of "vacant/unknown" parcels.

[12] Discover GIS data NY https://orthos.dhses.ny.gov/

TABLE 4-3
SUBWATERSHEDS WITH VACANT/UNKNOWN LAND USE

Rank by Size	Subwatershed	Vacant/Unknown Land Use (acres)	% of Total
1	Leeds Pond	72.85	19.51
2	Whitney Pond	72.04	19.29
3	Kings Point Creek	70.20	18.80
4	Mitchell Creek	53.73	14.39
5	Sheets Creek E	28.80	7.71
6	Sheets Creek N	19.26	5.16
7	Kings Point Pond	15.58	4.17
8	North East Shore	13.83	3.70
9	Mill/Baxter Ponds	9.16	2.45
10	Plandome Heights	7.80	2.09
11	Stannard's Brook	5.28	1.41
12	Kensington	4.85	1.30

As shown in **Table 4-3**, the subwatersheds with the highest potential for new development based on vacant or unknown land use include Leeds Pond, Whitney Pond, Kings Point Creek, and Mitchell Creek, which collectively account for 71.99% of the total vacant land in the watershed. Leeds Pond leads with 72.85 acres (19.51% of the total), followed closely by Whitney Pond with 72.04 acres (19.29%) and Kings Point Creek with 70.20 acres (18.80%). Mitchell Creek, while slightly smaller, still holds significant potential with 53.73 acres (14.39%). These subwatersheds present prime opportunities for growth, given their sizable undeveloped areas. An additional notable update to vacant parcels since the 1999 WQIP is that the Former Thypin Steel Plant, which was characterized as "industrial" in 1999, is now "vacant". Engineering and institutional controls are in place to address remaining contamination associated with the historical operations at the Thypin Steel Plant, and the NYSDEC has approved an Environmental Easement (dated September 5, 2018)[13] for the property authorizing restricted residential, commercial, or industrial use on the property. Therefore, the Thypin Steel Plant is eligible for redevelopment in accordance with the Environmental Easement. There are no known upcoming large-scale developments in the watershed area. It is expected that any new developments would be

[13] Thypin Steel Environmental Easement: https://extapps.dec.ny.gov/docs/remediation_hudson_pdf/130119e.pdf

designed and built in accordance with applicable zoning; therefore, major impacts to land use would not be expected.

A zoning map for the Town of North Hempstead portion of the watershed is provided as **Figure 4-3**. Due to the multiple jurisdictional nature of the subwatershed area, a large portion of zoning data was not readily available in digital file format. Zoning maps for additional municipalities that were not available in digital file format are provided in **Appendix C**. Due to the limited zoning data available, land use as outlined above was a more accurate depiction of characterization of the watershed, and a detailed zoning analysis is not applicable.

4.3 Geology, Soils, and Topography

The peninsulas of Cow Neck (Port Washington) and Great Neck form the embayment known as Manhasset Bay. These peninsulas were formed by a combination of subglacial tunnel valleys, inherited preglacial topography, and postglacial erosion[14]. Soils within the Manhasset Bay watershed include till and outwash deposits of sand, silt, clay, and boulders[15]. The bedrock surface is located approximately 150 to 600 feet below sea level, and generally slopes to the southeast. Clay rich deposits and ultimately bedrock form confining layers of the aquifers.

The Lloyd aquifer, the deepest aquifer in the Long Island aquifer system, lies directly above bedrock and is confined by the Raritan Clay, which serves as an effective barrier to vertical water movement. The Lloyd is a vital source of high-quality groundwater but is the least replenished due to its depth and confinement. Its hydraulic connectivity to other aquifers, especially to the North Shore Aquifer, suggests some water exchange may occur, though the extent of this interaction is not fully understood.[16]

The North Shore aquifer, which also overlies bedrock, is located more northerly than the Llyod. It shares similarities in depth but serves predominantly localized water supply needs due to its smaller size and the presence of overlying confining layers. Hydraulic connectivity with the Lloyd Aquifer implies potential mutual influence, though the magnitude of flow between them is limited by geological features.

[14] Continuous resistivity profiling data from Northport Harbor and Manhasset Bay, Long Island, New York: U.S. Geological Survey Open-File Report 2011-1041, 1 CD-ROM. https://pubs.usgs.gov/of/2011/1041/

[15] Hydrogeology and extent of saltwater intrusion on Manhasset Neck, Nassau County, New York: U.S. Geological Survey Water-Resources Investigations Report 2000–4193, 42 p., https://pubs.er.usgs.gov/publication/wri004193.

[16] Water-table and potentiometric-surface altitudes of the upper glacial, Magothy, and Lloyd aquifers on Long Island, New York, in March-April 2000

The Magothy Aquifer, the largest and most utilized aquifer on Long Island, lies above the Raritan Clay and beneath the Upper Glacial Aquifer. This aquifer is extensive, stretching across much of the southern portion of the watershed, where it serves as a primary source of potable water. It is composed mainly of sand and gravel deposits with significant storage capacity, making it the backbone of the region's groundwater supply. However, in the northern areas of the watershed, the Magothy is replaced by the Upper Glacial Aquifer, which overlies the North Shore confining layer.

The Upper Glacial Aquifer, the shallowest of the aquifers, consists predominantly of sand and gravel deposits from glacial outwash. While more susceptible to contamination due to its proximity to the surface, it plays a crucial role in recharging deeper aquifers and supporting local water needs.

Well pumpage data for Great Neck compiled by USGS (2002) from 1992-1996 indicated that approximately 70% of the water was supplied from the Magothy aquifer. The Lloyd Aquifer was the second most pumped well accounting for 14% of the supply. The North Shore and Upper Glacial Aquifers both accounted for approximately 8% of the supply.

Topography within the Manhasset Bay watershed varies between sea-level along the shoreline of Manhasset Bay to approximately 220 feet in portions of Port Washington and in the southern limits of the watershed near the Long Island Expressway[17]. Topography of the watershed is shown in **Figure 4-4**. The western side of Manhasset Bay is generally lower with maximum elevations of approximately 135 feet. Although the western side is lower, the southern portion of Great Neck is characterized by steeper banks that slope towards the Bay. As the watershed and subwatershed boundaries are defined by topography and water drainage, any precipitation runoff within the watershed will generally flow towards the Bay. As shown in the topography figure (**Figure 4-4**), stormwater generally flows from the higher elevations along the perimeter of the watershed area downhill to the Bay. The steeper the slope, the faster the stormwater flows.

The soils of the Manhasset Bay watershed primarily consist of glacially derived soils and Urban land (Ug), with smaller inclusions of hydric soils, loamy sands, and beach sands. These soils are mapped by subwatershed in **Figures 4-5a** through **4-5m**.

[17] U.S. Geological Survey. (2011). *Publicly Available Lidar Point Cloud Data*. Retrieved from https://www.usgs.gov/media/images/publicly-available-lidar-point-cloud-data-sept-2011

Based on Soil Survey Geographic (SSURGO) data, the predominant soil types include Enfield loam (En), Montauk loam (Mk), Plymouth loam (Pl), Riverhead sandy loam (Rd), Beaches sand (Bc), and Urban land (Ug), along with minor inclusions such as Atsion loamy sand (At), Hooksan complex (BH), and hydric muck soils. These soils vary in their drainage capacity and erosion potential. Below is the soils provided for the subwatershed areas:

- **Soils Overview (Fig 4-5a):** Watershed-wide distribution indicates that Urban land comprises nearly 50% of the total area, while loamy soils (En, Mk, Pl, Rd) collectively account for approximately 30%.
- **North East Shore Subwatershed (Fig 4-5b):** Contains the highest proportion of native soils with moderate erosion hazard ratings. This subwatershed features 38% Enfield loam (En) and 30% Montauk loam (Mk), both well-drained loams with "low" to "moderate" erosion potential.
- **Sheets Creek North Subwatershed (Fig 4-5c):** Dominated by Montauk loam (Mk) at 56% and 28% Urban land, contributing to its classification with moderate erosion potential from native soils.
- **Sheets Creek East Subwatershed (Fig 4-5d):** Composed of 51% Urban land and 36% Montauk loam (Mk), reflecting a mix of high impervious surfaces and moderately draining native soils.
- **Mill/Baxter Ponds Subwatershed (Fig 4-5e):** Features 50% Urban land and over 20% Enfield loam (En), indicating a balance between high runoff potential and well-drained native soils.
- **Stannards Brook Subwatershed (Fig 4-5f):** Contains 75% Urban land—the highest in the watershed—and a mixture of native soils, contributing significantly to overall erosion potential.
- **Leeds Pond Subwatershed (Fig 4-5g):** Urban land accounts for 71% of this subwatershed, with smaller areas of Riverhead (Rd) and Montauk loams (Mk). The prevalence of Ug makes it a critical area of concern for stormwater management.
- **Plandome Heights Subwatershed (Fig 4-5h):** Includes 56% Urban land and 25% Montauk loam (Mk), resulting in moderate runoff and erosion potential.
- **Whitewood Creek Subwatershed (Fig 4-5i):** Composed of 65% Urban land and notable percentages of Enfield and Riverhead loams (12% each), offering a mix of impervious and moderately draining soils.
- **Kensington Subwatershed (Fig 4-5j):** Dominated by Urban land (Ug) at 81%, contributing to a "very high" runoff classification and a "severe" erosion hazard rating.

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- **Kings Point Creek Subwatershed (Fig 4-5k):** Contains 53% Urban land and 24% Plymouth loam (Pl), which is moderately well-drained.
- **Michel Creek Subwatershed (Fig 4-5l):** Urban land makes up 61% and Montauk loam (Mk) 22%, supporting moderate infiltration.
- **Kings Point Pond Subwatershed (Fig 4-5m):** Characterized by 58% Urban land and 18% Enfield loam (En), a well-draining loam with "low" runoff potential.

These loam soil types account for approximately 30% of the watershed and are located throughout the watershed. Urban lands are highly developed areas with considerable amounts of impervious surface and have a runoff classification of "very high". Urban land accounts for almost 50% of the watershed and represents a "severe" erosion hazard rating. Each subwatershed contains urban lands but specific subwatersheds of note with a high percentage of urban land are Stannards Brook and Leeds Pond. An analysis of the remaining, non-urban soil components indicates that approximately 1% of the native soils have a "severe" erosion hazard rating, concentrated in small pockets within Plandome Heights, Kings Point Creek, and Michel Creek, where steeper slopes and poorly draining soils intersect. Additionally, 25% of the native soils have a "moderate" erosion hazard rating, primarily found in North East Shore, Sheets Creek North, and Mill/Baxter Ponds, where loamy and sandy soils dominate but moderate slope or drainage limitations increase erosion risk. Therefore, approximately 75% of the land surface within the watershed (throughout the subwatershed areas) has a moderate to severe erosion hazard rating due to their impervious coverage, soil properties, and/or slope.

4.4 Hydrology

The Manhasset Bay watershed receives approximately 45 inches of precipitation annually. This value is based on the average precipitation measured by NOAA from 1991 to 2020 at both LaGuardia Airport and Mineola weather stations [18]. Total annual precipitation can vary considerably year to year with some annual totals over 55 inches and some under 40 inches[19]. These varying precipitation values can lead to periods of drought or abnormally wet conditions, which can last several years. The Manhasset Bay watershed and Long Island as a whole, obtains all potable water from its aquifers. Periods of drought along with continuous pumping of groundwater for potable water and irrigation can put stress on these sole source aquifers.

[18] **National Centers for Environmental Information (NCEI). (2021).** *U.S. Climate Normals Quick Access (1991–2020)*. Retrieved from https://www.ncei.noaa.gov/access/us-climate-normals/

[19] **U.S. Geological Survey. (2024).** *Water-Year Summary for Site USGS 01302250: East Creek at Sands Point, NY*. Retrieved from https://waterdata.usgs.gov/nwis/wys_rpt/?site_no=01302250

Long Island's aquifers are recharged from precipitation that infiltrates the soil. When precipitation falls within the Manhasset Bay watershed it can either infiltrate into the soil or flow over land as runoff. Precipitation that infiltrates the soil becomes available water that can be absorbed by plant roots and evapotranspirated back into the atmosphere or continue its path into groundwater that empties into and recharges the shallow aquifer. Groundwater in the shallow aquifers may move horizontally and seep into streams and wetlands providing base flow to these water ways or seep directly into the Bay. Groundwater in the shallow aquifer that does not seep into surface waters will eventually move deeper into the ground and recharge deeper aquifers. Precipitation that becomes runoff may flow into streams, ponds and the Bay or become ponded and infiltrate into the ground. Some stormwater infrastructure channels runoff into pipes that flow directly into surface water bodies, ultimately reaching the Bay. In other cases, the runoff is directed to recharge basins, allowing it to infiltrate into the groundwater. A more in-depth discussion of the public water supply is provided in **Section 4.5.4**.

The surface waters of the Manhasset Bay watershed include Manhasset Bay, Sheets Creek, Mill Pond, Baxter Pond, Leeds Pond, Whitney Pond/Lake, Manhasset Valley Pond, Kensington Park Pond, Twin Pond, Mitchell's Creek, and Kings Point Pond (Wilson's Pond). There are also smaller streams and ponds found within the watershed as well. Figures showing existing NYSDEC-regulated wetlands (freshwater wetlands and tidal wetlands) and National Wetland Inventory (NWI) wetlands within the watershed areas are included as **Figure 4-6** and **Figure 4-7**, respectively.

The ponds within the Manhasset Bay Watershed (see **Figure 4-1**) provide many recreational opportunities that are highly valued by the community. These water bodies not only support activities such as fishing, birdwatching, and picnicking but also play a critical role in stormwater management. By collecting and filtering stormwater runoff, they act as a natural pretreatment system before the water discharges into Manhasset Bay. This process helps to reduce pollutants, sediments, and nutrients in the water, improving the water quality in Manhasset Bay and supporting the overall health of the watershed ecosystem. Moreover, these ponds contribute to local biodiversity by providing habitat for various aquatic plants and wildlife, further enhancing their ecological value within the community.

Due to the relatively high topography along the North Shore of Long Island, most of the land within the Manhasset Bay Watershed is not designated a Federal Emergency Management Agency (FEMA) flood zone, as seen in **Figure 4-8**. Some FEMA flood zone areas present within the area include Zone A, AE, AO, and VE. Zone A comprises areas at risk of inundation from a 1-

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percent annual chance flood (100-year flood). Zone AE is similar to Zone A but provides base flood elevations to indicate expected flood heights. Zone AO includes areas prone to shallow flooding, with specific depth indicators. Finally, Zone VE covers coastal regions vulnerable to 100-year floods, facing additional hazards from storm waves. The shoreline properties along Manhasset Bay and the adjacent ponds and creeks are designated a high-risk flood zone (AE or VE), but these flood zones generally do not extend inland very far. Based on the FEMA maps high risk areas include the highly developed portion of East Shore Drive in Great Neck (Whitney Pond and Kensington subwatersheds), the highly developed coastline of Manorhaven (Sheets Creek N and E subwatersheds) and portions of Port Washington, the entire Plum Beach Point peninsula (North East Shore and Sheets Creek N subwatersheds), and major roadways located within flood prone areas.

The depth to groundwater within the watershed area varies significantly, with deeper depths (greater than 80 feet) occurring near the watershed boundary, especially in its southern portion, as seen in Figure 4-9c, and shallower depths closer to the Manhasset Bay coastline. Figures illustrating groundwater depths throughout the watershed area are provided as **Figures 4-9a – 4-9f**. This variation in groundwater depth is crucial for the watershed's hydrology, as it influences surface water interactions, local vegetation, and habitat health. Shallow groundwater areas along the coast contribute to the base flow of streams and wetlands, which helps maintain surface water levels during dry periods. Additionally, groundwater serves as a vital source of freshwater recharge for the bay, supporting local ecosystems and reducing saltwater intrusion from the bay into inland areas. Understanding groundwater depth trends also aids in planning for sustainable water use, pollution control, and flood risk management within the watershed. Depth to groundwater in the northwestern portion of the watershed (**Figure 4-9a**) is fairly shallow throughout the area, which reflects the fact that there is a lot of surface freshwater (such as Mitchells Creek) here. Depth to groundwater in Port Washington and Sands Point also remains fairly shallow, even close to the watershed boundary (**Figure 4-9e-f**). The other subwatersheds (**Figure 4-9b-d**) show the same variation in depth to groundwater seen in the watershed as a whole.

4.5 Physical Setting

The following sections detail infrastructure within the Manhasset Bay Watershed area including major roadways and transportation infrastructure, stormwater infrastructure, wastewater infrastructure, and the public water supply available to the area.

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4.5.1 Major Roadways & Transportation Infrastructure

Roads

There are a total of 245 miles of roads within the Manhasset Bay Watershed, 182 miles of which have been classified by New York State Department of Transportation (NYSDOT). Roads and road jurisdiction are shown in **Figure 4-10**. NYSDOT groups roads, streets and highways into functional classes according to the character or service they provide. Individual roads and streets serve as part of a network through which traffic moves. Functional classifications define the nature of this movement by defining the part that any particular road or street should play in serving the flow of trips through a highway network and the type of access it provides to adjacent properties. There are currently seven functional classifications which are further distinguished as urban and rural yielding fourteen distinct designations. For clarity only the 5 functional classes found within the Manhasset Bay Watershed are listed below in **Table 4-4**.

TABLE 4-4
FUNCTIONAL ROADWAY CLASSIFICATIONS WITHIN THE WATERSHED AREA

Roadway Type	Length (feet)	Length (miles)
Urban Principal Arterial -Interstate	9,386	1.78
Urban Principal Arterial - Other	35,853	6.79
Urban Minor Arterial	157,711	29.87
Urban Major Collector	325,223	61.60
Urban Local	432,152	81.85
Total	960,324	181.88

The majority of roads within the watershed are Village- or Town-owned roads. Major roadways within the watershed include Port Washington Boulevard, which runs north-south and serves as a primary corridor between the Port Washington area and other municipalities in the region. Northern Boulevard (Route 25A), which runs east-west, is a key Urban Principal Arterial road, owned by NYSDOT, and provides critical access between the waterfront areas and inland communities. Both of these roads are vital for regional connectivity, providing routes for commuters and commercial traffic and linking various neighborhoods to the bay.

East Shore Road in Great Neck, which turns into Community Drive south of Northern Boulevard, is another major north-south road within the watershed. This road, which is County-owned, serves as an important route for local traffic and provides direct access to waterfront areas, particularly in communities along the shoreline. Additionally, East Shore Road plays a significant role in connecting the bay with surrounding residential and commercial areas.

These roads also serve as important connectors to other municipalities and are critical for emergency response, public services, and access to recreational and environmental areas along the bay. The network of roads within the watershed provides essential routes for accessing the bay and plays a role in facilitating both local and regional traffic, making them integral to the connectivity of the bay to the larger regional transportation network.

Train Stations

There are three Long Island Railroad Stations within the Manhasset Bay Watershed as seen in the inset Image 4-1 below. These include the Manhasset Train Station, Plandome Train Station, and the Port Washington Train Station, the last three stations on the Port Washington Branch. The Manhasset Train Station is located on the corner of Park Avenue and Plandome Road and features two below-grade tracks, one eastbound and one westbound. There are four parking lots that serve the train station, which require a Manhasset Resident permit. These parking lots have a combined total acreage of approximately 4 acres. The Plandome Train Station is located at the intersection of Rockwood Road and Stonytown Road and features two above grade tracks. Three parking lots with a combined acreage of approximately 1.20 acres serve the station. Two small parking lots are exclusively for Village of Plandome residents, and one serves Village of Plandome Manor residents. Village of Plandome Manor's post office is located within the train station waiting room. The Port Washington Train Station serves as the terminus of the Port Washington Branch and is located south of Main Street, between South Bayles Avenue and Haven Avenue. This station features 4 above grade tracks and 8 commuter parking lots for Port Washington residents with a combined total acreage of 9.70 acres. The Great Neck and other stations further west on the inset Image 4-1 below are not within the Manhasset Bay watershed.

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Image 4-1: Train Stations

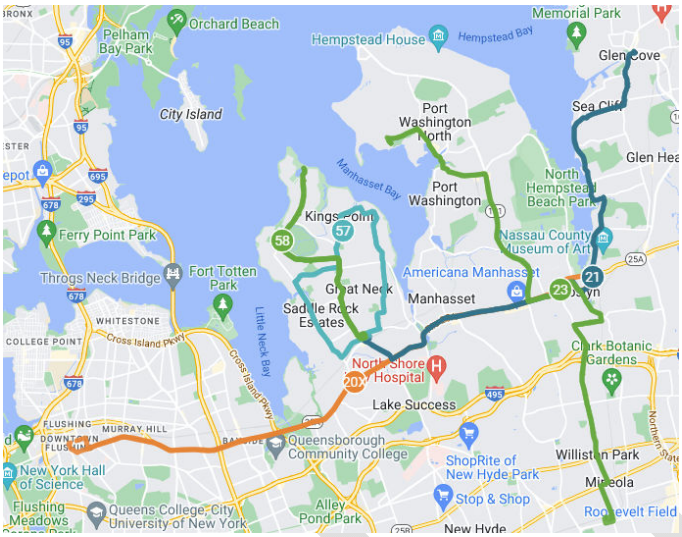


Bus Stops

Nassau County's bus service, the Nassau County Inter-County Express or NICE, runs 40 service lines throughout the County. Four of these bus routes have stops within the Manhasset Bay Watershed boundaries as shown in the below inset Image 4-2. Route 23 (Mineola – Manorhaven) starts at the Mineola train station and ends at the Manorhaven Town Park and has two stops within the watershed - the Park Lane/Orchard Beach stop and Herbert Avenue/ Main stop. Route 20x (Roslyn – Flushing Express) has one bus stop at Brinkerhoff Lane/Northern within the watershed boundary. Route 21 (Great Neck – Glen Cove) also has a stop at the same Brinkerhoff Lane/Northern bus stop. Route 57 (Great Neck Loop) starts and ends at the Great Neck Plaza and has a stop at North Road/Middle Neck Road which is within the watershed boundary. Lastly, Route 58 (Great Neck – Kings Point) has two stops within the watershed at North Road/Middle Neck Road and Kings Point Road Loop.

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Image 4-2: Bus Stops



Bridges, Culverts, and Dams

According to field surveys performed in the summer of 2022 by the North Atlantic Aquatic Connectivity Collaborative[20], there are 16 bridges and 19 culverts within the watershed. The majority of the bridges (13) are pedestrian bridges within trail networks and pose an insignificant barrier to wildlife. There are two roadway bridges over Baxter Creek and one driveway bridge over Baxter Creek, all are reported to pose an insignificant barrier. Most of the culverts are located along Whitney Creek (7) and Leeds Creek (8), Baxter Creek has two culverts, which are shown in **Figure 4-11b**. Three culverts along Whitney Creek were reported to have minor barriers to wildlife while one at Green Tree Road is reported to have a moderate barrier. The culverts along the Animal Shelter Trail over Leeds Creek all were reported to have minor barriers due to debris as well as a minor barrier at Stonytown Road. The culverts at the LIRR were not able to be fully accessed but one showed moderate debris accumulating. One of the barriers at Tianderah Road along Baxter Creek was reported to have a moderate barrier. Undersized and/or unmaintained culverts are often the main impediment for the migration of migratory fish such as Alewife and American eels to reach their spawning grounds. Poorly maintained or designed culverts also impede the migration of intertidal saltmarshes as sea levels rise and allow for the spread of invasive species. When undersized and poorly maintained culverts can also cause flooding upstream during heavy rain events. It is therefore critical to properly resize culverts when doing roadwork and adequately maintain existing ones.

[20] North Atlantic Aquatic Connectivity Collaborative (NAACC). (2025). Stream Continuity Portal. University of Massachusetts Amherst. Retrieved from https://streamcontinuity.org

According to the NYSDEC Division of Water, Dams Section Virtual Globe dataset[21], there are five regulated dams within the watershed area and they are displayed in the Inset Image 4-3 below. These dams are shown in the inset figure and identified below in **Table 4-5**. All the five dams were identified as "low hazard dams," indicating a low down-stream hazard potential of a dam failure. This means that if one of these dams were to fail, it would pose a minimal risk of harm to people or property downstream. The height of a dam, its maximum impoundment capacity, the physical characteristics of the dam site, and the location of downstream facilities are assessed to determine the appropriate hazard classification.

Image 4-3: Dams



Note: The location of Dam# 4 in the above image is incorrectly displayed in the NYSDEC dataset. The correct location of this dam is Leed's Pond.

[21] Esri. (n.d.). *ArcGIS Online Feature Layer: Item ID 5a7d83359cc842e08711215408f5b55c*. Retrieved from https://www.arcgis.com/home/item.html?id=5a7d83359cc842e08711215408f5b55c

TABLE 4-5
DAMS WITHIN WATERSHED AREA

ID#	Name	Owner	Year Built	Purpose
1	Kings Point Dam	Kings Point Yacht Haven	1870	Recreation
2	Mill Pond Dam	Nassau County	1800s	Milling, Irrigation
3	Baxter Pond Dam	Town of North Hempstead	1800s	Recreation
4	Leeds Pond Dam	William Leeds	1908	Recreation
5	Little Leeds Pond Dam	Mrs. William Leeds	1910	Recreation

4.5.2 Stormwater Infrastructure

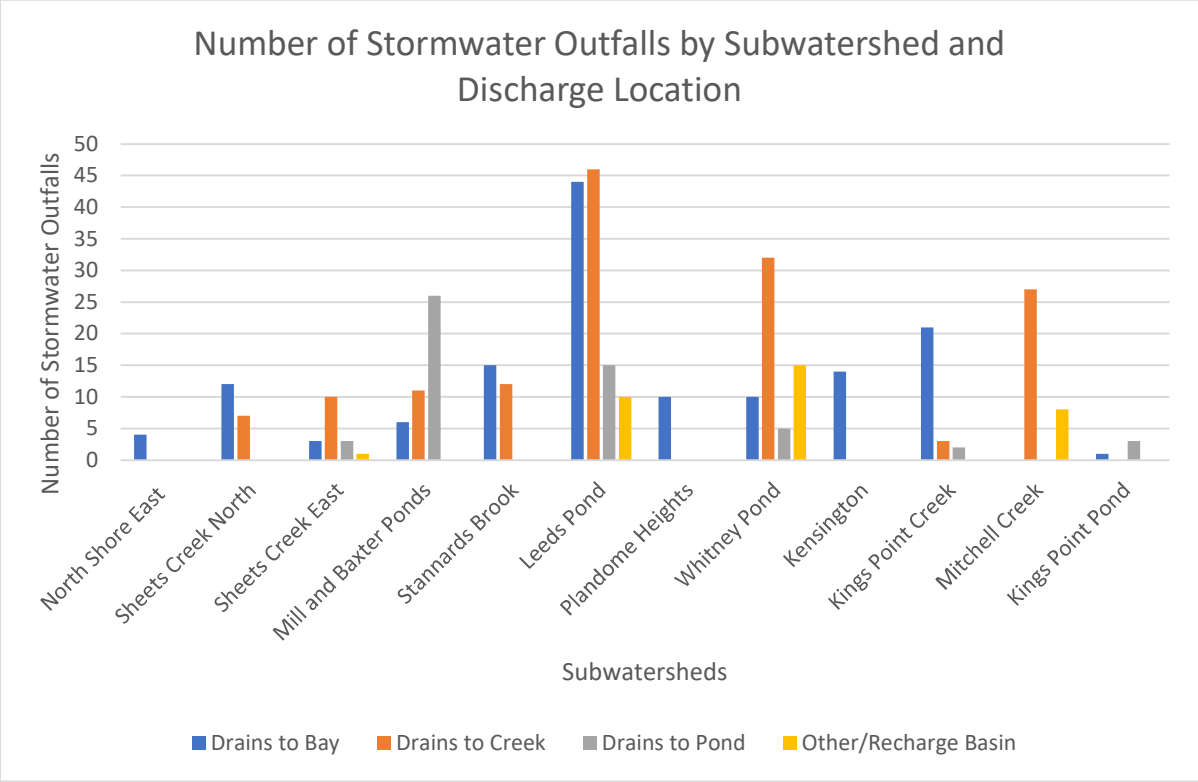
Stormwater generated by rainfall events will either recharge the groundwater or eventually be conveyed directly or indirectly to the Bay. The stormwater that percolates into the ground or is captured and conveyed to a recharge basin will eventually make its way into the groundwater system due to the sandy nature of soils on Long Island. Depending upon where this water initially percolates into the ground will determine whether it makes its way to the Bay, recharges the drinking water aquifer and is ultimately pumped back up or deep recharge can make its way to Long Island sound. All the water that does not percolate into the ground and ultimately makes its way to the Bay is considered stormwater runoff.

Stormwater runoff can carry a variety of pollutants along with it depending upon land use, time of year, intensity of rainfall, and best management practices (BMPs) it may encounter along the way. Pollutants include fertilizers, herbicides, and pesticides used in landscape management, oils and other compounds picked up off the roadway from automobiles, sediments from construction sites, road salts during winter months, and finally coliform bacteria from pets, wildlife and illicit septic hookups. Floatables (trash/debris) are also a problem.

Pollutants are conveyed to the Bay via roads and pipes which eventually discharge into streams, which then make their way to the Bay or directly to the Bay itself. Occasionally, streams with impoundments or ponds serve to trap pollutants, but this often comes at the expense of these smaller waterbodies, which become degraded as they accumulate contaminants from larger water systems. Data acquired from the Town of North Hempstead indicates that there are 70 miles of pipe that discharge to 376 outfalls, shown in Figures **, 4-11a-4-11c**. Seventy-one of these outfalls are larger than 36" in diameter indicating they collect and discharge a considerable amount of water. The data also indicates that there are 140 outfalls that discharge directly to the Bay. These direct outfalls provide little to no opportunity for the trapping and treatment of pollutants including sediment, floatables, nutrients and other dissolved compounds. There are

148 outfalls that discharge to streams or creeks and 54 outfalls that discharge to ponds. Although discharging stormwater into these other surface waters prevents direct runoff into the bay, it negatively impacts the health of those streams and ponds. Streams and ponds that receive excessive amounts of polluted, untreated stormwater can become silted up, choked with invasives, or have harmful algal blooms. Recharge basins are a highly efficient tool in both preventing stormwater from reaching the surface waters while simultaneously recharging the aquifer. Unfortunately, the use of recharge basins is extremely limited with only a handful of them throughout the entire watershed with 34 outfalls contributing to them (see **Figure 4-11a-4-11c**). Most of the stormwater outfalls are in the subwatersheds along the eastern and southern portion of the Bay where development is most dense. The below inset graph, Image 4-4, shows the distribution of outfalls by subwatershed and discharge point.

Image 4-4: Number of Stormwater Outfalls by Subwatershed and Discharge Location



As shown in the above graph, the Leeds Pond and Kings Point Creek subwatersheds include the greatest number of stormwater outfalls that discharge to the Bay; and the Leeds Pond, Whitney Pond, Mitchell Creek, and Mill and Baxter Ponds subwatersheds include the greatest number of outfalls that discharge to creeks or ponds.

Once in the Bay these pollutants may cause the closure of shellfishing beds and bathing beaches due to elevated coliform levels[22]. Nitrogen and phosphorus from fertilizers and overflowing cesspools lead to eutrophication, which in turn leads to increased algal blooms and low dissolved oxygen, and a cascade of ecological and environmental impacts. The impact of these pollutants is more pronounced in smaller freshwater bodies, where the limited size and lower dilution capacity can result in more severe water quality issues. In contrast, larger saltwater bodies may experience some dilution, but without proper flushing or sufficient water exchange, the pollutants can still accumulate and degrade water quality. Sediments and suspended solids accelerate the filling of waterbodies, while floatables, mostly plastics, results in unsightly litter ridden shorelines. Each of these impacts has societal and economic impacts ranging from the loss of fisheries, increased frequency for dredging and general decline in the quality of life for those living or visiting the Bay.

Since 1990 the EPA has been requiring compliance with Municipal Separate Storm Sewer System (MS4)[23] regulations to comply with the Clean Water Act. The first phase of compliance began with municipalities of more than 100,000 residents and expanded to all municipalities in the second phase starting in 1999. A suite of BMPs can be employed to comply with the MS4 programs and those practices typically fall into one of six categories.

1. Public outreach and education campaign
2. Public Involvement
3. Illicit discharge detection and prevention
4. Control of pollution from construction sites over an acre.
5. Control runoff from redevelopment and new development.
6. Good housekeeping measures of existing stormwater systems.

The variety of development patterns within the watershed is also reflected in the variety of options for implementing the MS4s. An evaluation of each applicable municipalities' compliance with the MS4 program is provided in the local law analysis.

<u>New ways of approaching stormwater</u>

The conventional way of approaching stormwater was to collect the water and convey it directly to the nearest surface water body. The 1999 report highlighted a table of options from 1983 drafted by the Long Island regional Planning Council. More recently the NYSDEC has published an

[22] New York State Department of Environmental Conservation (NYSDEC). (2025). *Shellfishing in New York State*. Retrieved from https://dec.ny.gov/things-to-do/shellfishing

[23] U.S. Environmental Protection Agency (EPA). (2024). *Stormwater Discharges from Municipal Sources*. Retrieved from https://www.epa.gov/npdes/stormwater-discharges-municipal-sources

updated Stormwater Design Manual (2024)[24] that details numerous new techniques and technologies that can be employed to reduce specific pollutants of concern. These new techniques incorporate the understanding it is best to get the rainfall into the ground as close to where it falls as possible to reduce runoff and increase aquifer recharge. Many of the practices in the design manual also highlight the power of green infrastructure practices, such as rain gardens and bio-swales. When properly designed, installed and maintained green infrastructure can be highly effective at trapping and treating nutrients and pathogens in stormwater while providing aesthetically pleasing features that also provide critical pollinator habitat.

Climate impacts on stormwater

A warmer climate allows the atmosphere to uptake and retain more moisture. This creates the conditions where individual rainfall events release much higher volumes of water. Many of the existing collection, retention, and conveyance systems in place were never designed to handle such intense events. Receiving rainfall in heavier events increases the amount of runoff to the surface waters, increases the chance of flooding and decreases the amount of recharge to the aquifer since the rain does not have time to percolate through the soils. It is critical to plan for these types of events for the long-term health and safety of the community. This includes ensuring the aquifer can receive sufficient recharge and that the surface waters are not polluted with untreated runoff. A detailed discussion of the impacts of climate change on the watershed is provided in **Section 7**.

4.5.3 Wastewater Infrastructure

According to the Nassau County Nine Element Watershed Plan for Nitrogen[25] conducted by Dr. Gobler at SUNY Stony Brook 84% of the nitrogen load to Manhasset Bay comes from wastewater. This wastewater enters via on-site wastewater treatment systems leaching into the groundwater that ultimately discharges into the Bay. Septic systems and cesspools, cumulatively referred to as on-site wastewater treatment systems, dominate the wastewater load accounting for 62% of the wastewater load. It also enters Manhasset Bay from the outfalls at Great Neck Water Pollution Control District (GNWPCD) and Port Washington Water Pollution Control District (PWWPCD) sewage treatment plants.

[24] New York State Department of Environmental Conservation (NYSDEC). (2024). *New York State Stormwater Management Design Manual, July 31, 2024*. Retrieved from https://extapps.dec.ny.gov/fs/projects/24-25DraftCGPDesignManual/Manual.SW.CGP.2024-07-31.Design_Manual_Issued_2024-07-31.pdf

[25] Nassau County. (2022). *Nine Element Plan for Nassau County: September 2022 Final*. Retrieved from https://www.nassaucountyny.gov/DocumentCenter/View/39315/Nine-Element-Plan-for-Nassau-County-September-2022-Final?bidId=

On-site Wastewater Treatment Systems

On-site wastewater treatment systems such as cesspools and septic systems (e.g., septic tank and leaching pool) were simply designed to discharge wastewater in a way that gets raw sewage away from direct human contact as quickly as possible. Given the age of structures in much of the watershed, and the fact that these disposal systems are not capable of nutrient reduction in accordance with today's standards, the nitrogen load to the watershed from these systems is considerable. The average residential septic systems have an effluent concentration of 50 milligrams per liter (mg/l) of total nitrogen (TN). The average residential septic system discharges approximately 40 pounds of nitrogen per year[26].

Areas of greatest impacts (i.e., "hot spots") from on-site wastewater treatment systems are those unsewered areas as depicted in **Figure 4-12** that have high-density residential land uses (see Land Use **Figure 4-2**) and shallow depths to groundwater (see Depth to Groundwater Map, **Figure 4-9**). Areas with these conditions within the watershed, include the area southeast of Manhasset Bay with moderate-high and high land use types in the vicinity of Plandome Heights, Munsey Park, and NY 25A, and areas of shallow groundwater in the northwest portion of the watershed in Kings Point.

Following suit from the success of Suffolk County's onsite septic system upgrade program, Nassau County now allows for the use of innovative and alternative Septic Systems, commonly referred to as IA systems, nitrogen removing systems, or clean water septic systems. The new State- and County-funded program, S.E.P.T.I.C[22], is an incentive-based program designed to assist homeowners upgrade their antiquated cesspool or septic system to a new IA system. There are a handful of proprietary systems currently available that meet the County's requirement of 19 mg/l of TN. As of the writing of this report there were only a handful of these systems installed within the watershed. The following technologies are currently accepted for use as part of the S.E.P.T.I.C. Program:

- Hydro-Action AN Series
- Norweco Singulair TNT and Norweco HydroKinetic
- Orenco Advantex AX20
- Fuji Clean CEN Series
- SeptiTech STAAR

[26] **Nassau County. (2025).** *Nassau S.E.P.T.I.C. Program*. Retrieved from https://www.nassaucountyny.gov/5654/Nassau-Septic

Sewered Areas

The Great Neck Water Pollution Control District (GNWPCD) serves the Villages of Great Neck, Saddle Rock, and Kensington as well as parts of Thomaston, Great Neck Plaza and unincorporated parts of Manhasset. All of the Village of Saddle Rock, 50% of residential properties (2364 parcels), and 72% of commercial properties (430 parcels) in the Village of Great Neck are geographically outside of the Manhasset Bay Watershed. However, they are conveyed into the watershed via a number of lift stations. **Figure 4-12** shows the wastewater treatment plants and sewer districts within and around the watershed area (note that the Village of Manorhaven operates their own pump stations that feed to the PWWPCD).

The GNWPCD recently underwent a consolidation effort, which brought in the resources of the Village of Great Neck. Prior to 2010 the GNWPCD was its own sewer district. During the consolidation process, GNWPCD also upgraded to tertiary nitrogen removal capabilities in 2012 to comply with the LI Sound TMDL goals of 58.5% removal. According to the GNWPCD, the plant surpassed those goals, and it had since reduced its nitrogen load by roughly 70%. In the process of upgrading, the plant gained efficiency and now has additional capacity available. A 2020 feasibility study[27] to expand sewer service to surrounding businesses and homes found that 2.7 million gallons per day (MGD) of wastewater is being processed out of the 5.3MGD design flow capacity. The feasibility study recommends extending sewer service to Plandome Road, which would consume 55,500 Gallons Per Day (GPD) with 61.5% of that flow going to commercial properties and 35% of that flow going towards residential properties. A secondary service area was also recommended to the west of Plandome Road up to the water's edge and this would be nearly 100% of the existing residential flow from that area which is currently discharged to onsite wastewater treatment systems.

The Port Washington Water Pollution Control District (PWWPCD) serves roughly 7,000 connections in the Villages of Baxter Estates, Manorhaven, Port Washington North, and unincorporated parts of Port Washington, including 343 residential parcels and 41 commercial parcels outside of the watershed (see **Figure 4-12**). The PWWPCD has also made significant improvements in its infrastructure and treatment capabilities. The district has a design flow capacity of 4 million gallons per day (MGD) and hydraulic max capacity of 7.5 MGD. They are currently utilizing 2.6 MGD on average[28]. According to the treatment facility website, the plant

[27] Cameron Engineering & Associates. (2020, January). *Manhasset Sewer Feasibility Study*. Prepared for the Great Neck Water Pollution Control District.
[28] Port Washington Water Pollution Control District. (n.d.). *About The Port Washington WPCD*. Retrieved May 21, 2025, from https://www.pwwpcd.us/about/about-the-port-washington-wpcd/

was also upgraded to tertiary nitrogen removal treatment to comply with the LIS TMDL[29] and has been achieving an effluent TN concentration of between 3 and 5 milligrams per liter (mg/l) of effluent discharge, down from an average of 22 mg/l prior to the upgrades, an 81% decrease in nitrogen concentration. The plant was also upgraded from chlorination-based disinfection to ultraviolet (UV) disinfection during the upgrade process. Some of this effluent is reclaimed and utilized as process water for maintenance cleaning within the plant as well as for water pressure cleaning of trunk lines. Reuse efforts like this provide multiple benefits including reducing the amount of water discharged to the surface waters as well as reducing the amount of potable water for cleaning wastewater lines.

Improvements are ongoing throughout the PWWPCD, including: the resurfacing and lining of mains, some of which are a century old, to prevent infiltration of groundwater; upgrading of pump/lift stations; and other stormwater and resilience projects to ensure the safe and reliable functioning of the plants. While much of this maintenance is proactive, the PWWPCD has identified the Village of Manorhaven service area as in need of addressing infiltration and inflow where high flows from rain events can persist for up to a week after a rain event.

The district is also a leader in tracking COVID in wastewater, a practice initiated in March 2020. This data has been shared with multiple municipalities to aid in tracking the global pandemic and continues to monitor for both COVID and polio viruses. In terms of gravity sewer collection system improvements, the PWWPCD is conducting Cured-In-Place Pipe (CIPP) lining of all gravity sewer pipes in easements, as well as gravity sewers with limited access. The district is also lining deficient gravity sewers discovered through its in-house CCTV inspection program. The total estimated length for this project is approximately 16,000 linear feet of 8" to 24" diameter sewer pipes. To further reduce sanitary sewer overflows (SSO) and inflow and infiltration (I/I), the district is installing manhole inserts in low-lying areas prone to flooding. Additional efforts include reducing root intrusion and implementing grease control measures through chemical treatments, public education, and inspections. Continuous rehabilitation of the sanitary sewer system is planned, with another 16,000 linear feet of pipes scheduled for CIPP lining.

The PWWPCD has also undertaken the replacement of wastewater pumps with more efficient modern systems and is in the process of replacing the over 35-year-old biosolids dewatering system with a more reliable system, designed to reduce labor, electrical, and disposal costs. To ensure effective monitoring and control, the district installed a Supervisory Control and Data

[29] New York State Department of Environmental Conservation & Connecticut Department of Environmental Protection. (2000). *A Total Maximum Daily Load Analysis to Achieve Water Quality Standards for Dissolved Oxygen in Long Island Sound*. Retrieved from http://longisoundsoundstudy.net/wp-content/uploads/2010/03/Tmdl.pdf

Acquisition (SCADA) system in 2021, providing 24/7 monitoring of the 17 pump stations and wastewater treatment plant. Continuous pump and equipment replacements are also taking place within these facilities to maintain operational reliability.

Since much of the service area is fully developed there is limited development potential that could add new flow to the facility. Currently the Village of Flower Hill is seeking to be included within the service area and would add flow that is well within the capacity of the plant. The district currently has an additional $50M in pump stations, pipe linings and manhole repair funding needs, which they are prepared to bond $18M.

Outfall pipes from both WPCDs currently discharge into shallow, poorly mixed areas of the Bay. The public has repeatedly expressed a desire for the extension of these outfall pipes.

All the flow from the Village of Lake Success (8 residential parcels and 3 commercial parcels) is exported from the watershed to a treatment facility in the nearby Village of Belgrave (see **Figure 4-12**).

4.5.4 Public Water Supply

The Manhasset Bay Watershed and Long Island as a whole, obtains 100% of all potable drinking water from aquifers. The three major aquifers underlying Long Island include the Upper Glacial, the Magothy, and the Lloyd aquifer; the Lloyd aquifer is the oldest and deepest of the three. These aquifers constitute a Sole Source Aquifer (SSA), which is defined by the EPA as an aquifer that supplies at least 50% of the drinking water for its service area, with no reasonable available alterative drinking water sources available should the aquifer become contaminated.

Long Island's sole source aquifer is vulnerable due to contamination, over-pumping, and saltwater intrusion. Periods of drought along with continuous pumping of groundwater for potable water and irrigation can put stress on these sole source aquifers. Saltwater intrusion from groundwater pumping has occurred in the Lloyd and Magothy aquifers on western Long Island since the 1940s. Contamination by human activities also poses a threat to the water supply. Contamination can be from point sources, such as industrial and commercial facilities, or from nonpoint sources such as domestic wastewater, road salt, fertilizers, pesticides.

Recharge of the aquifers is critical for the sustainability of the regions' sole source aquifer. Over-pumping of the aquifers must be avoided to ensure a sustainable supply and prevent saltwater

intrusion. According to a USGS report[30] that focused on Great Neck, three public supply wells on the Great Neck peninsula have been shut down due to elevated chloride levels, an indicator of saltwater intrusion. The report identified three known saltwater intrusion wedges—lateral movements of saline water into freshwater aquifers that create wedge-shaped formations due to density differences—within the watershed, as well as two additional potential wedges. The report also stated that volatile organic compounds (VOCs) have been observed in at least two supply wells within the watershed above NYS maximum contaminant level (MCL). According to the Water Authority of Great Neck North's 2022 Annual Water Quality[31] report, several VOCs, metals, Per- and polyfluoroalkyl substances (PFAS), and perfluorooctanoic acid (PFOA) compounds have been detected at levels exceeding the MCL. Currently, the water authority utilizes a series of filtration and air stripping methods to reduce contaminants to acceptable levels. The water authority also acknowledged the threat from saltwater intrusion and has implemented conservation measures and installed three wells off the peninsula, further from the Bay and Sound to mitigate this. It is important to note that the Water Authority of Great Neck North is one of multiple water districts within the watershed and their boundaries do not reflect that of the watershed. [32]

There are seven water districts that serve the Manhasset Bay watershed area, as shown in **Figure 4-13**. These include, Village of Sands Point Water District, Port Washington Water District, Manhasset-Lakeville Water District, Village of Plandome Water District, Roslyn Water District, and the Water Authority of Great Neck North. Collectively, these districts maintain a total of 50 wells, supplemented by 4 metered interconnections as shown in **Figure 4-13**[33]. The distribution of wells is as follows:

- Village of Sands Point Water District: 6 wells
- Port Washington Water District: 12 wells
- Manhasset-Lakeville Water District: 14 wells
- Village of Plandome Water District: supplied by the Manhasset-Lakeville Water District through 4 metered interconnections
- Roslyn Water District: 7 wells
- Water Authority of Great Neck North: 11 wells

[30] Barlow, P.M., & Reichard, E.G. (1999). *Hydrogeology and Extent of Saltwater Intrusion of the Great Neck Peninsula, Long Island, New York*. U.S. Geological Survey Water-Resources Investigations Report 99–4280. Retrieved from https://doi.org/10.3133/wri994280

[31] **Water Authority of Great Neck North. (2023).** *Annual Drinking Water Quality Report*. Retrieved from https://www.waterauthorityofgreatnecknorth.com/waterquality.html

[32] **Port Washington Water District. (2023).** *2022 Annual Drinking Water Quality Report*. Retrieved from https://pwwd.org/water_quality_report/2022-water-quality-report/

[33] Detailed mapping of all water supply wells is not readily available.

It is noted that while these water districts service areas within the Manhasset Bay Watershed Boundary, there are portions of the water districts that are not within the boundary of the watershed.

Water Authority of Great Neck North

The total population served by the Water Authority of Great Neck North is approximately 32,400 customers through 9,433 service connections within a 7.5 square mile service area[33] according to the District's website. The District's water supply consists of groundwater drawn from eight operating wells located throughout the service area and three operating wells located off the Great Neck peninsula. Three wells draw water from the Magothy aquifer at depths ranging from 143 feet to 161 feet, and 5 wells draw water from the Lloyd aquifer at depths ranging from 286 feet to 464 feet.

According to the Water Authority facility protocols, prior to distribution, all water is treated with chlorine for bacteriological quality and with polyphosphate, which is used to control iron and discoloration associated with old unlined cast iron water mains and services. All water is treated for pH control, either with sodium hydroxide or through the air stripping process. Source water from Well Nos. 2A, 6, 8, 9, 12, 13, and 14 are treated by air stripping to remove volatile organic contaminants. Well Nos. 2A and 9 are treated by Granular Activated Carbon to remove PFAS. Well Nos. 2A, 6, 9, and 11A are treated by Advanced Oxidation Process which uses highly reactive molecules to break down and remove 1,4-Dioxane.

Conservation efforts are vital in maintaining the health of Long Islands sole source aquifer. Generally, the District has sufficient supply to avoid over-pumping; however, during peak periods of the summer, lawn irrigation increases to a point that creates stress on the system. Conservation efforts within the District include a leak detection program, expedient leak repair, 100% metered system, public awareness program, water use audits and retrofit programs, construction of an irrigation-free garden, and sprinkling regulations. The district has limited lawn irrigation to three times per week and requires installation and testing of moisture sensors or rain gauges for all automatic systems.

Manhasset-Lakeville Water District

Based on the Manhasset-Lakeville Water District website, the District serves about 45,000 customers through over 10,000 individual service connections within a 10.2 square mile service area. The District produces its supply of potable water from eighteen separate wells located at thirteen sites[34]. Fourteen wells draw water from the Magothy aquifer at depths between 100 and 470 feet, while the other four wells are drilled into the deeper Lloyd aquifer at depths reaching 700 feet.

[34] Mapping of all well locations is not available. **Figure 4-13** provides known well locations based on USGS data.

Currently, nine wells are being treated for the removal of elevated levels of VOCs. Packed aeration towers (air strippers) or Granular Activated Carbon (GAC) filters are used to remove these organics. The raw water pH is raised to between 7.5 and 8.0 by the addition of a 25% sodium hydroxide solution (caustic soda). Since aeration also increases the pH of raw water, wells which are aerated, are not treated with sodium hydroxide. Three wells have been removed from service as part of the offsite remediation plan associated with the former Lockheed Martin site in Lake Success. One well has been removed from service for elevated nitrate levels.

Water conservation efforts are vital in order to protect the sole source aquifer. Lawn irrigation is determined to be the leading non-essential water use in the district. To mitigate the amount of water used, the District has enacted a policy whereby odd-numbered houses may use their sprinklers on odd-numbered days and even-numbered houses on even-numbered days. In addition, rain sensors or moisture gauges are required on all automatic systems to ensure the sprinklers will turn off in the event of rain. In addition, sprinklers are not permitted to operate between the hours of 10:00 am and 4:00 pm.

Village of Plandome Water District

Based on the Plandome Water District, the District serves approximately 1,350 customers through 456 service connections. All water distributed in the Village of Plandome Water Supply System is groundwater pumped at Manhasset Lakeville Water District's wells and delivered through four (4) metered interconnections served by Manhasset-Lakeville Water District.

Village of Sands Point Water District

On the “Manhasset Neck” Peninsula there are two smaller aquifers known as the Port Washington Aquifer and the Port Washington Confining Unit. The Village of Sands Point Water District website indicated that it operates six separate wells located on three well fields utilizing the Upper Glacial and Port Washington aquifers in delivering water to their system, and the district is currently constructing a new well. The District serves approximately 2,900 people with 1,682 metered connections.

The water in the district is treated with sodium hydroxide to lessen acidity, thereby reducing corrosivity before it enters the distribution system per the District. Sodium hypochlorite is added to water to maintain disinfection. Sands Point has conducted numerous tests for the PFAS compounds, and no sample has exceeded the level of 10 ppt. However, since some of the tests have exceeded half the proposed MCL, the Village Board approved the purchase of a granular activated carbon (GAC) system to remove these contaminants from the affected wells. The GAC system has been under construction and according to the District, will be operational in 2025.

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The district does not have any mandatory water conservation measures in place; however, they do recommend that the public consider their water usage and implement measures to save water such as reducing water usage in irrigation systems.

Port Washington Water District

Based on the Port Washington Water District website, the District serves about 30,000 customers through over 9,418 individual service connections. The district produces its supply of potable water through the use of twelve separate wells ranging from 90 feet to 600 feet in depth, located at eight stations throughout the district (specific well locations by well number are not readily available). These wells are drilled into the Glacial, Port Washington, Magothy, and Lloyd Aquifers.

The Source Water Assessment has rated all but one of the wells as having a very high susceptibility to industrial solvents and all wells as having a high to very high susceptibility to nitrates. One well is rated as having a medium high susceptibility to microbial contamination. The elevated susceptibility to industrial solvents is due primarily to point sources of contamination related to transportation routes and commercial/industrial facilities and related activities in the assessment area. According to the assessment[35], the elevated susceptibility to nitrates is due to unsewered residential land use and related practices, such as fertilizing lawns, as well as the commercial/industrial activities in the assessment area.

Calcium hypochlorite is routinely added to the ground level reservoirs to maintain chlorine residual, as indicated on the District's website[36]. The District disinfects its water supply with tablet chlorine at each pumping station. Sodium hydroxide is routinely added at all well stations to maintain optimum pH levels and reduce corrosivity. GAC adsorption facilities are used for organic chemical removal at five wells. VOCs are removed at four wells using packed tower aeration (air stripping towers). A nitrate removal facility treats water for elevated nitrates at the Hewlett Well No. 4 station. The District was granted an MCL (maximum contamination level) deferral for 1,4-dioxane in 2020. A deferral renewal was granted extending the MCL compliance deadline to August 2023, and the district requested an additional deferral extension to August 2024. The District has been implementing an action plan, which includes designing and constructing Advanced Oxidation Process (AOP) treatment systems for the removal of 1,4-dioxane. As of May 2025, everything is either on-line or has been removed from service for construction.

Water conservation efforts within the district include a required 20% reduction in irrigation water usage. To accomplish this goal, the District has advised their residents to turn back watering

[35] Port Washington Water District. (2024, May 22). *2023 Annual Drinking Water Quality Report*. Retrieved from https://pwwd.org/our-2023-drinking-water-quality-report-is-now-available/

[36] Port Washington Water District. (n.d.). *Water Quality*. Retrieved May 29, 2025, from https://pwwd.org/about/water-quality/

times, adhere to Nassau County Odd/Even Lawn Watering Ordinance, ensure rain and soil moisture sensors are operating correctly, as well as plant native/drought resistant plants.

Rosyln Water District

Based on the Rosyln Water District website, the District[37] has 5,804 service connections and supplies drinking water to a population estimated at 17,900 people within a 5.1 square mile service area. The District's source of water supply is from 7 individual wells drilled into the Magothy aquifer at depths ranging from 431 feet to 530 feet. In addition, the District has eight common suction wells ranging in depth from 260 feet to 555 feet located on one well field (which the specific well locations by well number are not readily available). Seven of these wells are drilled into the Magothy aquifer and one in the Lloyd aquifer.

Water is treated at each well site before entering distribution as follows, which is based on the information from the District's website: first, the addition of sodium hydroxide to adjust the pH (naturally occurring acidity in groundwater) to help prevent corrosion; second, the addition of calcium hypochlorite is added as a precaution for disinfection. Three wells are also treated by packed tower aeration and by granular activated carbon for removal of various organic contaminants. The District also includes three tanks presently out of service for installing GAC treatment. In addition, well #4 is currently out of service for needed Air Stripping Treatment installation (which the specific well locations by well number are not readily available).

The Roslyn Water District has implemented a water conservation program, which requires all irrigation systems to have time clock controllers and a rain or soil moisture sensor. Sprinkling of lawns and gardens can only be performed between the hours of 4:00 p.m. and 10:00 a.m. for a maximum of 2-hour duration on alternate days; on odd days for odd numbered premises and even days for even numbered premises. The district also encourages consumers to promptly repair leaks as soon as they are disclosed and reduce water use by installing aerators on faucets, displacement devices in toilet tanks and automatic shut-off nozzles on garden hoses.

[37] Roslyn Water District. (n.d.). *Roslyn Water District*. Retrieved May 29, 2025, from https://www.roslynwaterdistrict.org/

5.0 ECOLOGICAL RESOURCES

The ecology of the Manhasset Bay Watershed is strongly influenced by its coastal setting and human development. The watershed provides habitat for a variety of plants, birds, mammals, fish, and shellfish. Much of the uplands have been developed with only a few remaining tracts of relatively large natural areas which are displayed in **Figure 5-1**. The wetlands and waterways of the watershed are the most ecologically-rich habitats within the watershed. However, **Figure 5-1** also shows heavy development along the coast near areas of consistently high bacteria counts in the Bay. This follows the national model demonstrating that development in the watershed is directly linked to water quality.

According to land cover data, the watershed area was characterized and quantified according to land cover type (**see Figure 5-1**). The results of this analysis are presented below in **Table 5-1**. The rank identified in the below table indicates the prevalence of each land cover type within the watershed area, with 1 being the most prevalent, and 15 being the least prevalent.

TABLE 5-1
LAND COVER WITHIN WATERSHED

Rank	Land Cover Type	Acres	% of Total
1	Developed, Open Space	3,729.57	30.69
2	Developed, Low Intensity	2,925.16	24.07
3	Open Water	2,185.26	17.98
4	Developed, Medium Intensity	1,692.61	13.93
5	Developed, High Intensity	592.29	4.87
6	Deciduous Forest	452.71	3.73
7	Woody Wetlands	225.44	1.86
8	Mixed Forest	194.21	1.60
9	Pasture/Hay	68.41	0.56
10	Emergent Herbaceous Wetlands	32.83	0.27
11	Evergreen Forest	18.60	0.15
12	Shrub/Scrub	11.25	0.09
13	Grasslands/Herbaceous	10.33	0.09
14	Barren Land	7.58	0.06
15	Cultivated Crop	4.36	0.04

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As shown in **Table 5-1** above, the area's most prominent land covers within the watershed are developed areas and open water. This would mean the majority of the land situated within the watershed is classified as Developed Open Space (31%), Developed/Low Intensity (24%), Open Water (18%), or Developed/Medium Intensity (14%). The less prominent areas would be classified as the habitat types that occupy less than 14%, such as Shrub/Scrub, Grasslands/Herbaceous, Barren Land, and Cultivated Crop. The largest area of open space is in the southern watershed in the Whitney Pond subwatershed. Other subwatersheds with large open space areas are the North East Shore and Mill/Baxter Ponds. Development of various intensities is found in all subwatersheds. High density development is found in the Manhasset and Port Washington areas in the subwatersheds of Sheets Creek North and East, Mill/Baxter Ponds, Stannard's Brook, Leeds Pond, Whitney Pond, and Kensington.

5.1 Marine, Aquatic, and Wetland Habitats

Manhasset Bay, Mitchells Creek and parts of Sheets Creek are designated a Significant Coastal Fish and Wildlife habitat by NYSDOS[38]. This designation is due to the habitat's relative rarity in the region , the presence of vulnerable species, its recreational importance, being a regionally important waterfowl wintering area, and being irreplaceable. The Bay is a productive area for fish and shellfish and serves as an important nursery and foraging habitat for many fish species. As such, the Bay supports a significant recreational fishery, though, the removal of shellfish for any reason is illegal and unsafe.

Mitchells Creek is the last remaining undeveloped tidal stream and wetland complex within the Bay (see **Figure 4-7**), which is the relative rare habitat. The salt marsh wetlands within Mitchells Creek are rare and important habitats for a variety of marine and avian species. Salt marshes can still be found in other parts of the Bay; however, these areas are now limited to small, fragmented patches that are increasingly under threat. Over time, these marshes have been reduced in size due to factors such as coastal development, rising sea levels, and erosion. This makes the remaining portions highly vulnerable. A study conducted on behalf of New England Interstate Water Pollution Control Commission, known now exclusively as NEIWPCC, estimated the spatial loss of high marsh, intertidal marsh, and fresh marsh within Manhasset Bay from 1976 to 2005[39]. The results of their study indicate that these tidal wetland losses at the monitored sites range

[38] New York State Department of State (NYSDOS). (2005). *Significant Coastal Fish and Wildlife Habitat: Manhasset Bay, Mitchells Creek, and Parts of Sheets Creek*. Retrieved from https://dos.ny.gov/significant-coastal-fish-wildlife-habitats

[39] **NEIWPCC. (2015).** *Long Island Tidal Wetlands Trends Analysis*. Prepared by Cameron Engineering & Associates. NEIWPCC Publication No. N-2011-023. Retrieved from https://neiwpcc.org/resource-library/

from 16.5% to 100% with an overall loss of 59% of the Bay's tidal wetlands. Recent efforts to restore tidal wetlands have begun within the Bay but their long-term success is uncertain.

5.1.1 Shellfish

Shellfish found within the Bay include hard clams, duck clams, mud crabs, flat-clawed hermit crabs, oysters, ribbed mussels, soft clams, razor clams, Eastern mud snails, and common slipper snails, among others. Historically Manhasset Bay was an important shellfishery, known as the "shellfish garden of New York City", but due to declines in water quality the Bay is no longer certified for shellfish harvesting based on NYSDEC sampling data. **Figure 5-2** shows shellfish areas in Manhasset Bay and the surrounding Long Island Sound. A 2023 shellfish population survey of Manhasset Bay determined that the Bay's standing stock of hard clams is substantial and plays an important ecological role[40]. The shellfish study concluded that few seed clams juvenile clams in the early stages of development- were observed, and the large hard clam population is likely driven by its uncertified waters designation creating a de facto shellfish sanctuary. The study recommends selective clam and oyster restoration projects and water quality improvement projects in the watershed to reduce sedimentation, turbidity, nutrients, pesticides, and other stormwater pollutants, which is supported by the Manhasset Bay Protection Committee and the municipalities involved in this update of the WQIP.

Oysters can be found in the Bay but not in abundance. In 2022, the Town of North Hempstead led an oyster restoration project, which planted 1 million spat-on-shell oysters at three locations within the Bay. The 2023 shellfish study inspected the pilot sites in 2023 and determined that one site had great success while the other two performed poorly. The failure at two of the sites is thought to be caused by predation and/or wave action and tidal currents dispersing the seeds. The success at the one site is thought to be due to optimal bottom substate and being in a more protected area of the Bay. The results indicate that oysters can thrive within the Bay, but additional site-specific factors must be considered when selecting seeding location.

Expanded shellfish restoration efforts are underway. The MBPC is using federal funds to further seed the Bay during the summers 2024 – 2026. The Town of North Hempstead is also continuing their regular restoration and has begun oyster gardening with Cornell Cooperative Extension of Nassau County.

[40] **Cashin Associates P.C. & Bay Environmental Consulting LLC. (n.d.).** *Manhasset Bay Shellfish and Sediment Study*.

5.1.2 Fish

Manhasset Bay is an important nursery and foraging habitat for striped bass (*Morone saxatilis*), scup (*Stenotomus chrysops*), bluefish (*Pomatomus saltatrix*), Atlantic silversides (*Menidia menidia*), Atlantic menhaden (*Brevoortia tyrannus*), winter flounder (*Pseudopleuronectes americanus*), and blackfish (*Tautoga onitis*)[41]. According to National Oceanic and Atmospheric Administration's (NOAA's) Essential Fish Habitat (EFH) Mapper, which is included in **Appendix D,** Manhasset Bay may provide habitat for Atlantic butterfish (*Peprilus triacanthus*), Atlantic herring (*Clupea harengus*), Atlantic mackerel (*Scomber scombrus*), black sea bass (*Centropristis striata*), bluefish (*Pomatomus saltatrix*), little skate (*Leucoraja erinacea*), longfin squid (*Doryteuthis pealeii*), pollock (*Pollachius virens*), red hake (*Urophycis chuss*), sand tiger shark (*Carcharias taurus*), scup (*Stenotomus chrysops*), summer flounder (*Paralichthys dentatus*), windowpane flounder (*Scopthalmus aquosus*), winter flounder (*Pseudopleuronectes americanus*), and winter skate (*Leucoraja ocellata*). The NOAA EFH program generally focuses on commercially/recreational important fish species and is not a comprehensive list of fish species that can be expected to be found in Manhasset Bay. Other common fish species of Long Island Sound that may inhabit the Bay as well include weakfish (*Cynoscion regalis*), herrings (*Clupeidae* family), shads (*Alosa* genus), and sea robins (*Prionotus* genus). Since 1984, the Long Island Sound Trawl Survey (LISTS) program has conducted annual fish trawls throughout the Long Island Sound to provide long term monitoring of marine fishery resources. As of the 2022 survey year, the LISTS program has identified 113 fish species, and an additional 45 fish species have been identified by other sampling programs within the sound. Many of these fish species, but not all, may be found within Manhasset Bay as well.

5.1.3 Waterfowl and Coastal Birds

Manhasset Bay is considered a major waterfowl wintering area. Large concentrations of great scaup (*Aythya marila*), lesser scaup (*Aythya affinis*), canvasback (*Aythya valisineria*), ruddy duck (*Oxyura jamaicensis*), and American black duck (*Anas rubripes*) have been observed during historical surveys. In smaller concentrations, populations of mallard (*Anas platyrhynchos*), Canada goose (*Branta canadensis*), common goldeneye (*Bucephala clangula*), bufflehead (*Bucephala albeola*), long-tailed duck (*Clangula hyemalis*), red-breasted merganser (*Mergus serrator*), hooded merganser (*Lophodytes cucullatus*), northern shoveler (*Anas clypeata*), green-winged teal (*Anas crecca*), and northern pintail (*Anas acuta*) have been observed.

[41] **New York State Department of State**. (2020). *Manhasset Bay Coastal Assessment and Management Plan* https://dos.ny.gov/system/files/documents/2020/03/manhasset_bay.pdf

Coastal birds are also commonly observed in Manhasset Bay, including the great blue heron (*Ardea herodias*), great egret (*Ardea alba*), snowy egret (*Egretta thula*), black-crowned night heron (*Nycticorax nycticorax*), laughing gull (*Leucophaeus atricilla*), ring-billed gull (*Larus delawarensis*), great black-backed gull (*Larus marinus*), herring gull (*Larus argentatus*), double-crested cormorant (*Phalacrocorax auritus*), red-winged blackbird (*Agelaius phoeniceus*), belted kingfisher (*Megaceryle alcyon*), killdeer (*Charadrius vociferus*), sanderling (*Calidris alba*), and greater yellowlegs (*Tringa melanoleuca*). Nesting pairs of least terns (*Sternula antillarum*, threatened), ospreys (*Pandion haliaetus*, species of concern), and American oystercatchers (*Haematopus palliatus*) have historically occurred on Plum Point. Common terns (*Sterna hirundo*) have also been observed on Plum Point, but data is limited.

5.2 Upland Habitats

The flora and fauna of much of the upland and freshwater habitats within the watershed has been greatly altered over time by development. The largest tracts of natural uplands include portions of the 175-acre Kings Point Park; the 32-acre Leeds Pond Preserve; the 24-acre Whitney Pond Park; a narrow tract of woodlands land and creek that bisects the Village of Plandome, and a large tract of woodlands in the south of the watershed adjacent to North Shore University Hospital, Deepdale Golf Club, and North Hills Country Club. With the exception of the large tract of land in the south end of the watershed, these opens spaces are publicly owned and include pond, stream, and wetland habitat. The forested and wetland environments provide important habitat for a variety of birds including several migratory species. The fauna within the watershed includes typical suburban wildlife such as racoons, coyotes, squirrels, opossums, mice, and box turtles. In recent years fox and deer sightings have become more common.

5.2.1 Rare, Threatened, and Endangered Species

NOAA and United States Fish and Wildlife Service (USFWS) are responsible for the management of species protected under the Endangered Species Act. NOAA's focus is on marine life and USFWS' focus is on terrestrial, freshwater, and avian species. At the state level, NYSDEC oversees endangered species for all habitats. An endangered species is one that is at risk of extinction throughout all or a significant portion of its range. A Threatened species is one that is likely to become endangered in the foreseeable future. For NYSDEC, the designation refers to the threat of extinction from New York State, and not necessarily species-wide extinction.

According to NOAA's Endangered Species Act Section 7 Mapper, the following species may use Manhasset Bay during part of their migration and life cycle:

- Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*, endangered)
- Shortnose sturgeon (*Acipenser brevirostrum*, endangered)
- Green sea turtles (*Chelonia mydas*, threatened)
- Kemp's ridley sea turtles (*Lepidochelys kempii*, endangered)
- Leatherback sea turtles (*Dermochelys coriacea*, endangered)Loggerhead sea turtles (*Caretta caretta*, endangered).

According to USFWS's Information for Planning and Consultation (also known as the IPaC - Endangered Species Mapper), the following species may be found within the watershed during part of their migration or life cycle:

- Northern long-eared bat (*Myotis septentrionalis*, endangered)
- Piping plover (*Charadrius melodus*, threatened)
- Roseate tern (*Sterna dougallii*, endangered)
- Rufa red knot (*Calidris canutus rufa*, threatened)
- Monarch butterfly (*Danaus plexippus*, Candidate Species)

The USFWS IPaC Endangered Species Mapper (IPaC) is found in **Appendix E**.. The USFWS's IPaC also identifies species protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. According to the IPaC, both Bald and Golden Eagles may be present within the watershed, as well as 40 other migratory birds.

According to the NYSDEC Environmental Assessment Form Mapper, the following threatened or endangered species may be found within the watershed:

- Bald eagle (*Haliaeetus leucocephalus*, state-threatened)
- Pale duckweed (*Lemna minor*, state-endangered)
- American strawberry bush (*Euonymus americana*, state-endangered)
- Lowland loosestrife (*Lysimachia hybrida*, state-endangered)
- Green milkweed (*Asclepias viridis*, state-threatened)
- White-edged sedge (*Carex marginalis*, state-threatened)
- Piping plover (*Charadrius melodus*, state-endangered)
- Least tern (*Sternula antillarum*, state-threatened)
- Common tern (*Sterna hirundo*, state-threatened)

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5.3 Water Quality

The following sections provide a detailed analysis of current water quality in Manhasset Bay expanding on data introduced previously in this report and identify non-point and point sources of pollution that contribute to water quality degradation.

5.3.1 Water Quality Overview and Literature Review

The primary water quality issues within Manhasset Bay and its watershed include elevated nitrogen and coliform bacteria, and low dissolved oxygen. These conditions can have cascading negative impacts to human and ecosystem health, recreation and enjoyment, and the economy. The causes of these water quality issues vary but at a high-level are predominantly the result of high-density development within the watershed and the coastal region. Manhasset Bay has consistently ranked poorly on the Save the Sounds annual Long Island Sound Report Card[42] with the inner Bay performing the worst.

Elevated nitrogen, also referred to as eutrophication, can result in algal blooms. Eutrophication refers to excessive inputs of nutrients to a waterbody; however, for marine systems, nitrogen is considered the limiting nutrient, and therefore, the primary nutrient of concern. Algal blooms can result in ecosystem imbalances and hypoxia due to subsequent bacterial decomposition. Sources of nitrogen impacting the watershed include on-site wastewater treatment system leachate, wastewater treatment effluent, wildlife and pet waste, and fertilizer, among others. The majority of the nitrogen enters the Bay and tributaries through stormwater runoff, onsite wastewater systems (e.g., cesspools), and water pollution control outfalls.

Waterbody Assessment Classification

The water quality of Manhasset Bay, freshwater ponds, lakes, and tributaries are influenced by a variety of factors and sources. In addition, priority water quality issues for one waterbody or segment of a waterbody to another can vary. To assess water quality, site specific conditions must be characterized to determine best uses and corresponding water quality standards necessary to allow their respective uses to be sustainable. Information on the assessed waterbodies in New York can be found on the DECinfo Locator at https://gisservices.dec.ny.gov/gis/dil/.

[42] **Save the Sound. (2024).** *Long Island Sound Report Card*. Retrieved from https://www.savethesound.org/report-card

All waters in New York state are assigned a letter classification that designates their best uses (e.g., contact recreation, fishing, shellfishing, drinking water supply, etc.). Fresh surface waters are designated A, B, C, or D and Saline waters are assigned letter classes SA, SB, SC, I, or SD. NYSDEC has developed water quality standards for each classification which specify maximum pollutant concentrations that will continue to sustain the water bodies best use classification. NYSDEC assesses waterbodies to determine if their best use classification is being achieved. For classification purposes, Manhasset Bay is divided into three segments, each with distinct geographic and hydrologic characteristics as shown in **Figure 5-3**:

- Portion 1 – Outer Manhasset Bay (Segment ID 1702-0021): This segment includes bay waters southeast of a line from Hewlett Point to Barker Point, southwest of a line from Plum Point to the Port Washington Yacht Club dock, and north of a line extending east from the Harbor Way dock. It is the largest and most open area of the Bay, located near its mouth where it connects to Long Island Sound. This segment experiences the greatest tidal exchange and includes the central open waters. Subwatersheds draining into this portion include North East Shore, Mitchells Creek, Kings Point Pond, and parts of Stannard's Brook, Leeds Pond, and Kings Point Creek.
- Portion 2 – Northeastern Manhasset Bay (Segment ID 1702-0141): Located northeast of the line from Plum Point to the Port Washington Yacht Club dock, this segment includes the northeastern shoreline of the Bay, including Manorhaven Beach. It is more enclosed than Portion 1 and primarily receives runoff from adjacent residential areas and parklands. Contributing subwatersheds include Sheets Creek North, Sheets Creek East, Mill/Baxter Ponds, and portions of Stannard's Brook.
- Portion 3 – Inner Manhasset Bay (Segment ID 1702-0142): This segment consists of bay waters south of the line running east from the Harbor Way dock. It is the most inland and narrowest section of the Bay, with limited tidal flushing and greater sensitivity to nutrient loading and stormwater runoff. It is fed by the subwatersheds of Plandome Heights, Whitney Pond, Kensington, and parts of Leeds Pond and Kings Point Creek.

The NYSDEC LIS-MB Portion 1 has a water quality classification of SA (**Figure 5-3**), which reflects this portion's best uses of fishing, primary and secondary contact recreation, and shellfishing. Historical data indicates an impaired use assessment for all best uses of LIS-MB Portion 1 due to elevated levels of fecal coliform in this area. Supplemental indicators of impairment found that this portion of Manhasset Bay also has elevated mercury levels derived from both point and non-point sources. LIS-MB Portion 1 (1702-0021 is listed on the current 2022 303(d) list as requiring

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a total maximum daily load plan (TMDL) to address fecal coliform pollutants[43] because it is unsafe to consume shellfish from this portion[44].

The NYSDEC LIS-MB Portion 2 has a water quality classification of SB (**Figure 5-3**), which supports the best uses of fishing, and both primary and secondary contact recreation (e.g., swimming, kayaking respectively). Historical data shows that there is impaired use for both primary and secondary recreation due to detectable fecal coliform bacteria. The best use of fishing is unassessed in Portion 2 of LIS-MB. LIS-MB Portion 2 (1702-0141) is listed on the current 2022 303(d) list as requiring a TMDL to address fecal coliform pollutants.

The NYSDEC LIS-MB Portion 3 has a classification of SC (**Figure 5-3**), which is suitable for general recreation use, such as secondary contact recreation, but does not support primary contact recreation or shellfishing. Fish consumption in the Class SC portion is considered stressed due to possible elevated levels of PCBs in weakfish and other species which advisories recommend limiting consumption. It is important to note that this fish consumption advisory is statewide and not indicative of PCB sources or contamination within Manhasset Bay. Aquatic life in LIS-MB Portion 3 is considered impaired due to periodic low dissolved oxygen levels, likely the result of elevated nutrient loadings from point and non-point sources. LIS-MB Portion 3 (1702-0142) is not included in the current 2022 303(d) list, because it is considered to be meeting its best use.

The tributaries connected to Manhasset Bay (segment 1702-0143) have a classification of C, which supports the best use of fishing. This includes Kings Point Park Creek, Mitchell Creek, Kings Point Pond Outlet, Stannards Brook, and Sheets Creek Channel. This class does not support other activities such as primary and secondary contact recreation, shellfishing, etc. Fishing throughout the tributaries is classified as stressed due to low dissolved oxygen[45]. The cause of the low dissolved oxygen levels is likely due to nutrient loading from urban and stormwater runoff, as well as from other point and non-point sources of pollution in the surrounding area. 1702-0143 is not included in the 2020/2022 303(d) list.

Mill Pond (segment 1702-0145) is a tidally influenced impoundment located adjacent to Manhasset Bay in Port Washington. Shore Road separates the pond from the Bay and a

[43] New York State Department of Environmental Conservation (NYSDEC). (2022). *Water Quality Assessment and Section 303(d) List of Impaired Waters*. Retrieved from https://dec.ny.gov/nature/waterbodies/watersheds/management/assessment
[44] New York State Department of Environmental Conservation (NYSDEC). (2018). *Section 303(d) List of Impaired Waters Requiring a TMDL/Other Strategy*. Retrieved from https://extapps.dec.ny.gov/docs/water_pdf/section303d2018.pdf
[45] **New York State Department of Environmental Conservation (NYSDEC). (2025).** *DECinfo Locator Waterbody Inventory/Priority Waterbodies List (PWL) Fact Sheet for Waterbody ID 1702-0143*. Accessed April 29, 2025. Retrieved from https://extapps.dec.ny.gov/data/WQP/PWL/1702-0143.html

culvert/weir system connects the two. It appears that tidal waters back flow Mill Pond regularly during periods of high tide. It is classified as SC and suitable for general recreation use and to support aquatic life. Shellfishing and public bathing are not suitable under this classification. Mill Pond is not included in the 2020/2022 303(d) list.

Whitney Lake (segment 1702-0101), locally known as Whitney Pond, is a freshwater lake located south of Manhasset Bay. It is classified as C and fishing is the only use applicable to this waterbody. Fishing is considered impaired due to low dissolved oxygen levels and chlordane contamination. Chlordane contamination is reported to be found in the sediment, but limited information is available to support this finding. Whitney Lake is listed on the 2020/2022 303(d) list as requiring a TMDL to address chlordane and low dissolved oxygen[46].

Leeds Pond (segment 1702-0048) is classified as SC. This waterbody is not listed on the 303(d) list as there was no data available to conduct an assessment[36]

Long Island Sound (Segments 1702-0028 and 1702-0027) is directly connected to Manhasset Bay and is listed on the 303(d) list for low dissolved oxygen, nitrogen, and fecal coliform. The Long Island Sound routinely experiences extended periods of hypoxia due to elevated nitrogen levels. A TMDL was developed as part of the Long Island Sound Study's Comprehensive Conservation and Management Plan (CCMP)[47] to address the low dissolved oxygen/hypoxia. The Long Island Sound Study, first established by congress in 1985, is supported by federal, state, interstate, and local government partnerships with collaboration from universities, non-governmental organizations, private industries, and community groups. The Long Island Sound Study's primary goal is to restore and protect the Sound. The CCMP, originally approved in 1994 and reassessed and updated in 2015 and 2025, provides a framework for addressing six priority problems facing the Long Island Sound. The priority problems are low dissolved oxygen, toxic contamination, pathogen contamination, floatable debris, the impacts of poor water quality on habitat and ecosystem health, and land use and development impacts on habitat and water quality.

The Long Island Sound Nitrogen TMDL is a phased approach to reducing nutrient loading and pollutant sources that includes, but not limited to, preventing additional nitrogen loading above 1990 levels, low-cost upgrades at select municipal wastewater treatment plants, propose

[46] New York State Department of Environmental Conservation (NYSDEC). (2025). *DECinfo Locator Waterbody Inventory/Priority Waterbodies List (PWL) Fact Sheet for Waterbody ID 1702-0101*. Accessed April 29, 2025. Retrieved from https://extapps.dec.ny.gov/data/WQP/PWL/1702-0101.htm
[47]Long Island Sound Study. (2015). *Comprehensive Conservation and Management Plan*. Retrieved from https://longislandsoundstudy.net/2015/09/2015-comprehensive-conservation-and-management-plan/

modifications to NPDES/SPDES permits to achieve nitrogen reductions, commit to nonpoint source reductions actions, and evaluate out-of-basin sources and develop reduction strategies. Many of these actions have been successfully implemented resulting in significant reductions in nitrogen loading to the Sound.

Nitrogen and Dissolved Oxygen

Excessive nitrogen can cause many environmental problems in any estuary including harmful algal blooms (HABs), acidification, hypoxia, and habitat degradation and loss[48]. Excess nitrogen inputs to the Bay can result in increased primary activity. However, as algae begins to die off, a dramatic increase in bacterial decomposition results in hypoxia. Hypoxic conditions are harmful and potentially fatal for fish, shellfish and crustaceans. Chronic or recurrent hypoxia will alter ecosystems which can have further cascading effects. The NYSDEC ambient water quality standard for dissolved oxygen is a daily average of 4.8 mg/L and no individual readings below 3.0 mg/L. A 2023 report on Manhasset Bay water quality prepared by MBPC indicated that dissolved oxygen levels were observed to routinely be less than the 4.8 mg/L standard and, in general, appear to decrease spatially from north to south. On a few occasions, dissolved oxygen levels were observed below the 3.0 mg/L acute standard. It is important to note that the 4.8 mg/L standard is for a daily average and the 2023 study was limited to discrete samples so a direct comparison is not possible. However, these results demonstrate similar findings of dangerously low dissolved oxygen levels in the Long Island Sound region and the impact of excess nitrogen continues to negatively impact Manhasset Bay and the watershed (subwatershed-specific data is not available).

In response to growing concerns regarding nitrogen pollution from the public, environmental groups, and politicians, State funding was provided in 2015 for the development of the Long Island Nitrogen Action Plan. This plan focuses on assessing nitrogen pollution and sources, establishing reduction goals, and developing an implementation plan. A study conducted by The Nature Conservancy (2016) modeled nitrogen source loads for several north shore bays including Manhasset Bay. The study estimated total nitrogen loading to Manhasset Bay from fertilizer use, wastewater, and atmospheric deposition, the three major sources of nitrogen in receiving waters. Compared with the other thirteen embayments (watersheds), Manhasset Bay had the highest total nitrogen loading (kg N/yr). As the size of the watershed strongly impacts total nitrogen loading, the loading rate was also normalized on a per hectare basis. Manhasset Bay was still found to be the highest when comparing the watershed normalized rate. A second

https://longislandsoundstudy.net/2015/09/2015-comprehensive-conservation-and-management-plan/*t 6-2.15 – Recreational Aquatic Spray Grounds*. Accessible at: https://govt.westlaw.com/nycrr/Document/I378ad700c22411dd80c2c6f42ff0193c

normalized loading rate was calculated based on the size of the receiving embayment. Manhasset Bay's embayment normalized rate was lower than four of the thirteen bays. This lower ranking for the embayment normalized rate indicates that while loading rates are high, they are likely to be found at lower concentrations within the Bay compared to some of the other bays included in this study. It is worth noting that a similar study (SBU, 2020) estimated Cold Spring Harbor and Hempstead Harbor to have slightly higher total nitrogen loading rates.

The nitrogen study also assessed the relative loading rates by source. The most noteworthy observation was that Manhasset Bay was the only bay where wastewater treatment loading was the highest single source. It is worth noting that the SBU study (2020) estimated that on-site wastewater treatment systems were the largest source of nitrogen for Manhasset Bay. These discrepancies highlight the variability in modeling outputs and must be considered when evaluating results.

Although not the largest source identified in the TNC study, on-site wastewater treatment still accounted for a significant portion of the overall nitrogen load followed by lawns, atmospheric deposition, and recreational areas. One of the main drivers for this observation by the TNC study was that the sewer districts, which discharge to Manhasset Bay, service communities outside of its watershed boundary. Despite their inconsistencies, these two reports provide insight into nitrogen sources and their relative contributions to the Bay and can be used to help prioritize future nitrogen reducing initiatives.

The Nassau County Nine Key Element Watershed Plan for Nitrogen (2022), calculated nitrogen load reduction goals for all subwatersheds in the County, including Manhasset Bay. The reduction goals are based on current nitrogen loading rates and estimated nitrogen residence times. The goal for Manhasset Bay is a 38.7% reduction. The plan identifies multiple strategies to achieve this goal including expanding sewer districts, upgrading on-site wastewater treatment systems, improvements to stormwater systems, reducing the use of fertilizer, and bioextraction. There are plans to expand the Port Washington sewer district and to connect portions of the Village of Plandome to the Great Neck sewer district, both of which require significant funding.

<u>Pathogens</u>

Pathogens are disease-causing bacteria, viruses, and protozoa and pose a public health risk. Stormwater runoff, sewage treatment discharges, and wildlife can discharge pathogens to surface waters making the water unsafe for swimming. Section 303(c) of the Clean Water Act (CWA) requires States to develop water quality standards; a process regulated by the US

Environmental Protection Agency (EPA) under 40 CFR Part 131[49]. In order to ensure bathing beaches are safe for swimming, indicator bacteria (Enterococci and fecal coliform) are routinely monitored to determine if pathogen levels are elevated, and if temporary beach closures are required. NYS Department of Health water quality standards for marine bathing beaches are a monthly mean of the logarithms of samples less than 200 CFU/100 mL for fecal coliform, or 35 CFU/ 100 mL for Enterococci. In addition, single sample can exceed 1000 CFU/ 100 mL for fecal coliform in Class SB or SC waters or 104 CFU/100 mL for Enterocci in Class SB or SA waters[50]. Any single sample that exceeds either of these standards requires the beach to be closed until acceptable levels return. According to the Save the Sound's 2023 Long Island Sound Beach Report (Data from 2020-2022), Manorhaven Beach is listed as one of the top ten lowest scoring beaches with a "C" grade. But elevated counts of the indicator bacteria are a problem throughout Manhasset Bay. Pathogens are monitored at seven locations throughout the Bay and pathogen exceedances often occur at many of these sites. Weekly bacteria monitoring data from 2023 for Manorhaven Beach indicates that the samples exceeded the NYS bathing beach standards and EPA recommended value on multiple occasions in 2023.

Two studies[51] were conducted for Manhasset Bay that looked at the link between water quality and other environmental factors, namely precipitation . The 2017 study[52] concluded that the eastern shoreline generally has higher bacteria concentrations and is more likely to experience elevated bacteria concentration on the same day as a rain event. The western shoreline is more likely to experience elevated bacteria concentrations the day after a rain event. It is assumed this discrepancy is due to the eastern shoreline being more densely populated with numerous stormwater outfalls which expedites the transport of pollutants to the Bay. Interestingly, the 2023 report which had similar investigative goals could not find any definitive correlations between environmental factors and pathogen concentrations. Across the seven sites and five years of the 2023 study, there were variable results for the correlation between water temperature and dissolved oxygen, dissolved oxygen and rainfall, and salinity and rainfall. For example, in 2017, there was a negative correlation between salinity and rainfall across all sites, but in 2019, there was no correlation shown between salinity and rainfall. For most of the study, there were observable spatial differences in bacteria concentrations within the Bay. Manhasset Bay has areas that are highly developed and more densely populated than other areas. According to the 2023 study, from 2017-2020, the spatial differences in bacteria concentrations show that

[49] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-D/part-131
[50] NYCRR Title 10 Part 6-2.15 https://govt.westlaw.com/nycrr/Document/I378ad700c22411dd80c2c6f42ff0193c
[51] These and other water quality studies can be accessed from the Committee's Water Quality webpage at: https://manhassetbayprotectioncommittee.org/water-quality.html
[52] Fuss & O'Neill (2017). *Manhasset Bay Water Quality Analysis*. Prepared for the Manhasset Bay Protection Committee, June 2017.

more developed, highly populated areas had higher concentrations of bacteria compared to the less populated areas of Manhasset Bay, as expected. However, the 2023 study indicates bacteria concentrations at a site that is in a narrow, shallow part of the Bay (MB-7) that is highly developed, were the lowest across all sites for the entire summer. The 2023 report concluded that no consistent correlations can be made based on the available data, the Bay is not achieving ambient water quality standards and stormwater is a major driver affecting these conditions. These sources of pollution are often separated into two categories: point source and non-point source.

5.3.2 Non-Point Sources

Non-point source (NPS) pollution refers to diffuse pollutants that cannot be traced back to a single source. Many of the actual sources of NPS pollution release a negligible contaminant load, but the cumulative impact of all NPS pollution can often be the primary cause of water quality impairment. Generally, NPS pollution is transported to waterbodies by runoff, direct precipitation, atmospheric deposition, and groundwater seepage. Stormwater is generally considered to be a point source (PS) under federal regulations as the associated outfalls represent a source location. However, the actual source of the contaminants found in stormwater are often diffuse and not traceable. Strategies to mitigate pollution from stormwater should include both PS and NPS considerations as this pollution is a problem throughout the entire watershed.

NPS pollution can include pathogens and nutrients from on-site wastewater treatment systems (OWTS), pet waste, fertilizers, pesticides, road salt, sediment, and oils and toxic chemicals. Boats and marinas can also contribute to NPS pollution such as illicit waste discharges; improper maintenance and operation of pump out facilities; metal contamination from bottom paint; and accidental releases of chemicals, fuel, and oils.

Due to the diffuse and widespread nature of NPS pollution, it can be difficult to control. Strategies to mitigate NPS pollution can include source control such as upgrading OWTSs or expanding sewer districts; reducing fertilizer and pesticide use through awareness and regulations; increased oversight of erosion and sediment control at construction sites; and facilitating access and adequately maintaining boat pump out stations. In addition to source reduction, upgrades to stormwater infrastructure and use of bioswales and other “green” solutions can provide pre-treatment to stormwater. Many of these NPS pollutant reduction strategies require public support and compliance. Public outreach and awareness programs are integral to the success of many NPS reduction initiatives.

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Non-point sources of nitrogen and pathogens appear to be the most impactful pollutants in the Manhasset Bay watershed and worst in the most developed subwatersheds. The non-point sources of nitrogen include runoff and leachate from OWTSs, runoff from excess fertilizer applications, pet and wildlife waste, and atmospheric deposition. The non-point sources of pathogens include runoff from OWTS, pet and wildlife waste, and potentially from illicit waste discharges from boats.

5.3.3 Point Sources

Based on a review of the NYSDEC DEC InfoLocator[53] databases, several potential PS within the watershed area were identified including Remediation Sites, State Superfund Program Sites and Voluntary Cleanup Sites, a Solid Waste Facility Transfer Station, Wastewater Facilities, Industrial Stormwater Discharge Facilities, Petroleum Bulk Storage (PBS) Sites, Chemical Bulk Storage (CBS) Sites, and Underground Storage Tanks.

Ten (10) Remediation Sites were identified from the database to be within the watershed area, including active State Superfund Program Sites, Voluntary Cleanup Program sites, a Brownfields site, and closed sites. Two of these sites (each) are located in the Sheets Creek North and Mill/Baxter Ponds subwatersheds; three are located in the Whitney Pond subwatershed, and one each are found in the Leeds Pond, Kensington, and Mitchell Creek subwatersheds. The locations of these potential point sources are shown in **Figure 5-4a**. Additional details regarding these sites are provided below in **Table 5-2**. These sites have potential to introduce PS of pollution primarily from impacts to soil and groundwater from historical industrial operations. All of the sites are below and given in **Figure5-4a** are involved in cleanup programs with coordinated regulatory oversight.

TABLE 5-2
REMEDIATION SITES WITHIN THE WATERSHED AREA

ID	Name	Address	Status	Potential Contaminants
1	Manhasset – Hortonsphere Site	43 High Street, Manhasset	State Superfund Program – No Further Action	VOCs, PAHs, metals
1	Mt. Olive Former LILCO Site	1 High Street, Manhasset	Brownfield Cleanup Program – No Further Action	VOCs, SVOCs, metals

[53] New York State Department of Environmental Conservation (NYSDEC). (2025). *DECinfo Locator: Interactive Environmental Mapping Tool*. Retrieved from https://dec.ny.gov/maps/interactive-maps/decinfo-locator

ID	Name	Address	Status	Potential Contaminants
2	100-150 Community Drive Site	100-150 Community Drive, Great Neck	State Superfund Program – Potential Site	Freon 22
3	Manhasset N10 (LIRR)	Virginia Drive & Tracks, Manhasset	State Superfund Program – Active	Mercury
4	The Moorings at Kings Point	240, 266 and 280 East Shore Road, Great Neck	Brownfield Cleanup Program – No Further Action	VOCs, SVOCs, metals
5	Alert Fire Company	140 Steamboat Road	Voluntary Cleanup Program – Completed. Institutional/engineering controls in place.	VOCs, PCE, SVOCs
6	Port Washington N12 (LIRR)	Bayles & Davis Avenues, Port Washington	Voluntary Cleanup Program - Active	Metals, PCBs
7	Former Munsey Cleaners	1029 Port Washington Boulevard, Port Washington	State Superfund Program – Closed, continued site management required	VOCs, PCE
8	Plaza Cleaners	966 Port Washington Boulevard, Port Washington	State Superfund Program – Active	VOCs, PCE
9	Chez Valet Dry Cleaners	1 Manorhaven Boulevard, Port Washington	State Superfund Program – Completed	VOCs, PCE
10	Former Thypin Steel Plant	5 Sagamore Hill Drive, Manorhaven	Voluntary Cleanup Program - Completed	VOCs, SVOCs, metals

Notes:
PAHs = polyaromatic hydrocarbons
PCBs = polychlorinated biphenyls
PCE = Perchloroethylene
VOCs = volatile organic compounds
SVOCs = semi-volatile organic compounds
State Superfund Program "Potential" Site indicates a site may have contamination that makes it eligible for consideration for placement on the Registry of Inactive Hazardous Waste Disposal Sites

Several Petroleum Bulk Storage (PBS) sites were identified within the watershed area, consisting primarily of gasoline service stations, former gasoline service stations, and automobile service

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stations. Additionally, several Chemical Bulk Storage (CBS) facilities were identified including primarily utility/municipal facilities consisting of well sites, wastewater treatment plants, and pools. These types of facilities have potential to introduce point sources of pollution consisting primarily of tank contents (i.e., petroleum, water treatment chemicals, etc.) to the watershed area due to tank failures. These sites are spread out throughout almost all the subwatersheds. The locations of these sites are shown in **Figure 5-4b**. Additional details regarding these sites are provided below in **Table 5-3**.

TABLE 5-3
BULK STORAGE SITES WITHIN THE WATERSHED AREA

ID	Name	PBS/CBS	Site Type
1	Estron Oil	PBS	Retail Gasoline Sales
2	Citgo	PBS	Retail Gasoline Sales
3	Dejana Industries Incorporated	PBS	Trucking/Transportation/Fleet Operation
4	Port Gas & Service Corporation	PBS	Retail Gasoline Sales
5	St. Francis Hospital	PBS	Utility
6	Gulf Service Station	PBS	Retail Gasoline Sales
7	BP #12704	PBS	Retail Gasoline Sales
8	Regulated By NCHD 057928	PBS	Retail Gasoline Sales
9	NSK and Sons Gas	PBS	Unknown
10	Manhasset Bay Marina	PBS	Retail Gasoline Sales
11	Denardis Contr. Corporation	PBS	Unknown
12	Kiamisha Concord Service Station	PBS	Retail Gasoline Sales
13	Citgo	PBS	Retail Gasoline Sales
14	Mobil	PBS	Retail Gasoline Sales
15	Village of Kings Point Storage Yard	PBS	Municipality
16	Regulated by NCDH Reg#059813	PBS	Retail Gasoline Sales
17	Mobil 13846	PBS	Retail Gasoline Sales
18	Port Washington Water Dist.	CBS	Utility
19	Great Neck Water Pollution Control District	CBS	Utility
20	Whitney Pond Park	CBS	Municipality
21	Manorhaven Beach Park	CBS	Municipality
22	Great Neck Estates Park	CBS	Municipality
23	Port Washington Water District	CBS	Utility
24	Plant No. 10A Water Authority of Great Neck	CBS	Utility
25	Valley Road Well Station	CBS	Municipality
26	Munsey Park Well Station	CBS	Municipality
27	Port Washington Water District	CBS	Utility

ID	Name	PBS/CBS	Site Type
28	Village of Great Neck	CBS	Municipality
29	Cumberland Well Station	CBS	Municipality
30	Plant No. 7 Water Authority OF Great Neck N.	CBS	Utility
31	Water Authority of Great Neck North-Well 12,13,14	CBS	Utility
32	East Shore Road	CBS	Municipality
33	Searingtown Road Well Station	CBS	Municipality
34	Parkwood Sports Complex	CBS	Municipality
35	Port Washington Pollution Control	CBS	Municipality

Additional potential PS identified within the watershed area include one Solid Waste Facility/Transfer Station, two State Pollutant Discharge Elimination System (SPDES)/wastewater facilities, and nine Multi-Sector General Permit (MSGP)/Industrial Stormwater Discharge Facilities. These facilities are located in the subwatersheds of Sheets Creek North, Sheets Creek East, Mill/Baxter Ponds, Stannard's Brook, Leeds Pond, and Kensington. These sites are identified in **Figure 5-4c** and the status of the permits is shown in **Table 5-4.** Notably, several of the identified MSGP facilities were found to have a history of significant noncompliance with their MSGP permit. Two facilities identified are noted to currently be in a significant/category I non-compliance status according to USEPA's Enforcement and History Online (ECHO) database.

Table 5-4
Potential Point Source Permit status

ID	SPDES Number/ Authorization Number	Facility Name	Permit Type	Compliance Status	Date of Last Compliance activity
1	NY0026999	Great Neck Water Pollution Control District Plant	SPDES	N/A	N/A
2	NYR00E897	ALK INC	MSGP	No Violations Identified	10/19/2016
3	NYR00F163	Port Washington Yacht Club	MSGP	Violation Identified	8/19/2014
4	NYR00E978	Manhasset Bay Shipyard	MSGP	Violation Identified	8/19/2014
5	NY0026778	Port Washington Water Pollution Control Plant	SPDES	N/A	N/A
6	NYR00G495	Dejana Industries	MSGP	No Violations Identified	5/19/2016

ID	SPDES Number/ Authorization Number	Facility Name	Permit Type	Compliance Status	Date of Last Compliance activity
7	NYR00A483	Manhasset Bay Marina	MSGP	No Violations Identified	8/25/2014
8	NYR00E980	Toms Point Marina	MSGP	Violation Identified	8/19/2014
9	NYR00G544	Brewer Capri Marina	MSGP	No Violations Identified	N/A
10	NYR00G543	SHM CAPRI LLC	MSGP	No Violations Identified	N/A

N/A indicates no detailed facility report readily accessible from USEPA.

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6.0 ESTIMATED RUNOFF AND POLLUTANT LOADS ANALYSIS

This section summarizes the methods and results of a stormwater pollutant loading model that was developed for the Manhasset Bay watershed in order to estimate pollutant loads and provide a framework for identifying strategies to reduce pollution within the watershed. Pollutant loads characterize the amount or mass of a given pollutant delivered to a water body over a period of time. Estimation of pollutant loads from a watershed, therefore, provides insight into the relative contributions of pollutants from different land use practices within a watershed and is a key element of the watershed-based planning process.

The pollutant loads were modeled using the Center for Watershed Protection's 2013 Watershed Treatment Model (WTM) to quantify existing pollutant loads and determine which subwatersheds are the most impacted given the above-described conditions. The WTM is a spreadsheet-based screening-level model that can be used to estimate the loading of pollutants to a waterbody based on land use, land surface coverage types, and other activities within a watershed. Based on user-specified inputs describing characteristics of the watershed including existing land use categories, estimated impervious coverage based on land use types, and soil types within the subwatersheds the WTM estimates pollutant loads from various land uses and activities. Land use categories were based primarily upon the most recent Nassau County Parcel data (2018), adjusted/corrected as necessary based upon user knowledge. While fecal indicator bacteria impairments are the primary focus of the watershed-based plan, the WTM also provides loading for other pollutants including total phosphorus (TP), total nitrogen (TN), total suspended solids (TSS), in addition to an estimated runoff volume. The assessment was conducted using the most recent data available. As indicated in Section 4.2, land use has not changed significantly over the years. Therefore, the most recent parcel data used for this assessment is representative of current land use conditions. Note that this is for informational purposes in order to identify potential problem areas.

The watershed (±9,590 acres) is comprised of primarily residential uses ranging from low-density to high-density, in addition to commercial uses and open space/recreational uses. Stormwater generated from impervious surfaces and lawns within the watershed is directed into Manhasset Bay. These estimates are based on 48" annual precipitation, per the recent 10-year average. Model inputs included factors such as land use, housing density, depth to groundwater and soils.

Land use is considered a primary source of runoff pollutant loads in the WTM, which uses a loading calculation known as the Simple Method[54] to calculate nutrient, sediment, and bacteria loads from urban land uses, and area loading factors to calculate loads from non-urban land uses. Model inputs were specified for each land use category, including area, estimated impervious

[54] **Center for Watershed Protection. (n.d.).** *Simple Methods for Conducting Stormwater Monitoring and Assessment*. Retrieved from https://www.stormwatercenter.net/monitoring%20and%20assessment/simple%20meth/simple.htm

cover, runoff coefficient, and runoff pollutant concentrations or export coefficients. Literature-based event mean concentration values (the mean concentration of a pollutant in stormwater runoff for each land use type) were used for all developed land use categories, while selected regional export coefficients were used for non-urban land uses. The model inputs, including approximate acreage in each land use category, and approximate percentage of impervious and turf coverage within each land use category, are provided in **Appendix F**. Areas in roadways were estimated by subtracting area in parcels from the overall subwatershed boundary areas, and parcels categorized as vacant/unknown land uses were assigned average impervious/turf coverages and loading rates in order to be conservative. Additionally, the resultant existing loads for each subwatershed based on the user-specified inputs is provided in **Appendix F**.

A summary of the model results for each subwatershed and the total pollutant loads representing the overall watershed are provided below in **Table 6-1** and are depicted in **Figure 6-1a**.

Table 6-1
Existing Stormwater Pollutant Load Summary

Subwatershed	Pollutant[1]					
	TN (lb/year)	TP (lb/year)	TSS (lb/year)	Fecal Coliform (billion/ year)	Runoff Volume (acre-feet/year)	Watershed size (acres)
Whitney Pond	25,040[2]	4,640	684,993	930,852	3,766	2,391
Leeds Pond	22,040[3]	4,157	666,105	814,384	3,294	2,172
Mill/Baxter Ponds	10,563	2,036	307,283	384,552	1,556	1,055
Mitchell Creek	8,492	1,727	224,008	309,301	1,252	952
Kings Point Creek	7,043	1,464	205,869	245,646	1,035	827
Sheets Creek E	5,885	1,053	164,804	223,131	903	554
Kensington	4,374	767	141,439	163,606	665	389
Stannard's Brook	3,982	738	124,784	147,610	597	376
Sheets Creek N	4,126	723	135,492	157,382	637	368
North East Shore	2,124	450	60,383	76,444	309	248
Kings Point Pond	1,232	266	38,508	43,782	177	169
Plandome Heights	1,436	262	44,935	53,939	218	138
Total	**96,337**	**18,282**	**2,798,602**	**3,550,629**	**14,408**	**9,640**

[1]All pollutant loads rounded to nearest whole number.
[2]Highest concentration illustrated in red.
[3]Second-highest concentration illustrated in orange.

As illustrated in **Table 6-1**, Whitney Pond and Leeds Pond subwatersheds appear to generate the greatest contribution of all pollutants to the waterbody. It is noted that this comparison is based on load contribution alone, which is largely attributed to the size of the subwatershed and does not compare the pollutant load contribution per acre.

Zoning regulations would limit major changes in land use from occurring. In order to normalize the data, the pollutant contribution was calculated per acre for each watershed in order to identify areas of concentrated pollutant loads based on land use, rather than size of the subwatersheds. **Table 6-2** and **Figure 6-1b** illustrate the pollutant contribution per acre for each subwatershed.

Table 6-2
Existing Stormwater Pollutant Load Summary – Pollutant Load Per Acre

Subwatershed	Pollutant[1]			
	TN (lb/year per acre)	TP (lb/year per acre)	TSS (lb/year per acre)	Fecal Coliform (billion/year per acre)
Whitney Pond	10.47	1.94	286.43	389.24
Leeds Pond	10.15	1.91	306.62	374.87
Mill/Baxter Ponds	10.01	1.93	291.34	364.60
Mitchell Creek	8.92	1.81	235.38	325.01
Kings Point Creek	8.52	1.77	248.93	297.03
Sheets Creek E	10.63	1.90	297.56	402.88
Kensington	11.24[2]	1.97	363.60	420.58
Stannard's Brook	10.58	1.96	331.64	392.30
Sheets Creek N	11.22[3]	1.97	368.43	427.96
North East Shore	8.56	1.81	243.24	307.94
Kings Point Pond	7.29	1.57	227.86	259.06
Plandome Heights	10.38	1.89	324.72	389.79
Total	**117.97**	**22.45**	**3,525.77**	**4,351.27**

[1]All pollutant loads rounded to nearest hundredth.
[2]Highest concentration illustrated in red.
[3]Second-highest concentration illustrated in orange.

When "normalizing" the pollutant loads through comparison of existing stormwater pollutant load per acre of subwatershed, the Kensington and Sheets Creek N subwatersheds have the

greatest contribution of nitrogen, phosphorus, TSS and fecal coliform. Stannard's Brook has the second greatest contribution of phosphorus. The comparison of **Table 6-1** to **Table 6-2** illustrates that the largest subwatershed does not necessarily exhibit the greatest concentration of pollutants discharged to Manhasset Bay, and that the land use factors within the subwatersheds are important when estimating pollutant loads. As a result, both the total load estimate per subwatershed and the load per acre per subwatershed are utilized in determining appropriate subwatershed recommendations, which are further described in **Section 9.0**.

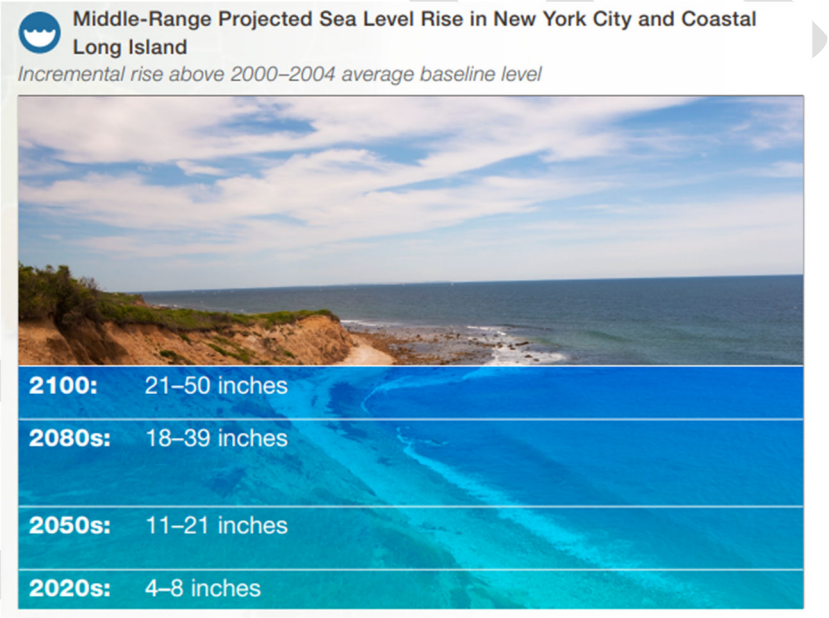
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7.0 CLIMATE VULNERABILITY

Like many coastal regions around the world, the watershed is likely to be impacted by climate change in several ways, including increased annual temperatures, sea-level rise and increased frequency and intensity of storms. In 2014, New York State Energy Research and Development Authority (NYSERDA) issued an updated report assessing climate change and climate risks in New York State.[55] The report provides information on trends and projections specifically for the seven regions of NYS for climate change variables including sea level rise, extreme storm events, precipitation patterns, and temperature. Key findings applicable to the watershed area include:

- Sea levels in the region could rise by 1 to 8 inches in the 2020s and 11-21 inches by the 2050s. Image 7-1 below is from NYSERDA's Sea Level Rise Viewer[56] depicts 2 feet of sea level rise.

Image 7-1: Projected Sea Level Rise in New York City and Coastal Long Island



- Temperatures are expected to rise across the state by 1.5 to 3°F in the 2020s and 3 to 5.5°F by the 2050s.

[55] New York State Energy Research and Development Authority (NYSERDA). (2011). *Responding to Climate Change in New York State (ClimAID): The Integrated Assessment for Effective Climate Change Adaptation*. Retrieved from https://www.nyserda.ny.gov/About/Publications/Energy-Analysis-Reports-and-Studies/Environmental-Research-and-Development-Technical-Reports/Response-to-Climate-Change-in-New-York

[56] New York State Energy Research and Development Authority (NYSERDA). (n.d.). *Sea Level Rise Viewer*. Retrieved from https://services.nyserda.ny.gov/SLR_Viewer/default

- Annual average precipitation is projected to increase by up to 5% in the 2020s and up to 10% by the 2050s. Rainfall distribution is expected to occur unevenly, with higher precipitation during winter months as rain and increased frequency of heavy downpours.

The estimated sea level rise for the Manhasset Bay Watershed area is mapped in **Figure 7-1**, which indicates areas of each subwatershed expected to be impacted by 1-foot, 3-foot, and 6-foot rises in sea level. As seen on this figure, all of the subwatersheds have areas along the Manhasset Bay coastline that will be impacted by sea level rise. Many of the areas with projected impact include existing commercial or residential development. Based on the projected sea level rise figure, the greatest impact to built resources appear to be in the Sheets Creek N, Sheets Creek E, Stannard's Brook, and Kensington subwatersheds, in which large areas of existing development would be impacted by 1-foot or 3 feet in sea level rise. At the 6-foot sea level rise level, a large portion of the coastline of the Kings Point Creek subwatershed would be impacted as well.

The Coastal Risk Areas Map, shown in **Figure 7-2**, identifies NYSDOS-designated Coastal Risk Areas with respect to existing development within the Manhasset Bay watershed and subwatershed areas. These areas are designated based on factors such as floodplain locations, historical storm impacts, and projections of sea-level rise in order to evaluate potential hazards to communities, infrastructure, and natural resources. As shown in **Figure 7-2**, all of the subwatersheds contain coastal risk areas ranging from moderate to extreme. The extreme coastal risk areas are primarily along the coastline of Manhasset Bay, along Sheets Creek (Sheets Creek North subwatershed), Mill Pond (Mill/Baxer Ponds subwatershed), Leeds Pond (Leeds Pond subwatershed), Kings Point Creek (Kings Point Creek subwatershed), and Mitchell Creek (Mitchell Creek subwatershed). There is a need to identify these areas at the subwatershed level to guide the prioritization of resources and efforts to enhance resilience in the most vulnerable coastal zones within the watershed, including key water and habitat resources such as tidal wetlands, freshwater ponds, and creek corridors that warrant special protection and restoration.

A summary of potential climate change risks that should be factored into the watershed planning are provided below.

1. Sea-Level Rise:
    - Direct Impact: As sea levels rise, low-lying areas around Manhasset Bay as shown in **Figure 7-1** will (and are) experience more frequent and severe flooding, as well as expand the areas subject to coastal flooding risk. This can lead to inundation of habitats, increased coastal erosion such as in the case of Baxter Beach, and loss of property and infrastructure along the waterfront.
    - Saltwater Intrusion: Higher sea levels may also lead to the intrusion of saltwater into freshwater systems, which creates challenges for water supply and can impair

water quality and negatively affect the flora and fauna that are adapted to a freshwater environment. As shown in **Figure 7-2**, several freshwater systems in the watershed are situated within identified coastal risk areas. The degradation of these areas threatens species dependent upon these habitats.

- Infrastructure and Property: The rise in sea level can impact sewage treatment facilities, leading to higher risks of contaminating the watershed and the Bay with untreated or partially treated sewage during flooding events. Property damage occurring to buildings, residential homes, and other infrastructure will lead to increased costs for rebuilding or possible relocation to other inland areas. Flooding of cesspools and chemical and other facilities would potentially release pathogens, nutrients, and other pollutants into the Bay.
- Wetlands: Coastal wetlands, which are vital for flood mitigation and serve as biodiversity hotspots, face potential losses due to natural barriers or human development preventing their inland migration. A wetland loss viewer, funded by the Long Island Sound Study (LISS), was utilized to identify specific areas at risk[57]. In Sands Point although the current 23 acres of marsh are predicted to remain viable under a wide range of sea level rise scenarios, marsh areas could be reduced to 21 acres by 2100 under more extreme conditions. Marsh migration onto newly inundated dry lands could offset these losses, allowing up to 5 acres of new marsh by 2055 and 27 acres by 2100. In Mitchell's Creek, the current 16 acres of marsh are also predicted to remain viable, though more extreme sea level rise scenarios could reduce the marsh to 12 acres by 2100. However, 6 acres of new marsh could form by 2055 and 20 acres by 2100, if marsh migration is allowed. In East Creek, the current 43 acres of marsh may decline to 20 acres by 2100 in more extreme scenarios, but 3 acres of new marsh could form by 2055 and 15 acres by 2100, if migration is allowed.

2. Increased Frequency and Intensity of Storms:
    - Stormwater Runoff: More intense and more frequent storms will lead to increased stormwater runoff, carrying pollutants from urban and suburban areas into the watershed. This will increase bacterial, nitrogen, and other pollutant loads to the Bay, impacting aquatic life, limiting recreational activities and restoration success.
    - Erosion and Sedimentation: Stronger/higher intensity storms can cause increased erosion rates and carry more sediment into the Bay, which can smother aquatic habitats and wildlife and lead to turbidity issues that disrupt the ecosystem. Erosion can threaten homes and businesses. Sedimentation can limit boat access, thus limiting both recreational and commercial activities.
    - Flooding: Sea level rise, storm surge and an increased likelihood of floods from intense rainfall can have immediate and severe consequences on human

[57] NEIWPCC. (n.d.). *Long Island Coastal Resilience Mapping Tool*. Retrieved from https://warrenpinnacle.com/LIMaps

communities as well as aquatic ecosystems in the watershed. (See also impacts to infrastructure above).

- Infrastructure Strain: The local infrastructure, including drainage and sewer systems and sewage treatment plants, may be overwhelmed by the volume of water, potentially leading to system failures and untreated sewage discharges.

3. Higher temperatures
    - Higher water and air temperatures could cause changes in species composition and provide the opportunity for invasive species to move in.
    - Higher water temperatures hold less dissolved gases, further exasperating hypoxia issues in Manhasset Bay and causing species die-offs.
4. Coastal Risk Areas
    - The Coastal Risk Area map of the Manhasset Bay area (**Figure 7-2**) highlights the NYSDOS-designated Coastal Risk Areas and their alignment with land use patterns, emphasizing their potential impacts on water quality. The analysis reveals that areas along the edge of Manhasset Bay, primarily zoned for residential use, fall within extreme risk zones for coastal erosion. Further inland, the risk decreases progressively but remains significant, encompassing residential neighborhoods and essential infrastructure. The Port Washington Water Pollution Control Plant and the Great Neck Water Pollution Control Plant are both situated in high to extreme coastal risk zones. These facilities are vital for wastewater management for the surrounding communities, serving significant portions of the population. In extreme weather events or during periods of storm surge, these plants face a heightened risk of overflows, potentially releasing untreated wastewater directly into Manhasset Bay. Such incidents not only degrade water quality but also threaten public health and the bay's ecosystem. Coastal erosion risks threaten residential areas and infrastructure, including Kings Point Park and other green spaces, which serve as both recreation areas and natural buffers. Erosion in these zones can increase sedimentation and nutrient runoff, harming Manhasset Bay's water quality. Residential developments in high-risk areas contribute to stormwater runoff carrying pollutants into the bay, while wastewater plants in hazard zones risk overflow during extreme events, releasing untreated water.
5. Secondary Impacts:
    - Habitats and Species: Altered water temperatures, changes in salinity, and increased coastal acidification can shift the species composition within the Bay and the watershed, affecting fishing, local biodiversity, and restoration efforts.
    - Economic Impact: Flooding and erosion can damage property and essential infrastructure including transportation, energy, and sewage treatment facilities. Additionally, economic activities that depend on the watershed may become increasingly vulnerable and adversely impacted, including recreational boating, commercial fishing, and waterfront businesses.

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- Community Preparedness: Frequent and intense events can stress disaster preparedness and response efforts, requiring updates to emergency management strategies and infrastructure resilience planning.

The 2014 NYSERDA Study also includes adaptation strategies and policies that can help reduce climate change risks and manage long term impacts. These strategies and policies are discussed in **Section 9**.

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8.0 REGULATORY REVIEW AND ASSESSMENT

This section identifies applicable federal, state, and local laws and programs related to water quality within the Manhasset Bay watershed area and assesses the ability and effectiveness of these programs to implement best management practices (BMPs) that protect surface and groundwater quality and habitat. While federal and state frameworks provide overarching guidance, the review of local regulations and BMPs is focused at the municipal level rather than by subwatershed. This approach reflects the practical reality that multiple municipalities often span a single subwatershed, and it is through municipal codes, ordinances, and planning tools that local water quality protections are enacted. Therefore, evaluating local efforts through the lens of municipal jurisdiction offers a more accurate and actionable understanding of how BMPs are implemented across the watershed.

8.1 Description of Federal and State Regulations

The federal and New York State governments play essential and interconnected roles in ensuring water quality through legislation, regulation, and enforcement. The below narrative summarizes their contributions and collaboration.

8.1.1 Federal Regulations and Entities

Water quality management in the U.S. is guided by a combination of federal agencies and regulations designed to safeguard public health and protect natural resources. At the federal level, the U.S. Environmental Protection Agency (EPA) is the principal agency overseeing water quality, primarily through the Clean Water Act (CWA) and the Safe Drinking Water Act (SDWA). The CWA works to restore and maintain the integrity of the nation's waters by regulating the discharge of pollutants into surface waters and setting water quality standards for various contaminants. Under this act, municipalities and other entities are required to secure National Pollutant Discharge Elimination System (NPDES) permits to manage point and nonpoint source pollution. New York State has been authorized to permit several components of the NPDES program (described in section 8.1.2 below). The SDWA ensures that public drinking water is safe by setting standards for contaminants in drinking water systems, a mandate that municipalities must adhere to protect public health.

Additionally, the U.S. Army Corps of Engineers (USACE) plays a crucial role in water resource management, particularly with its responsibilities under Section 404 of the Clean Water Act. This section regulates the discharge of dredged or fill material into navigable waters, including wetlands, which are vital for water quality and ecosystem health. Municipalities must obtain permits from USACE for any activities that could impact these water bodies. The U.S. Fish and Wildlife Service (FWS) is also involved in water quality protection through the Endangered Species Act (ESA), which designates critical habitats for endangered species. Municipalities are required

to consult with the USFWS when their projects may affect these habitats to ensure compliance with federal protections for vulnerable species.

The National Oceanic and Atmospheric Administration (NOAA) governs coastal water quality through the Coastal Zone Management Act (CZMA), which requires coastal municipalities to implement programs that protect water resources in these sensitive areas. In addition, the United States Geological Survey (USGS) provides essential data on water resources, including stream flow, groundwater levels, and water quality information, which municipalities rely on for informed water management decisions. The Natural Resources Conservation Service (NRCS), part of the U.S. Department of Agriculture, offers technical assistance to municipalities and landowners to conserve water resources, primarily in rural areas, and helps manage agricultural runoff through programs like the Wetlands Reserve Program.

8.1.2 State Regulations and Entities

In New York State, several state agencies and regulations oversee water quality, with the New York State Department of Environmental Conservation (NYSDEC) being the central authority. New York State has been authorized to permit several components of the NPDES program. Through its State Pollutant Discharge Elimination System (SPDES) program, NYSDEC enforces regulations on wastewater discharges and stormwater management. Municipalities must comply with SPDES permitting requirements to ensure that water pollution levels do not exceed state water quality standards. The NYSDEC also sets water quality standards for surface waters, which include limits on various pollutants such as nutrients and heavy metals. These standards must be met by municipalities to protect the health of local waterways.

The New York State Department of Health (NYSDOH) oversees the safety of public drinking water systems in the state through the Sanitary Code (Part 5), which mandates monitoring for contaminants and the maintenance of treatment processes. Municipalities with public water systems must adhere to these regulations to ensure their residents have access to safe drinking water. In addition, the New York State Office of General Services (OGS) plays a key role in land use planning, especially in relation to stormwater management. Municipalities are required to implement stormwater management practices under the guidance of the OGS to control runoff and mitigate water quality impacts from urban development.

Another critical entity, the New York State Soil and Water Conservation Committee (NYSSWCC), supports the implementation of conservation practices that reduce soil erosion and manage water runoff, which is vital for maintaining water quality. Municipalities work with the NYSSWCC to adopt these practices, particularly in rural areas where agricultural runoff can significantly impact water quality. Similarly, the New York State Department of Agriculture and Markets (NYSDAM) helps municipalities manage water quality concerns related to farming, including addressing nutrient runoff and promoting erosion control practices.

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Finally, the New York State Canal Corporation is responsible for managing the New York State Canal System, which includes important water resources for municipalities. The Canal Corporation's Canalway Plan outlines strategies for preserving water quality in the canal system, and municipalities located along these waterways must work with the corporation to ensure that water quality is protected in these shared resources.

8.1.3 Summary of Federal and State regulations

The below provides a summary of key federal and state regulations applicable to water quality.

Federal Regulations:

- Clean Water Act (CWA): Regulates pollutant discharge into surface waters and sets water quality standards.
- Safe Drinking Water Act (SDWA): Ensures safe drinking water standards for public systems.
- Section 404 of the CWA: Requires permits for discharges of dredged or fill material into navigable waters and wetlands.
- Endangered Species Act (ESA): Protects endangered species and their habitats, impacting water quality management.
- Coastal Zone Management Act (CZMA): Requires coastal municipalities to manage and protect coastal water resources.
- National Pollutant Discharge Elimination System (NPDES): Requires permits for municipalities and other entities to manage stormwater and wastewater discharges. Several components of this program have been delegated to New York State under their State Pollutant Discharge Elimination System (SPDES).
- USGS: Provides essential hydrological data to support water resource management.

State Regulations:

- State Pollutant Discharge Elimination System (SPDES): Regulates wastewater and stormwater discharges, ensuring compliance with state water quality standards.
- Sanitary Code (Part 5): Oversees safe drinking water through monitoring and treatment standards for public water systems.
- Stormwater Management: Municipalities must implement stormwater controls to protect water quality during development.
- Soil and Water Conservation Programs: Supports municipalities in reducing runoff and managing erosion.
- Canalway Plan: Guides municipalities in managing water quality within the New York State Canal System.

These are regulations that every municipality within the Manhasset Bay watershed must adhere to. Discussed in greater detail in **Section 8.2** are the individual regulations set in place at the local level and the agencies involved.

8.2 Description of County and Local Agencies and Assessment of Local Laws

In New York State, land use policy and regulations are primarily the responsibility of local government. Municipal decisions regarding how the physical and regulatory landscapes are developed will ultimately affect the quality and quantity of surface water features. There are many regulatory actions that can be enacted at the municipal level that may have a positive impact on the local water quality including comprehensive plans, zoning ordinances, subdivision and site plan review and stormwater and erosion control regulations, each of which can be used separately or in combination to protect local water resources.

Local laws and regulations can have a profound impact on the water quality of Manhasset Bay and the watershed as a whole. Local laws pertaining to elements of water quality are inconsistent between the municipalities, and this contributes to water quality challenges in the region. Implementation of better land-use regulations that are uniform throughout the watershed that some municipalities may have not considered in the past will ultimately strengthen cohesion across the watershed and assist in ensuring water quality protection.

8.2.1 Assessment of Land Use Plans and Regulations

New York is a "home rule" state, meaning that primary authority for guiding community planning and land development is vested in cities, towns, and villages. While this provides local municipalities with the power to define how their community grows, it can also complicate watershed management efforts, particularly related to nonpoint sources of pollution. Variations in local laws at the municipal level can lead to inconsistent water resources-related protections within a watershed.

There are several relevant local planning and zoning tools with significant potential to affect lands and waters. With the assistance of county and local officials (including local building supervisors, village clerks, and department of public works) and information obtained from publicly available sources, NPV conducted an assessment of local laws for the municipalities situated within the Manhasset Bay watershed to determine whether codes or ordinances are in place that may have the potential to impact water quality. The assessment followed the Municipal Nonpoint Assessment (MNA) methodology developed by the EPA Division of Coastal Resources[58] and involved the identification and evaluation of each municipality's applicable programs and practices with respect to water quality impacts. The goal of this assessment is to identify areas where watershed municipalities may improve, develop or implement new land use ordinances that can be utilized to improve and protect water quality throughout the Manhasset Bay Watershed. Each municipality was assessed by the extent to which each of 29 land use regulations

[58] U.S. Environmental Protection Agency (EPA). (1993). *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* (EPA 840-B-92-002). Retrieved from https://www.epa.gov/nps/guidance-specifying-management-measures-sources-nonpoint-pollution-coastal-waters

pertaining to water quality protection were in place. The land use regulations are outlined in the below **Table 8-1** and were selected by tailoring the MNA methodology to the most applicable regulations to the specific watershed area that could have the highest potential to impact water quality. Additionally, most recent MS4 annual reports and Stormwater Management Programs (SWMPs) for each municipality were obtained from local officials or municipal websites (where applicable). Review of these programs and annual reports provided data pertaining to the municipalities' effectiveness in managing their respective storm sewer systems.

Table 8-1a-f summarizes the results of the municipal code search for the county, town, and villages within the Manhasset Bay watershed, and identifies which municipalities have enacted specific codes or ordinances that may have the potential to impact water quality within the watershed, where applicable. If a code was not applicable to a municipality (e.g., a municipality has no waterways or marinas), that municipality was assigned a "N/A" entry for that item.

Table 8-1a below indicates which municipalities within the watershed have implemented Comprehensive Plans, zoning regulations, a site plan review process, planned unit development (PUD) regulations, and subdivision laws. Since zoning regulations are not administered at the county level, Nassau County was assigned an "N/A" for that item. The letter "T" is noted for the municipality classification of town and the letter "V" is noted for the municipality classification of village.

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Table 8-1a

Regulatory Planning and Legislative Tools					
Municipality	**Comprehensive Plan**	**Zoning Regulations**	**Site Plan Review**	**Planned Unit Development (PUD)**	**Subdivision Law**
Nassau County	✓ (2010)	N/A	✓		✓
North Hempstead (T)		✓	✓	✓	✓
Baxter Estates (V)		✓	✓		✓
Flower Hill (V)		✓	✓		✓
Great Neck (V)	✓ (2006)	✓	✓		✓
Kensington (V)		✓			
Kings Point (V)		✓			✓
Lake Success (V)		✓	✓		✓
Manorhaven (V)		✓	✓		✓
Munsey Park (V)		✓			
North Hills (V)		✓			✓
Plandome (V)		✓			✓
Plandome Heights (V)		✓			✓
Plandome Manor (V)		✓			✓
Port Washington North (V)		✓	✓		✓
Roslyn Estates (V)		✓	✓		✓
Sands Point (V)		✓	✓		✓
Thomaston (V)		✓	✓		✓

Table 8-1b below indicates which municipalities within the watershed have implemented regulations pertaining to cluster development subdivision, overlay zoning districts, wetlands, MS4 communities, and erosion/sediment control. Since zoning regulations are not administered at the county level, Nassau County was assigned an "N/A" for the overlay district item. The Villages of Lake Success and North Hills are exempted by the NYSDEC from the MS4 requirements; therefore, they were assigned an "N/A" for the MS4 Community item. Additionally of note, both freshwater and saltwater wetlands were considered in the classification of municipalities. All of the

municipalities, including inland ones, have designated wetlands, including upland areas with freshwater wetlands. The letter "T" is noted for the municipality classification of town and the letter "V" is noted for the municipality classification of village.

Table 8-1b

Regulatory Planning and Legislative Tools					
Municipality	**Cluster Development Subdivision**	**Overlay Zoning Districts**	**Wetlands[1]**	**MS4 Community**	**Erosion/Sediment Control Law**
Nassau County		N/A		✓	
North Hempstead (T)	✓	✓		✓	✓
Baxter Estates (V)				✓	✓
Flower Hill (V)				✓	✓
Great Neck (V)		✓		✓	✓
Kensington (V)				✓	✓
Kings Point (V)			✓	✓	✓
Lake Success[2] (V)		✓		N/A	✓
Manorhaven (V)	✓	✓		✓	✓
Munsey Park (V)				✓	✓
North Hills[2] (V)	✓	✓		N/A	
Plandome (V)				✓	✓
Plandome Heights (V)				✓	✓
Plandome Manor (V)				✓	✓
Port Washington North (V)	✓			✓	✓
Roslyn Estates (V)				✓	✓
Sands Point (V)		✓		✓	✓
Thomaston (V)				✓	✓

1 Both freshwater and saltwater wetlands were considered in the classification of municipalities.
2 Lake Success and North Hills do not participate in the MBPC and are exempted by the NYSDEC from the MS4 requirements.

Table 8-1c below indicates which municipalities within the watershed have implemented regulations pertaining to stormwater pollution prevention plan (SWPPP) requirements for construction projects, transfer of development rights, watershed management, docks and mooring, and boats and waterways. Inland municipalities without access to the waterfront were

assigned "N/A" entries for regulations pertaining to boats and waterways. Additionally, "N/A" entries were assigned for docks and mooring for municipalities that are inland without access to the waterways, or municipalities that do not have any such features. The letter "T" is noted for the municipality classification of town and the letter "V" is noted for the municipality classification of village.

Table 8-1c

Regulatory Planning and Legislative Tools					
Municipality	**SWPPP Requirement for Construction Projects**	**Transfer of Development Rights**	**Watershed Management Code**	**Docks & Mooring Law**	**Boats and Waterways**
Nassau County					✓
North Hempstead (T)	✓			✓	✓
Baxter Estates (V)	✓			N/A	
Flower Hill (V)	✓			N/A	✓
Great Neck (V)	✓				✓
Kensington (V)	✓			N/A	✓
Kings Point (V)	✓			✓	✓
Lake Success (V)	✓			N/A	N/A
Manorhaven (V)	✓				✓
Munsey Park (V)	✓			N/A	N/A
North Hills (V)				N/A	N/A
Plandome (V)	✓				
Plandome Heights (V)	✓				
Plandome Manor (V)	✓				✓
Port Washington North (V)	✓				✓
Roslyn Estates (V)	✓			N/A	N/A
Sands Point (V)	✓			✓	✓
Thomaston (V)	✓			N/A	N/A

Table 8-1d below indicates which municipalities within the watershed have implemented regulations pertaining to flood damage prevention/floodplain management, sanitary waste or I/A wastewater treatment systems, sewers, tree and shrub clearing/protection, and steep slopes. The

letter “T” is noted for the municipality classification of town and the letter “V” is noted for the municipality classification of village.

Table 8-1d

Regulatory Planning and Legislative Tools					
Municipality	**Flood Damage Prevention/ Floodplain Management**	**Sanitary Waste or I/A OWTS**	**Sewers**	**Tree & Shrub Clearing/ Protection**	**Steep Slopes**
Nassau County		✓	✓	✓	
North Hempstead (T)	✓		✓	✓	
Baxter Estates (V)	✓		✓	✓	
Flower Hill (V)	✓			✓	
Great Neck (V)	✓	✓	✓	✓	
Kensington (V)	✓		✓	✓	
Kings Point (V)	✓			✓	
Lake Success (V)	✓			✓	
Manorhaven (V)	✓	✓	✓	✓	
Munsey Park (V)	✓	✓		✓	
North Hills (V)				✓	
Plandome (V)	✓	✓		✓	
Plandome Heights (V)	✓			✓	
Plandome Manor (V)	✓			✓	
Port Washington North (V)	✓			✓	✓
Roslyn Estates (V)	✓		✓	✓	
Sands Point (V)	✓		✓	✓	
Thomaston (V)	✓		✓	✓	

Table 8-1e below indicates which municipalities within the watershed have implemented regulations pertaining to illicit discharges, climate smart community, sustainability/green

infrastructure, EnergyStar, and fertilizers/pesticides. The letter "T" is noted for the municipality classification of town and the letter "V" is noted for the municipality classification of village.

Table 8-1e

Regulatory Planning and Legislative Tools						
Municipality	**Illicit Discharges**	**Climate Smart Community**	**Sustainability /Green Infrastructure**	**Energy Star**	**Fertilizers**	**Pesticides**
Nassau County			✓		✓	✓
North Hempstead (T)	✓	✓				✓
Baxter Estates (V)	✓					
Flower Hill (V)	✓	✓				✓
Great Neck (V)	✓			✓		✓
Kensington (V)	✓					✓
Kings Point (V)	✓					✓
Lake Success (V)	✓					✓
Manorhaven (V)	✓					✓
Munsey Park (V)	✓					
North Hills (V)	✓					
Plandome (V)	✓					
Plandome Heights (V)	✓					
Plandome Manor (V)	✓					✓
Port Washington North (V)	✓					✓
Roslyn Estates (V)	✓					✓
Sands Point (V)	✓					✓
Thomaston (V)	✓					✓

Table 8-1f below indicates which municipalities within the watershed have implemented regulations pertaining to hazardous materials, industrial uses, golf courses, and marinas. Municipalities that do not include any industrial uses, golf courses, or marinas were assigned "N/A" entries for those regulations, where applicable. The letter "T" is noted for the municipality classification of town and the letter "V" is noted for the municipality classification of village.

Table 8-1f

Regulatory Planning and Legislative Tools				
Municipality	**Hazardous Materials**	**Industrial Uses**	**Golf Course**	**Marina**
Nassau County				
North Hempstead (T)	✓	✓	✓	✓
Baxter Estates (V)	✓	N/A	N/A	N/A
Flower Hill (V)	✓	✓	✓	N/A
Great Neck (V)	✓	✓	N/A	
Kensington (V)	✓	N/A	N/A	N/A
Kings Point (V)	✓	N/A	N/A	
Lake Success (V)	✓	✓	✓	N/A
Manorhaven (V)	✓	✓	N/A	✓
Munsey Park (V)	✓	N/A	N/A	N/A
North Hills (V)	✓	N/A		N/A
Plandome (V)	✓	N/A	N/A	N/A
Plandome Heights (V)	✓	N/A	N/A	N/A
Plandome Manor (V)	✓	✓		N/A
Port Washington North (V)	✓	N/A	N/A	✓
Roslyn Estates (V)	✓	N/A	N/A	N/A
Sands Point (V)	✓	N/A		
Thomaston (V)	✓	N/A	N/A	N/A

Note: "N/A" indicates that the planning or legislative tool is not applicable to the municipality because the relevant facilities are not present.

Table 8-2 provides a summary of each code that was assessed and the percentage of municipalities that implement and do not implement the code. If a code was not applicable to a municipality (e.g., a municipality has no golf courses or marinas), that municipality was excluded from the percentage of applicable municipalities implementing the code. The colors in **Table 8-2** corelate to the percentage of municipalities that implement the associated code as follows:

- Codes that are implemented by 75% or more of applicable municipalities are displayed as green.
- Codes that are implemented by 50% to 74% of applicable municipalities are displayed as blue.
- Codes that are implemented by 25% to 49% of applicable municipalities are displayed as yellow.
- Codes that are implemented by 0 to 24% of applicable municipalities are displayed as red.

Table 8-2

Overview of Watershed Municipalities		
Code	**Percentage of Municipalities with Code**	**Percentage of Municipalities without Code**
Comprehensive Plan	17%	83%
Zoning Regulations	100%	0%
Site Plan Review	61%	39%
Planned Unit Development (PUD)	6%	94%
Subdivision Law	89%	11%
Cluster Development Subdivision	22%	78%
Overlay Zoning Districts	35%	65%
Wetlands	6%	94%
MS4 Community	100%	0%
Erosion/Sediment Control Law	89%	11%
SWPPP Requirement	89%	11%
Transfer of Development Rights	0%	100%
Watershed Management Code	0%	100%
Docks & Mooring Law	30%	70%
Boats and Waterways	77%	23%
Flood Damage Prevention/Floodplain Management	89%	11%
Sanitary Waste or I/A OWTS	28%	72%
Sewers	50%	50%
Tree/Shrub Clearing/Protection	100%	0%
Steep Slopes	6%	94%
Illicit Discharges	94%	6%
Climate Smart Community	11%	89%
Sustainability/Green Infrastructure	6%	94%
EnergyStar	6%	94%
Fertilizers/ Pesticides	72%	28%

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Overview of Watershed Municipalities		
Code	**Percentage of Municipalities with Code**	**Percentage of Municipalities without Code**
Hazardous Materials	94%	6%
Industrial Uses	86%	14%
Golf Course	43%	57%
Marina	43%	57%

Figure 8-1 provides a concise summary of the number of water quality regulations adopted by each village in the Manhasset Bay Watershed. These data are presented in greater detail in **Table 8-1a-f**, which outlines the specific topics of regulations enacted. To create a visual representation, the detailed information from the table was simplified to show only the total number of codes for each village.

As illustrated in **Figure 8-1**, the Villages of Great Neck, Manorhaven, Sands Point, Flower Hill, and Port Washington North have implemented the highest number of regulations aimed at protecting water quality within the Manhasset Bay Watershed. In contrast, the Villages of North Hills, Munsey Park, Plandome Heights, and Plandome have enacted the fewest regulations. Areas without shading in the figure represent unincorporated regions.

This visualization highlights disparities in regulatory approaches within the watershed and underscores the need for a targeted analysis of the types of codes enacted. The villages with the highest number of regulations (Great Neck, Manorhaven, Sands Point, Flower Hill, and Port Washington North) have adopted measures such as site plan review requirements, sewer management codes, and restrictions on fertilizers and pesticides**.** These types of regulations are particularly critical because they directly address key contributors to water quality degradation, such as nutrient runoff, stormwater management, and untreated wastewater discharge.

Conversely, the villages with fewer regulations lack many of these impactful codes, leaving them less equipped to mitigate negative effects on the watershed. For example, Site plan review requirements ensure that new developments consider stormwater management and minimize impervious surfaces, reducing runoff into the bay. Sewer management codes address aging infrastructure and reduce the likelihood of leaks or overflows, which can contribute to nutrient loading and pollution. Fertilizer and pesticide regulations limit the amount of harmful chemicals entering the water, protecting aquatic ecosystems and reducing eutrophication risks.

The absence or limited adoption of such regulations in other villages suggests potential gaps in their approach to watershed protection. By analyzing these gaps, stakeholders can identify priority areas for improvement and collaboration.

Figure 8-1 serves not only as a visual summary but also as a diagnostic tool for understanding regulatory coverage within the watershed. It underscores the importance of enacting a diverse range of water quality codes to comprehensively address the various sources of pollution affecting Manhasset Bay. Villages with fewer regulations should prioritize the implementation of impactful measures, especially those demonstrated to have significant positive effects on watershed health.

8.2.2 Code Summary and Impacts

Below is a summary of the code, its potential to impact water quality, and a summary of the findings of the municipal code search. It is important to note that each of these codes does not necessarily protect water quality.

Comprehensive Plan/Master Plan: A comprehensive plan is a document intended to guide the future actions of a community. The plan presents a vision for the future, with long range goals and objectives for the community, and establishes the official land use policy. The plan assesses the current land use, transportation, housing, infrastructure, environmental protection, economic development, public facilities, and community goals, providing a strategic framework for future growth. A primary goal of comprehensive planning is to identify issues, opportunities, and goals of the municipality based on community values, emerging technologies, and public need.

A comprehensive plan can impact water quality through thoughtful and coordinated land use planning, resource management, and infrastructure decisions. For example, a comprehensive plan can guide where it is appropriate for certain types of development to occur and steer intense growth away from sensitive areas, it can promote green infrastructure and incentivize smart growth, identify needs for stormwater infrastructure, and encourage low-impact development techniques. Additionally, comprehensive plans often identify the need for upgrades to wastewater treatment facilities and offer recommended resilience strategies for adapting to changing climates and storm events. The comprehensive planning process involves gathering community input regarding the current landscape, issues, and opportunities regarding land use which may directly impact the watershed area. Community input helps inform the municipality's values (e.g., the waterfront, groundwater quality, etc.), which encourages municipalities to adopt zoning for protection of these resources.

Based on the results of the regulatory review, approximately 17% of the municipalities within the watershed have an adopted local comprehensive plan (**Table 8-2**). However, the comprehensive plans for these municipalities—Nassau County (2010) and Great Neck (2006 are over 10 years old. It is recommended that comprehensive plans be updated every 5 to 10 years to maintain relevancy. Regularly updating a municipality's comprehensive master plan ensures that local policies are adaptive, reflect the latest environmental practices, align with current regulatory frameworks, and reflect the goals and values of the community. This is a proactive approach that

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supports long-term watershed preservation and water quality improvement. Most of the municipalities in the Manhasset Bay watershed (83%) do not have a comprehensive plan in place (**Tables 8-1a** and **8-2**). If communities do not have comprehensive plans, it is recommended they develop and adopt one to ensure consistent stormwater management, pollution control, and other water quality protections. A comprehensive plan would provide clear regulations to address pollution sources and improve resilience to environmental challenges.

Zoning Regulations: These regulations are important mechanisms through which municipalities implement their comprehensive plans (if applicable) and ensure that development occurs in a way that is compatible with the community's vision. Zoning regulations do not by default protect water quality. Zoning regulates the use, density, siting and form of development throughout a community and can control how development impacts water quality. For example, zoning can be utilized to:

- Regulate types of uses allowed within proximity of water/sensitive areas and the intensity of these uses.
- Establish best management practices for intensive land uses (industrial or commercial uses, i.e. gas stations, transfer stations, larger commercial parking areas, warehouse and distribution facilities)
- Guide density of uses in crucial environmental areas (such as erosion control areas, aquifer protection areas, etc.)
- Incentivize green infrastructure, buffers, etc.
- Require stormwater management and water quality treatment of stormwater.
- Require advanced denitrification wastewater management systems.
- Incentivize actions that benefit water quality and further municipal goals, such as grant funding to offer tax credits for land preservation or use of I/A OWTS.

Based on the results of the regulatory review, all of the applicable municipalities (Nassau County excluded) have adopted zoning as a foundation for regulating land use (**Tables 8-1a** and **8-2**).

Site Plan Review: Site Plan Review is an essential component of zoning regulation and can be used to guide building placement on a site, parking and vehicular access, stormwater design, landscaping and the protection of natural features on the site. Lack of site plan review limits the ability of the reviewing body to modify development on a site-specific basis and in ways that will protect water quality.

Site Plan Review is an essential zoning tool for a community to control the way its land is developed. Lack of an adequate site plan review process limits the Planning Board (or other designated review body) the authority and ability to modify development on a site-specific basis.

Municipalities can encourage water quality improvement through the site plan review process by shaping site plan requirements that guide development which is preservative of the environment and improves water quality. For example, this can pertain to stormwater catchment, ensuring

drainage and stormwater management systems are closely evaluated to ensure they handle runoff effectively. Additionally, planners often encourage the use of green infrastructure during the site plan review process (i.e., features such as vegetated swales, green roofs, etc.), site layout optimization, sustainable landscaping, and a reduction of impervious surfaces. The site plan review process can also mandate that construction be phased in ways that limit the amount of land exposed at any given time, reducing the risk of erosion and sedimentation.

Based on the results of the code review, approximately 61% of municipalities within the watershed have some level of site plan review (**Table 8-2**). Due to the fact that each municipality follows their own site plan review code (if applicable) the extent to which site plan review can impact water quality depends on the process and authority of the reviewing body. The stricter the regulations protecting water bodies when reviewing these site plans, the greater the positive impact on water quality. Therefore, there are greater opportunities to protect water quality in the 61% of municipalities that implement site plan review.

Planned Unit Development (PUD): Planned unit development (PUD) refers to a zoning designation that allows for the development of a mixed-use community or neighborhood. A PUD may include a mix of housing for homeowners with different price points along with convenient access to workplaces, shopping, education and recreation. This approach encourages balanced and sustainable development that takes into account the needs and preferences of the community. Additionally, PUDs often incorporate green spaces and sustainable design principles to promote environmental conservation and enhance the overall quality of life for residents.

Based on the results of the code review, approximately 6% of municipalities within the watershed have a regulation in place pertaining to PUD (**Table 8-2**).

Subdivision Regulations: Subdivision regulations guide the way that land is divided into smaller parcels and can ensure that parcels are of adequate size and shape with adequate infrastructure and open space. These ordinances can control the density of new development, where it can occur, the layout and extension of new infrastructure, and the protection of open land and sensitive features.

Based on the results of the code review, approximately 89% of municipalities within the watershed have subdivision regulations in place (**Table 8-2**).

Cluster Development Subdivision: Cluster development subdivisions are a land development tool used by communities to protect open space or environmentally- sensitive lands, including hazard-prone lands such as steep slopes or floodplains. Specifically, a cluster subdivision typically groups homes closely together on smaller lots within a portion of the proposed development site, leaving a significant portion of the property as open space or natural areas. This design approach contrasts with conventional subdivisions, where homes are spread out more evenly across the entire development site. In addition to preservation of open space and protection of sensitive

areas, clustered developments can impact water quality by reducing impervious surfaces in a development, reducing fertilizer and pesticide use associated with lawncare, and typically implement sustainable landscaping practices.

Based on the results of the code review, approximately 22% of municipalities within the watershed have a regulation in place pertaining to cluster subdivisions (**Tables 8-1b** and **8-2**).

Overlay Zoning Districts: Zoning overlays are zoning districts applied to specific geographies based on unique, defined criteria, which are in addition to the standards outlined for the underlying base zoning district. Zoning overlays are utilized by municipalities to more effectively address special features and other elements of the community deemed important to address municipal goals and to protect health, safety, and general welfare of the community. Zoning overlays can be specifically targeted to mitigate unique site characteristics that can be more difficult to address as part of a traditional zoning district. Zoning can target defined environmental features (i.e. flood areas, wetlands, woodlands, steep slopes, etc.) to lessen degradation and provide additional protection standards.

Based on the results of the code review, approximately 35% of municipalities within the watershed have overlay zoning districts in place (**Tables 8-1b** and **8-2**).

Wetlands: A majority of freshwater and saltwater wetlands are regulated at the state level by the NYSDEC, which oversees wetlands designated as 'regulated' under the Freshwater Wetlands Act or Tidal Wetlands Act, while the US Army Corps of Engineers oversees federal permitting, particularly for wetlands identified in the National Wetlands Inventory (NWI) or for activities in jurisdictional saltwater wetlands. However, there are many smaller un-mapped wetlands not protected under federal or state regulations that municipalities should document and extend protections to. Additionally, protections to wetlands may change on the federal level. Municipalities can benefit from a wetland protection and restoration program in many ways including reducing water quality problems, protecting water supplies, reducing stormwater quality and quantity problems, reducing flood and erosion losses, providing outdoor recreation activities, providing research and educational opportunities, and allocating lands throughout the community to their most suitable uses. Additionally, wetland-adjacent areas directly influence the ecological health, water quality, and hydrology of the wetland. These areas may be subject to specific municipal regulations, such as overlay districts, setbacks, and buffers, to prevent development or activities that could degrade the wetland. Model local regulatory tools[59] available to municipalities include wetland conservation overlay districts, simple wetland and watercourse setbacks, and local freshwater wetland laws, as outlined in the New York State Department of State's Model Local Laws to Increase Resilience. These tools provide municipalities with flexible, legally vetted options to enhance local protections for wetlands and watercourses,

[59] New York State Department of State. 2020. *Model Local Laws to Increase Resilience*. Accessible at: https://dos.ny.gov/system/files/documents/2020/09/model_local_laws_to_increase_resilience.pdf

particularly where state or federal jurisdiction does not apply. It is encouraged for municipalities to explore these tools for any applicability and adoption locally where applicable. Incorporating such measures into local codes can strengthen resilience to flooding, improve water quality, and preserve critical habitat.

Based on the results of the code review, approximately 6% of municipalities within the watershed have a regulation in place pertaining to wetlands (**Tables 8-1b** and **8-2**). Of note, all of the municipalities within the watershed, even inland ones, have designated wetlands, including upland areas with freshwater wetlands.

Municipal Separate Storm Sewer System (MS4) Permitted Community: The National Pollutant Discharge Elimination System (NPDES) Stormwater Phase II Program requires designated municipalities to obtain a municipal separate storm sewer system (MS4) permit through the NYS Department of Environmental Conservation and follow an MS4 program to ensure that the stormwater that is conveyed in the municipal system does not contain pollutants. These communities must implement a six-point program to manage stormwater being passed through their system and, as that system expands due to development, ensure that modern engineering standards for stormwater are also applied. Based on the results of the code review, all of the applicable municipalities are designated MS4 communities. Of the MS4 communities, 50% have a Stormwater Management Plan (SWMP) readily available in accordance with the requirements of the SPDES General Permit GP-0-24-001. It is noted that two of the three municipalities that did not have their 2023 Annual Reports readily available do not participate in the MBPC (Lake Success and North Hills) and are exempted by the NYSDEC from the MS4 requirements. Per the municipalities' available annual reports, all have a designated Stormwater Management Coordinator, and all are MBPC members. Regarding the six required minimum control measures (MCMs):

- MCM-1: All of the municipalities conducted public education and outreach activities during the most recent annual reporting period available (2023). The Manhasset Bay Protection Committee assists member municipalities with completing this MCM.
- MCM-2: All of the municipalities provided opportunities for public involvement/participation. The Manhasset Bay Protection Committee assists member municipalities with completing this MCM.
- MCM-3: All of the municipalities have mapped all stormwater outfalls; however, only 47% of the applicable municipalities screened all outfalls for dry weather discharges during the most recent monitoring period, and 67% have completed storm sewershed mapping. A total of 50 illicit discharges were detected in three of the 15 reporting municipalities over the most recent monitoring period.
- MCM-4: All of the reporting municipalities have a local law for stormwater management and 89% have erosion and sediment control laws (**Tables 8-1b** and **8-2**). 89% of municipalities have Stormwater Pollution Prevention Plan (SWPPP; described below) review procedures in place (**Tables 8-1c** and **8-2**), and construction site inspections have occurred at all municipalities that reported active SWPPPs.

- MCM-5: 40% of reporting municipalities indicated they conduct post-construction inspections.
- MCM-6: Parking lot sweeping was conducted in 80% of reporting municipalities, street sweeping was conducted in 93% of reporting municipalities and catch basin inspection and cleaning was conducted in all of the reporting municipalities. Stormwater management training was conducted for at least one employee in 40% of reporting municipalities.

For a more detailed analysis of the municipalities' MS4 programs refer to **Section 8.3**.

Erosion/Sediment Control Law: Activities involving land clearance and modification such as the construction of new buildings, roads and parking lots, and the clearing of land can all create soil erosion and sediment laden run-off. Sedimentation of waterways reduces channel flow and depth, creating issues with conveyance, temperature, and habitat and water quality health. Besides being a significant source of non-point source pollution, sedimentation can also increase municipal costs for maintaining stormwater infrastructure. Local laws pertaining to erosion and sediment control establish standards and specifications for conservation practices and planning activities which minimize soil erosion and sedimentation. These laws control land disturbances, soil storage, and erosion and sedimentation resulting from such activities and establish procedures for issuance, approval, administration, and enforcement of a permit.

Based on the results of the code review, approximately 89% of municipalities within the watershed have regulations in place pertaining to erosion/sediment control (**Tables 8-1b** and **8-2**).

Stormwater Pollution Prevention Plan (SWPPP) Requirement: A Stormwater Pollution Prevention Plan (SWPPP) is a document required by the Environmental Protection Agency (EPA) that regulates construction sites, outlines how the site will manage stormwater runoff and identifies all potential pollution sources which could come in contact with runoff. This document protects surrounding water bodies from increased influx of runoff and pollutants, lessening environmental degradation of sensitive environments.

Based on the results of the code review, approximately 89% of municipalities within the watershed have a requirement in place pertaining to the development of SWPPPs (**Tables 8-1c** and **6-2**).

Transfer of Development Rights: Transfer of Development Rights is a program that allows a landowner to sell or exchange development rights from their land to another party who can use them to increase density of development on a different land parcel. This program is used to protect lands with conservation value, such as wetlands or sensitive areas, by redirecting development to areas planned for growth.

Based on the results of the code review, none of municipalities within the watershed have a regulation in place pertaining to transfer of development rights (**Table 8-2**).

Watershed Management Code: Local watershed management codes regulate activities that affect the health of the watershed and the bodies of water within it. Watershed management laws typically aim to protect, preserve, and restore the natural processes that filter and clean water.

Based on the results of the code review, none of municipalities within the watershed have a watershed management code in place (**Table 8-2**).

Docks & Mooring Law: Construction and placement of docks and moorings are regulated by both state and federal laws to ensure navigational safety and environmental protection. Local municipalities may have their own ordinances governing docks and moorings, which can impose additional requirements or restrictions. Municipal Docks & Mooring Law applies to the construction, reconstruction, or repair of docks, piers, wharfs, platforms and breakwaters and the installation of moorings, and delineates where these actions can take place, and which actions require permits. These restrictions increase the protection of coastal areas from degradation from watercraft influences.

Based on the results of the code review, approximately 30% of municipalities within the watershed situated on or adjacent to a waterbody have a regulation in place pertaining to docks and mooring (**Table 8-1c** and **8-2**).

Boats and Waterways: Boats and Waterway Regulations refer to the speed and operation of boats, anchorage, moorings, environmental regulations, use and abandonment of boats, boat equipment and lighting, prevention of drift, and consequent penalties to offenses. These protections ensure the preservation of waterways and shorelines as a source of public and private recreation.

Based on the results of the code review, approximately 77% of municipalities within the watershed situated on or adjacent to a waterbody have regulations in place pertaining to boats and waterways (**Tables 8-1c** and **8-2**).

Flood Damage Prevention/Floodplain Management: The Flood Damage Prevention ordinance is designed to minimize the damage to residential and commercial structures in the event of flooding, regulating all development within a 100-year floodplain. Floodplain management is corrective and preventative measures for reducing flood damage. These measures are adopted by state and local governments so that citizens in the community are eligible to purchase flood insurance. These regulations are designed to promote the public health, safety and general welfare of all citizens living in close proximity to shorelines.

Based on the results of the code review, approximately 89% of municipalities within the watershed have regulations in place pertaining to flood damage protection or floodplain management (**Tables 8-1d** and **8-2**).

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Innovative/Alternative Onsite Wastewater Treatment Systems (I/A OWTS): Onsite wastewater treatment systems (e.g., cesspools, septic systems) can be one of the leading sources of water pollution. Such systems tend not to be properly maintained, may not be replaced on a timely basis, or may be installed on sites and/or in soils that are not optimal due to high permeability or shallow water table, as is the case in several areas of Long Island. Innovative and alternative Onsite Wastewater Treatment Systems (I/A OWTS) are septic systems specially designed to remove nitrogen, reducing environmental impact and protecting water quality. There is a move to replace outdated cesspools and septic systems with this new technology.

Based on the results of the code review, approximately 28% of municipalities within the watershed have regulations in place pertaining to sanitary waste (**Tables 8-1d** and **8-2**). Onsite systems are regulated by county and NYS health laws that specify installation, maintenance and minimum inspection requirements. County Departments of Health require inspections prior to the sale of properties, yet it may be decades between title transfers.

Nassau County offers a Septic System Replacement Program for residents and small businesses through the Septic Environmental Program to Improve Cleanliness (S.E.P.T.I.C.). This program provides grant funding to eligible participants for replacing outdated or failing conventional septic systems with innovative and alternative onsite wastewater treatment systems (I/A OWTS), designed to reduce nitrogen levels and improve water quality. This initiative supports the transition from conventional systems to more sustainable technologies, helping to protect the environment and public health.

Sewers: Sewer regulations designate what buildings must be hooked up to a public sewer system, sewer construction and repair designations, treatment requirements, damage protection, and powers and authority of sewer inspectors. Careful planning and review of all such infrastructure is important because new or upgraded sewer systems can significantly improve water quality in an area with failing onsite wastewater treatment systems. However, new sewer and water infrastructure may lead to inappropriate growth and development, more impervious surface area, and the potential water quality problems that are associated with development. Communities should carefully plan future land use and determine where this infrastructure will be needed and allowed to expand in the future and where it should be limited. These regulations are in place to protect the environment from sewage leaching into groundwater and our waterways.

Based on the results of the code review, approximately 50% of municipalities within the watershed have regulations in place regulating sewers (**Tables 8-1d** and **8-2**).

Tree/Shrub Clearing/Protection: Regulations on tree or shrub clearing seek to preserve the natural landscape through the protection of existing trees. Regulations on tree removal and permit requirements are commonly put in place to preserve environmental and aesthetic benefits of trees, including reduction of air pollution and noise, increased shade, and protection against

soil erosion while improving surface drainage, minimizing flooding and decreasing runoff and sediment deposition into waterways.

Based on the results of the code review, all municipalities within the watershed have regulations in place pertaining to tree/shrub clearing and/or protection (**Table 8-2**).

Steep Slopes: Steep Slope regulations are designed to limit disturbance or development on steeply sloped terrain in order to avoid erosion or sedimentation impacts.

Based on the results of the code review, only one municipality (the Village of Port Washington North), representing approximately 6% of municipalities within the watershed, has a regulation in place pertaining to steep slopes (**Tables 8-1d** and **8-2**).

Illicit Discharges: An illicit discharge is any discharge to a municipality's storm water drainage system that is not composed entirely of stormwater. Regulations on discharges defines exceptions of allowable discharges of non-storm water to the drainage system, while giving the municipality the authority to take action and levy fines against illicit discharge in order to decrease pollutants entering outfalls. Illicit discharges are a main focus area of the MS4 program, as outlined further in **Section 8.3**.

Based on the results of the code review, approximately 94% of municipalities within the watershed have a regulation in place pertaining to illicit discharges (**Tables 8-1e** and **8-2**).

Climate Smart Community (CSC): Climate Smart Communities (CSC) is a New York State program that helps local governments take action to reduce greenhouse gas emissions and adapt to a changing climate. The program offers grants for climate change adaptation and mitigation projects and rebates for electric vehicles. Grants are offered for projects pertaining to resiliency to future flood risk for those living near the shoreline and relocation and retrofitting of critical infrastructure to reduce the risks of flooding.

Based on the results of the code review, approximately 11% of municipalities within the watershed are designated a CSC (**Tables 8-1e** and **8-2**).

Sustainability/Green Infrastructure: Green Infrastructure refers to natural or semi-natural (including bioengineered) infrastructure systems which deliver environmental, economical, and social values for sustainable development. Green infrastructure for stormwater includes any vegetation or soils, permeable surfaces or stormwater catchment and reuse systems, which store, infiltrate or evapotranspirate stormwater, reducing runoff flows to municipal drainage systems and surface waters.

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Based on the results of the code review, approximately 6% of municipalities (Nassau County) within the watershed have regulations in place pertaining to sustainability or green infrastructure (**Tables 8-1e** and **8-2**).

EnergyStar: EnergyStar is a program run by the US Environmental Protection Agency (EPA) that promotes energy efficiency. The EnergyStar Residential New Construction program sets energy efficiency requirements for new homes and apartments, which in turn will generate fewer greenhouse gas emissions than older buildings due to their energy efficiency.

Based on the results of the code review, approximately 6% of municipalities (only the Village of Great Neck) within the watershed have a regulation in place pertaining to EnergyStar (**Tables 8-1e** and **8-2**).

Fertilizers: Fertilizer regulations govern when and where fertilizers can be applied on residential properties, including restrictions near shorelines. They also specify the types of chemicals allowed. These rules aim to reduce nutrient runoff into waterways, protecting wetlands and aquatic ecosystems from excess nitrogen and phosphorus.

Pesticides: Pesticide regulations control the timing, location, and chemical composition of pesticide applications, particularly near sensitive areas like shorelines. By limiting pesticide runoff, these regulations help prevent harmful substances from entering water bodies, supporting overall water quality and ecosystem health.

Based on the results of the code review, approximately 72% of municipalities within the watershed have a regulation in place pertaining to fertilizers/pesticides (**Tables 8-1e** and **8-2**).

Hazardous Materials: Hazardous Material regulations control the storage and handling of toxic and hazardous materials and required permits and registration. These regulations protect the environment from possible hazardous material spillage or leakage, which could seep into groundwater and waterways, threatening public health and damaging ecosystems.

Based on the results of the code review, approximately 94% of municipalities within the watershed have a regulation in place pertaining to hazardous materials (**Tables 8-1f** and **8-2**).

Industrial Uses: Regulations on industrial uses can significantly affect these facilities' impact on water quality through regulation of stormwater discharges, pollution control, pretreatment requirements, monitoring and compliance, and spill response and containment procedures.

Based on the results of the code review, approximately 86% of municipalities within the watershed that contain industrial uses have a regulation in place pertaining to industrial uses (**Tables 8-1f** and **8-2**).

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Golf Course: Golf Course regulations work to control the amount of sediment and stormwater runoff coming from the site and depositing in off-site waterways through the implementation of water catchment structures and preserves at the edges of properties. They also regulate the percentage of pervious and imperious land within the lot.

Based on the results of the code review, approximately 43% of municipalities within the watershed that contain golf courses have a regulation in place pertaining to golf courses (**Tables 8-1f** and **8-2**).

Marina: Recreational boating can have significant water quality impacts from facility construction, waste disposal, boat maintenance and fueling, as well as influencing the spread of aquatic invasive species and shoreline erosion (wakes). Marina regulations specify the permitted construction and uses of marinas and permitted applications of private boat slips within a municipality, to protect human health and safety and the environment. Areas in which marina construction is allowed vary depending on the vulnerability of the surrounding ecosystems and waterbodies.

Based on the results of the code review, approximately 43% of municipalities within the watershed that include marina(s) have a regulation in place pertaining to marinas (**Tables 8-1f** and **8-2**).

8.3 Evaluation of local MS4 programs

The below **Table 8-3a-e** provides a summarized overview of the 2023 Annual Reports available for the relevant municipalities. Note that the table is the result of the review of Stormwater Management Program Plans (SWMP) and MS4 Annual Reports provided by each municipality within the watershed. This review was conducted in 2024 before the new SWMPs were required by DEC to comply with the new 2024 permit. It is important to note that Lake Success and North Hills have been excluded from this summary, as they are not members of the MBPC and are exempt from MS4 requirements under NYSDEC regulations. Additionally, no materials were provided by the Village of Manorhaven, leading to the assumption that the referenced documents or reports are unavailable for this municipality.

Table 8-3a below addresses whether each municipality has a SWMP in place, whether they completed their 2022—2023 required MS4 Annual Report, which Village staff member is listed as their Stormwater Management Coordinator, whether they participate in the MBPC, and whether they have implemented Watershed Improvement Strategy Best Management Practices (BMPs) in accordance with the MS4 program. The letter “T” is noted for the municipality classification of town and the letter “V” is noted for the municipality classification of village.

Table 8-3a

Local MS4 (GP-0-15-003) Analysis					
Municipality	**SWMP**	**2023 Annual Report**	**Stormwater Management Coordinator**	**Partner - MBPC Coordination**	**Watershed Improvement Strategy BMPs**
Nassau County	Yes	Yes	Commissioner of Public Works	Yes	Yes
North Hempstead (T)	Yes	Yes	Commissioner of Public Works	Yes	No
Baxter Estates (V)	Yes	Yes	Building Inspector	Yes	Yes
Flower Hill (V)	No	Yes	Superintendent of Public Works	Yes	No
Great Neck (V)	Yes	Yes	Mayor	Yes	Yes
Kensington (V)	No	Yes	Village Clerk-Treasurer	Yes	No
Kings Point (V)	No	Yes	Village Clerk-Treasurer	Yes	No
Manorhaven (V)	No	No	No	Yes	No
Munsey Park (V)	No	Yes	Clerk/ Treasurer	Yes	No
Plandome (V)	Yes	Yes	Mayor	Yes	Yes
Plandome Heights (V)	Yes	Yes	Mayor	Yes	Yes
Plandome Manor (V)	Yes	Yes	Mayor	Yes	Yes
Port Washington North (V)	Yes	Yes	Mayor	Yes	Yes
Roslyn Estates (V)	No	Yes	Mayor	No	Yes
Sands Point (V)	No	Yes	Mayor	Yes	No
Thomaston (V)	Yes	Yes	Village Administrator	Yes	Yes

As noted in the above table, documentation was not provided for review for the Village of Manhorhaven. Several municipalities do not have SWMPs in place or readily available including the Villages of Flower Hill, Kensington, Kings Point, Munsey Park, Roslyn Estates, and Sands Point. In addition to a requirement as part of the MS4 Program, a SWMP is a vital tool for municipalities to improve water quality by addressing pollutants carried by stormwater runoff into local waterbodies. Four additional municipalities (Town of North Hempstead, and the Villages of Flower Hill, Kensington, and Kings Point) did not report implementing Watershed Improvement

Strategy BMPs, which help municipalities improve water quality by targeting pollutants at their source, reducing runoff impacts, and restoring hydrological processes within a watershed.

Table 8-3b below summarizes public education topics each municipality reported covering in order to comply with MCM-1 of the previous MS4 Permit (GP-0-15-003), and opportunities the municipality reported for conducting public/community involvement in accordance with MCM-2 of the MS4 permit (GP-0-15-003). The letter "T" is noted for the municipality classification of town and the letter "V" is noted for the municipality classification of village.

Table 8-3b

Local MS4 (GP-0-15-003) Analysis		
Municipality	**MCM1 - Public Education Topics**	**MCM2 - Opportunities**
Nassau County	Construction sites, general stormwater management information, household hazardous waste disposal, storm drain marking, green infrastructure/better site design/low impact development, pesticide and fertilizer application, pet waste management, recycling, vehicle washing, water conservation, wetland protection, septic maintenance, boat pumpout	Cleanup events, community hotlines, storm drain markings, stakeholder meetings, volunteer monitoring
North Hempstead (T)	Construction sites, general stormwater management information, household hazardous waste disposal, illicit discharge detection and elimination, infrastructure maintenance, smart growth, storm drain marking, green infrastructure/better site design/low impact development, pesticide and fertilizer application, pet waste management, recycling, trash management, vehicle washing, water conservation, swimming pools, boat pumpout	Cleanup events, comments on SWMP, community hotlines, community meetings, stakeholder meetings, volunteer monitoring, STOP, sustainability classes
Baxter Estates (V)	Stormwater management, household hazardous waste disposal, illicit discharge detection and elimination, storm drain marking, pesticide and fertilizer application, pet waste management, recycling, trash management, vehicle washing, water conservation, wetland protection, septic maintenance, boat pumpout	Cleanup events, community hotlines, storm drain markings, stakeholder meetings, volunteer monitoring
Flower Hill (V)	Construction sites, general stormwater management information, household hazardous waste disposal, illicit discharge detection and elimination, infrastructure maintenance, smart growth, storm drain marking, green infrastructure/better site design/low impact development, pesticide and fertilizer application, pet waste management, recycling, riparian corridor protection/restoration, trash management, vehicle washing, water conservation, wetland protection, pools, septic tanks, geese, fishkills	Cleanup events, comments on SWMP, community hotlines, community meetings, plantings, storm drain markings, stakeholder meetings, volunteer monitoring, boy scouts, park & beautification committee

Great Neck (V)	Construction sites, general stormwater management information, household hazardous waste disposal, illicit discharge detection and elimination, storm drain marking, green infrastructure/better site design/low impact development, pesticide and fertilizer application, pet waste management, recycling, trash management, vehicle washing, water conservation, wetland protection, boat pumpout	Cleanup events, comments on SWMP, community hotlines, stakeholder meetings, volunteer meetings
Kensington (V)	Construction sites, general stormwater management information, household hazardous waste disposal, illicit discharge detection and elimination, pesticide and fertilizer application, pet waste management, trash management, recycling, trash management, vehicle washing, water conservation, septic maintenance, boat pump out	Cleanup events, comments on SWMP, community hotlines, community meetings, plantings, stakeholder meetings, volunteer monitoring, board of trustees
Kings Point (V)	Construction sites, general stormwater management information, household hazardous waste disposal, illicit discharge detection and elimination, infrastructure maintenance, smart growth, storm drain marking, green infrastructure/better site design/low impact development, pesticide and fertilizer application, pet waste management, recycling, trash management, vehicle washing, water conservation, wetland protection, pools	Cleanup events, comments on SWMP, community hotlines, storm drain markings, stakeholder meetings, volunteer monitoring, town S.T.O.P. program
Manorhaven (V)	Not available	Not available
Munsey Park (V)	Construction sites, general stormwater management information, household hazardous waste disposal, illicit discharge detection and elimination, infrastructure maintenance, smart growth, storm drain marking, green infrastructure/better site design/low impact development, pesticide and fertilizer application, pet waste management, recycling, trash management, vehicle washing, water conservation, wetland protection, swimming pools	Cleanup events, comments on SWMP, community hotlines, community meetings, plantings, storm drain markings, stakeholder meetings, volunteer monitoring, Town STOP Program, Tree Committee
Plandome (V)	Construction sites, general stormwater management information, household hazardous waste disposal, illicit discharge detection and elimination, storm drain marking, pesticide and fertilizer application, pet waste management, recycling, trash management, vehicle	Cleanup events, stakeholder meetings, volunteer monitoring

	washing, water conservation, wetland protection, clean marinas, no discharge zone	
Plandome Heights (V)	Construction sites, general stormwater management information, household hazardous waste disposal, illicit discharge detection and elimination, storm drain marking, pesticide and fertilizer application, pet waste management, recycling, trash management, vehicle washing, water conservation, septic maintenance & boat pumpout	Cleanup events, storm drain markings, stakeholder meetings, volunteer monitoring
Plandome Manor (V)	Construction sites, general stormwater management information, household hazardous waste disposal, illicit discharge detection and elimination, storm drain marking, pesticide and fertilizer application, pet waste management, recycling, trash management, vehicle washing, water conservation, wetland protection, clean marinas, no discharge zone	Cleanup events, stakeholder meetings, volunteer monitoring
Port Washington North (V)	Construction sites, general stormwater management information, household hazardous waste disposal, illicit discharge detection and elimination, infrastructure maintenance, storm drain marking, green infrastructure/better site design/low impact development, pesticide and fertilizer application, pet waste management, recycling, riparian corridor protection/restoration, trash management, vehicle washing, water conservation, wetland protection, boat pump out, septic maintenance	Cleanup events, comments on SWMP, community hotlines, plantings, storm drain markings, stakeholder meetings, volunteer monitoring, beautification committee
Roslyn Estates (V)	Construction sites, general stormwater management information, household hazardous waste disposal, illicit discharge detection and elimination, pesticide and fertilizer application, pet waste management, recycling, trash management, vehicle washing, water conservation	Community hotlines, community meetings, trustees and planning and zoning boards
Sands Point (V)	Construction sites, general stormwater management information, household hazardous waste disposal, illicit discharge detection and elimination, infrastructure maintenance, storm drain marking, green infrastructure/better site design/low impact development, pesticide and fertilizer application, pet waste management, recycling, riparian corridor protection/restoration, trash management, vehicle	Cleanup events, comments on SWMP received, community hotlines, community meetings, stakeholder meetings, volunteer monitoring

	washing, water conservation, wetland protection, septic maintenance, boat pumpout	
Thomaston (V)	Construction sites, general SW management information, household hazardous waste, illicit discharge, storm drain marking, green infrastructure, pesticide and fertilizer, pet waste, recycling, trash management, vehicle washing, water conservation, wetland protection, septic maintenance, boat pumpout	Cleanup events, community hotlines, community meetings, plantings, stakeholder meetings, volunteer monitoring, trustees and planning and zoning boards, webpage

As noted in the table above, all available municipalities (Village of Manorhaven excluded) are conducting required public education and public involvement. **Table 8-3c** below summarizes each municipality's compliance with MCM-3 as reported on their respective Annual Report forms (GP-0-15-003). Specifically, the table specifies whether all outfalls have been mapped as required, whether all outfalls have been screened for dry weather discharges assisting with the detection of illicit discharges, whether storm sewershed mapping has been completed, and whether any illicit discharges were detected. The letter "T" is noted for the municipality classification of town and the letter "V" is noted for the municipality classification of village.

Table 8-3c

Local MS4 (GP-0-15-003) Analysis				
Municipality	**MCM3 - All outfalls mapped?**	**MCM3 - All outfalls screened for dry weather discharges?**	**MCM3 - Storm Sewershed mapping complete?**	**MCM3 - Illicit discharges detected?**
Nassau County	Yes	No- 10 of 3780	Yes	Yes - 3
North Hempstead (T)	Yes	No - 0 of 263	Yes	Yes - 30
Baxter Estates (V)	Yes	Yes	Yes	No
Flower Hill (V)	Yes	Yes	Yes	Yes - 17
Great Neck (V)	Yes	Yes	No	No
Kensington (V)	Yes	Yes	No	No
Kings Point (V)	Yes	No - 14 of 66 screened	Yes	No
Manorhaven (V)	No	No	No	No

Munsey Park (V)	Yes	Yes	No	No
Plandome (V)	Yes	No - 0 of 12	Yes	No
Plandome Heights (V)	Yes	No - 2 of 4 screened	Yes	No
Plandome Manor (V)	Yes	No - 4 of 18	Yes	No
Port Washington North (V)	Yes	No - 0 of 8	Yes	No
Roslyn Estates (V)	Yes	No - 0 of 4	No	No
Sands Point (V)	Yes	Yes	No	No
Thomaston (V)	yes	yes	Yes	No

As noted in the above table, nine municipalities have not reported completion of screening of all outfalls for dry weather discharges. Screening stormwater outfalls for dry weather discharges is critical to the MS4 Program because it helps identify and address illicit discharges. Six municipalities have not reported completing storm sewershed mapping, which provides a detailed understanding of how stormwater flows through a community, where it discharges, and what pollutants it carries. Mapping these areas helps municipalities make informed decisions about managing stormwater and protecting local waterbodies. Lastly, illicit discharges were detected in three municipalities. The detection of illicit discharges is important for identifying and eliminating sources that are potentially impacting water quality.

Table 8-3d below summarizes each municipality's compliance with MCMs-4 and 5 as reported on their respective Annual Report forms. Specifically, the table specifies whether the municipalities have implemented a SPDES-equivalent local law, whether each municipality has SWPPP review procedures in place for construction projects, whether each municipality is conducting inspections of their active construction sites, and whether municipalities are conducting inspections of post-construction practices. Of note, municipalities that did not report any active construction sites were assigned an "N/A" entry with respect to construction site inspections. The letter "T" is noted for the municipality classification of town and the letter "V" is noted for the municipality classification of village.

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Table 8-3d

Local MS4 (GP-0-15-003) Analysis				
Municipality	**MCM4 - SPDES Equivalent Local Law**	**MCM4 - SWPPP Review Procedures**	**MCM4 - Construction Site Inspections**	**MCM5 - Inspections**
Nassau County	Yes	Yes	Yes	Yes
North Hempstead (T)	Yes	Yes	Yes	Yes
Baxter Estates (V)	Yes	Yes	N/A	Yes
Flower Hill (V)	Yes	Yes	Yes	Yes
Great Neck (V)	Yes	Yes	N/A	No
Kensington (V)	Yes	Yes	N/A	No
Kings Point (V)	Yes	Yes	N/A	No
Manorhaven (V)	No	No	No	No
Munsey Park (V)	Yes	No	N/A	No
Plandome (V)	Yes	Yes	N/A	No
Plandome Heights (V)	Yes	Yes	N/A	No
Plandome Manor (V)	Yes	Yes	N/A	No
Port Washington North (V)	Yes	Yes	Yes	Yes
Roslyn Estates (V)	Yes	Yes	N/A	Yes
Sands Point (V)	Yes	Yes	N/A	No
Thomaston (V)	Yes	Yes	Yes	No

As noted above, all available municipalities (Village of Manorhaven excluded) have a SPDES-equivalent local law, and all municipalities with active construction sites are conducting SWPPP inspections. Additionally, each municipality has SWPPP review procedures in place, with the exception of Munsey Park. SWPPP review procedures assist in ensuring that construction and development activities within a municipality comply with regulations designed to prevent polluted stormwater runoff. Seven municipalities reported that they do not conduct post-construction stormwater inspections, which ensure that stormwater management systems are designed properly and are functioning over the long term.

Table 8-3e below summarizes each municipality's compliance with MCM-6 as reported on their respective Annual Report forms. Specifically, the table specifies whether municipalities are conducting sweeping of parking lots and streets, inspecting and cleaning catch basins, and conducting required training. The letter "T" is noted for the municipality classification of town

and the letter "V" is noted for the municipality classification of village. "No" listed below for the parking lot sweeping column indicates this information was not in the Annual report.

Table 8-3e

Local MS4 (GP-0-15-003) Analysis				
Municipality	**MCM6 - Parking Lot Sweeping (acres)**	**MCM6 - Street sweeping (miles)**	**MCM6 - Catch basins inspected/cleaned**	**MCM6 - stormwater management trainings for municipal employees (# of employees)**
Nassau County	300	8,596	1,536	N/A
North Hempstead (T)	5	12,602	454	Yes - 15
Baxter Estates (V)	No	30	42	No
Flower Hill (V)	1	172	254	Yes - 3
Great Neck (V)	90	1,837	110	No
Kensington (V)	1	5	153	No
Kings Point (V)	35	1,000	13	Yes - 2
Manorhaven (V)	No	No	No	No
Munsey Park (V)	0.5	75	86	Yes - 1
Plandome (V)	1	8	25	Yes - 1
Plandome Heights (V)	No	10	40	No
Plandome Manor (V)	1	8	76	No
Port Washington North (V)	No	88	4	Yes - 1
Roslyn Estates (V)	1	No	65	No
Sands Point (V)	2	84	10	No
Thomaston (V)	10	168	4	No

As shown in the table above, all applicable municipalities reported conducting street sweeping and inspection/cleaning of catch basins. Nine municipalities indicated they have not conducted

stormwater management training for municipal employees. Training ensures that municipal employees understand their role in managing stormwater effectively and preventing pollutants from entering the MS4.

The analysis of the MS4) data across municipalities reveals several strengths and weaknesses in their stormwater management programs. Municipalities such as Nassau County, Town of North Hempstead, and the Village of Baxter Estates and Great Neck demonstrate significant strengths with comprehensive Stormwater Management Programs (SWMPs), active participation in watershed improvement strategies, and robust stormwater best management practices (BMPs), including extensive public education and engagement efforts. These municipalities also show progress in mapping outfalls, screening for dry weather discharges, and implementing SPDES-equivalent measures.

However, weaknesses are evident in smaller municipalities like Villages of Manorhaven and Munsey Park, where gaps exist in SWMP implementation, outfall screening, and construction site inspections. Additionally, many municipalities have incomplete mapping of storm sewersheds or lack thorough inspections for illicit discharges, which can hinder overall stormwater management effectiveness. Training for municipal employees is also inconsistent, with several municipalities not reporting any training sessions. This highlights the need for uniform standards and resource allocation to improve stormwater management and compliance with state and federal regulations. The variability in data reporting, such as the number of street-sweeping miles and catch basins cleaned, suggests the potential for greater regional coordination to address these disparities effectively.

8.4 Recommended Actions

This section highlights changes to local regulations, codes, zoning, and planning that would be recommended to be made in an effort to protect and restore water quality and habitat in Manhasset Bay. Nothing noted here constitutes a requirement, but is merely a suggestion.

All of the applicable municipalities (Nassau County excluded) within the Manhasset Bay Watershed currently have zoning regulations in place; however, only two municipalities have comprehensive plans in place, neither of which were developed within the past 10 years. Several gaps were found in existing municipal codes and planning documents that could have the potential to impact water quality within the watershed. It is recommended that all municipalities within the watershed area evaluate land uses. If the municipality contains industrial uses, golf courses, or marinas, applicable local laws should be enacted to ensure negative impacts to Manhasset Bay water quality from these uses are mitigated and, preferable, prevented.

It is recommended that, in order to protect water quality, all municipalities enact site plan review local laws and for those municipalities that have the potential for future development, planning tools should be considered in local laws to minimize disturbance to the local ecosystem in the

form of PUD, cluster development, or zoning overlays. All municipalities are recommended to ensure regulations are in place pertaining to wetlands, erosion/sediment control, and SWPPP. Municipalities that contain steep slopes should consider enacting a local law mitigating the impacts from development on steep slopes, and municipalities along the shoreline should consider local laws pertaining to docks, moorings, boats, and waterways. All municipalities should consider how sanitary waste within their local area is impacting water quality and ensure appropriate regulations are in place as they pertain to sanitary waste, I/A OWTS, or sewers.

Per the analysis of existing codes implemented within each municipality, the below list summarizes recommended codes/legislative tools to be enacted for each municipality. Again, these are just recommendations. It is recommended that each municipality within the Manhasset Bay watershed area review the applicability of each of the codes/legislative tools below and consider adoption.

- Nassau County:
  - PUD
  - Cluster Subdivision
  - Wetlands
  - Erosion/Sediment Control Law
  - SWPPP Requirement
  - Transfer of Development Rights
  - Watershed Management Code
  - Docks & Mooring Law
  - Flood Damage Prevention/Floodplain Management
  - Steep Slopes
  - Illicit Discharges
  - CSC
  - EnergyStar
  - Hazardous Materials
  - Industrial Uses
  - Golf Course
  - Marina
- Town of North Hempstead
  - Comprehensive Plan
  - Wetlands
  - Transfer of Development Rights
  - Watershed Management Code
  - Sanitary Waste or I/A OWTS
  - Steep Slopes
  - Sustainability/Green Infrastructure
  - EnergyStar
- Village of Baxter Estates
  - Comprehensive Plan

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  - PUD
  - Cluster Development Subdivision
  - Overlay Zoning Districts
  - Wetlands
  - Transfer of Development Rights
  - Watershed Management Code
  - Boats and Waterways
  - Sanitary Waste or I/A OWTS
  - Steep Slopes
  - CSC
  - Sustainability/Green Infrastructure
  - EnergyStar
  - Fertilizers/Pesticides
- Village of Flower Hill
  - Comprehensive Plan
  - PUD
  - Cluster Development Subdivision
  - Overlay Zoning Districts
  - Wetlands
  - Transfer of Development Rights
  - Watershed Management Code
  - Sanitary Waste or I/A OWTS
  - Sewers
  - Steep Slopes
  - Sustainability/Green Infrastructure
  - EnergyStar
- Village of Great Neck
  - PUD
  - Cluster Development Subdivision
  - Wetlands
  - Transfer of Development Rights
  - Watershed Management Code
  - Docks & Mooring Law
  - Steep Slopes
  - CSC
  - Sustainability/Green Infrastructure
  - Fertilizers/Pesticides
  - Marina
- Village of Kensington
  - Comprehensive Plan
  - Site Plan Review
  - PUD

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  - Subdivision Law
  - Cluster Development Subdivision
  - Overlay Zoning Districts
  - Wetlands
  - Transfer of Development Rights
  - Watershed Management Code
  - Sanitary Waste or I/A OWTS
  - Steep Slopes
  - CSC
  - Sustainability/Green Infrastructure
  - Energy Star
- Village of Kings Point
  - Comprehensive Plan
  - Site Plan Review
  - PUD
  - Cluster Development Subdivision
  - Overlay Zoning Districts
  - Transfer of Development Rights
  - Watershed Management Code
  - Sanitary Waste or I/A OWTS
  - Sewers
  - Steep Slopes
  - CSC
  - Sustainability/Green Infrastructure
  - Energy Star
  - Marina
- Village of Lake Success
  - Comprehensive Plan
  - PUD
  - Cluster Development Subdivision
  - Wetlands
  - Transfer of Development Rights
  - Watershed Management Code
  - Sanitary Waste or I/A OWTS
  - Sewers
  - Steep Slopes
  - CSC
  - Sustainability/Green Infrastructure
  - Energy Star
- Village of Manorhaven
  - Comprehensive Plan
  - PUD

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  - Wetlands
  - Transfer of Development Rights
  - Watershed Management Code
  - Docks & Mooring Law
  - Steep Slopes
  - CSC
  - Sustainability/Green Infrastructure
  - Energy Star
- Village of Munsey Park
  - Comprehensive Plan
  - Site Plan Review
  - PUD
  - Subdivision Law
  - Cluster Development Subdivision
  - Overlay Zoning Districts
  - Wetlands
  - Transfer of Development Rights
  - Watershed Management Code
  - Sewers
  - Steep Slopes
  - CSC
  - Sustainability/Green Infrastructure
  - Energy Star
  - Fertilizers/Pesticides
- Village of North Hills
  - Comprehensive Plan
  - Site Plan Review
  - PUD
  - Wetlands
  - Erosion/Sediment Control Law
  - SWPPP Requirement
  - Transfer of Development Rights
  - Watershed Management Code
  - Flood Damage Prevention/Floodplain Management
  - Sanitary Waste or I/A OWTS
  - Sewers
  - Steep Slopes
  - CSC
  - Sustainability/Green Infrastructure
  - Energy Star
  - Fertilizers/Pesticides
  - Golf Course

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- Village of Plandome
    - Comprehensive Plan
    - Site Plan Review
    - PUD
    - Cluster Development Subdivision
    - Overlay Zoning Districts
    - Wetlands
    - Transfer of Development Rights
    - Watershed Management Code
    - Docks & Mooring Law
    - Boats and Waterways
    - Sewers
    - Steep Slopes
    - CSC
    - Sustainability/Green Infrastructure
    - Energy Star
    - Fertilizers/Pesticides
- Village of Plandome Heights
    - Comprehensive Plan
    - Site Plan Review
    - PUD
    - Cluster Development Subdivision
    - Overlay Zoning Districts
    - Wetlands
    - Transfer of Development Rights
    - Watershed Management Code
    - Docks & Mooring Law
    - Boats and Waterways
    - Sanitary Waste or I/A OWTS
    - Sewers
    - Steep Slopes
    - CSC
    - Sustainability/Green Infrastructure
    - Energy Star
    - Fertilizers/Pesticides
- Village of Plandome Manor
    - Comprehensive Plan
    - Site Plan Review
    - PUD
    - Cluster Development Subdivision
    - Overlay Zoning Districts
    - Wetlands

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  - Transfer of Development Rights
  - Watershed Management Code
  - Docks & Mooring Law
  - Sanitary Waste or I/A OWTS
  - Sewers
  - Steep Slopes
  - CSC
  - Sustainability/Green Infrastructure
  - Energy Star
  - Golf Course
- Village of Port Washington North
  - Comprehensive Plan
  - PUD
  - Overlay Zoning Districts
  - Wetlands
  - Transfer of Development Rights
  - Watershed Management Code
  - Docks & Mooring Law
  - Sanitary Waste or I/A OWTS
  - Sewers
  - CSC
  - Sustainability/Green Infrastructure
  - Energy Star
- Village of Roslyn Estates
  - PUD
  - Cluster Development Subdivision
  - Overlay Zoning Districts
  - Wetlands
  - Transfer of Development Rights
  - Watershed Management Code
  - Sanitary Waste or I/A OWTS
  - Steep Slopes
  - CSC
  - Sustainability/Green Infrastructure
  - Energy Star
- Village of Sands Point
  - Comprehensive Plan
  - PUD
  - Cluster Development Subdivision
  - Wetlands
  - Transfer of Development Rights
  - Watershed Management Code

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  - Sanitary Waste or I/A OWTS
  - Steep Slopes
  - CSC
  - Sustainability/Green Infrastructure
  - Energy Star
  - Golf Course
  - Marina
- Village of Thomaston
  - Comprehensive Plan
  - PUD
  - Cluster Development Subdivision
  - Overlay Zoning Districts
  - Wetlands
  - Transfer of Development Rights
  - Watershed Management Code
  - Sanitary Waste or I/A OWTS
  - Steep Slopes
  - CSC
  - Sustainability/Green Infrastructure
  - Energy Star

8.5 Model Regulations and Resources

The following sections include model ordinances and zoning regulations (see footnote links) from various localities within the watershed area that strengthen local protections on water resources from the impacts of development.

Site Plan Review

Site Plan Review is an essential zoning tool for a community to control the way its land is developed. Lack of an adequate site plan review process limits the Planning Board (or other designated review body) the authority and ability to modify development on a site-specific basis. The Town of North Hempstead code §70-219[60] is provided as Model Law[64], which outlines the process and procedures for site plan review within the Town.

Planned Unit Development (PUD)

Adopting a Planned Unit Development (PUD) zoning law can be beneficial for municipalities that are growing or near growing ones. The New York State Legislative Commission on Rural Resources created "A Guide to Planned Unit Development," which exemplified a model planned unit

[60] Town of North Hempstead Code §70-219: https://ecode360.com/9301678

development ordinance (NYS Legislative Commission on Rural Resources 2005)[61]. Additionally, the Town of North Hempstead code Chapter 70, Article XC[62] is provided as Model Law, which is enacted to promote and protect the public health, safety, property values and general welfare. The intent of the code is to create the flexibility, which is necessary to achieve environmentally sensitive, economically beneficial, and socially desirable development, which is more creative and imaginative in its land use and design than is possible under the more rigid, conventional regulations in place.

Cluster Development Subdivision

Specific well-designed cluster development guidelines should be in place in subdivision or zoning laws to further protect environmentally sensitive areas and to preserve open space and scenic viewsheds. These guidelines will identify clear thresholds of where and when this type of development is required and the minimum requirement for approval. Sound cluster development practices encourage builders to maximize a parcel's potential by increasing the density of new construction in one section, while leaving sensitive areas undeveloped. This particular type of development reduces the quantity of impervious surfaces. Village of Manorhaven code Chapter 133, Article II[63] pertaining to procedure for cluster development is provided as Model Law.

Zoning Overlay Districts

There are several different types of overlay districts, such as those that address flooding, wetlands, riparian buffers, special habitats, scenic view sheds, and urban design standards. Environmental Protection Overlay Districts are a type of zoning specification designed to address environmental concerns. The nature of this zoning tool, as an overlay, means it overlaps the underlying zoning districts to provide additional regulations specific to the goals of the community.

Town of North Hempstead code Chapter 70, Article XXA[64] pertaining to an Aquifer Protection Overlay District is provided as Model Law. The objective of the Town's Aquifer Protection Overlay District is to provide special protection of certain lands that have been identified as particularly critical to the present and future quality and quantity of the groundwater aquifer, which is the sole source of the Town's potable water supply.

Additionally, the Village of Sands Point Coastal Overlay Districts code, Chapter 176, Article XI[65] is provided as Model Law. The objective of this overlay district is to protect the coastline that borders the Hempstead Harbor, Manhasset Bay, and Long Island Sound shorelines.

[61] https://dos.ny.gov/system/files/documents/2019/05/plannedunitdevelopmentguide.pdf
[62] Town of North Hempstead Code Chapter 70, Article XC: https://ecode360.com/9300207
[63] Town of Manorhaven Chapter 133, Article II: https://ecode360.com/6965620
[64] Town of North Hempstead Code Chapter 70, Article XXA: https://ecode360.com/9301286
[65] Village of Sands Point Code Chapter 176, Article XI: https://ecode360.com/34190064

Wetlands

It is important to preserve natural wetlands for their stormwater retention abilities. Wetlands often lessen the need (and cost) for constructed municipal or private stormwater infrastructure. Municipalities should protect existing riparian buffers from vegetative clearing and development and re-establish riparian buffers where they have been lost.

Environmental overlay districts are one of the best ways to protect wetlands and riparian buffers at the local level. However, municipalities can also add provisions to their zoning setback requirements, subdivision regulations, sediment and erosion control laws, and site plan review process to protect these areas.

Village of Kings Point code Chapter 91[66] pertaining to Freshwater Wetlands is included as Model Law. The purpose of the Village of Kings Point's code is to preserve freshwater wetlands and adjacent areas as important assets to present and future residents of the Village.

Erosion/Sediment Control Law

Helpful guidance for implementing this law, created by the New York State Department of Environmental Conservation, is called "Specifications for Erosion and Sediment Control" (Lake Jr 2016)[67]. Village of Great Neck code Chapter 480[68] pertaining to Erosion and Sediment Control is provided as Model Law to comply with the New York SPDES program.

SWPPP Requirement

Municipalities should limit the impact of development activities through effective erosion and sediment control laws and proper enforcement of Stormwater Pollution Prevention Plans (SWPPPs) during and following construction activities. The NYSDEC's Sample Local Law for Stormwater Management and Erosion and Sediment Control can be used as a baseline model and is designed for MS4 regulated communities who need to meet Phase II SPDES requirements. Town of North Hempstead Code §46A-7[69] is provided as Model Law and indicates no application for approval of land development activity shall be reviewed until the appropriate board has received a SWPPP prepared in accordance with the specifications of that chapter.

Docks & Mooring Law, Boats and Waterways

[66] Village of Kings Point Code Chapter 91: https://ecode360.com/11007046
[67] https://extapps.dec.ny.gov/fs/docs/pdf/erosionsediment_bluebook.pdf
[68] Village of Great Neck Code Chapter 480: https://ecode360.com/6306586
[69] Town of North Hempstead Code § 46A-7: https://ecode360.com/9298098

Regulations are important if any new docks and moorings are built in the future or maintenance and repair are required on the pre-existing structures. Town of North Hempstead code Chapter 69, Article III[70] pertaining to anchorages, moorings and environmental regulations is provided as Model Law and provides regulations pertaining to anchoring of boats and vessels, boat operation, and the prohibition of discharge of sewage and litter.

Sanitary Waste or I/A OWTS

Municipalities should consider creating an additional layer of regulation at the local level to ensure systems are operating properly, such as requiring regular inspections or additional requirements for old systems. Village of Plandome code Chapter 130[71] pertaining to sewage disposal and I/A OWTS is provided as Model Law. This code indicates the continuing goal of the Village to protect groundwater and surface water resources and impacts from conventional on-site wastewater treatmentsystems that do not adequately remove nitrogen. In this code, the Village has authorized the use of I/A OWTS in lieu of conventional on-site wastewater treatmentsystems. The legislation assures the proper siting, construction and maintenance of all individual on-site wastewater treatmentsystems, and is intended to protect and preserve the Village's natural resources and potable water supply.

Sewers

Communities should carefully plan future land use and determine where this infrastructure will be needed and allowed to expand in the future and where it should be limited. Communities may also consider establishing policies that limit access to these services, thereby discouraging development in sensitive areas and preventing sprawl. Maintenance and/or improvement of existing infrastructure should be prioritized over new infrastructure. The Town of North Hempstead's code Chapter 47[72] pertaining to sewers is provided as Model Law, which includes provisions pertaining to the use of the public sewer, construction specifications, and prohibited wastes.

Steep Slopes

Development in hillside areas has the potential to disrupt the aesthetic and scenic qualities of these sites and may adversely impact surrounding properties by disrupting the surrounding natural vegetation and wildlife habitat, increasing the risk of stormwater runoff, flooding, surface erosion, sudden slope failure, and soil movement. The Village of Port Washington code Chapter 176, Article XXIII[73] pertaining to Steep Slopes Conservation Law is provided as Model Law. The objective of the code is to protect and safeguard scenic landscapes and the vegetative features of steeply sloped lands throughout the Village.

[70] Town of North Hempstead Code Chapter 69, Article III: https://ecode360.com/9299337
[71] Village of Plandome Code Chapter 130: https://ecode360.com/10899164
[72] Town of North Hempstead Code Chapter 47: https://ecode360.com/9298232
[73] Village of Port Washington Code Chapter 176, Article XXIII: https://ecode360.com/32485212

9.0 WATERSHED MANAGEMENT RECOMMENDATIONS

9.1 Introduction

This chapter of the WQIP sets forth recommendations designed to protect and restore the lands and waters draining to Manhasset Bay. It is important to note that these are just recommendations and depend on funding and commitment. Nothing included here obligates the Committee or its municipal members to complete all these recommendations. This is a roadmap of all potential recommendation actions that work to improve water quality and habitat in Manhasset Bay.

The characterization of water resources within Manhasset Bay, input from the MBPC and the public, and regulatory considerations were all considered and factored into the development of recommendations in support of improvement of water quality. The overall intent of this document is to identify those measures that can be implemented to reduce existing water quality impacts and make meaningful strides toward water quality improvement. The recommendations provided herein will be incorporated into an Implementation Plan, which will further evaluate each recommendation as well as specific improvement projects, with respect to priority in scheduling and methods for implementation. It is recognized that this WQIP update is a long-term plan that will require funding and collective resources (i.e., MBPC and municipal staff assistance, data sharing efforts, joint grant applications and shared municipal, non-profit and private entity responsibilities) to achieve optimum benefits successful implementation and the greatest improvement of the Bay's water quality.

These recommended actions focus on measures to maintain and expand the availability of Manhasset Bay for recreational uses and protecting human health, while enriching the environmental and maritime quality of the Bay Ecosystem. Achieving the community's vision will require balancing multiple factors, including economic development, water quality and habitat protection, recreation, and building resilience to a changing climate. Implementing the recommendations will require a coordinated effort across multiple levels, including federal, state, and local governments, educational institutions, not-for-profit organizations, and community residents.

The recommendations reflect a watershed-specific analysis of the natural and built environment, current water quality conditions, key sources of pollution, and existing regulatory framework. Some recommendations address improving land conditions and water resources, while others are oriented toward long-term protection. Several high priority subwatersheds were identified in the process of developing this WQIP. They are the subwatersheds that were identified as having the highest pollutant loads per Table 6-2 of the Characterization Report. These subwatersheds include Kensington, Sheets Creek N, and Stannard's Brook.

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Recommendations are organized into seven distinct categories, each identified by a unique letter code for easy reference:

B-#	**General Bay-Wide Recommendations**
S-#	**Stormwater Management**
M-#	**Municipal Facilities**
W-#	**Wastewater Management**
N-#	**Natural Resource Management**
R-#	**Water Quality Research & Monitoring**
P-#	**Watershed Planning and Management**
O-#	**Public Outreach and Stewardship**

Each recommendation is labeled with a category-specific letter followed by a number (e.g., B-1, S-3), for ease of reference in the Implementation Plan. These codes appear before the main description of each recommendation. For a full list of category codes, please refer to the section above.

9.2 General Bay Wide Recommendations (B)

This section details broad Bay-wide recommendations to improve water quality. These include systematic approaches to monitoring, controlling pollutant sources, and enhancing natural and engineered systems throughout Manhasset Bay. Recommendations address the need for frequent and comprehensive water quality testing, targeted investigations to trace inputs from stormwater, pesticides, and aging septic systems, as well as strategies for habitat restoration and infrastructure upgrades. The implementation of these actions will require coordinated efforts among local agencies, environmental organizations, and the community, ensuring that both current and emerging challenges to water quality are addressed efficiently and effectively as outlined in the recommendations that follow.

B-1:	**Comprehensive Water Quality Monitoring Program**

This recommendation is for a comprehensive water quality monitoring program to be established throughout the Bay. Currently, the Committee organizes the summer monitoring program with services offered by partners, but, in the future, a different partner may take the lead. Manhasset Bay and its tributary ponds and wetlands have been identified as impaired waterbodies under various regulatory frameworks, with existing water quality data often limited in frequency,

spatial coverage, and parameters. To address these gaps, a comprehensive water quality monitoring program is recommended to be established and expanded to include regular, systematic sampling throughout the Bay, its tributaries, ponds, and wetlands. Monitoring should occur at least 6–8 times per year, covering a range of field and laboratory parameters such as temperatures (ambient and water), clarity, salinity, dissolved oxygen, total and fecal coliform, pH chlorophyll-α, total nitrogen, total phosphorus, total dissolved solids (TDS), enterococcus, cyanobacteria counts, and other environmental conditions. Though the Committee, with the assistance of the Town of North Hempstead Bay Constables and the Nassau County Department of Health, already has an established summer monitoring program, this expanded monitoring program would go beyond the scope of this program and would likely need multiple partners, yet to be identified, to undertake. This recommendation should also incorporate climate change tracking, as called for in Recommendation **R-5**.

Ideally, sampling should be conducted at multiple locations, including high priority subwatersheds (i.e., Kensington, Sheets Creek N, and Stannard's Brook), stormwater outfalls, bathing beaches, and shellfish beds, with increased spatial coverage to include under-monitored areas. Real-time data collection and integration of continuous sensors for dissolved oxygen, temperature, and salinity are recommended to enhance the robustness of the dataset. DNA analysis of coliforms should be performed to identify sources of pathogens (e.g., human, waterfowl, pet, wildlife), and monitoring for harmful algal blooms (HABs; such as brown tide and red tide) is recommended to be included.

The expansion of water quality monitoring will provide a robust, up-to-date dataset for tracking and recognizing trends, identifying pollution hotspots, and evaluating the effectiveness of management actions. Enhanced monitoring will enable adaptive management and rapid response to water quality events (e.g., algal blooms, HABs, fish kills, pathogen spikes), support compliance with regulatory requirements, and strengthen grant applications. Data collected will also inform targeted restoration and management actions for tributary ponds and wetlands, which may act as either pollutant sources or sinks for Manhasset Bay. Recommendation **R-6**is to utilize a centralized portal for all data collected to be organized and evaluated (see).

This program should be coordinated with municipal mapping and maintenance efforts, as identified in Recommendation **M-1**, and should incorporate citizen science and community-based monitoring initiatives, as Recommended in **R-4**, to expand coverage and community engagement. Seeking funding or expansion of volunteer efforts, including younger generations, will further assist in identification of remedial actions and reduce environmental stress on the ecosystem.

B-2:	Expand Water Quality Sampling to Include Pesticides Coming From Outfalls

It is recommended that a new program to monitor for pesticides (which includes herbicides, insecticides, etc.) in stormwater runoff entering the Bay from outfalls be explored as community concerns have been raised regarding pesticide runoff from residential and landscaped properties surrounding Manhasset Bay and the impact to human health through primary recreation. Additional work is needed to identify lead and supporting partners for this project. Pesticide use for lawn care, mosquito control, and tick management may contribute to water quality degradation, especially in residential areas, golf courses, and parks. Initial pesticide screenings should be conducted at key stormwater outfalls, particularly in areas with dense residential development or proximity to golf courses and parks. Sampling locations should be selected based on upland land use and runoff potential. Based on these results, public education efforts and municipal management practices can be targeted.

B-3:	Investigate Septic System Contributions to Pollution

The exact contributions and hot spot locations of pollution, especially pathogens, from on-site wastewater systems are unknown, so this recommendation aims to address that, though the exact partners have not yet been identified for this undertaking. Certain shoreline neighborhoods around Manhasset Bay rely on aging or failing septic systems, especially in areas with shallow groundwater and poorly drained soils. Note that some of these areas have under drain systems that move septic discharges directly to the Bay. Sewering of unsewered areas is recommended, particularly areas of highest density including Kings Point (which incorporates three subwatersheds), - Sands Point (in the North East Shore and Sheets Creek East subwatersheds), Manhasset (in the Whitney Pond subwatershed), the Plandomes (in the Leeds Pond and Plandome Heights subwatersheds), and portions of Port Washington (in the Mill/Baxter Ponds subwatersheds) - are unsewered and consist primarily of older homes on aging cesspools and septic systems.

To prioritize areas, microbial source tracking (MST) studies (also recommended in **R-1** and **B-1**) and targeted inspections of areas identified as high-priority are recommended to identify human-sourced pathogens. Outfalls and culverts in vulnerable neighborhoods should be evaluated for

direct sanitary inputs, particularly the highest density areas with high groundwater conditions. Sampling during peak usage and significant storm events to capture "first flush" conditions may help identify overflow conditions. Additionally dry weather monitoring can also help identify significant issues for areas of shallow groundwater and high-density residential uses. Recommendations for system upgrades or connections to sewer infrastructure should be encouraged and developed based on findings, including prioritization of the most vulnerable areas and applying for grant funding based on documented water quality issues. This investigation could help prioritize areas for sewer expansion and legacy on-site wastewater elimination as called for in Recommendations **W-1, W-2,** and **W-3**.

B-4:	**Feasibility Study to Evaluate Use of Aeration Systems in Stagnant Areas of the Bay**

It is recommended that a partner or partners undertake a feasibility study to investigate the possible use of aeration systems around the Bay. Stagnant zones within Manhasset Bay, particularly near enclosed coves or marinas, may benefit from aeration systems to improve circulation and oxygen levels. Aeration can promote aerobic bacterial activity and reduce anaerobic pathogen persistence. A feasibility study should be conducted to assess potential locations and system types to determine feasibility and prioritization of areas in greatest need. Case studies from other regions (e.g., Shinnecock Bay, New Jersey estuaries) may provide useful models.

B-5:	**Support Shellfish Restoration and Other Bioextraction Programs**

Through the Committee, Town of North Hempstead, and other partners, it is recommended that shellfish restoration programs be continued and, where feasible, expanded in the Bay. Shellfish restoration offers a nature-based solution to improve water quality through filtration. Though it can take decades to see results, expansion of already existing shellfish seeding programs as well as introducing new programs in Manhasset Bay should be prioritized, in coordination with NYSDEC and local hatcheries. Funding and partnerships with academic institutions (including State University of New York, Stonybrook) and environmental organizations can help sustain these efforts and bring in volunteers in different age groups. Similar programs have been successful in the Town of Islip and Southampton that can be consulted for process and lessons learned. Partners may also consider other forms of nutrient bioextraction, such as sugar kelp farming. Seeking grant opportunities to support these initiatives will likely be important.

B-6:	**Manage Nuisance Waterfowl Populations and Pet Waste to Reduce Pathogen Inputs**

It is recommended that the Committee partners work to manage nuisance waterfowl populations and public feeding practices and offer public education and programs for proper pet waste disposal throughout the watershed. Nuisance waterfowl, particularly geese, are known contributors of pathogens to surface waters. Therefore, managing nuisance waterfowl populations by reducing favorable conditions for nuisance waterfowl to congregate near surface water on private and public lands can assist in improving water quality. Management strategies should include habitat modifications (e.g., vegetated buffers, fencing), public education, and coordination with existing MS4 programs. Local ordinances prohibiting feeding of waterfowl and outreach to homeowners can help reduce congregation and associated water quality impacts. Teaming with local municipalities and community and youth groups, the MBPC and other resources may be a good resource for training and implementation of goose and nuisance waterfowl management programs for municipal parks, golf courses and waterfront open spaces and to assist in reducing the costs for implementing such programs. Additionally, goose/ nuisance waterfowl management can be accomplished through volunteer efforts and reaching out directly to large local landowners (particularly golf courses and properties with large open lawns) with educational materials and training. Adoption of local laws prohibiting the feeding of waterfowl on public lands, as called out in Recommendation **O-1**, and providing educational material and signage regarding the issues associated with feeding of waterfowl can also help the public gather greater understanding of the issue.

Similarly, educating the general population on the importance of cleaning up and properly disposing of pet waste is also important to reduce pathogen inputs to surface waters. Leaving pet waste on lawns allows for increased nutrients and pathogens to enter surface waters either by stormwater runoff or via groundwater (particularly in areas with shallow depths to groundwater). Educational material could also be developed for local homeowners/property owners regarding the importance of pet waste management and methods to control goose/ nuisance waterfowl on their properties. Such materials can be distributed through partners, municipalities, local schools, markets, and pet food stores. Additionally, installation of pet waste bag stations at parks, waterfront trails and public places with educational signage is a low-cost approach to reach a larger population of residents and provide easy access to bags to clean up and dispose of waste on the spot. If it is not already enacted, municipalities are encouraged to consider pet waste laws for their communities.

B-7:	Conduct a Tidal Flushing and Circulation Study for Manhasset Bay

This recommendation is for the Committee to conduct a tidal flushing and circulation (hydrodynamic) study of Manhasset Bay. Understanding circulation patterns and residence times within Manhasset Bay is critical to addressing pollutant retention and water quality impairments. A hydrodynamic study should be conducted to map tidal flushing, identify stagnant zones, and model pollutant transport. This information will inform future restoration and infrastructure planning, including stormwater retrofits and habitat enhancements.

B-8:	Investigate Areas for Removal of Sediment from Manhasset Bay

The extent, composition, and water quality impacts of accumulated sediments throughout Manhasset Bay are not fully understood, particularly outside of areas that have been recently investigated for navigation-related dredging. Sediment accumulation can contribute to degraded water quality by reducing water depth and circulation, increasing residence time, promoting resuspension of fine sediments and associated nutrients or contaminants, and impairing benthic and marsh habitats. This recommendation focuses on advancing a more comprehensive understanding of sediment conditions and their relationship to water quality, habitat function, and long-term Bay resilience, while acknowledging that full-scale sediment removal is constrained by funding and disposal limitations.

Field investigations should be expanded in the northeastern and lower portions of the Bay, building on work already completed near Town Dock and northward, to include updated bathymetric surveys, sediment sampling, and biota and species diversity assessments. These investigations should evaluate sediment grain size, organic content, and potential nutrient or contaminant associations, with the goal of identifying areas where sediment accumulation is contributing to poor water quality, reduced dissolved oxygen, or loss of ecological function. Sediment characteristics that link to water quality conditions will need to be identified as it would be critical in supporting future management and funding decisions.

A dredging and sediment management feasibility assessment should be revisited and updated, recognizing that prior feasibility studies were completed many years ago and may no longer reflect current conditions, regulatory requirements, or disposal options. While the cost of dredge spoil disposal has historically limited dredging activities in Manhasset Bay (particularly beyond

navigation channels) and the Bay no longer benefits from USACE federal channel maintenance, an updated assessment could evaluate alternative sediment management approaches. These may include beneficial reuse of suitable sediments for marsh restoration or shoreline resilience projects, thin-layer placement, or targeted removal in areas where sediment accumulation is directly linked to water quality impairments.

Environmental permitting efforts with NYSDEC and USACE are currently underway for dredging near Town Dock and adjacent areas, supported by FEMA Sandy recovery funds and Town of North Hempstead capital funding. Additional permitting and planning efforts should be informed by updated field data and coordinated with ongoing and future projects to maximize environmental benefit and avoid piecemeal implementation. Although DOS does not fund sediment removal directly, sediment investigations and planning efforts may support complementary funding applications and interagency coordination.

Potential funding sources should be identified to support the development and implementation of a comprehensive sediment and water quality sampling plan, including state and federal resilience, habitat restoration, or climate adaptation programs. Securing funding for data collection and analysis is a critical first step toward understanding the role of sediment accumulation in bay-wide water quality trends and prioritizing future actions.

B-9:	**Identify Areas for Open Space Preservation**

It is recommended that areas of open space be preserved when feasible. Preservation of open space allows for stormwater infiltration, reductions in impervious surface cover, nitrogen attenuation, and natural stormwater filtration. This also allows for the opportunity to bring in local community members and youth organizations to assist in the identification of local lands for preservation. Once areas for conservation are identified, municipalities and other entities can coordinate with the NYSDEC for potential land conservation.

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9.3 Stormwater Management (S)

This section outlines targeted recommendations to address stormwater impacts through the implementation of green infrastructure techniques, outfall retrofits, pre-treatment practices, and maintenance of existing stormwater infrastructure. These recommendations are designed to reduce pollutant loads, enhance infiltration, and promote sustainable watershed practices. Recommendations **S-1** through **S-7** are general recommendations, meant both to explain the practices and for consideration for implementation throughout the watershed. Project recommendations **S-8** through **S-19** are site-specific, targeted recommendations to improve water quality in their respective watersheds. These projects have been identified to have the most impact on the water quality of Manhasset Bay.

S-1:	Green Infrastructure: Install Rain Gardens Throughout the Watershed

It is recommended that rain gardens be installed at strategic locations throughout the watershed, prioritizing areas with high impervious surface, direct stormwater discharges to surface waters, and proximity to sensitive waterbodies. Green infrastructure is recommended to be designed to capture and treat at least the "first flush[1]" of stormwater runoff of regularly occurring storms (which are defined by the 2024 *NYSDEC Stormwater Management Design Manual* as a 1.5 inch rainfall event or less from contributing impervious areas. Design elements including the following are recommended for green infrastructure installations:

- Use of native, deep-rooted plants tolerant of both wet and dry conditions to maximize infiltration and pollutant uptake.
- Incorporate engineered soils and underdrains as needed to ensure adequate drainage, especially in areas with compacted or poorly draining soils.
- Include pretreatment features (e.g., grass filter strips, stone aprons, designed forebays) to trap sediment and debris before water enters the practice.
- Include maintenance plans and allocated budget for watering during the initial establishment of vegetation and upkeep for a minimum of three years (after which plants are typically mature enough to reduce maintenance requirements).

[1] At the beginning of a storm, the first rainfall that hits an impervious surface carries the most pollutants because it picks up the accumulated litter, hydrocarbons, chemicals, debris, and other pollutants as it travels, untreated, towards Manhasset Bay.

Green Infrastructure practices are beneficial because they reduce stormwater runoff volumes and pollutant loads, improve water quality, provide habitat for pollinators, enhance neighborhood aesthetics, and support climate resilience. They are a cost-effective, community-friendly solution that can be integrated into both public and private landscapes. Installation can utilize volunteers from local community and youth groups to get local buy-in to the practices. Rain gardens will require periodic maintenance in order to sustain their ecological and stormwater benefits. Maintenance includes mulching as needed, inspection of practice every six months for erosion and clogged inlets and outlets; and removal of invasive species and weeds. Typically, a watering program for the first establishment year as well as monitoring for plants that need to be replaced is encouraged for long-term success. It is also recommended to utilize existing programs that incentivize green infrastructure.

S-2:	**Green Infrastructure: Streambank Stabilization**

It is recommended for streambank stabilization as it helps prevent erosion by reinforcing stream edges, especially where vegetation is sparse, slopes are steep, or high volumes of runoff occur from surrounding upland land-uses. Stabilization aids in intercepting runoff, reducing stormwater velocity, and trapping sediment before it reaches waterbodies. Key locations such as Whitney Pond Park (Whitney Pond subwatershed), Stannards Brook (Stannards Brook subwatershed), and Leeds Pond (Leeds Pond subwatershed) tributaries would benefit from such measures.
Stabilization methods fall into two main categories:

- Bioengineering techniques – use of combined living plant material and other natural materials (e.g., live stakes, coconut fiber rolls)
- Vegetative stabilization techniques – use of predominantly living plant and their root structures for stabilization(e.g., planting buffers)

Combining these approaches—such as using vegetated slopes with strategic placement of whole trees in channels—may enhance long-term streambank resilience and ecological health. Installation can utilize volunteers from local community and youth groups to get local buy-in to the practices. Typical maintenance will include monitoring and repairing erosion throughout the stabilized area, especially during major storm events during it's first establishment year. Vegetative management will include control of invasive / weedy species and addressing gaps in vegetative cover over time.

S-3:	Green Infrastructure: Bioswales Along Right-of-Ways

It is recommended that bioswales be installed along right-of-ways. Newer development projects typically incorporate stormwater management practices while legacy roadways and infrastructure without stormwater controls remain a priority for improvement. Bioswales, like rain gardens, are effective strategies for capturing and treating the "first flush" of stormwater runoff from roads and other impervious surfaces. These systems help intercept pollutants before they reach surface waters or overwhelm storm drains during heavy rain events.

Bioswales are particularly well-suited for areas with limited space due to slope, narrow rights-of-way (ROW), or other physical constraints. Incorporating rain guardians[2], an inlet pretreatment solution, can further enhance the bioswales performance by simplifying sediment and debris removal to a centralized location within the guardian and preventing sediment and debris from entering sensitive ecosystems. The efficiency of the pretreatment solution is contingent upon regularly scheduled cleanings of the rain guardians throughout the year. Maintenance for rain guardians should be routinely done at least every six months to ensure proper functioning of the bioswales. Regularly inspect all inlets / outlets for blockages, and remove debris, organic material and trash from guardians. Bioswale vegetative maintenance will be similar to rain garden management, by removing invasive / weedy vegetation; watering during the first establishment year; and inspecting for erosion throughout the practice.

Pretreatment Rain Guardian Models include:

- **Bunker:** This model is ideal for residential streets. Its rectangular design makes cleanout and maintenance easy and quick. Designed for garden depths of 12" but can be modified for bioretention practices deeper or shallower (as shown in *inset image 9-1*).
- **Turret:** With a larger internal storage capacity, the Turret is ideal for high traffic uses, such as commercial parking lots or industrial application (as shown in *inset image 9-2*).
- **Foxhole:** This model is ideal for re-routing runoff underneath walkways, bike paths and boulevards, without obstructing traffic-flow (as shown in *inset image 9-3*).

[2] A Rain Guardian is a precast stormwater pretreatment chamber designed to intercept sediment, debris, and trash before runoff enters the stormwater practice. The chamber can be retrofit or installed into new practices, while allowing for centralized maintenance of debris collection to improve the functionality of stormwater practices.





Inset Image 9-1 Bunker green infrastructure practice, inset image 9-2 Turret green infrastructure practice, inset image 9-3 Artist rendering of a Foxhole green infrastructure practice. All image sources: Rain Guardian

S-4:	**Green Infrastructure: Permeable Pavement**

It is recommended that permeable pavement, a type of green infrastructure that manages stormwater runoff by allowing rainwater to infiltrate through the surface into underlying layers of soil and gravel, be utilized. These alternative pavements come in multitudes of options that can fit different municipal maintenance requirements, ADA-compliance and infiltration needs. In addition to reducing runoff, permeable pavers can aid in pollutant filtration, reduce the need for road salt, and alleviate construction costs related to conventional drainage improvements. Public permeable pavement installations should be considered within parking lots, walkways and trails, street parking, roadways and overflow parking locations. Installation can also be considered for private driveways. Routine maintenance should be done one to four times a year depending on need and pavement type. Maintenance includes weeding as necessary and vacuum sweeping to prevent clogging, especially in the fall/winter months. In the winter, sand should be avoided as to not clog pervious joints.



Inset Image 9-4 Interlocking permeable pavers, Source: NPV

Permeable pavement options include, but are not limited to:

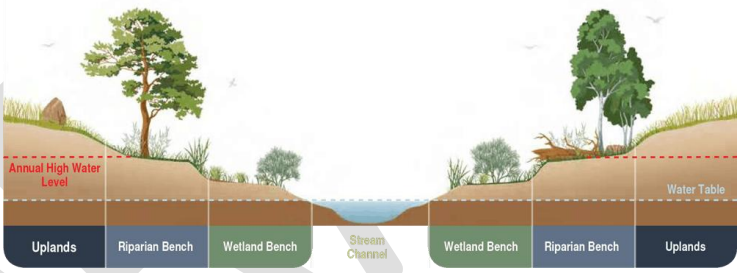
- Pervious Concrete
- Interlocking Pavers (As shown in *inset image 9-4*)
- Plastic Grid Pavers
- Pervious Asphalt

S-5:	Outfall Retrofits

It is recommended that outfall retrofits include modifying existing stormwater infrastructure to accommodate new stormwater treatment practices to reduce rainwater velocity, improve infiltration, reduce pollutant and debris loading, control flooding from large rain events, and reduce erosion along banks. Incorporating stormwater treatment practices increases the health of aquatic life, streams and other receiving waterbodies by addressing issues directly at the point of discharge. Several nature-based practices can be constructed but are widely dependent on space available for the practice, level of erosion, and treatment needed.

Nature-Based Stormwater Treatment Practices include:

- **Channel Reshaping**: This solution is ideal if there is enough space to widen the channel for vegetation and there is a need for additional stormwater storage space. Excavate the channel from a "V" to "U" shape with vegetative floodplain benches to provide additional stormwater storage (as shown in *inset image 9-5*).



Inset Image 9-5, Source: Streamhandbook.org

- **Stepped Pool Conveyance System**: This system is ideal for large open areas with steep slopes and high erosion. Engineering a constructed channel reduces high-energy surface flow to low-energy rainwater that can percolate through a series of pools within boulder steps (as shown in *inset image 9-6*).



Inset Image 9-6 Stepped Pool Conveyance System: NPV

- **Constructed Wetland**: This solution is ideal for locations where there is standing water and a need for high pollutant removal, especially suspended solids and nitrogen. The subwatersheds of Kensington and Sheets Creek North can benefit from utilizing this practice throughout their subwatersheds. This system utilizes wet-tolerant species to uptake pollutants within a gravel-filled basin before it overflows into the waterbody (as shown in *inset image 9-7*).



Inset Image 9-7 Constructed Wetland ,Source: NPV

  Specific maintenance includes checking pipes for proper water flow into the vegetative treatment area. Routine inspections of inlets/outlets, banks and sediment forebays are crucial for the performance of the constructed wetland. Vegetative management will include mowing and monitoring for woody, weedy and invasive vegetation within the practice.

It is recommended that outfall stabilization is constructed to protect receiving waterbodies from erosion. Concentrated discharge flows at an outfall can generate high velocities and turbulence that erode channel beds, banks, undermine structures and transport sediment downstream. The following strategies reduce stormwater flow and minimize ongoing erosion.

Outfall Stabilization and Erosion Control include:

- **Rock Revetments:** This solution is ideal for outfalls experiencing erosion at the base with limited space for retrofits.
- **Plunge Pool**: This solution is ideal for reducing high-velocity water discharging from pipe to prevent scouring. It should be utilized with other practices, such as swales, wetland or bioretention areas to increase water quality improvement.
- **Level Spreader**: This solution is ideal for diverting flows into a stable, gentle-to-moderately sloped area. Converts concentrated flows by distributing runoff into a vegetative non-erosive sheet flow.

All outfall retrofits and erosion control measures should be monitored, especially if flooding upstream occurs. During the first year establishment period, the practices should be monitored for erosion and structural integrity of any earthwork, especially after a heavy storm event.

Natural erosion control measures, such as jute mesh for vegetative improvements, are encouraged as they biodegrade as plant roots are being established. Where bare areas are found, hydroseed or reseed as necessary. Monitor outfall pipes and ensure the structures are clear of debris and properly armored by riprap to dissipate energy.

S-6:	**Pre-Treatment Practices**

Pre-treatment proprietary practices are recommended for integration with existing grey practices. Newer development projects typically incorporate stormwater management practices while legacy roadways and infrastructure without stormwater controls remain a priority for improvement. These are manufactured systems designed to capture stormwater runoff and remove debris, sediment, and pollutants to provide water quality control before they enter a larger treatment practice downstream. These practices can often be utilized in urban settings with small spaces or as retrofit options for sites that lack the space for green infrastructure practices. All proprietary practices will require regular inspections for sediment removal, filter replacement and debris clearing. Maintenance is dependent on the device type and severity of site conditions; however manufacturer's manuals should be the primary source for maintenance schedules.

NYSDEC Approved Proprietary Practices include:

- **Hydrodynamic systems:** This system incorporates gravity or vortex separators that are ideal for removal of course particles, small drainage areas, and effective in offline configurations.
- **Wet Vaults:** This system utilizes permanent pools that promote settling of particulates. It can be manufactured to fit a variety of water quality volumes or flow rate, sediment capacity, and incorporate bypass.
- **Median Filters:** This system utilizes surface or subsurface practices containing filter beds for the absorption and adsorption of pollutants. A range of media are available for the filter beds to combat specific pollutants from stormwater runoff.
- **Underground Infiltration Systems:** This system incorporates prefabricated pipes and vaults to capture and infiltrate runoff. It is ideal for sites that prioritize space saving.

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S-7:	Culvert & Drainage Maintenance

It is recommended that culvert and stormwater drainage systems be regularly inspected, repaired and cleaned to ensure proper drainage and prevent flooding in the event inlets or outlets get blocked. This task should be added to municipal DPW operations who own the culvert or drainage system. Potential environmental concerns of damaged or clogged culverts include discharge of sediment and debris into storm drainage systems or streams. This could alter flows, causing flooding or wash out in roads. Additionally, fish passage can be blocked from debris within inlets.

Maintenance can be done in all weather and should include:

- Removing debris, trash and vegetation from inlets, outlets, and culverts (also recommended in **S-8**)
- Clearing sediment from swales
- Checking for damages, cracks or offset joints
- Repairing damaged passing devices (culverts, siphons, box culverts, catch basins, drop inlets)
- Using backhoe or high-pressured hoses and/or vacuums to clear blockages.

9.3.1 Site-Specific Stormwater Improvement Projects – Selection Methodology

The overall watershed area was assessed to identify specific stormwater management improvement opportunities utilizing the above described stormwater management techniques. Site-specific projects were identified, and green infrastructure solutions and/or stormwater retrofits were assessed based on various site-specific conditions and opportunities to capture stormwater runoff, increase infiltration and provide pollutant load removal from stormwater runoff to key locations within the watershed. Priority was given to areas that included potential point sources of stormwater pollutants (as shown in **Figure 5-4a-c**), coastal risk areas (as shown in **Figure 7-2**), areas vulnerable to sea level rise (as shown in **Figure 7-1**), and areas that were identified as having the highest pollutant loads per **Table 6-2** of the Watershed Characterization Report. Based on these factors, the analysis of priority stormwater improvement areas identified but were not limited to four key quadrants to focus site-specific stormwater management projects:

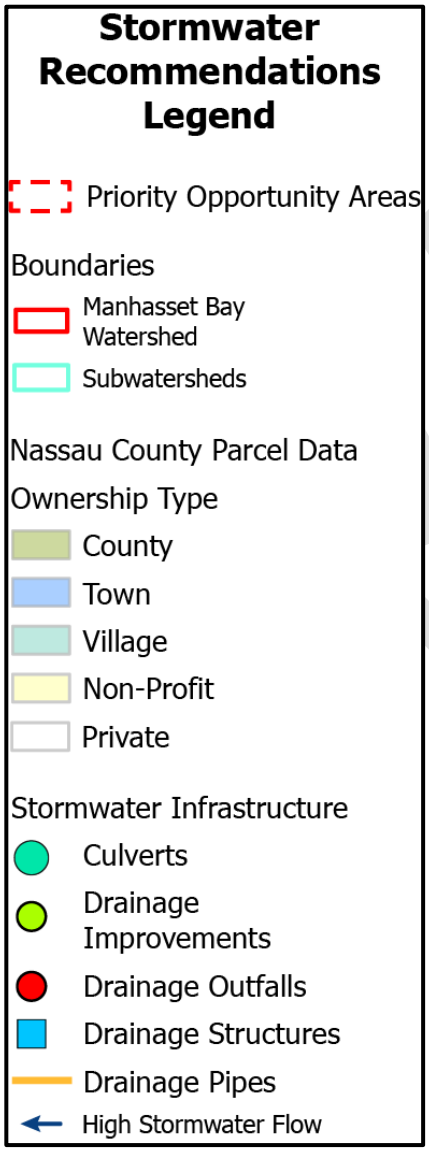
1. **Northeastern portion of the watershed** encompassing Sheets Creek N, Sheets Creek E, Mill/Baxter Ponds, and the northern portion of the Stannard's Brook subwatersheds

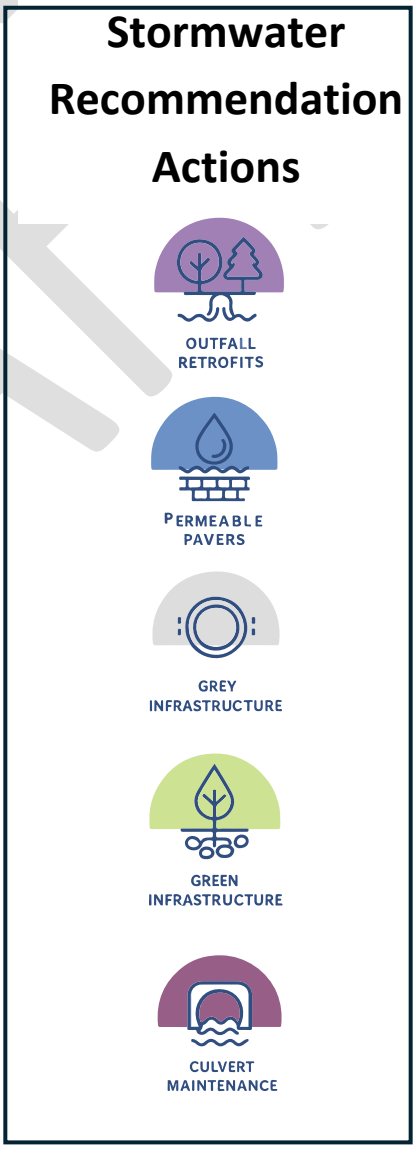
2. **Eastern portion of the watershed** surrounding Leeds Pond within the Leeds Pond subwatershed
3. **Southern portion of the watershed**, primarily within the Plandome Heights and Whitney Pond subwatersheds, in addition to the southeast portion of Kings Point Creek subwatershed and eastern portion of Kensington subwatershed.
4. **Northwest portion of the watershed**, primarily within the Mitchells Creek subwatershed and surrounding Kings Point Pond.

Once the four quadrant focus areas were identified, project areas within these quadrants were selected based on public and the Protection Committee input, a stormwater flow accumulation assessment model, field reconnaissance, and availability of land area to install various potential stormwater management improvements options. The stormwater flow accumulation model is a Geographic Information System (GIS) based modeling software that uses the 1 -foot Digital Elevation Model (DEM) mapping and land use data from NY State GIS data[3] to model stormwater contributing areas, direction and the amount of stormwater runoff generated and the peak stormwater discharge locations to areas/surface waters within the various subwatersheds. The flow accumulation model then maps a hierarchy of the stormwater tributary flows using the stream order function[4]. The model identifies the most significant areas of stormwater accumulation and flow, which was then used to prioritize areas in greatest need of stormwater management improvements. The stormflow accumulation analysis was completed for the entire watershed, which ensures that key stormwater improvement areas (areas with the greatest potential to capture significant quantities of stormwater runoff) are targeted, as these represent the greatest opportunities for pollution load reduction to the Bay and its contributing surface waters. The flow accumulation model is provided in **Figure 9-1**. This information was utilized in conjunction with mapping of existing stormwater drainage infrastructure to determine what areas were most suitable for potential green infrastructure or retrofit improvement projects. Potential improvement projects were also focused on locations based on the availability of publicly owned land and public road or drainage right of ways. Maintenance of existing structures and green infrastructure practices are encouraged as primary recommendation types, although grey infrastructure is recommended where green infrastructure is not appropriate due to space availability constraints within public land and right-of-ways.

[3] NPV completed a flow accumulation analysis using the land use, LiDAR topography, and stormwater outfall data (outlined in the Watershed Characterization Section of this report).
[4] Stream order creates a hierarchy of stormwater flow by assigning a numeric value to the stormwater flow paths and classifies the stormwater flows based on the amount of accumulation from the surrounding contributing areas.

The identified specific stormwater improvement project locations are described below and presented in **Figure 9-2**. Each opportunity area is described below, including the key issues for the area, specific stormwater improvement project opportunities (both short term and long term), project benefits and the estimated costs associated with the specific project recommendations. Symbols representing the types of potential stormwater management opportunities (described in detail above) are provided for each location for easy reference. A key map is provided for each location, and a project specific figure is provided for each location that identifies the publicly owned lands, existing drainage infrastructure, tax parcel outlines and stormwater flow accumulation directional arrows. The legend below is applicable to all the site-specific projects presented below:





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Project ID: S-8: Sheets Creek Coastline and Watershed Activities	Priority: High	Cost: $, $$, $$$
Subwatershed: Sheets Creek N/E	**Location:** Manorhaven Coastline / Sheets Creek	



Key Issues:
Foul odors, algal blooms, high bacteria counts, and loss of tidal wetlands vegetation (spartina) due to stormwater impacts, illicit discharges and shoreline erosion. High coastal risk in Sheets Creek.

Project Description/Action (Cost Per Recommendation): *The numbers shown on the map above identify project locations and correspond directly to the numbered project descriptions and actions listed below.*

GREEN INFRASTRUCTURE

OUTFALL RETROFITS

1. Promote property owner/municipal best management practices (BMPs) (reducing fertilizer/pesticide use on lawn areas, educating the public on sustainable lawn maintenance and alternative landscapes, wetland buffers, native lawn alternatives; this connects with Recommendation O-1). $ (Short-term)
2. Complete regular outfall screening/illicit discharge detection; enhance enforcement of illicit discharges from adjacent/nearby commercial uses that directly discharge/overflow to municipal drainage systems. $ (Short-term)
3. Investigate the feasibility of mussel mats within Creek. $$ (Installation, Long-term), $/Year (Maintenance, Long-term)
4. Locate culvert under Manhasset Avenue connecting Sheets Creek North and East and clean out to restore functionality $/Year (Maintenance, Short-term)
5. Install end of street rain gardens, remove invasive phragmites from adjacent wetlands/sediment basin on the east end of Sheets Creek and revegetate/stabilize shoreline areas with spartina/native species. $$$ (Installation, Long-term). See **S-1/2** for maintenance/monitoring guidance. $/Year (Maintenance, Long-term)
6. Install additional green infrastructure within parking lots adjacent to Sheets Creek. $-$$ (Installation, Long-term). See **S-1** for maintenance/monitoring guidance.

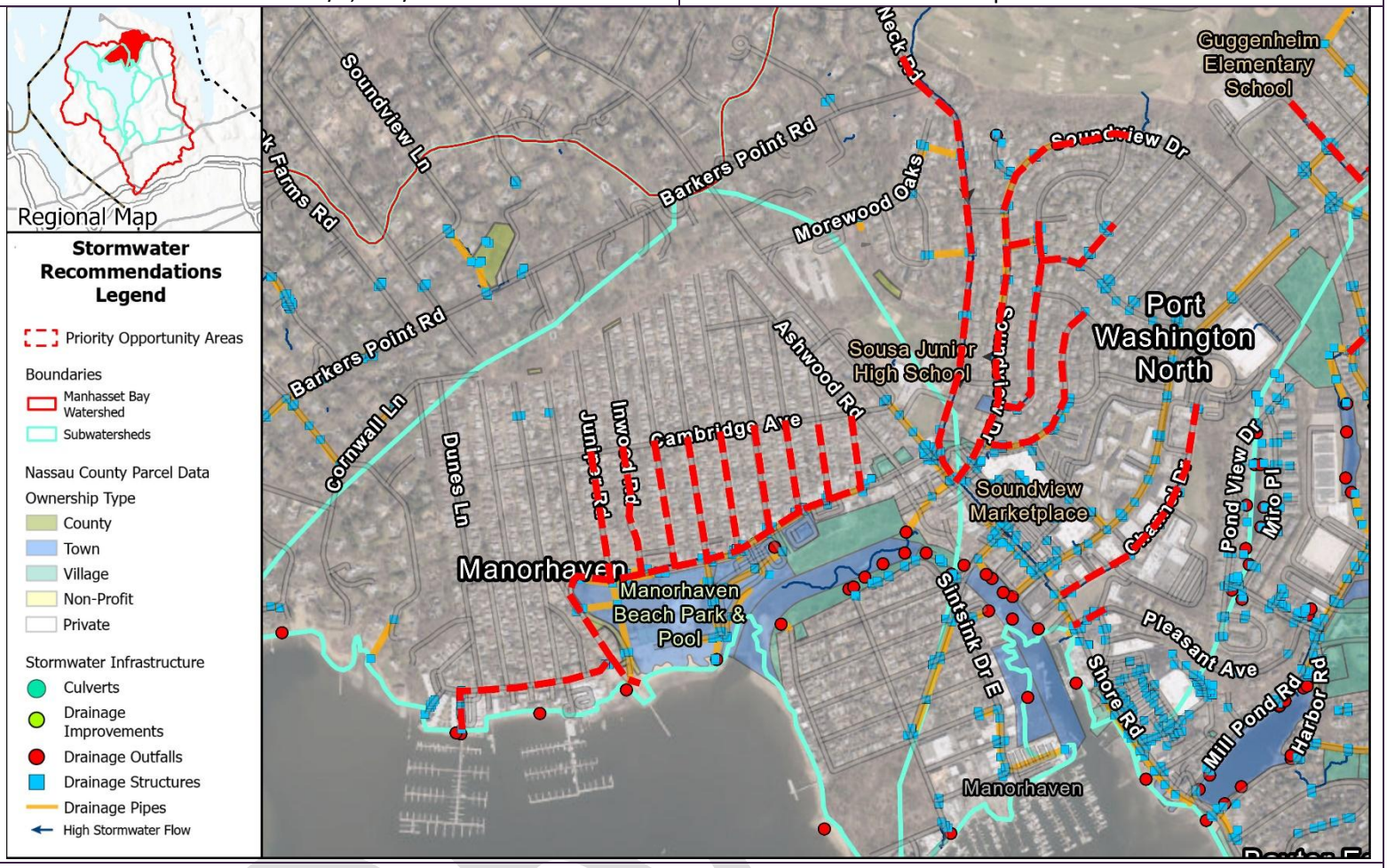
7. Wetland/shoreline restoration at Sagamore Hill Dr. and Sintsink Dr. E & W street ends. $-$$ (Installation, Long-term). See **S-2** for maintenance/monitoring guidance. $/Year (Maintenance, Short-term)
8. Conduct continuous water quality sampling at significant outfalls. $/Year (Long-term)

Benefits:

- Reduce pollutant loads, improve infiltration, and flood and erosion control.
- Increase climate resilience.
- Increase community engagement/stewardship.

DRAFT

Project ID: S-9: NE Residential Area Stormwater Abatement	Priority: High	Cost: $$$
Subwatershed: Sheets Creek N/E, Mill/Baxter Ponds	**Location:** Residential Developments	



Key Issues:
Stormwater runoff, legacy high density/high impervious lot coverage, fertilizer/pesticide use, nuisance waterfowl/pet waste management, floatable debris, illicit discharges, and skeet shooting debris (associated with various clubs on the Bay).

Project Description/Action (Cost Per Recommendation): *The numbered project descriptions shown below apply to all priority opportunity areas shown on the map above.*

GREEN INFRASTRUCTURE

1. Create rain gardens and bioswales along rights-of-way where possible, or retrofit existing drainage systems with off-line hydrodynamic separators/media filter inlet inserts in above identified commercial and residential areas that directly discharge into Manhasset Bay. $-$$$ (Installation, Long-term). See **S-1/3/6** for maintenance/monitoring guidance. $/Year (Maintenance, Long-term)
2. Promote property owner/municipal BMPs (reducing fertilizer/pesticide use on lawn areas, educating the public on sustainable lawn maintenance and alternative landscapes, wetland buffers, native lawn alternatives). $ (Short-term)
3. Create and distribute educational materials to landscapers and landowners about the importance of proper fertilization practices and their effect on water quality. This recommendation links to Recommendations **P-7** and **O-1**. $ (Short-term)
4. Encourage volunteer cleanups along the shorelines, especially through yacht club youth clubs. $ (Short-term)
5. Continue and, where possible, expand programs such as the Town's Rain Barrel Program and others to capture rainwater from residences and other properties. $ (Short-term)

Benefits:

- Reduce pollutant loads, improve infiltration, and increase flood and erosion control
- Increase climate resilience through community engagement/stewardship programs. Support community awareness of water quality within their subwatershed.

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Project ID: S-10: Shore Rd Actions	Priority: High	Cost: $, $$
Subwatershed: Mill/Baxter Ponds	**Location:** Main Street, Sunset Park	



Key Issues:
Plastic litter being carried through stormwater conveyance systems, resulting in discharges to the Bay and surrounding waterfronts.

Project Description/Action (Cost Per Recommendation): *The numbers shown on the map above identify project locations and correspond directly to the numbered project descriptions and actions listed below.*

GREY INFRASTRUCTURE

1. Install Bandalong-style litter traps, new trash receptacles that better secure trash, maintain and regularly empty the receptacles, and launch a signage/public education campaign. $ (Construction, Short-term), $/Year (Maintenance, Long-term)

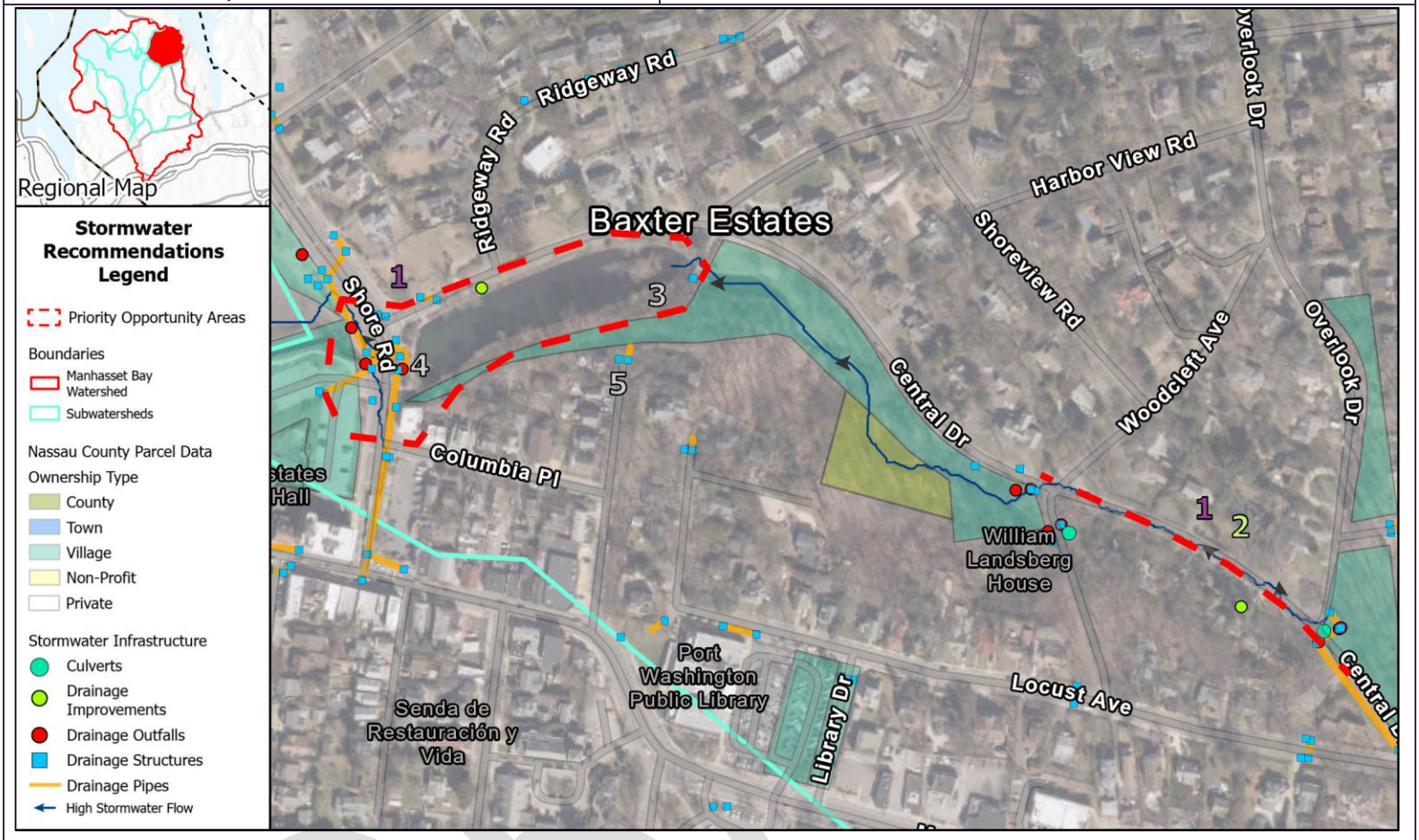
GREEN INFRASTRUCTURE

2. Install hydrodynamic separators in stormwater drainage system connected to outfalls. $$ (Construction, Mid-term). See **S-6** for maintenance guidance. $/Year (Maintenance, Long-term)
3. Install green infrastructure practices within Sunset Park along Main Street to divert runoff from catch basins attached to outfall. $$ (Construction, Mid-term). See **S-1** for maintenance/monitoring guidance. $/Year (Maintenance, Long-term)

Benefits:

- Provide public awareness to the issue of litter collection within the bay and public spaces.
- Improve water quality through the utilization of systems that can be retrofit into existing drainage systems.
- Prevent future debris/vegetation build-up with proper inlet retrofit options and regular maintenance.
- Improve water quality through improved water flow and removal of debris/trash/sediment from Ponds.
- Capture excess rainwater and debris/trash improves drainage system functionality and reduces the amount of debris and trash entering drainage systems, the Pond and ultimately the Bay.

Project ID: S-11: Baxter Pond Watershed Stormwater Abatement	Priority: High	Cost: $, $$
Subwatershed: Mill/Baxter Ponds	**Location:** Baxter Pond	



Key Issues:
Floatables on beaches and clogged stormwater inlet grates/collection systems discharging to both Mill and Baxter Ponds.

Project Description/Action (Cost Per Recommendation): *The numbers shown on the map above identify project locations and correspond directly to the numbered project descriptions and actions listed below.*

CULVERT MAINTENANCE

1. Coordinate with Nassau County and the Village of Baxter Estates to remove sediment/trash/floatables and regularly maintain stormwater infrastructure. See **S-7** for maintenance/monitoring guidance. $/Year (Maintenance, Long-term)

GREEN INFRASTRUCTURE

2. Green infrastructure with rain guardians along Central Drive, as space allows, to collect debris before reaching catch basins. $$ (Construction, Mid-term). See **S-3** for maintenance/monitoring guidance. $/Year (Maintenance, Long-term)
3. Retain debris dragged by stormwater from Baxter Creek, using methods such as an upstream dam. $$$ (Construction, Mid-term). $/Year (Maintenance, Long-term)

GREY INFRASTRUCTURE

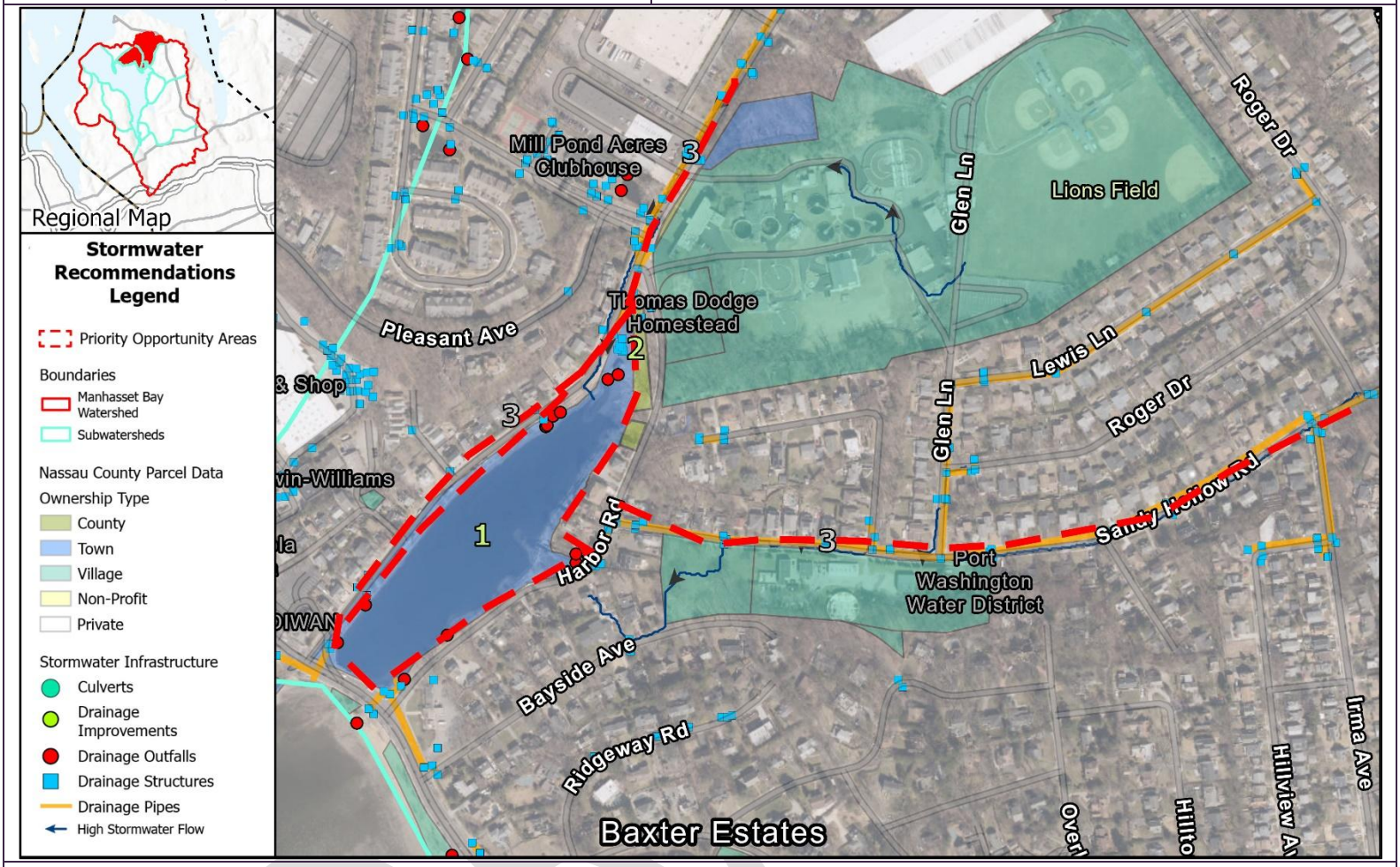
4. Reshape the "stepped pool" Baxter Pond outfall to balance reducing stormwater erosion and minimizing low tide pools. $$ (Construction, Mid-term). $/Year (Maintenance, Long-term)
5. Replace the storm catch basin system at the north end of high street. $ (Construction, Short-term). See **S-7** for maintenance/monitoring guidance. $/Year (Maintenance, Long-term)

Benefits:

- Improve water quality through the removal of debris and trash within Baxter Pond.
- Reduce the load of drainage systems and probability of debris and trash floating into inlets, by capturing excess rainwater and debris. of debris and trash entering drainage systems, the Pond and ultimately the Bay.
- Prevent future debris/vegetation build-up with proper retrofit options and regular maintenance.
- Create stable environments to reduce fish entrapment/kill during low tide pools in Baxter Pond's outfall.

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Project ID: S-12: Mill Pond Watershed Abatement	Priority: High	Cost: $, $$
Subwatershed: Mill/Baxter Pond	**Location:** Mill Pond Park	



Key Issues:
Large amounts of plastic and metal trash entering Mill Pond and invasive species surrounding the pond's edge.

Project Description/Action (Cost Per Recommendation): *The numbers shown on the map above identify project locations and correspond directly to the numbered project descriptions and actions listed below.*

GREEN INFRASTRUCTURE

1. Remove invasive species and revegetate with native wetland species. $ (Installation, Short-term). See **S-2** for maintenance/monitoring guidance. $/Year (Maintenance, Short-term)
2. Divert stormwater from Sandy Hollow Rd. and Harbor Rd. into rain gardens/bioswales with rain guardians at the open space northeast/east side of Mill Pond. $$ (Construction, Mid-term). See **S-3** for maintenance/monitoring guidance. $/Year (Maintenance, Long-term)

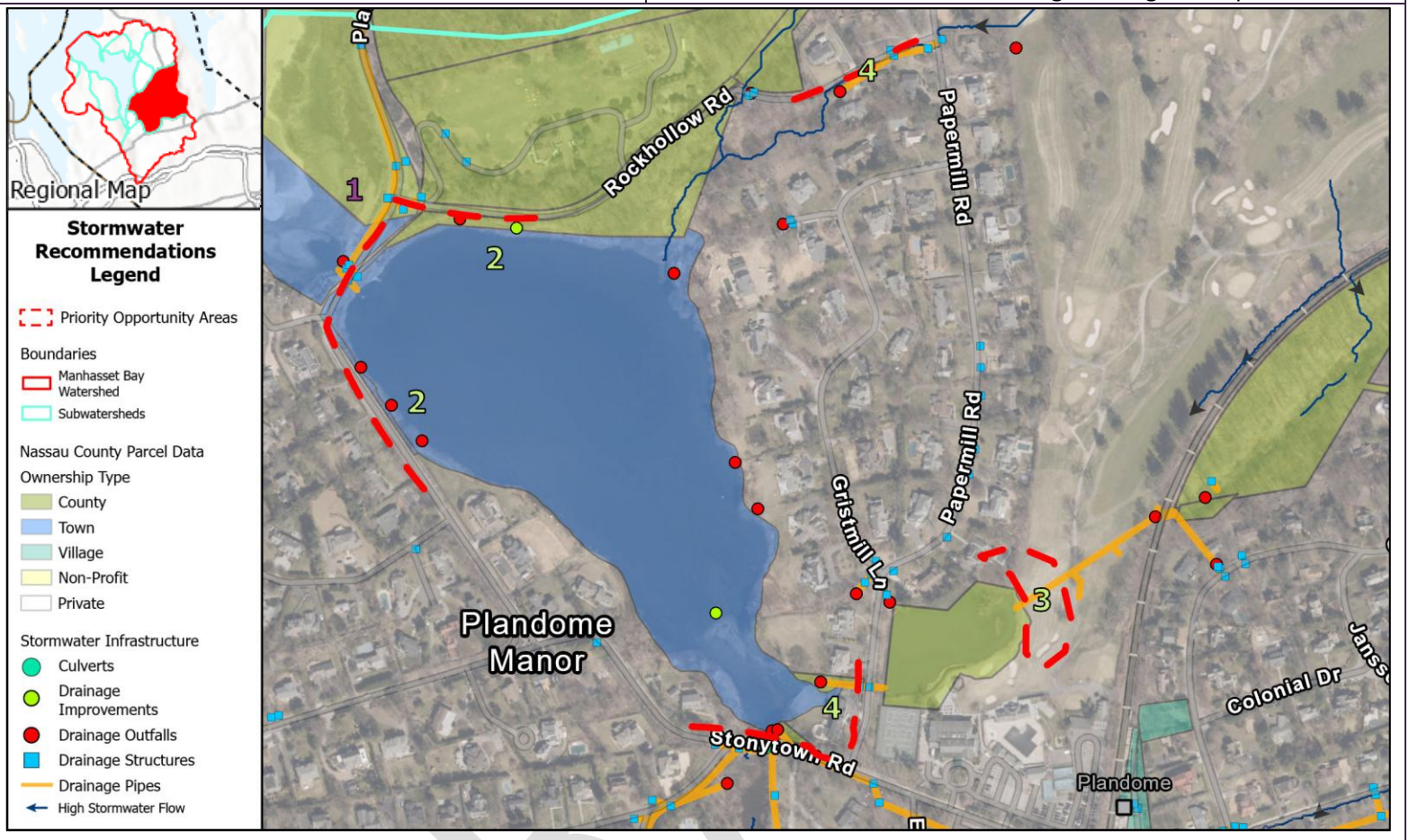
GREY INFRASTRUCTURE

3. Retrofit stormwater systems within Harbor Rd. and Sandy Hollow Rd. with hydrodynamic separators or drainage inlet media filters to remove pollutants from upland residential, park and commercial land uses. $$ (Construction, Mid-term). See **S-6** for maintenance/monitoring guidance. $/Year (Maintenance, Long-term)

Benefits:

- Improve water quality through the removal of debris and trash within Mill Pond.
- Increased infiltration and reduction of pollutant loads in stormwater runoff from upland residential and commercial land uses and roadways.
- An outfall water quality study will provide data to support future projects related to nutrient and contamination inputs from stormwater runoff after storm events.

Project ID: S-13: Leeds Pond Stormwater Abatement	Priority: High	Cost: $, $$
Subwatershed: Leeds Pond	**Location:** Science Museum of LI and governing municipalities	



Key Issues:
Clogged stormwater drainage systems, invasive phragmites along the perimeter of Leeds Pond, direct stormwater discharges from a N. Hempstead Golf Course outfall. Surface runoff from nearby streets, especially Stonytown Road.

Project Description/Action (Cost Per Recommendation): *The numbers shown on the map above identify project locations and correspond directly to the numbered project descriptions and actions listed below.*

CULVERT MAINTENANCE

1. Clean out stormwater drains and culverts (sediment and vegetation removal). $/Year (Initial maintenance, Short-term), See **S-7** for maintenance/monitoring guidance. $/Year (Maintenance, Long-term)

GREEN INFRASTRUCTURE

2. Removal of phragmites / invasive vegetation along the streambank and replant with native vegetation to restore vistas, enhanced habitat function, stabilize shorelines from erosion and reduce sedimentation of the stream, and provide shade. $ (Installation, Short-term). See **S-2** for maintenance/monitoring guidance. $/Year (Maintenance, Short-term)
3. Increase the width/vegetation density of the buffer at the southwest corner of Plandome Country Club, along the pond's edge. $ (Installation, Short-term). See **S-2** for maintenance / monitoring guidance. $/Year (Maintenance, Short-term)
4. Add bioretention practices along the roadsides at Plandome Rd, Stonytown Rd., and Rockhollow Rd. to provide pollutant load removal prior to discharges (marked in Purple). $$ (Installation, Mid-term). See **S-3** for maintenance/monitoring guidance. $/Year (M -Long-term).

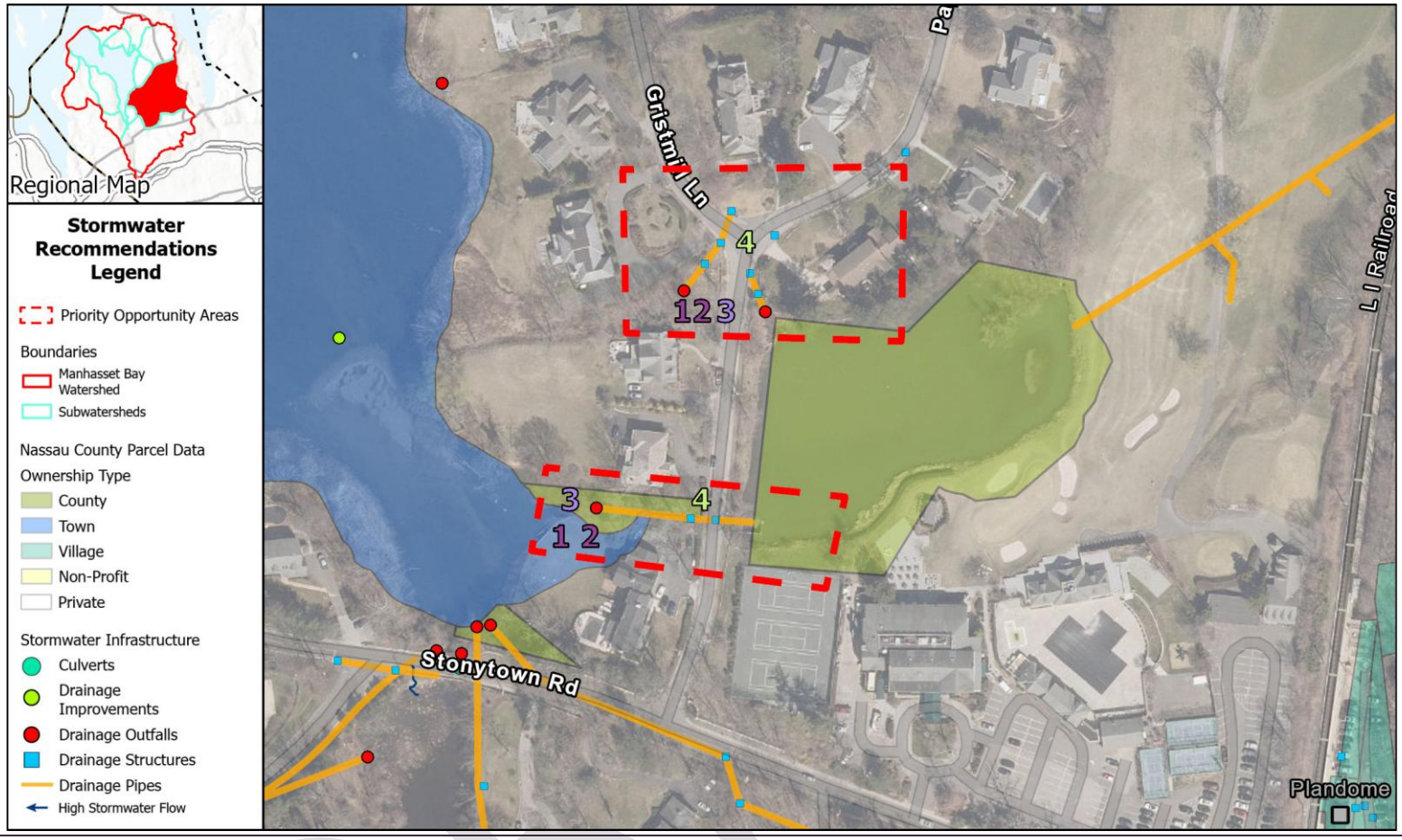
5. Conduct a subwatershed/engineering study of the Leeds Pond watershed. $ (Feasibility, Mid-term), $$$ (Implementation, Long-term)

Benefits:

- Increase infiltration and reduce pollutant loading from stormwater, particularly nitrogen/pathogens from fertilizers and nuisance waterfowl and sediment/chlorides/metals from roadways and parking lots.
- Improve buffers and shading around the Pond, reducing temperature, sediment inputs and summer algal blooms.

DRAFT

Project ID: S-14: Gristmill Ln/Papermill Dr Actions	Priority: High	Cost: $, $$
Subwatershed: Leeds Pond	**Location:** Gristmill Ln & Papermill Dr	



Key Issues:
Blocked culvert, causing flooding and limiting proper waterflow and flushing of Leeds Pond to the Bay.

Project Description/Action (Cost Per Recommendation): *The numbers shown on the map above identify project locations and correspond directly to the numbered project descriptions and actions listed below.*

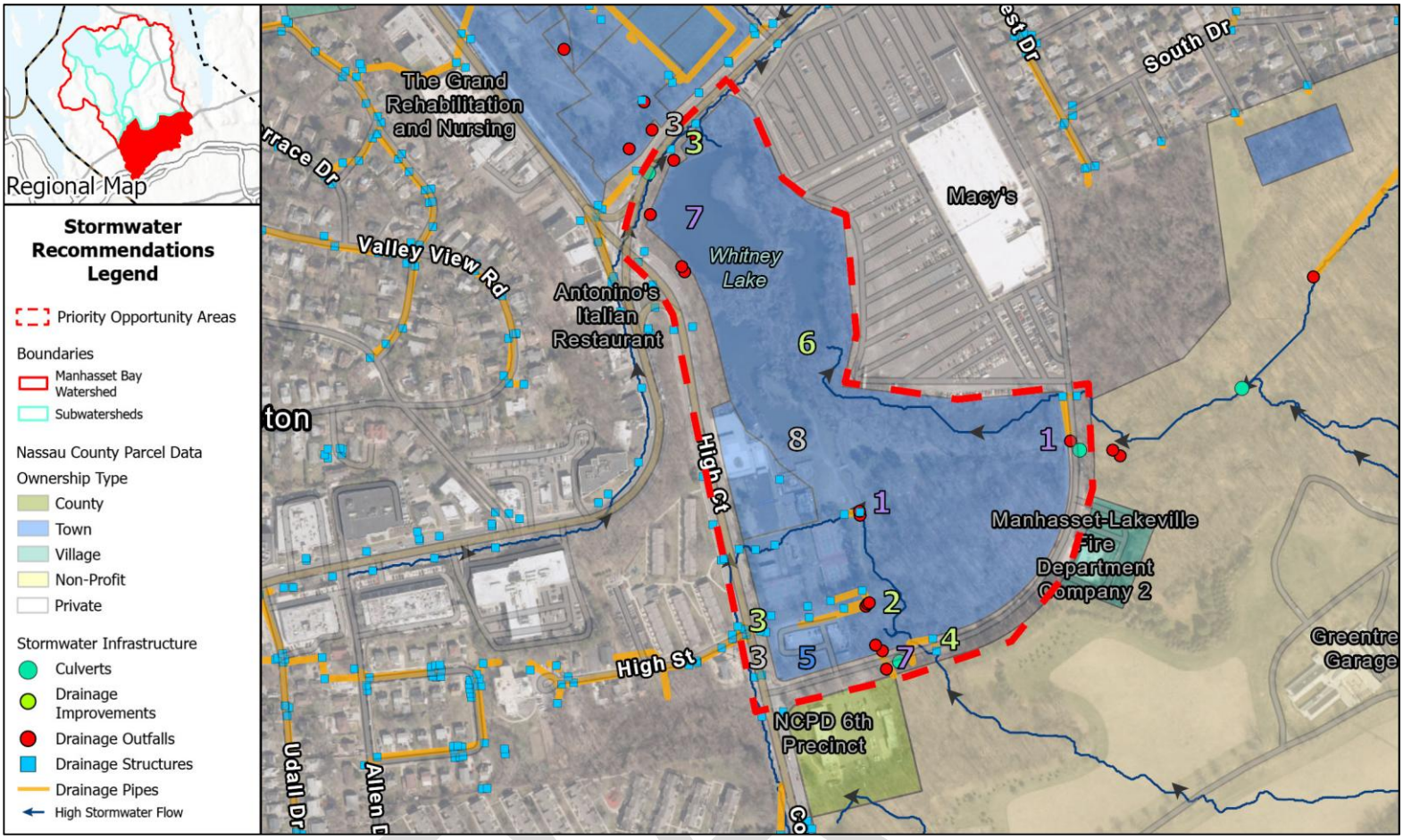
1. Clean culvert's inlet and outlet as well as Gristmill ln and Papermill Rd outfalls to restore function and check for damages along drainage pipe. Repair as necessary and install a more substantial filtration system, as the current system is a chain link fence. $ (Initial maintenance, Short-term). See **S-7** for maintenance/monitoring guidance. $/Year (Maintenance, Long-term)
2. Evaluate the extent of floatables and debris clogging inlet, and install culvert sediment traps or debris deflector inlet, dependent on debris type, to prevent build-up and prioritize regular maintenance/debris removal. $ (Construction, Short-term). See **S-7** for maintenance/monitoring guidance. $/Year (Maintenance, Long-term)
3. Install stabilized rock revetment to prevent erosion. $ (Construction, Short-term). See **S-5** for maintenance/monitoring guidance. $/Year (Maintenance, Long-term)
4. Install bioswales/rain gardens/infiltration practices or proprietary filter inserts along ROW/public lands prior to existing directly discharging drainage infrastructure. $$ (Construction, Mid-term). See **S-1/3/6** for maintenance/monitoring guidance. $/Year (Maintenance, Long-term

Benefits:

- Reduce stormwater backup and flooding occurring to the east.
- Prevent future debris/vegetation build-up with proper inlet retrofit options and regular maintenance.
- Improve water quality through improved water flow and removal of debris/trash/sediment within Leed's Pond.
- Capture excess rainwater and debris/trash improves drainage system functionality and reduces the amount of debris and trash entering drainage systems, the Pond and ultimately the Bay.

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Project ID: S-15: Whitney Pond Stormwater Abatement	Priority: High	Cost: $, $$
Subwatershed: Whitney Pond	**Location:** Whitney Pond/Whitney Pond Park	



Key Issues:

Stormwater runoff from roadways, commercial buildings and parking areas contributing pollutants either directly to Whitney Pond from outfall(s) or via overland flow, minimal stormwater pre-treatment or buffers around the Pond. Large commercial land-uses such as Macy's are in close proximity to the Pond with little stormwater management.

Project Description/Action (Cost Per Recommendation): *The numbers shown on the map above identify project locations and correspond directly to the numbered project descriptions and actions listed below.*

OUTFALL RETROFITS

1. Install native vegetative buffers by converting lawn to unfertilized native meadows within the Whitney Pond Park to reduce nitrogen/pathogen inputs from geese/waterfowl and improve pollutant removal before entering the waterbody. $ (Installation, Short-term). See **S-2** for maintenance/monitoring guidance. $/Year (Maintenance, Long-term)

GREEN INFRASTRUCTURE

2. Install rain gardens/bioswales within Whitney Pond Park and around the parking lot, roadsides, and buildings that outfall to Whitney Pond. $$ (Installation, Short-term). See **S-1/S-3** for maintenance/monitoring guidance. $/Year (Maintenance, Long-term)

GREY INFRASTRUCTURE

3. Install bioretention basins and additional leaching structures along right-of-ways to intercept stormwater runoff from commercial land uses and large parking lots $$ (Installation, Short-term). See **S-3** for maintenance/monitoring guidance. $/Year (Maintenance, Long-term)
4. Install bioswales along Community Drive E to intercept and treat stormwater prior to storm drains that connect to outfalls to Whitney Pond. $$ (Installation, Short-term). See **S-3** for maintenance/monitoring guidance. $/Year (Maintenance, Long-term)

PERMEABLE PAVERS

5. Install permeable pavement or green infrastructure/infiltration practices for nearby parking lots. $$ (Construction, Mid-term). See **S-4** for maintenance guidance. $/Year (Maintenance, Long-term).
6. Evaluate the need for streambank stabilization and additional shade tree installation. $$ (Construction, Mid-term)

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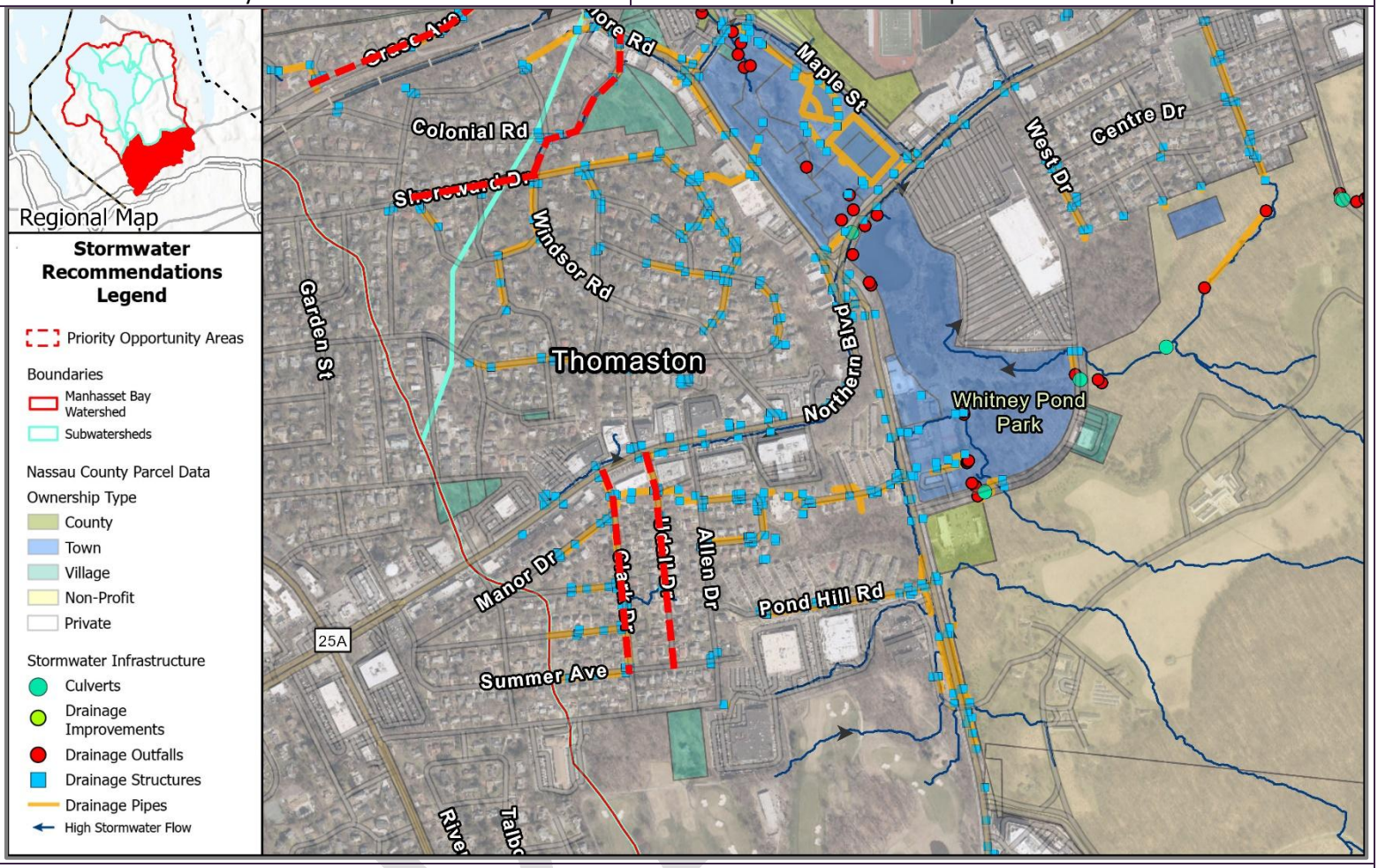
7. Regularly repair and clean out outfalls into Whitney Pond (sediment and vegetation removal). $/Year (Initial maintenance, Short-term), See **S-7** for maintenance/monitoring guidance. $/Year (Maintenance, Long-term)
8. Evaluate feasibility of in-stream solutions through a subwatershed/engineering study of the Whitney Pond subwatershed. $ (Feasibility, Mid-term), $$$ (Implementation, Long-term)

Benefits:

- Increase infiltration and reduce pollutant loading (nitrogen, pathogens, sediment, chlorides, metals) from stormwater
- Improve buffers and shading around the Pond, reducing temperature, sediment inputs and summer algal blooms.
- Reduce flood risks and extend life of infrastructure through regular maintenance

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Project ID: S-16: Southern Residential Area Stormwater Abatement	Priority: High	Cost: $$$
Subwatershed: Whitney Pond	**Location:** Residential Developments	



Key Issues:

Stormwater runoff, legacy high density/high impervious lot coverage, fertilizer/pesticide use, nuisance waterfowl/pet waste management, floatable debris and illicit discharges.

Project Description/Action (Cost Per Recommendation): *The numbered project descriptions shown below apply to all priority opportunity areas shown on the map above.*

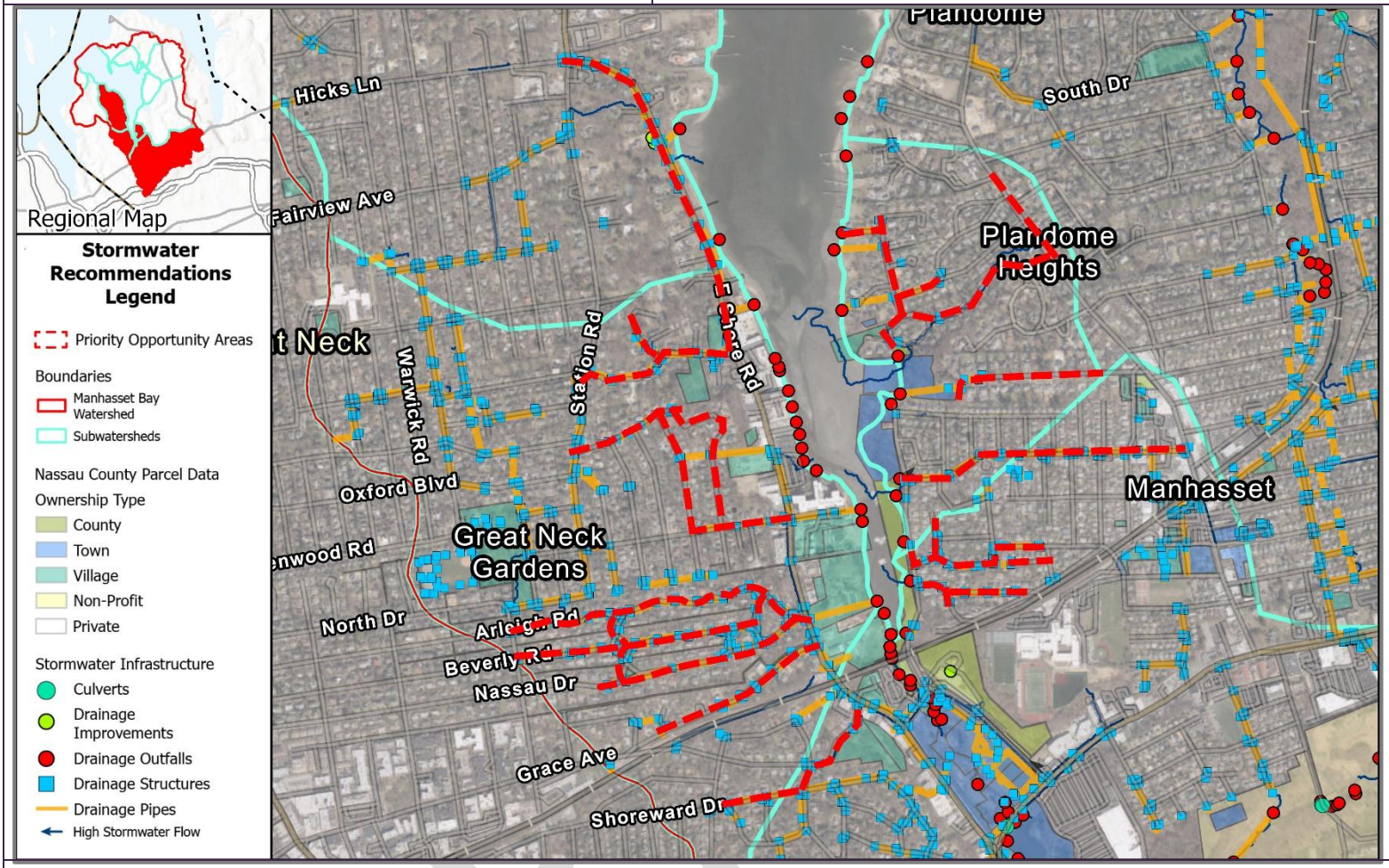
GREEN INFRASTRUCTURE

1. Create rain gardens and bioswales along right-of-ways where possible, or retrofit existing drainage systems with off-line hydrodynamic separators/media filter inlet inserts in the above identified residential and commercial/industrial uses (including the Mt. Olive Former LILCO/Hortonsphere site). $$$ (Installation, Long-term). See **S-1/3/6** for maintenance/monitoring guidance. $/Year (Maintenance, Long-term)
2. Promote property owner/municipal BMPs (reducing fertilizer/pesticide use on lawn areas, educating the public on sustainable lawn maintenance and alternative landscapes, wetland buffers, native lawn alternatives). $ (Short-term)
3. Create and distribute educational materials to landscapers and landowners about the importance of proper fertilization practices and their effect on water quality. This recommendation links to Recommendations **P-7** and **O-1**. $ (Short-term)
4. Encourage volunteer cleanups along the shorelines, especially through yacht club youth clubs. $ (Short-term)
5. Continue and, where possible, expand programs such as the Town's Rain Barrel Program and others to capture rainwater from residences and other properties. $ (Short-term)

Benefits:

- Reduce pollutant loads, improve infiltration, and increase flood and erosion control
- Increase climate resilience through community engagement/stewardship programs. Support community awareness of water quality within their subwatershed.

Project ID: S-17: Southern Watershed Stormwater Abatement	Priority: High	Cost: $$$
Subwatershed: Plandome Heights, Kensington, Whitney Pond?	**Location:** Residential Developments	



Key Issues:

Stormwater runoff, legacy high density/high impervious lot coverage, fertilizer/pesticide use, nuisance waterfowl/pet waste management, floatable debris and illicit discharges.

Project Description/Action (Cost Per Recommendation): *The numbered project descriptions shown below apply to all priority opportunity areas shown on the map above.*

GREEN INFRASTRUCTURE

1. Create rain gardens and bioswales along right-of-way's where possible, or retrofit existing drainage systems with off-line hydrodynamic separators/media filter inlet inserts in the above identified residential and commercial/industrial uses. $-$$$ (Installation, Long-term). See **S-1/3/6** for maintenance/monitoring guidance. $/Year (Maintenance, Long-term)
2. Promote property owner/municipal BMPs (reducing fertilizer/pesticide use on lawn areas, educating the public on sustainable lawn maintenance and alternative landscapes, wetland buffers, native lawn alternatives). $ (Short-term
3. Install a vegetative or concrete curb and/or shoulder to act as an erosion control buffer along problematic roadways to prevent uncontrolled runoff gullies along the wooded/vegetated areas along the eastern shoreline.
   Install retention chambers or sediment traps at stormwater outfalls. $ (Short-term). See **S-3** for maintenance/monitoring guidance. $/Year (Maintenance, Long-term)
4. Create and distribute educational materials to landscapers and landowners about the importance of proper fertilization practices and their effect on water quality. This recommendation links to Recommendations **P-7** and **O-1**. $ (Short-term)
5. Encourage volunteer cleanups along the shorelines, especially through yacht club youth clubs. $ (Short-term)

6. Continue and, where possible, expand programs such as the Town's Rain Barrel Program and others to capture rainwater from residences and other properties. $ (Short-term)

Benefits:

- Reduce pollutant loads, improve infiltration, and increase flood and erosion control
- Increase climate resilience through community engagement/stewardship programs. Support community awareness of water quality within their subwatershed.

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Project ID: S-18: Kings Point Watershed Stormwater Abatement	Priority: High	Cost: $$$
Subwatershed: Kings Point Creek, Mitchells Creek, Kings Point Pond	**Location:** Residential Streets	



Key Issues:

Stormwater runoff, legacy high density/high impervious lot coverage, fertilizer/pesticide use, nuisance waterfowl/pet waste management, floatable debris and illicit discharges.

Project Description/Action (Cost Per Recommendation): *The numbered project descriptions shown below apply to all priority opportunity areas shown on the map above.*

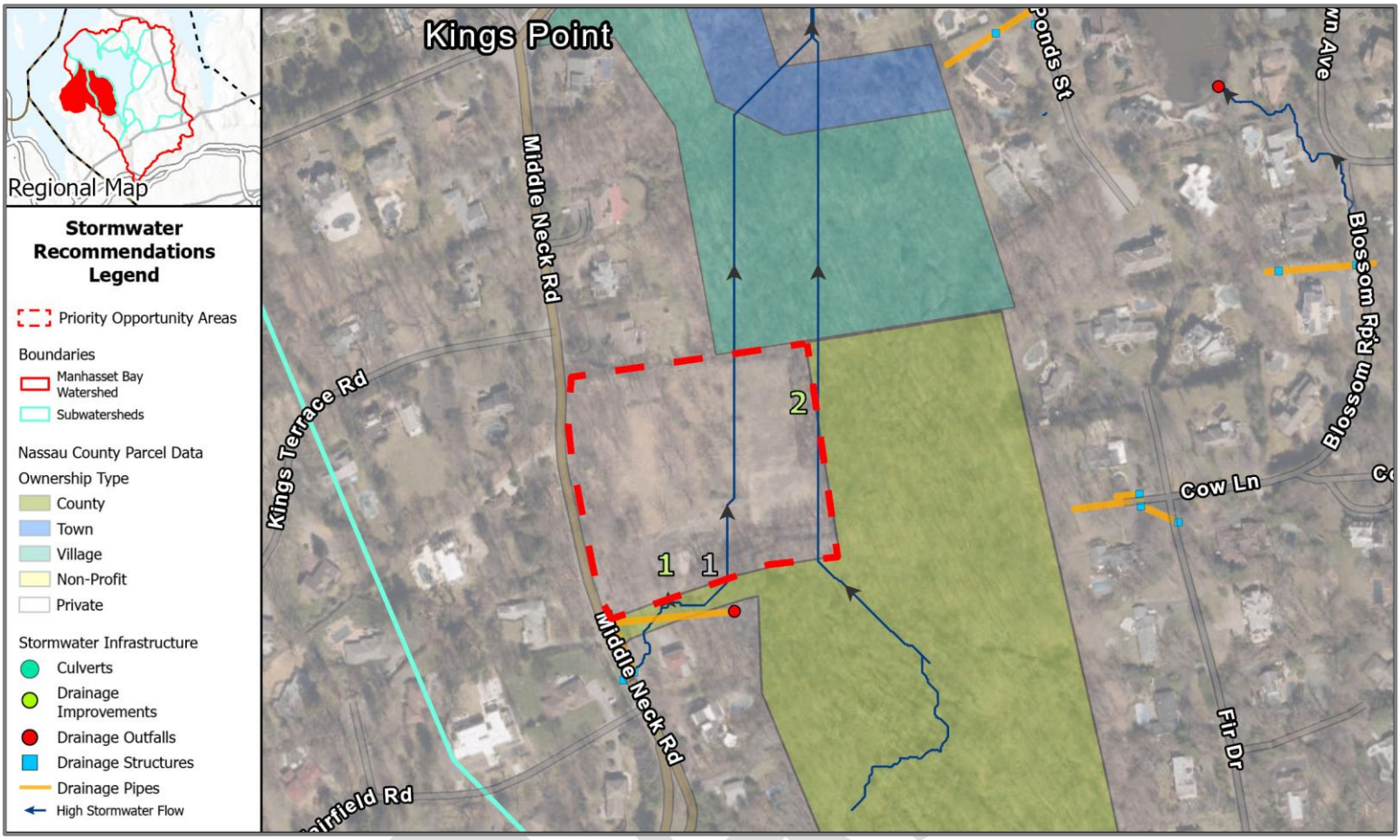
GREEN INFRASTRUCTURE

1. Create rain gardens and bioswales along right-of-ways where possible, or retrofit existing drainage systems with off-line hydrodynamic separators/media filter inlet inserts in the above identified residential and commercial uses and in streets with drainage infrastructure that discharges into Kings Point Park/public lands/wetlands. $-$$$ (Installation, Long-term). See **S-1/3/6** for maintenance/monitoring guidance. $/Year (Maintenance, Long-term
2. Promote property owner/municipal BMPs (reducing fertilizer/pesticide use on lawn areas, educating the public on sustainable lawn maintenance and alternative landscapes, wetland buffers, native lawn alternatives). $ (Short-term)
3. Create and distribute educational materials to landscapers and landowners about the importance of proper fertilization practices and their effect on water quality. This recommendation links to Recommendations **P-7** and **O-1**. $ (Short-term)
4. Encourage volunteer cleanups along the shorelines, especially through yacht club youth clubs. $ (Short-term)
5. Continue and, where possible, expand programs such as the Town's Rain Barrel Program and others to capture rainwater from residences and other properties. $ (Short-term)

Benefits:

- Reduce pollutant loads, improve infiltration, and increase flood and erosion control
- Increase climate resilience through community engagement/stewardship programs. Support community awareness of water quality within their subwatershed.

Project ID: S-19: Proposed Village Park Actions	Priority: High	Cost:$$$
Subwatershed: Kings Point Creek, Mitchells Creek	**Location:** Proposed Village Park	



Key Issues:

Invasive Phragmites surrounding the wetlands within the property (former tennis club). Direct stormwater runoff from the former tennis courts and existing parking area contributing pollutants directly into the wetlands within/adjoining the property via overland flow.

Project Description/Action (Cost Per Recommendation):

GREEN INFRASTRUCTURE

1. Establishment of a public park including a nature center/classroom and greenhouse for public education about native species, pollinators, and green infrastructure; creation of passive parkland trails and demonstration gardens; drainage improvements in and around the existing gravel parking lot to collect stormwater that will overflow into the Southeastern wetlands within the proposed Park. $$ (Installation, Short-term). See **S-3-6** for maintenance/monitoring guidance. $/Year (Maintenance, Long-term)
2. Install native vegetative buffers and bioretention areas by converting lawn and impervious areas to unfertilized native meadows and demonstration gardens within the proposed Park to reduce runoff into the wetlands on the eastern/southeastern edge of the property. $$ (Installation, Short-term). See **S-3** for maintenance/monitoring guidance. $/Year (Maintenance, Long-term)

Benefits:

- Increase infiltration and reduce pollutant loading from stormwater, particularly sediment/chlorides/metals from roadways and parking lots.
- Improve buffers and shading around the wetland, reducing temperature, sediment inputs.
- Public education regarding use of native species and green infrastructure.
- Establishment of passive public recreation to be combined with existing adjoining Village and County-owned open space.

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9.4 Municipal Facilities Recommendations (M)

The following recommendations pertain to good housekeeping at municipal facilities throughout the Manhasset Bay watershed area, which can be a source of contamination due to common maintenance practices, storage and handling of potentially hazardous materials (fuel, fertilizers and pesticides, road salt, large trucks and snow removal equipment, etc.).

M-1	**Complete a GIS-Based Mapping of the Stormwater Management System and Contributing Areas to the MS4 System.**

It is recommended that a partner or partners, yet to be identified, complete a GIS-based mapping of the entire stormwater management system and contributing areas throughout the entire watershed. The NYSDEC MS4 Permit requirements include mapping of all outfalls and associated drainage infrastructure with the storm sewershed (or the catchment area that drains into the storm sewer system based on the surface topography and pipe connections in the area served by the stormsewer). Mapping and updating the stormwater system through the entire watershed using ArcGIS provides a means to maintain and update information associated with the stormwater infrastructure, including tracking systems for maintenance (i.e., which catch basin has been cleaned out, the frequency of cleanings needed, establishment of a regular maintenance schedule, outfall monitoring and sampling). This tracking system would also aid in prioritization of drainage system cleanouts, repairs and replacements, regular monitoring of green infrastructure to ensure vegetation is well established and sediment is removed, and monitoring of structural water quality treatment systems that may require periodic filter replacement or cleaning), as well as help prioritize areas for street sweeping based on the frequency of necessary drainage cleaning.

It is important to note that all stormwater management systems require maintenance to ensure the practices are properly functioning. GIS is an excellent tool to keep mapping updated and track information such as frequency of inspections and maintenance of the systems. Oftentimes drainage improvements are installed, and the mapping is not updated, so knowledge of such systems may disappear with changes in personnel. It is important for the municipalities to keep stormwater system mapping up to date and for the mapping to be used by highway and maintenance staff. This would ensure that maintenance personnel are aware of the locations of specific stormwater practices and are fully informed regarding the specific maintenance requirements of the stormwater practice (i.e., maintenance personnel know the locations of all systems with water quality treatment inserts and when such inserts need to be changed; know the location of bioretention areas and so vegetation is properly maintained, etc.).

M-2	**Provide Training for Municipal Maintenance Personnel Regarding Stormwater Runoff and Water Pollution, Hazardous Materials Handling, Illicit Discharge Detection and Best Management Practices.**

This recommendation is for a comprehensive training program for municipal maintenance personnel throughout all the Committee's municipal members. This recommendation may be

undertaken municipality-by-municipality or could be coordinated by a single partner. It includes continuing education of municipal maintenance personnel on municipal best management practices and the provisions in the municipal Stormwater Management Program Plan. Basic understanding by all maintenance employees of the need and benefits of regular maintenance of storm drains and how stormwater can carry harmful pollutants to surface waters is a critical component of effective watershed management. Regular maintenance and sediment removal from stormwater drains (which accumulate debris, metals, and other pollutants) can have a beneficial effect on water quality improvement. Additionally, if maintenance personnel understand best management practices for hazardous materials storage and handling (for everyday practices such as vehicle fueling, vehicle maintenance, pesticide and fertilizer applications and storage and storm drain cleaning as indicated in the stormwater program), it can significantly reduce pollutants carried in stormwater from municipal operations.

M-3	**Provide Designated Areas in Municipal Facilities (DPW Yards, Police and Fire Stations, Vehicle Storage Yards, etc.) for Washing of Vehicles with Proper Filtration and Drainage to Prevent Toxic or Hazardous Materials from Entering the Watershed.**

It is recommended that each municipal member provide designated areas in their municipal facilities for vehicle washing. Control of vehicle wash areas is a requirement of the MS4 and Multi-Sector Stormwater Permit requirements and represents good housekeeping and common sense. Municipal maintenance vehicle wash facilities should be properly controlled to ensure that no toxic or hazardous materials contained in wash water are released to surface or groundwater. Dedicated washing areas are designed to direct vehicle wash water to a contained area so that pollutants washed from vehicles can be filtered/treated and not allowed to enter the MS4 system or nearby surface waters. Such dedicated areas should have regular filter replacement and proper disposal.

M-4	**Ensure that All Municipal Operations within the Watershed Incorporate Best Management Practices (BMP)/Good Housekeeping Practices into Daily Operations.**

It is recommended that the Committee or a partner review and ensure that all watershed municipal operations incorporate best management practices into daily operations Municipal facilities including public works yards, parks, golf courses, marinas and administrative buildings can contribute to water pollution through poor housekeeping practices. This recommendation calls for the development and implementation of a watershed-wide municipal housekeeping program aligned with MS4 permit requirements. Actions include: proper storage, handling and disposal of hazardous materials (i.e., fuels, lubricants, fertilizers/pesticides, chemicals and salt for winter highway de-icing), regular street sweeping and cleaning of stormwater infrastructure, spill prevention and clean up protocols, fleet and boat maintenance BMPs, integrated pest management protocols for fertilizer and pesticide applications, and staff training. Benefits

include reduced pollutant discharge, improved compliance, and enhanced municipal leadership in water quality stewardship.

M-5	**Complete Regular Municipal Facility and Operations Audits.**

In accordance with the MS4 permit, it is recommended that each municipality in the watershed complete regular municipal facility and operation audits. At a minimum frequency of once every five years, municipalities are required under the MS4 Permit to conduct comprehensive site-assessments of all municipal facilities. This is done to determine the sources of pollutants potentially generated by its operations and facilities (i.e., proper storage of hazardous materials and salt, fueling areas, waste storage areas, etc.). This self-assessment also helps identify the municipal operations and facilities that need to be addressed by the municipal pollution prevention and good housekeeping program (i.e., roadway maintenance, turf management, etc.). This recommendation must also include an educational component for golf course managers about fertilizer, pesticide, and other chemical use. This ties with Recommendation **O-1**.

M-6	**Incorporate Projections Addressing Changing Climate into Municipal Facility Planning and Upgrades.**

This recommendation is for all the municipalities in the watershed to incorporate climate change impacts and sea level rise projections into municipal facility planning and upgrades. Municipal infrastructure must be resilient to sea level rise, increased precipitation, and extreme weather events. This recommendation promotes climate-adaptive planning for municipal facilities, including elevating critical infrastructure, improving drainage systems and outfall placement, and integrating flood-resistant design including preservation and re-establishment of wetland buffers on municipal properties. Density should also be a consideration for incorporation. Review of building/zoning codes should include considerations of projected sea level rise and rising storm impacts. These actions will protect municipal assets and reduce water quality impacts during storm events. The NYS Department of State worked with the Department of Environmental Conservation and other partners to create model local laws to help local governments be more resilient. These model local laws can be found at https://dos.ny.gov/model-local-laws-increase-resilience.

M-7	**Enhance Municipal Trash Collection and Floatable Debris Control and Maintenance Across the Watershed.**

It is recommended that each watershed entity with public space(s) enhance their trash collection and floatable debris control. Public input during the initial public input sessions highlighted overflowing trash bins, significant accumulation of floatable debris/trash near stormwater

outfalls and along shorelines, skeet shooting from various yacht clubs, and concerns of industrial operations/waste storage in nearshore areas. This recommendation calls for municipalities to improve monitoring of critical shoreline areas for trash/debris collection, installation of additional enclosed trash bins, increase trash collection frequencies at popular public trails/parks and facilities, and deploy outfall floatable catchment nets/control structures where feasible. Public signage and education campaigns should accompany infrastructure upgrades and existing waste receptacles to encourage public use of trash receptacles and the harms of littering. These actions will reduce litter, improve aesthetics, and help to protect aquatic life.

M-8	**Improve Public Access to Waterfront Areas through Infrastructure Upgrades and Recreational Amenities.**

This recommendation, as is also recommended in **O-2**, is to improve and, where possible, expand public access to the waterfront. As individual properties are the focus of this recommendation, partners would have to be identified in the planning phase. Community feedback emphasized limited access to waterfront recreation. This recommendation supports municipal efforts to develop and expand waterfront recreation, improve shoreline pathways, and enhance ADA accessibility. Such enhancements could also incorporate public education on pollution sources and impacts. New developments should consider public access to the waterfront in their plans. These projects promote stewardship of the land and Bay, public engagement, and equitable use of the Bay's resources. This recommendation should also incorporate litter reduction strategies as called for in Recommendation **P-9**.

9.5 Wastewater Management (W)

As documented in the Watershed Characterization, reducing pathogen and nitrogen loading is essential to improving water quality in the Bay. This section details recommendations related to the wastewater management aimed at achieving water quality goals.

W-1	**Expand Sewer Connections and Eliminate Legacy Septic Systems**

Is it recommended that sewer connections be expanded to eliminate legacy on-site wastewater treatment systems. These systems are a major contribution of pathogens (bacteria, viruses, and protozoa) to Manhasset Bay which are a threat to human health. Such an effort would likely, but not necessarily, be led by the water pollution control districts. Promote the expansion of sanitary sewer infrastructure throughout the watershed, prioritizing areas with the highest densities, high groundwater tables, proximity to surface waters, and clusters of aging or failing septic/cesspool systems. This includes prioritizing sewering of Kings Point (which incorporates three subwatersheds), Sands Point (in the North East Shore and Sheets Creek East subwatersheds), Manhasset (in the Whitney Pond subwatershed), the Plandomes (in the Leeds Pond and

Plandome Heights subwatersheds), and portions of Port Washington (in the Mill/Baxter Ponds subwatersheds) that are unsewered and have aging septic systems and close proximity to surface waters. See **Figure 9-3** for priority areas for sewering. This work could be informed by investigating and identifying "hot spots" of on-site wastewater pollution as called for in Recommendation **B-3**.

Advocate for dedicated grant programs and financial incentives to support septic-to-sewer conversions, as current funding is often limited to Innovative and Alternative (I/A) on-site wastewater treatment system upgrades. Smaller sewer area options could also be examined for existing high-density, unsewered areas, in order to reduce existing nitrogen loading. This action will significantly reduce nitrogen, coliform bacteria, and other nutrient loads entering Manhasset Bay, directly addressing one of the largest sources of water quality impairment. Benefits include improved public health, reduced risk of groundwater contamination, and measurable improvements in bay water quality.

W-2	**Incentivize and Require Upgrades to Innovative/Alternative Onsite Wastewater Treatment Systems (I/A OWTS)**

Where sewer expansion is not feasible, it is recommended that unsewered municipalities throughout the watershed update their codes to require and incentivize the replacement of conventional septic systems with advanced nitrogen-removing I/A OWTS. Updates to local codes could include mandating I/A OWTS for all new construction, major renovations, and potentially considering property transfers in unsewered areas. Utilize public locations, such as the Science Museum of Long Island, as demonstration sites with press releases and educational kiosks installed on site. Provide outreach and technical assistance to homeowners and businesses to facilitate adoption. This approach will reduce nutrients and pathogen loading to groundwater and surface waters, supporting compliance with nitrogen reduction targets and protecting sensitive aquatic habitats. This incentivization would go hand-in-hand with Recommendation **P-2**, which calls for strengthening local codes for wastewater management. This work could be informed by investigating and identifying "hot spots" of on-site wastewater pollution as called for in Recommendation **B-3**.

W-3	**Develop a Program and Update Town and Village Codes to Identify and Require Regular Maintenance of Septic Systems in Areas with Shallow Depth to Groundwater and Poor Integrity/Not Properly Functioning**

This recommendation is to identify areas in the watershed with shallow depth to groundwater and poor integrity/not properly functioning on-site wastewater treatment systems and then update Town and Village codes to require regular maintenance of these on-site wastewater treatment systems in those areas. These systems are a major contributor of pathogens, nutrients, and other pollutants to the Bay. This Recommendation is similar to **P-2** which also calls for the adoption and enforcement of wastewater management ordinances.

Areas with sanitary systems situated in locations with shallow depth to groundwater have the greatest potential to discharge nutrients into the waters surrounding Manhasset Bay. Sanitary systems without adequate vertical separation between the bottom of the leaching pool and groundwater do not function properly as there is insufficient conversion of ammonia to nitrite and nitrate (the nitrification part of the intended treatment process) and reduced natural attenuation of the sediments separating the system from groundwater. As a result, there is a greater potential for groundwater transport and surface water release of available nitrogen and biological pollutants (i.e., bacteria and virus) to waterbodies. Prioritizing these areas is an important step to reducing direct wastewater overflows and nitrogen loading of the Bay.

Additionally, a program of regular sanitary system maintenance could be established to require property owners to provide proof of inspection and certification of sanitary systems once every three to five years. This data could be collected in an online platform. In addition to inspection by a licensed contractor, certification of the system could also be achieved through proof of maintenance (i.e., pumping of the sanitary system) within the three-to-five-year timeframe, proof of new system installation compliant with Nassau County requirements, or proof of adequate depth to groundwater through a test boring. If inspection revealed a failing system or a system which could not be certified, the system would either have to be pumped or replaced, depending on the severity of the failure. Once property owners demonstrate certification of a Nassau County-approved system, no additional submission/proofs of a compliant systems would be required (which may encourage property owners to replace antiquated systems rather than continually pumping the systems). **Figure 4-9** illustrates areas which may potentially have shallow depth to groundwater (less than 10 feet)[5], and could be utilized as a basis for target locations to be included in the inspection program.

Nassau County initiated a septic system replacement program[6] – Septic Environmental Program to Improve Cleanliness (S.E.P.T.I.C), which will provide grant funding to eligible recipients to replace a conventional or failing septic system with an innovative and alternative on-site wastewater treatment system. Continued and expanded funding for this program and similar incentive programs are an excellent way to incentivize property owners to voluntarily replace aging systems. This work could be informed by investigating and identifying "hot spots" of on-site wastewater pollution as called for in Recommendation **B-3**. Additionally, an educational campaign to spread awareness about the programs existence and importance can go a long way to addressing this issue. This ties with Recommendation **O-1.** Partners should strategize ways to continue and expand the funding to cover more replacements and consider using the funding to also pay for expanding water pollution control districts and sewer hook-ups.

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

[6] https://www.nassauswcd.org/SEPTIC

W-4	Upgrade and Optimize Wastewater Treatment Plant (WWTP) Performance

It is recommended that the Committee and its partners support ongoing upgrades and optimizations at the Port Washington and Great Neck Water Pollution Control Districts (WPCDs) to further reduce pathogen, nitrogen, and other nutrient or pollutant discharges. These facilities treat wastewater from parts or all of the subwatersheds of Sheets Creek North and East, Mill/Baxter Ponds, Stannard's Brook, Leeds Pond, Whitney Pond, Kensington, Kings Point Creek, and Mitchells Creek, as well as areas outside the Manhasset Bay watershed.

It is also recommended to encourage the adoption and implementation of best available technology including tertiary treatment, effluent polishing, and advanced nutrient removal technologies. Evaluate opportunities to relocate or extend outfalls to areas with better tidal flushing, and consider installation of diffusers to improve mixing and reduce localized impacts. These actions will help meet TMDL requirements, improve dissolved oxygen levels, and reduce algal blooms in the Bay.

W-5	Promote and Implement Water Reuse and Resource Recovery

It is recommended that the partners implement water reuse projects at local WWTPs, such as the Port Washington and Great Neck WPCDs. This is the process where treated wastewater is used to irrigate and fertilize nearby land, thus reducing effluent discharge volumes and nitrogen loading to Manhasset Bay. There is the added benefit that such reuse also reduces draws on groundwater. Partners will need to identify and connect potential end users (e.g., golf courses, hospitals, institutional campuses) for reclaimed water and encourage infrastructure sharing among clustered users to reduce costs. Water reuse conserves potable water supports drought resilience and can save tens of millions of gallons of drinking water annually while reducing nutrient pollution.

A Long Island Water Reuse Road Map & Action Plan published in 2023 highlights opportunities for water reuse from the two WPCDs on Manhasset Bay.[7] Aside from reusing water within each WWTP, the water reuse plan also prioritized irrigation projects using treated effluent from the WWTPs across Long Island.

These WPCDs treat wastewater from parts or all of the subwatersheds of Sheets Creek North and East, Mill/Baxter Ponds, Stannard's Brook, Leeds Pond, Whitney Pond, Kensington, Kings Point Creek, and Mitchells Creek, as well as areas outside the Manhasset Bay watershed.

[7] https://seatuck.org/water-reuse/

W-6	Enforcement and Education of Boat Pump-Out Practices

This recommendation is to identify a partner or partners to expand current enforcement of improper boat pump-out practices and to educate the boating public, including houseboat owners, about proper pump-out practices throughout the Bay and surrounding watershed. Improper disposal of sewage from recreational, residential, and commercial boat vessels contributes to elevated levels of fecal coliform, nitrogen, and phosphorus in waterbodies. These pollutants degrade water quality, harm aquatic life, and pose risks to human health. While pump-out stations are available, lack of awareness and enforcement leads to underutilization. Public input received indicated suspected improper sewage disposal from vessels within the Bay is occurring.

It is recommended that the frequency of waterway patrols be increased during peak boating seasons to monitor compliance, and vessels be required to maintain pump-out logs, subject to inspection. Houseboats should also be included in these inspections. Tiered fines can be implemented for illegal discharge, with escalating penalties for repeat offenses. Partnership with local marina operators is also recommended to encourage reporting of suspected violations and promoting compliance with pump-out use throughout the Bay.

Additionally, it is recommended that signage and mapping of pump-out station locations be improved, and pump-out practices be included in seasonal educational campaigns and social media posts. Partnering with the community to offer incentives for pump-out usage (e.g., fuel discounts, discounts for frequent pump out use, discounts at local waterfront restaurants and yacht clubs, etc.) could also assist in improving practices.

9.6 Natural Resource Management (N)

As documented in the Watershed Characterization, protection and restoration of natural resources within the watershed is essential to improving water quality in the Bay. This section details recommendations related to natural resource management aimed at achieving water quality goals. See **Figure 9-4** for overall natural resource recommendation project locations. In addition, each recommended project includes a planning-level cost estimate, expressed as cost ranges ($: $0–$50,000; $: $50,000–$100,000; $$: $100,000–$300,000; $$: $300,000+

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Project ID: N-1a Sheets Creek Habitat Restoration	Priority: High	Cost: $, $$, $$$$
Subwatershed: Sheets Creek N	**Location:** Sheets Creek North	



Key Issues:

Loss of native marsh habitat, replaced by invasives, algal blooms, shoreline erosion, and water quality degradation (including high bacteria counts); high stormwater and nutrient inputs from the dense surrounding development; industrial runoff; habitat fragmentation due to invasive species growth within the nature preserve. For information on work already completed at this site, see Table 3-2 in Section 3.1.

Project Description/Action (Cost Per Recommendation): *The numbers shown on the map above identify project locations and correspond directly to the numbered project descriptions and actions listed below.*

1. Invasive plant removal within the Manorhaven nature preserve. Annual monitoring and invasive plant treatment. $-$$ (Installation, Short-term), $/Year (Maintenance, Short-term)
2. Removal/treatment of invasives and planting of native species as a continuation of already completed restoration in the Sheets Creek. Annual monitoring and invasive plant treatment. $-$$ (Installation, Short-term), $/Year (Maintenance, Short-term)
3. Install a native vegetated buffer from industrial property that abuts the nature preserve to prevent sedimentation from the unvegetated dirt lot and any potential contamination sources. Determine if encroachment is occurring from this property. Annual maintenance includes invasive plant treatment and potential replanting of unsuccessful vegetation until successful establishment of plantings. $-$$ (Installation, Short-term), $/Year (Maintenance, Short-term)
4. Continued shoreline stabilization into the nature preserve to the east of Manorhaven Beach Town Park in the back of Sheets Creek North. Annual monitoring and maintenance of native plantings until successful establishment and invasive plant treatment. $$$$ for construction, $/Year ongoing maintenance (Mid-term)
5. Stormwater outfall water quality sampling at all outfalls after storm events to determine point and nonpoint sources of pollution and nutrient loading. $/Year (Long-term)
6. Conduct a feasibility study for sediment removal in both creeks $(Short term), $$$$ (Long Term)

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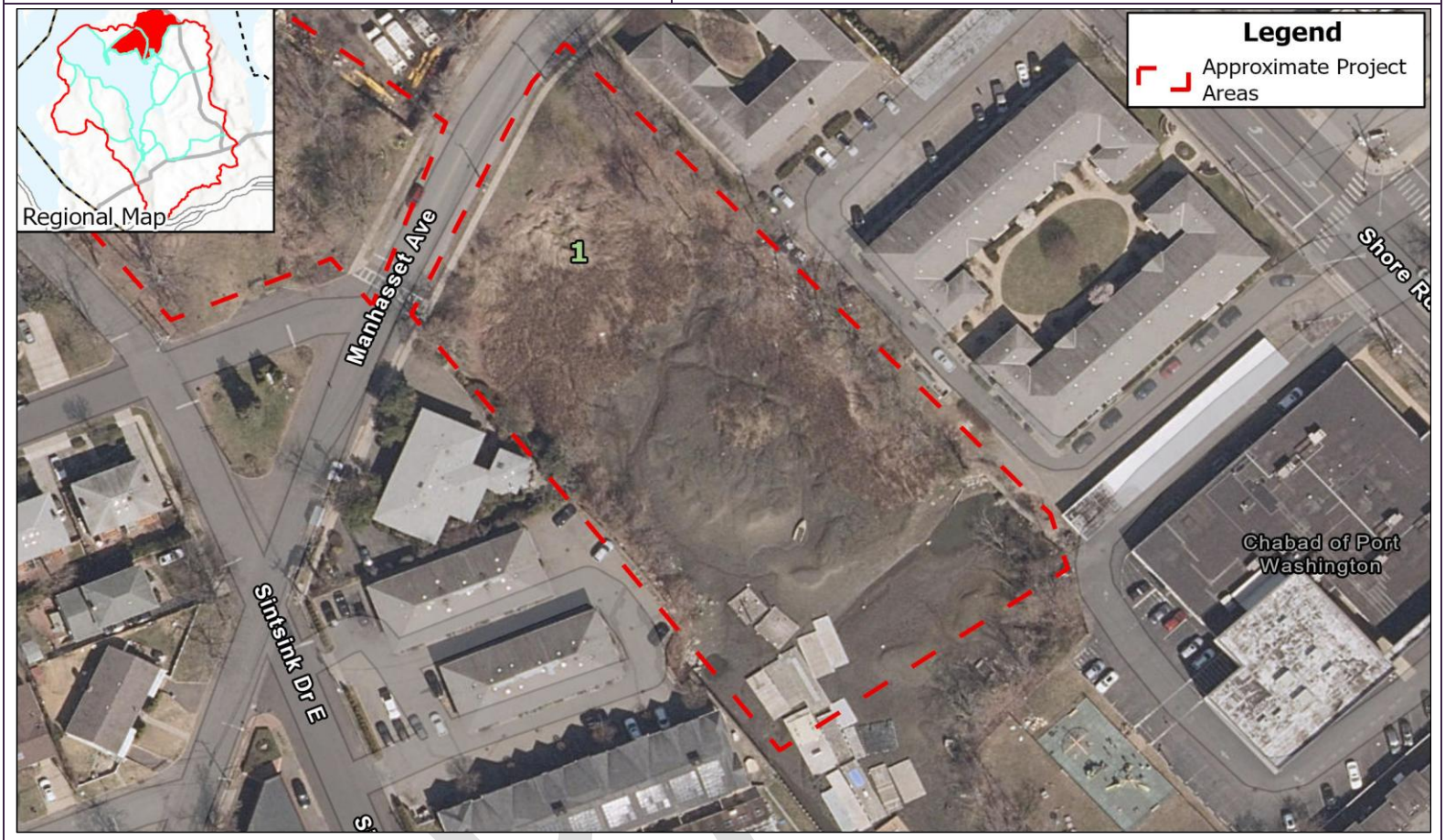
Benefits:

- Shoreline stabilization/living shoreline* along the eastern shoreline, within the Manorhaven nature preserve, will halt the degradation of the sloped shoreline and promote native species. It will also provide increased habitat for sessile organisms which will in turn improve oxygen content and water quality through filtration.
- Invasive species removal and replacement with native species will increase biodiversity and habitat for native fauna/flora as well as assisting in shoreline stabilization and erosional forces.
- Development of an outfall water quality study will provide data to support future projects related to nutrient and contamination inputs from stormwater runoff after storm events.

* A living shoreline is a nature-based shoreline stabilization technique that uses native plants and natural materials to control erosion, enhance habitat, and improve water quality.

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Project ID: N-1b Sheets Creek E Habitat Restoration	Priority: High	Cost: $, $$, $$$$
Subwatershed: Sheets Creek East	**Location:** Sheets Creek East	



Key Issues:

Loss of native marsh habitat, replaced by invasives, algal blooms, shoreline erosion, and water quality degradation (including high bacteria counts); high stormwater and nutrient inputs from the dense surrounding development; industrial runoff; habitat fragmentation due to invasive species growth within the nature preserve.

Project Description/Action (Cost Per Recommendation): *The numbers shown on the map above identify project locations and correspond directly to the numbered project descriptions and actions listed below.*

1. Removal/treatment of invasives and planting of native species as a continuation of already completed restoration in the Sheets Creek. Annual monitoring and invasive plant treatment. $-$$ (Installation, Short-term), $/Year (Maintenance, Short-term)
2. Conduct a feasibility study for sediment removal in both creeks. $ (Feasibility, Mid-term), $$$$ (Implementation, Long-term)

Benefits:

- Invasive species removal and replacement with native species will increase biodiversity and habitat for native fauna/flora as well as assisting in shoreline stabilization and erosional forces.

Project ID: N-2 Mill Pond Habitat Restoration	Priority: Medium	Cost: $, $$$$
Subwatershed: Mill/Baxter Pond	**Location:** Mill Pond	



Key Issues:

Periodic fish kills and algal blooms due to low oxygen and eutrophication, nuisance waterfowl overpopulation, road salt toxicity. The Town of North Hempstead undertook a multi-million-dollar restoration of Mill Pond. The project included sediment removal, extensively reshaping the pond floor, and rebuilding its surrounding wall. The wetland was revegetated to stabilize the bank, filter stormwater runoff, cleanse pond water, and discourage Canada geese. For information on work already completed at this site, see Table 3-2 in Section 3.1.

Project Description/Action (Cost Per Recommendation): *The numbers shown on the map above identify project locations and correspond directly to the numbered project descriptions and actions listed below.*

1. Planting of appropriate species and increased vegetation on the land along the northern pond shoreline to limit nuisance waterfowl resting habitat. Annual maintenance includes invasive plant treatment/removal and continued seeding for increased success rates until established. $ (Installation, Short-term), $/Year (Maintenance, Short-term)
2. Removal, treatment, and proper disposal of invasive species on the east side of the pond. Annual monitoring and invasive plant treatment. $ (Installation, Short-term), $/Year (Maintenance, Short-term)
3. Installation & maintenance of floatable traps at spillway to prevent floatable/debris from entering Manhasset Bay. Periodic monitoring and maintenance to ensure proper function and remove debris/floatables from the traps. - $ (Installation, Short-term), $/Year (Maintenance, Long-term)
4. Feasibility study for the installation & maintenance of aeration methods for the pond. Annual maintenance to ensure proper function and cleaning of aeration components. $ (Installation, Short-term), $/Year (Maintenance, Long-term)
5. Investigate the feasibility of seeding Oysters and Clams -. $$-$$$$ (Long-term)
6. Implementation of salt alternatives on roads around aquatic habitat. $/Year (Long-term)

7. Conduct a feasibility study on sediment removal for hydrological/habitat connectivity, sediment management, and potential invasive plant root mass removal to improve water quality.$ (Feasibility, Mid-term), $$$$ (Implementation, Long-term)
8. Targeted education to homes around the pond about the importance of tall, vegetated buffers $ (Short-term)

Benefits:

- Continued shoreline stabilization/living shoreline features to the east, within the nature preserve, will halt the degradation of the sloped shoreline and promote native species. It will also provide increased habitat for sessile organisms which will in turn improve oxygen content and water quality through filtration.
- Invasive species removal and replacement with native species will increase biodiversity and habitat for native fauna/flora.
- Aeration methods on the pond will increase dissolved oxygen concentrations.

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Project ID: N-3 Baxter Pond Habitat Restoration	Priority: Medium	Cost: $, $$$$
Subwatershed: Mill/Baxter Pond	**Location:** Baxter Pond	



Key Issues:

Erosion and sediment buildup, stagnant water, overpopulation of nuisance waterfowl, periodic fish kills due to low oxygen. For information on work that was previously completed at this site, see Table 3-2 in Section 3.1.

Project Description/Action (Cost Per Recommendation): *The numbers shown on the map above identify project locations and correspond directly to the numbered project descriptions and actions listed below.*

1. Installation & maintenance of fountain. Annual maintenance to ensure proper function and cleaning of fountain components. $ (Installation, Short-term), $/Year (Maintenance, Long-term)
2. Planting of native wildflower seed mix and increased non-grass vegetation on the northern pond shoreline to limit nuisance waterfowl resting habitat and stabilize slope. Annual maintenance includes invasive plant treatment/removal and continued seeding for increased success rates until established. $ (Installation, Short-term), $/Year (Maintenance, Short-term)
3. Installation & maintenance of floatable traps at spillway to prevent floatables/debris from entering Manhasset Bay. Periodic monitoring and maintenance to ensure proper function and remove debris/floatables from the traps. $ (Installation, Short-term), $/Year (Maintenance, Long-term)
4. Conduct a feasibility study of sediment removal for hydrological/habitat connectivity, sediment management, and potential invasive plant root mass removal to improve water quality. $$$$ (Short-term)
5. Remove fallen trees and debris from Baxter Brook. $/Year (Maintenance, Long-term)

Benefits:

- Installation of fountains will increase oxygen content and water.
- Native vegetation planted along the mowed grass shoreline on the north side of the pond will limit nuisance waterfowl resting areas as well as increasing biodiversity and promoting native pollinators. It will also decrease municipal maintenance of these areas during the growing season.

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- Installation of a floatable debris trap at the weir system will prevent floatables/debris from entering Manhasset Bay from Baxter Pond.

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Project ID: N-4 Shore Road Habitat Restoration	Priority: High	Cost: $$$$
Subwatershed: Mill/Baxter Pond	**Location:** Manhasset Bay Shoreline West of Baxter Pond	



Key Issues:

Shoreline erosion, dilapidated concrete structures, unvegetated shoreline.

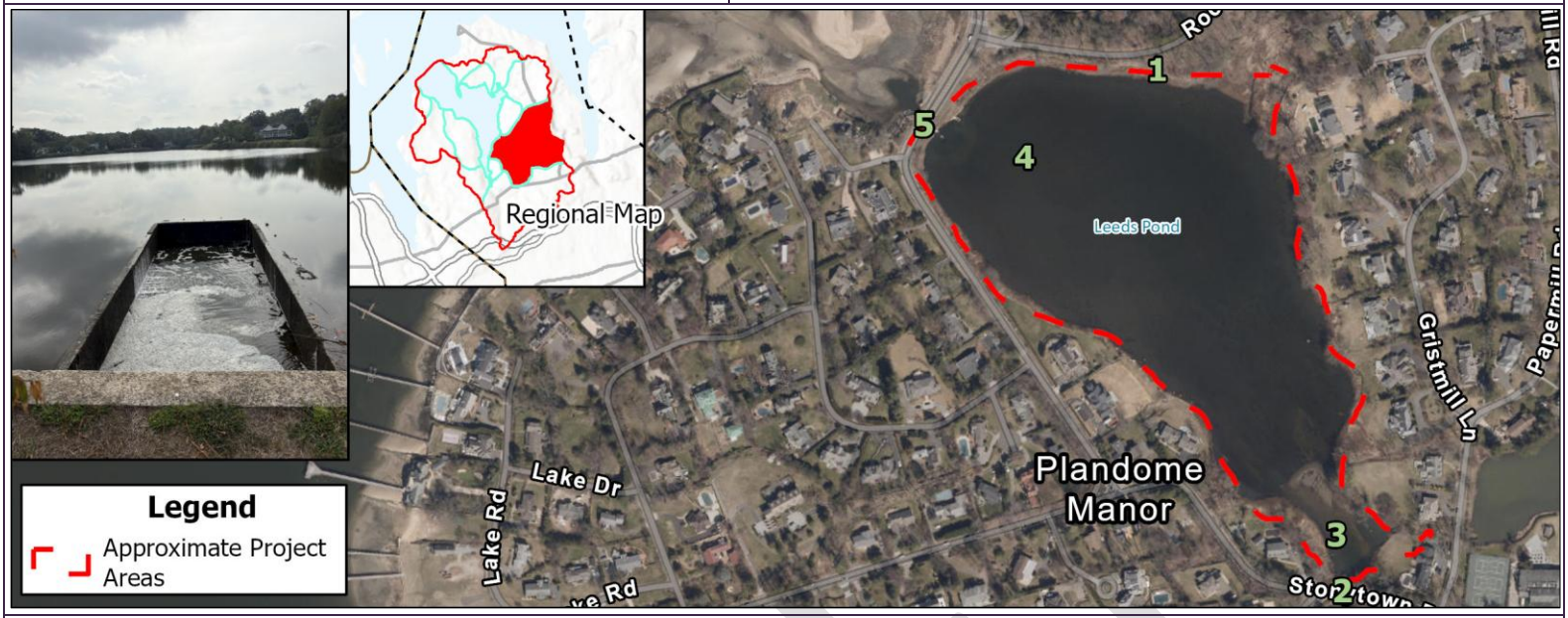
Project Description/Action (Cost Per Recommendation): *The numbers shown on the map above identify project locations and correspond directly to the numbered project descriptions and actions listed below.*

1. Installation of living shoreline features for shoreline stabilization. Annual monitoring of native plantings until successful establishment, invasive plant treatment, and maintenance of living shoreline features. $$$$ for construction, $/Year ongoing maintenance (Mid-term)

Benefits:

- Installation of living shoreline features and native vegetation will increase shoreline stabilization, assist in flood control and prevent further erosion towards Shore Road
- Installation of living shoreline features will provide water quality treatment for stormwater runoff, and provide beneficial habitat for native fauna.
- Installation of living shoreline features provides protection from climate change and sea level rise

Project ID: N-5 Leeds Pond Habitat Restoration	Priority: High	Cost: $-$$, $$$$
Subwatershed: Leeds Pond	**Location:** Leeds Pond	



Key Issues:

Reduced aquatic biodiversity, nuisance waterfowl overpopulation, and periodic fish kills due to invasive plant growth, eutrophication, and low oxygen; fragmented aquatic habitat due to barriers (culverts, dams).

Project Description/Action (Cost Per Recommendation): *The numbers shown on the map above identify project locations and correspond directly to the numbered project descriptions and actions listed below.*

Overall comprehensive management/restoration plan that includes the following:

1. Removal/treatment of invasive/nuisance species and plant native vegetation along stream banks, pond margins, and locations in the upper watershed. Annual monitoring and invasive plant treatment. $ (Construction, Short-term), $/Year (Maintenance, Short-term)
2. Investigate green infrastructure solution(s) for stormwater management on Stonytown Road where stormwater runoff is directly input into stream connected to Leeds Pond. $ (Planning, Short-term), $ (Construction, Mid-term).
3. Establish wetlands along tributaries in the watershed to trap sediment/nutrients, prevent erosion, and provide wildlife habitat where feasible. $-$$ (Mid-term)
4. Determine feasibility of seeding oysters and clams to improve water quality-. $ (Feasibility, Mid-term), $$$$ (Implementation, Long-term)
5. Install a fish ladder at the pond's outlet to help migratory fish like alewife reach upstream spawning areas. $$$$ (Long-term)
6. Conduct a feasibility study for sediment removal in the pond and tributaries. $ (Feasibility, Mid-term), $$$$ (Implementation, Long-term)

Benefits:

- Removal of invasive species and planting of native vegetation along streambanks will create slope stabilization, improve habitat connectivity by decreasing fragmentation, and improve biodiversity and suitable habitat for native fauna.
- Vegetation will act as a deterrent and limit nuisance waterfowl

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- Wildlife passage restoration helps fish like alewife and other wildlife reach their spawning areas, which supports populations, improves the ecosystem, and strengthens the food chain.
- Removal of sediment will improve hydrological/habitat connectivity and sediment management.

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Project ID: N-6 Plandome Park Habitat Restoration	Priority: Low	Cost: $-$$
Subwatershed: Leeds Pond	**Location:** Plandome Park	



Key Issues:

Algal growth in pond, lack of biodiversity due to mowed grass areas.

Project Description/Action (Cost Per Recommendation): *The numbers shown on the map above identify project locations and correspond directly to the numbered project descriptions and actions listed below.*

1. Continuation with native vegetation planting around the pond (some has already been completed and should be expanded). Annual maintenance includes invasive plant treatment and potential replanting of unsuccessful vegetation until successful establishment of plantings. $-$$ (Construction, Short-term), $/Year (Maintenance, Short-term)
2. Conversion of some mowed areas into native wildflower meadows with some elevated beds for aesthetics. Annual maintenance includes invasive plant treatment/removal and continued seeding for increased success rates until established. $ (Short-term), $/Year (Maintenance, Short-term)

Benefits:

- Continuation of planting of native wetland vegetation around the pond will promote biodiversity and improve bank stabilization and water quality.

- Conversion of mowed areas into native wildflower meadows will increase biodiversity, promote pollinators, and decrease municipal maintenance efforts.

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Project ID: N-7 Stannard's Brook Habitat Restoration	Priority: Medium	Cost: $, $$-$$$$
Subwatershed: Stannard's Brook	**Location:** Stannard's Brook County Park	



Key Issues:

Nassau County completed a wholesale park and stream rehabilitation project within the park in 2011/12, but some issues still remain, such as: direct stormwater inputs, stream obstructions, etc. For information on work already completed at this site, see Table 3-2 in Section 3.1.

Project Description/Action (Cost Per Recommendation): *The numbers shown on the map above identify project locations and correspond directly to the numbered project descriptions and actions listed below.*

1. Removal of debris and stream obstructions, such as fallen trees and branches. $ (Short-term)
2. Installation & maintenance of floatables/debris traps on stormwater culverts from the adjacent streets to the north of Stannard's Brook. (Washington, Adams, and Jefferson streets). Roadway jurisdiction would have to be established. Once installed, periodic monitoring and maintenance to ensure proper function and remove debris/floatables from the traps. $ (Installation, Short-term), $/Year (Maintenance, Long-term)
3. Removal/treatment of invasive species and replacement with native species. Annual monitoring and invasive plant treatment. This may be done with assistance from others who already conduct invasive removal in the area. $ (Installation, Short-term), $/Year (Maintenance, Short-term)
4. Exploration of the possibility of creating wetlands within the park to hold back runoff and capture sediments. $ (Planning, Short-term), $$$ (Construction, Mid-term), $/Year (Maintenance until established, Short-term)

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Benefits:

- Removal of stream obstructions will allow existing check dams to function properly.
- Installation and maintenance of floatables/debris traps on the stormwater systems will prevent floatables/debris from entering Stannard's Brook and the associated waterways.
- Removal/treatment of monocultures of invasive species (Japanese knotweed (*Reynoutria japonica*)) around Stannard's Brook will increase biodiversity and promote native species growth.
- Implementation of shoreline stabilization features will eliminate shoreline erosion and degradation on the steep banks to the north of Stannard's Brook, which will reduce erosion of the shoreline and sedimentation into the Brook improving habitat and water quality.

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Project ID: N-8 Manhasset Valley Park Habitat Restoration	Priority: Low	Cost: $-$$
Subwatershed: Whitney Pond	**Location:** Manhasset Valley Park	



Key Issues:

Severe erosion and sedimentation degraded aquatic habitat, nuisance waterfowl overpopulation and nutrification, stormwater overflows, high turbidity, loss of native habitat and habitat connectivity, established invasives, sediment contamination.

Project Description/Action (Cost Per Recommendation): *The numbers shown on the map above identify project locations and correspond directly to the numbered project descriptions and actions listed below.*

1. Conversion of mowed areas into native wildflower meadows. Annual maintenance includes invasive plant treatment/removal and continued seeding for increased success rates until established. $ (Short-term), $/Year (Maintenance, Short-term)
2. Sediment classification and sampling plan prior to sediment removal. Feasibility study of sediment removal along the pond and lake bottoms. $ (Short-term)
3. Installation of bioswale along west side of the pond in Manhasset Valley Park. Annual monitoring of native plantings until successful establishment, invasive plant treatment, and maintenance of bioswale to ensure proper function. $-$$ (Construction, Short-term), $/Year (Maintenance, Long-term)
4. Invasive plant removal/treatment and replacement with native vegetation on the island in Manhasset Valley Park and around the ponds within Whitney Park. Annual monitoring and invasive plant treatment. $ (Installation, Short-term), $/Year (Maintenance, Short-term)
5. Maintenance and potential replanting of forebay on the west side of the pond in Manhasset Valley Park. Annual monitoring of native plantings until successful establishment, invasive plant treatment and maintenance of forebay to ensure proper function. $ (Installation, Short-term), $ (Maintenance, long-term)

6. Feasibility study about right-sizing culverts or installing passages for wildlife where needed- $$ (Construction, Long-term)
7. Educational outreach & signage around the ponds and associated streams. $ (Short-term)

Benefits:

- Conversion of mowed areas into native wildflower meadows will increase biodiversity, promote pollinators, decrease municipal maintenance efforts, stabilize soils through increased groundcover, and reduce the sediment loadings to the lake, stream and ponds.
- Development of a sediment sampling and classification plan will determine if there is contamination within the sediment in the ponds prior to sediment removal.
- Installation of a bioswale on the west side of the pond in Manhasset Valley Park will collect overland flow, including sediment and debris, prior to entering the pond. This will help remove pollutants from stormwater prior to entering the pond that will improve water quality.
- Installation of fountains will increase oxygen content and water movement.
- Invasive species removal and replacement with native species will increase biodiversity and habitat for native fauna/flora as well as assisting in shoreline stabilization and erosional forces.
- The existing forebay is full of sediment and does not function properly as a sediment collection area for the pond. Preparation and adherence to a regular maintenance plan will allow for the existing forebay to function as intended.

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Project ID: N-9 Whitney Pond Habitat Restoration	Priority: Low	Cost: $-$$
Subwatershed: Whitney Pond	**Location:** Whitney Pond Park	



Key Issues:

Severe erosion and sedimentation degraded aquatic habitat, nuisance waterfowl overpopulation and nutrification, stormwater overflows, high turbidity, loss of native habitat and habitat connectivity, established invasives, sediment contamination.

Project Description/Action (Cost Per Recommendation): *The numbers shown on the map above identify project locations and correspond directly to the numbered project descriptions and actions listed below.*

1. Installation & maintenance of fountains at both locations. Annual maintenance to ensure proper function and cleaning of fountain components. $ (Installation, Short-term), $/Year (Maintenance, Long-term)
2. Removal/replacement of the dilapidated dock within Whitney Lake. $ (Short-term)
3. Water quality sampling to determine impacts of rust laden stormwater runoff and potential illicit discharges. $ (Short-term)
4. Feasibility study about right-sizing culverts or installing passages for wildlife where needed. $$ (Construction, Long-term)
5. Educational outreach & signage around the ponds and associated streams. $ (Short-term)
6. Education of municipal staff about proper maintenance techniques, illicit discharges, etc. $ (Establish educational program, Short-term, then continual training, Long-term)

Benefits:

- Conversion of mowed areas into native wildflower meadows will increase biodiversity, promote pollinators, and decrease municipal maintenance efforts. It will also improve ground cover, stabilize the soil, and reduce the sediment loadings to the lake, stream and ponds.

- Development of a sediment sampling and classification plan will determine if there is contamination within the sediment in the ponds prior to sediment removal.
- Installation of a bioswale on the west side of the pond in Manhasset Valley Park will collect overland flow, including sediment and debris, prior to entering the pond. This will help remove pollutants from stormwater prior to entering the pond that will improve water quality.
- Installation of fountains will increase oxygen content and water movement.
- Invasive species removal and replacement with native species will increase biodiversity and habitat for native fauna/flora as well as assisting in shoreline stabilization and erosional forces.
- The existing forebay is full of sediment and does not function properly as a sediment collection area for the pond. Preparation and adherence to a regular maintenance plan will allow for the existing forebay to function as intended.

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Project ID: N-10 Kings Point Park Habitat Restoration	Priority: High	Cost: $, $$$$
Subwatershed: Mitchells Creek	**Location:** Kings Point Park	



Key Issues:

Sediment loading, habitat degradation from fragmentation, nutrient loading from increased development, reduces biodiversity from invasive species.

Project Description/Action (Cost Per Recommendation): *The numbers shown on the map above identify project locations and correspond directly to the numbered project descriptions and actions listed below.*

1. Feasibility study to assess access constraints and management options for dense invasive species (predominately Common Reed (*Phragmites australis*)) along Split Rock Drive for future project development, including invasive plant treatment and habitat connectivity development. $ (Short-term)
2. Invasive plant removal/treatment and native vegetation planting where feasible. Annual monitoring and invasive plant treatment. $(Installation, Short-term), $/Year (Maintenance, Short-term)
3. Plant native vegetation on the land along streambanks where feasible. Annual monitoring of native plantings until successful establishment and invasive plant treatment. $ (Installation, Short-term), $/Year (Maintenance, Short-term)
4. Educational outreach and signage around the freshwater streams in Kings Point Park. $ (Short-term)
5. Determine feasibility of removing sediment in the mouth of Mitchells Creek to improve tidal flow and allow wildlife passage. $ (Feasibility, Mid-term), $$$$ (Implementation, Long-term)

Benefits:

- Proper access for future projects will help determine feasibility of project success within the creek. Increased private residential development around the eastern portion of the creek has limited public and maintenance access.
- Removal of invasives and replacement with native species will increase biodiversity and improve habitat connectivity.
- Sediment removal at the mouth of Mitchells Creek would have benefits including aquatic connectivity and increased flush rates to combat nonpoint sources of pollution within Mitchells Creek.

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Project ID: N-11 Mitchells Pond Habitat Restoration	Priority: Low	Cost: $-$$
Subwatershed: Mitchells Creek	**Location:** Mitchells Pond	



Key Issues:

Wetland loss due to development, poor water quality, sedimentation, high nitrogen, lack of detailed wetland inventory and assessment.

Project Description/Action (Cost Per Recommendation): *The numbers shown on the map above identify project locations and correspond directly to the numbered project descriptions and actions listed below.*

1. Wetland inventory and restoration. $-$$ (Mid-term)
2. Invasive plant removal/treatment and native planting. Annual monitoring and invasive plant treatment. $ (Installation, Short-term), $/Year (Maintenance, Short-term)
3. Conduction of studies on the water quality of the pond, water depths throughout the pond, and the degree of groundwater flow to the pond and its impact. $ (Short-term/Long-term)
4. Development of native habitat buffers on the pond's margins as well as bioswales, berms, and native plantings where feasible. Annual monitoring of native plantings until successful establishment and invasive plant treatment. $ (Installation, Short-term), $/Year (Maintenance, Short-term)
5. Conduction of a feasibility study to evaluate the condition of the outlet gate and potential replacements. $ (Feasibility, Mid-term), $$$$ (Implementation, Long-term)
6. Investigation of the feasibility of adding areas for marsh migration.[8] $ (Installation, Short-term), $/Year (Maintenance, Short-term)
7. Conduction of a feasibility study for sediment removal in the pond. $ (Feasibility, Mid-term), $$$$ (Implementation, Long-term)

Benefits:

- The preparation of a water quality study and wetland inventory/habitat mapping will allow for a detailed project plan to be created to help identify and address water quality issues within Mitchell's Pond. Sub-projects can then be

implemented with the goal of increasing biodiversity, habitat connectivity, water quality, and fish/native species habitat improvements.

- Establishment of native plant buffers would improve bank stabilization, provide flood control and improve water quality by filtering stormwater pollutants entering the pond from the lawn areas associated with the surrounding residential development.

N-12	**Consideration of Wildlife Crossings and Water Flow During Road Work and Infrastructure Improvements**

Sensitive wildlife species and natural hydrologic patterns could be adversely impacted by road work and other infrastructure improvement projects if wildlife movement and water conveyance are restricted. Road work and infrastructure improvements should consider maintaining or enhancing wildlife passage and aquatic organism connectivity through existing and proposed culverts during the design process. Culvert design and sizing should also ensure adequate water flow to prevent flooding, erosion, and habitat degradation upstream and downstream. The design process should reference the Nassau County Culvert Assessment to identify priority culverts for upgrade, right-sizing, or repair, and incorporate best management practices that support long-term ecological function, climate resilience, and infrastructure performance.

N-13	**Canada Geese Management**

Non-migratory Canada geese can cause serious environmental degradation and other community health concerns, this recommendation is for the partners to pursue ways to manage populations of non-migratory Canada geese. Canada geese produce high volumes of bacteria-laden feces, which is picked up by stormwater and moved into Manhasset Bay, contributing to high bacteria counts that keep shellfish beds closed. This feces also interferes with the use of recreational fields and lawns. Canada geese cause habitat destruction and property damage to lawns and cars. NYSDEC recommends developing a comprehensive management plan with several different population control mechanisms, including eliminating feeding (connected to Recommendation O-1), allowing grass and other vegetation to grow tall, using trained dogs to chase away geese, goose repellents, and egg oiling.

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[8] The fate of significant marsh systems on Long Island Sound under future Sea-Level Rise projections- https://lispartnership.org/LIMAPS/

9.7 Water Quality Research and Monitoring (R)

This section outlines recommendations to enhance water quality in the Bay through improved research and monitoring efforts. Recommendations include expansion of the frequency and parameters of water quality sampling, implementing real-time data collection, increasing spatial coverage to better track trends and pollution hotspots, and consideration of climate vulnerability in monitoring efforts.

R-1	**Implement Targeted Source Tracking and Microbial Source Identification**

It is recommended that the Committee and/or its partners implement targeted source tracking and microbial source tracking (MST) studies in areas with persistent pathogen exceedances at sampling sites (e.g., the subwatersheds of Sheets Creek North and East and Mill/Baxter Ponds) to distinguish between human, pet, wildlife, and avian sources. Use DNA-based methods to inform targeted management actions in order to enable the development of more effective interventions. This is also recommended in **B-3** to specifically identify areas with cesspool inputs.

R-2	**Establish a Watershed-Wide Stormwater Outfall and Illicit Discharge Monitoring Program**

This recommendation is to establish a watershed-wide stormwater outfall and illicit discharge monitoring program, though more investigation will need to be done to identify who and how to undertake this. Many outfalls within the watershed area discharge directly to the Bay with little or no treatment. As recommended in **P-10,** the recommendation to enforce illicit discharge ordinances, coordinated municipal efforts related to illicit discharges should be undertaken. Systematically screening all stormwater outfalls within the watershed for dry-weather flows, conducting regular sampling for indicator pollutants (bacteria, nutrients, surfactants), and mapping all outfalls and their contributing sewersheds will aid in each municipality's detection, track down, and elimination of illicit discharges and their compliance with the MS4 Program. The evaluation of watershed-wide baseline data will inform prioritization of retrofits and enforcement requirements. While this is a watershed-wide problem, it is recommended that this coordinated effort prioritize outfalls in subwatersheds with high pollutant loads per acre (e.g., Kensington, Sheets Creek North).

R-3	**Conduct Subwatershed-Scale Pollutant Loading and Trend Analysis**

It is recommended that pollutant loading modeling be updated/refined and re-evaluated routinely (every ±5 years) in each subwatershed in order to account for new land uses/development and climatic data, and track effectiveness of implemented BMPs and policy changes. This may be coordinated by the Committee or taken on by a partner organization or municipality. This expansion of pollutant loading data will aid in the analysis of trends in nitrogen, phosphorus, sediment, and bacteria loads, collected through the monitoring programs recommended in **B-1,** at the subwatershed scale to identify emerging hotspots and track progress toward reduction goals. A better understanding of trends will support adaptive management and prioritization of projects and will provide a quantitative basis for grant applications and regulatory reporting.

Additionally, targeted subwatershed planning can advance stormwater mitigation and improve habitat health and connectivity. Subwatershed plans for Whitney Pond and Leeds Pond would be impactful and a high priority for this recommendation.

R-4	**Expand Citizen Science and Community-Based Monitoring**

This recommendation is to expand citizen science and community-based monitoring throughout the watershed. This will likely be taken on by individual partner organizations. There is a high public interest within the watershed and a perceived willingness to participate in improving the water quality of Manhasset Bay, which can be leveraged to increase monitoring coverage in light of limited resources for agency-led monitoring. It is recommended that the MBPC and watershed municipalities support and expand citizen science programs for water quality monitoring, including bacteria sampling, HAB reporting, and floatable debris surveys. Stakeholders can provide training, QA/QC protocols, and integrate data into a centralized portal as called for in Recommendation **R-6**. Such programs can utilize volunteers from local community and youth groups.

R-5	**Monitor and Assess Climate Change Impacts on Water Quality**

It is recommended that the Committee or a partner monitor and assess climate change impacts on Bay water quality. Climate change is leading to increased frequency/intensity of storms, sea

level rise, and temperature changes, which are altering pollutant dynamics and risks. There is a need for data to support the implementation of resilient infrastructure and management.

Climate vulnerability assessments are recommended including tracking sea level rise, storm surge impacts, temperature trends, and extreme precipitation events. Documenting such trends can help to assess impacts on pollutant loading, flooding, and habitat conditions. Data collected will inform climate adaptation and resilience planning and will aid in anticipation of future water quality challenges. This data can be entered into the centralized data portal, described below in Recommendation **R-6**.

R-6	**Utilize a Centralized Water Quality Data Portal(s) for Manhasset Bay Data**

It is recommended that the Committee and other partners who collect water quality data in the Bay utilize a centralized water quality data portal. Currently, a lack of standardized data management hinders regional analysis and reporting at a watershed-wide scale. Data are currently siloed among the different municipal entities and not easily accessible by the public. It is recommended that a publicly accessible, centralized online portal be utilized to compile, visualize, and share all water quality data collected by municipalities, agencies, academic partners, and citizen scientists. The portal should allow for mapping, trend analysis, and data downloads, and include metadata and QA/QC protocols. Such portals are already in use through EPA (Water Quality Portal)[9] and the Long Island Sound Partnership (Quick Drops)[10].

This watershed-wide data sharing initiative would facilitate inter-municipal coordination and data-driven decision-making, improve transparency and public engagement, reduce duplication of effort, and ensure data consistency.

[9] https://www.epa.gov/waterdata/water-quality-data
[10] https://quickdrops.org/#/sts/overview

9.8 Watershed Planning and Regulatory Measures (P)

This section outlines recommendations for strengthening municipal codes throughout the watershed to protect water quality. It further advocates for the expansion of collaborative watershed planning through the active involvement of the MBPC, local stakeholders, municipalities, and environmental organizations in the development of effective management strategies.

P-1	Encourage the Adoption/Update of Municipal Comprehensive/Master Plans

It is recommended that all the watershed municipalities adopt or, where one has already been established, update their Municipal Comprehensive/Master Plan. A comprehensive plan can impact water quality through thoughtful and coordinated land use planning, resource management, and infrastructure decisions. For example, a comprehensive plan can guide where it is appropriate for certain types of development to occur and steer intense growth away from sensitive areas, it can promote green infrastructure and incentivize smart growth, identify needs for stormwater infrastructure, and encourage low-impact development techniques. Additionally, comprehensive plans often identify the need for upgrades to wastewater treatment facilities and offer recommended resilience strategies for adapting to changing climates and storm events. The comprehensive planning process involves gathering community input regarding the current landscape, issues, and opportunities regarding land use which may directly impact the watershed area. Community input helps inform the municipality's values (e.g., the waterfront, groundwater quality, etc.), which encourages municipalities to adopt zoning for protection of these resources. Bringing in local community and youth groups early will help to get local buy-in.

Based on the regulatory assessment, the majority of the municipalities within the watershed do not have a comprehensive/master plan, and the ones that do are dated. It is recommended that communities that do not have comprehensive plans develop and adopt one to ensure consistent stormwater management, pollution control, and other land and water quality protections. A comprehensive plan would provide clear regulations to address pollution sources and improve resilience to environmental challenges and climate change. For the municipalities that have existing comprehensive/master plans, it is recommended that comprehensive plans be updated every 5 to 10 years to maintain relevancy and ensure that local policies are adaptive and reflect the goals and values of the community. Overall, the Model Local Laws to Increase Resilience (MLL) provides model laws for land use tools, wetlands/watercourse protection measures, coastal shoreline protection measures, management of floodplain development, and stormwater control measures.

P-2	**Strengthen Local Codes and Intermunicipal Coordination for Wastewater Management**

This recommendation is for all watershed municipalities to adopt and enforce model ordinances for wastewater management, including requirements for I/A OWTS, sewer connection mandates, and regular inspection/maintenance of onsite systems. Fostering intermunicipal collaboration is recommended to ensure consistent standards, data sharing, and coordinated grant applications. Uniform regulations will help to close regulatory gaps, improve compliance, and maximize the effectiveness of wastewater management efforts across the watershed. Bringing in local community and youth groups early will help to get local buy-in.

Just as is recommended in Recommendation **W-3**, which calls for updating codes to require regular maintenance of on-site wastewater systems in certain areas, it is recommended that municipalities adopt local laws requiring that new or replacement sanitary systems in areas with shallow depth to groundwater or within shallow groundwater conditions (i.e., establish a minimum distance from surface waters) to utilize best current available technology. It is recommended municipalities within the watershed consider adoption of a Nitrogen Protection Zone, designed to require stricter nitrogen removal standards for sanitary systems associated with newly constructed structures in proximity to surface waters. These requirements would also apply to structures undergoing substantial reconstruction or expansion. This initiative should be considered for all unsewered areas within the Watershed that are within a minimum of 500 feet of surface water (this distance could be modified based on additional factors such as density, soil conditions and depth to groundwater).

The Villages of Plandome, North Haven[11], and Sag Harbor[12] have code that require upgrades to IA systems on all new construction and renovations/additions meeting certain requirements. These codes can serve as model codes for similar legislation in other watershed municipalities.

P-3	**Strengthen Local Codes and Intermunicipal Coordination for Protection of Wetlands Within the Watershed**

This recommendation is to strengthen local codes and intermunicipal coordination for the protection of wetlands throughout the watershed. This could be undertaken by each individual municipality or a single partner could coordinate across multiple municipalities. There are many smaller un-mapped wetlands not protected under federal or state regulations that municipalities should document and extend protections to. Municipalities can benefit from wetland protection,

[11] https://www.northhavenny.gov/environmental-information/pages/innovativealternative-ia-septic-systems
[12] https://ecode360.com/34136080#34136080

creation, and restoration program in many ways including reducing water quality problems, protecting water supplies, reducing stormwater quality and quantity problems, reducing flood and erosion losses, providing outdoor recreation activities, providing research and educational opportunities, and allocating lands throughout the community to their most suitable uses. Additionally, wetland-adjacent areas directly influence the ecological health, water quality, and hydrology of the wetland. Particular attention should be given to the vicinity of Mitchells Creek, where potential land preservation efforts could protect sensitive wetland and riparian habitats. These areas could be made subject to specific municipal regulations, such as overlay districts, minimum setbacks and buffers, sanitary system regulation, etc., to prevent development or harmful activities that could degrade the wetland and impact overall surface water health within the watershed.

Currently, only 6% of municipalities within the watershed have a regulation in place pertaining to wetlands (**Table 6-2** of the Regulatory Review and Assessment Section). Model local regulatory tools[13] available to municipalities include wetland conservation overlay districts, simple wetland and watercourse setbacks, and local freshwater wetland laws, as outlined in the New York State Department of State's Model Local Laws to Increase Resilience. These tools provide municipalities with flexible, legally vetted options to enhance local protections for wetlands and watercourses, particularly where state or federal jurisdiction does not apply. It is encouraged for municipalities to explore these tools for any applicability and adoption locally where applicable. Incorporating such measures into local codes can strengthen resilience to flooding, improve water quality, and preserve critical habitat.

P-4	**Update Municipal Codes for Commercial and Industrial Redevelopment**

This recommendation is to update local codes for commercial and industrial site redevelopment throughout the watershed to require green infrastructure and other water quality considerations. This could be undertaken by each individual municipality, or a single partner could coordinate across multiple municipalities. There are several large commercial properties within the Manhasset Bay watershed with redevelopment opportunities. Such sites may impact a large land area, have existing direct discharges of polluted stormwater to the waterbody, or directly abut the waterbody providing opportunities for establishment of beneficial buffers, updated nitrogen reducing sanitary systems, and green stormwater infrastructure. Therefore, it is recommended that municipalities explore incorporation of green infrastructure, drainage

[13] New York State Department of State. 2020. *Model Local Laws to Increase Resilience*. Accessible at: https://dos.ny.gov/system/files/documents/2020/09/model_local_laws_to_increase_resilience.pdf

improvements with water quality treatment requirements and requirements for establishment of native vegetative buffers into new development and redevelopment projects properties. There are few known industrial-zoned properties in the watershed; however, this recommendation should also be considered for industrial properties to ensure potential redevelopment incorporates these same recommendations.

It is recommended that any commercial or industrial property undergoing substantial redevelopment (e.g., site plan approval, change in use, or expansion over a set square footage) must include:

- Stormwater drainage improvements/upgrades upon existing conditions to meet best management practices, and ensure that drainage and water quality volumes account for the entirety of the property being redeveloped;
- Limitation of impervious surfaces;
- Installation of native vegetative buffers along property edges, especially abutting waterbodies, wetlands, or stormwater outfalls;
- Sewer connections or wastewater system upgrades in accordance with best-available technologies;
- Implementation of current energy/water conservation measures;
- Incorporation of green infrastructure techniques and stormwater pre-treatment to remove sediment, oils, and nutrients before discharge;
- Review of any open violations and pending status of permit coverage under the NYS Multi-Sector Stormwater General Permit (if applicable).

These improvements upon commercial redevelopment properties may also be achieved via offering incentives and flexibilities, such as offering expedited permitting, discounted application fees, tax incentives or similar incentives for projects that exceed minimum requirements. Municipalities should also require maintenance agreements for long-term care of drainage systems and buffers to ensure they are maintained in working, effective condition.

P-5	**Update Municipal Codes to Include Minimum Riparian Buffer Width Requirements**

This recommendation is to strengthen local codes to include minimum riparian buffer width requirements between development and the adjacent waterway throughout the watershed. This could be undertaken by each individual municipality, or a single partner could coordinate across multiple municipalities. Although riparian buffers should be as wide as possible to protect water quality, requiring the restoration of a minimum buffer width for those parcels where the native vegetation has been removed would provide an established standard to ensure some protection of a waterbody from stormwater runoff generated from site improvements and lawn areas. It is noted that the majority of the Bay's frontage is currently developed.

Redevelopment provides an opportunity to establish native buffers and provide stormwater treatment. In recognition of potential site constraints, particularly on water dependent uses, the establishment of a 25-50 foot wide buffer consisting of unmowed native plant species is the minimum recommended for redevelopment of residential properties fronting the Bay, while a minimum 20 foot wide buffer is recommended for the redevelopment of existing commercial properties (where parking lots immediately abut the Bay). In recognition of the limitations of some of the commercial uses that abut surface waters, an option to install a permeable reactive barrier (PRB) behind a bulkhead to provide filtration of stormwater contaminants in place of the vegetated buffer could be given to applicants so that loss of waterfront space vital to the commercial use does not occur. Bringing in local community and youth groups early will help to get local buy-in.

P-6	**Strengthen Municipal Oversight of Marina Operations**

It is recommended that municipalities within the watershed adopt uniform marina regulations. This could be undertaken by each individual municipality, or a single partner could coordinate across multiple municipalities. These regulations should address stormwater management, fueling practices, and waste handling. Specifically, provisions should include requirements for spill containment and cleanup, including spill response kits at fueling docks, mandated installation of best management practices, runoff monitoring, and proper storage and disposal of hazardous materials and solid waste.

Enforcement protocols should be strengthened to require routine annual inspections of marina facilities to ensure compliance with environmental standards. Clear fines and corrective action timelines for non-compliance should be established, with escalating consequences for repeat offenses.

P-7	**Incorporate Municipal Code Amendments for Fertilizer and Pesticide Use Fertilizer-Dependent Vegetation Limits**

It is recommended that municipalities throughout the watershed adopt uniform code amendments to regulate the application, storage, and sale of fertilizers and pesticides within the watershed for both commercial and residential properties. This could be undertaken by each individual municipality or a single partner could coordinate across multiple municipalities. Strategic recommendations to be implemented in codes include:

- Restricting applications during high-risk periods (e.g., heavy rainfall forecasts) and with sprinkler use.
- Establishing buffer zones that prohibit application within proximity to shorelines, wetlands, stormwater outfalls, and impervious surfaces.
- Mandating soil tests to prove the need for fertilizer.
- Requiring commercial applicators to be certified in integrated pest management (IPM) and nutrient management.
- Adopting codes to promote limitations on fertilizer-dependent landscaping by discouraging installation of turf grass or other fertilizer-intensive vegetation, and require use of native plants in landscaping plans.

Once adopted, educational materials should be created and distributed to landscapers and landowners about the code amendments and the importance of proper fertilization practices. Bringing in local community and youth groups will help to spread the message. This recommendation links to Recommendations **O-1** and **S-15**.

P-8	**Incorporate Municipal Code Amendments for Vegetation Clearing Restrictions**

It is recommended that municipalities within the watershed adopt vegetation clearing restrictions. This could be undertaken by each individual municipality or a single partner could coordinate across multiple municipalities. Such restrictions include: requiring permits for vegetation clearing over a defined threshold, wetlands, or steep slopes; restrictions on clearing within close proximity of wetlands; and mandated retention of mature trees and native understory vegetation. It is recommended municipalities require developers to submit vegetation management and landscaping plans as part of site plan approval and include long-term maintenance agreements for preserved vegetation and buffer zones. Bringing in local community and youth groups early will help to get local buy-in.

P-9	**Incorporate Litter Reduction Strategies**

This recommendation is for the partners and other entities throughout the watershed to incorporate litter reduction strategies. The majority of public comments on the Manhasset Bay WQIP were related to litter observations. Litter has been frequently encountered throughout the watershed. Implementing a coordinated municipal strategy that combines infrastructure, enforcement, education, and community engagement will reduce the volume of litter impacting

storm drains, streams, and waterbodies. Volunteer groups, such as girl and boy scout troops, are valuable partners in this effort.

It is recommended municipalities strengthen municipal ordinances by updating littering laws to increase fines for littering, and mandate litter control plans for large public events, public spaces, and commercial properties.

A coordinated feasibility study should be conducted to evaluate the effectiveness of trash capture devices in stormwater outfalls, the expansion of public waste stations, and the implementation of smart bin technology. The feasibility study must consider maintenance costs and responsibilities to ensure long-term effectiveness.

P-10	Enforce Illicit Discharge Ordinances

This recommendation is to enforce illicit discharge ordinances throughout the watershed. Further investigation is required to identify the lead partner. It is recommended that a coordinated effort be established to ensure all municipalities within the watershed are conducting required detection, elimination, and prevention of illicit discharges to stormwater systems, as required by the MS4 Program. While the majority of municipalities within the watershed have adopted codes pertaining to illicit discharge, a coordinated effort to ensure all municipalities are maintaining up-to-date maps of outfalls, conducting regular dry-weather screening of outfalls, and tracing sources of suspected discharges.

Municipal staff should be trained in illicit discharge protocols and legal enforcement procedures.

Data and best current management practices should be shared across all municipalities within the watershed in order to ensure enhanced municipal capacity for water quality protection throughout the watershed.

9.9 Public Outreach and Stewardship (O)

This section outlines three targeted Public Education Recommendations aimed at enhancing community awareness and involvement in watershed stewardship. While these specific recommendations focus on key areas such as nuisance waterfowl management and data collection, it is strongly encouraged that public education be woven throughout all actions incorporated with the recommendations. Promoting volunteer opportunities and sharing information about reported issues will help ensure that the public remains informed and

engaged. By fostering a well-informed community, we support long-term stewardship and the overall success of watershed protection efforts.

O-1	**Expand Upon Public Education and Signage Within the Watershed**

This recommendation is to expand upon existing public education and signage already in place throughout the watershed. This is an on-going need and could have various leads and partners for numerous projects in the future. Based on public comments received, there is a need for public education initiatives within the watershed pertaining to litter, fertilizer use, and other behaviors that may impact water quality. Educating residents, businesses, and stakeholders within the watershed about pollution prevention, sustainable practices, and watershed stewardship can aid in fostering long-term water quality improvements. Partnering with civic groups, residents, interested parties, and scout troops, as well as high schools will further this effort. This recommendation links to Recommendation **S-14**.

It is recommended that targeted educational materials be distributed to homeowners regarding fertilizer/pesticide use, septic system care, tips for reducing stormwater runoff, and native landscaping. In addition, educational materials can be spread regarding various rebate programs available to incentivize stormwater practices and native plantings for homeowners. Educational materials should also inform residents on the impacts of septic systems, the benefits of sewer connections and I/A OWTS, proper system maintenance, and the funding assistance offered by the S.E.P.T.I.C. program.

Targeted educational materials for businesses should include best practices for waste disposal, spill prevention, and stormwater compliance, and should include industry-specific materials for industries such as landscapers, marinas, and auto shops. Targeted educational materials for food-based businesses should include information about the damage caused by leaving food out for waterfowl and other animals.

Targeted educational materials should be distributed to boaters regarding clean boating practices including pumpout requirements and availability, littering impacts and prevention, oil and fuel spill prevention, friendly fishing, wildlife avoidance, and invasive species, among other topics. In regard to municipal code amendments for fertilizer and pesticide use, educational materials should be created and distributed to landscapers and landowners about the code

amendments and the importance of proper fertilization practices. This recommendation links to Recommendations **P-7** and **S-15**.

Educational materials should be distributed via multi channels such as social media, local newspapers, municipal websites, and fliers.

Educational signage should be implemented throughout strategic areas of the watershed providing messaging related to littering, picking up pet waste, and feeding of waterfowl. Signage could be placed in viewing areas and other areas of passive recreation to educate the community about waterfowl, wetlands, and the importance of conservation. This links to Recommendation **B-6**. Additionally, it is recommended the MBPC and municipalities within the watershed continue to collaboratively involve the public in volunteer opportunities, such as cleanups, focus groups, or habitat restoration plantings.

An additional educational campaign recommendation can be focused on golf course management about fertilizer, pesticide, and other chemical use. This ties with Recommendation **M-6**. An educational campaign to spread awareness about the Nassau County S.E.P.T.I.C. program's existence and importance can go a long way to encouraging septic upgrades. This ties with Recommendation **W-3**.

Develop an educational program about the consequences of trucks parked in the commercial district to water quality and what preventative measures can be taken to protect against environmental degradation. This is especially a problem in the Whitney Pond subwatershed. This ties with Recommendations **M-2, M-3, M-4** and **S-8**, though this issue goes beyond municipal operations and includes commercial truck use.

Increased public awareness of watershed health and pollution sources will strengthen community engagement and stewardship and improvements to problem behaviors will positively impact water quality. A targeted behavior change education campaign will further this impact.

O-2	**Expand Public Access to Manhasset Bay for Recreation**

It is recommended that public recreational access to Manhasset Bay be expanded, which is also called for in Recommendation **M-8**. Such an undertaking would likely take several partners and would need further investigation to identify the lead. Expansion of public access to Manhasset

Bay where possible helps to promote equitable, safe, and environmentally responsible public access to the waterbody for recreation – such as kayaking, fishing, and nature observation – while implementing safeguards to protect water quality and aquatic ecosystems. Public comment expressed a need for additional access points for kayaking launches or similar recreational uses. It is recommended that additional access points be evaluated, and that signage and public notification be improved for existing access points to improve public access to the waterbody and stewardship. These projects promote stewardship of the land and Bay, public engagement, and equitable use of the Bay's resources.

The design of any new access points should use permeable surfaces for parking and pathways to reduce runoff, incorporate green infrastructure where possible, provide pet waste stations, liter/recycling bins, and implement signage to protect habitat or educate the public on the health of the watershed. This recommendation should also incorporate litter reduction strategies, as called for in Recommendation **P-9**, and protect already existing recreational sites.

O-3	**Litter Tracking Portal**

It is recommended that a partner develop a litter tracking tool that could be used throughout the watershed. To strengthen public stewardship and support litter reduction, it is recommended that municipalities or the MBPC implement a watershed-wide portal for residents to report litter observations using a mobile app or web platform. This program will help identify litter hot spots and guide targeted cleanup and educational efforts. A GIS-based dashboard should be developed to track reported litter and monitor cleanup activities. Bringing in local community and youth groups early will help to ensure a user-friendly interface and spread the word of such a portal's existence. Public education campaigns should accompany the program to encourage participation (use of QR codes on signs that directly link to the website/tracking portal), raise awareness about the impacts of litter on water quality, and promote responsible disposal practices. This initiative will foster individual stewardship, community engagement, empower residents to take an active role in watershed protection, and support data-driven improvements to litter management.

10.0 IMPLEMENTATION STRATEGY

The Manhasset Bay WQIP is designed to improve water quality within Manhasset Bay and reduce pollutant loads from stormwater runoff entering the Bay. The Plan promotes education, environmental stewardship, best management practices for future land use and municipal operations, and improvements in stormwater collection and treatment. By implementing the pollution prevention and corrective actions outlined in the WQIP (including best management practices, public education and outreach, stormwater improvement strategies, ecological restoration and priority actions) steps can be taken to improve water quality, restore habitat, reduce water quality impairments to shellfish and other aquatic resources, and enhance recreational opportunities within Manhasset Bay.

10.1 Implementation Actions

The following implementation strategy (see **Tables 10-1** through **10-3**) addresses the methods and means by which the Manhasset Bay WQIP will implement the projects and actions outlined in **Section 9.0**. This section covers different aspects of implementation, including governmental jurisdiction, prioritization of actions, and potential funding sources to assist the Town, Villages, and partners in carrying out the recommended actions. **Table 10-2** outlines the implementation strategy for stormwater projects, and **Table 10-3** outlines the implementation strategy for natural resources projects.

Implementation of the Manhasset Bay WQIP involves many agencies, levels of government, civic groups, partners, and citizens. Inter-governmental coordination and cooperation among the numerous Villages, Town of North Hempstead, Nassau County, New York State, non-profit organizations, and the community are essential to the success of the WQIP. Groups such as the Manhasset Bay Protection Committee (MBPC), Nassau County Soil and Water Conservation District, NYSDEC, EPA, Sea Grant, Cornell Cooperative Extension, and other partners can provide information and support for the development of educational, outreach, and stewardship materials, as well as technical guidance on best management practices (BMPs), sanitary system maintenance, and green infrastructure practices for use at home (e.g., rain barrels, native landscaping). Opportunities for collective efforts are noted as applicable.

Cost ranges for implementation of various recommendations are also provided in **Table 10-1** ($: $0–$50,000; $$: $50,000–$100,000; $$$: $100,000–$300,000; $$$$: $300,000+). As funding for water quality improvements is often limited, the recommendations are also categorized by potential timeframes for completion from project initiation, denoted as follows:

- **O (Ongoing):** Projects, activities, and programs that occur annually or more frequently, such as education, outreach, or monitoring activities.
- **S (Short-term):** Activities or programs that could be initiated or completed within one or two years of project initiation and could occur at any time when funding and initiative are available. These projects may demonstrate immediate progress and/or help establish a framework for subsequent recommendations (e.g., stormwater retrofit plans, MS4 compliance, educational materials, code revisions).
- **M (Mid-term):** Programmatic and operational measures that could be initiated or completed over two to five years and may begin at any time when funding and initiative are available. Examples include land conservation, protection of unique landscapes, construction of large retrofit or restoration projects, low impact development (LID), green infrastructure, or more complex planning studies.
- **L (Long-term):** These are additional implementation projects necessary to meet watershed management objectives and water quality goals, as well as evaluation of progress and updates to existing plans. Long-term recommendations are intended to begin within the next ten years of WQIP completion and may continue to be initiated in later years.

Based on the different aspects of implementation as outlined in the tables below, a ranking system was utilized in order to assign priorities to each proposed action. For the General Recommendations in **Table 10-1**, rankings were assigned for each category including the number and importance of goals addressed by a project based on public and MBPC feedback, the timeframe for completion, and the cost estimate. Higher category rankings were given to projects that:

- address multiple watershed goals
- address the primary concerns of the community and MBPC
- could be completed with shorter term planning or are already ongoing
- are relatively inexpensive

Lower rankings were applied to projects that:

- achieve fewer watershed goals
- require longer term planning
- require greater expense

Based on the sum of the ranked categories, a priority was assigned and is provided in **Table 10-1**. Projects with a high total category ranking were assigned a high priority (I), projects with mid-range total category rankings were assigned a medium priority (II), and projects with a low total ranking were assigned a low priority (III).

For the Stormwater and Restoration projects in **Tables 10-2** and **10-3**, rankings were assigned to each category using various metrics, including the location of the proposed project within the watershed, the number and importance of goals addressed by a project based on public and MBPC feedback, the timeframe for completion, size of the restoration area (for restoration projects only), the anticipated complexity of regulatory/permitting requirements, operational maintenance requirements, and cost estimates. Higher category rankings were given to projects that:

- are located in high-priority subwatersheds (as identified in the characterization report)
- achieve multiple watershed goals
- address the primary concerns of the community and MBPC
- can be implemented with shorter term planning
- impact larger restoration areas (restoration projects only)
- involve less complex permitting/regulatory requirements
- require less operational maintenance
- are relatively inexpensive

Lower category rankings were given to projects that:

- are not located in high-priority subwatersheds
- would achieve fewer watershed goals
- require longer-term planning for implementation
- impact smaller restoration areas (restoration projects only)
- require more complex permits/regulatory requirements
- require extensive ongoing maintenance
- have relatively higher costs.

Based on the sum of the ranked categories, a priority was assigned and is provided in tables **10-2** and **10-3**. Projects with a high total category ranking were assigned a high priority (I), projects with mid-range total category ranking were assigned a medium priority (II), and projects with a low total ranking were assigned a low priority (III).

Table 10-1: General Recommendations Implementation Strategy

ID	Recommendation	Goal[1]	Involved Entities	Timeframe[2]	Cost Estimate[3]	Potential Funding Sources[4]	Priority[5] (I, II, III)
General Bay Wide Recommendations							
B-1	Comprehensive Water Quality Monitoring Program	1, 10, 11, 13	MBPC; Nassau County Dept. of Health; Town of North Hempstead; partners	O	$-$$	B1e, B1l, J3c, J6f, K1a, K3g, N1g	I
B-2	Expand Water Quality Sampling to Include Pesticides	1, 10	MBPC; Town of North Hempstead; Nassau County Dept. of Health; partners	S	$	J4d, B1l, K3g, N1g	II
B-3	Investigate Septic System Contributions to Pollution	1, 11	Nassau County Dept. of Health; Town of North Hempstead; MBPC; partners	S-M	$-$$	A1b, B1l, J3c, K3g, N1g	II
B-4	Feasibility Study to Evaluate Use of Aeration Systems in Stagnant Areas of the Bay	1, 9, 10	MBPC; Town of North Hempstead	M	$-$$$	B1l, J2b, K3g	II
B-5	Support Shellfish Restoration and Other Bioextraction Programs	5, 10, 11	Town of North Hempstead; NYSDEC; MBPC; Non-profit partners	O	$-$$	J5e, K1c, B1d	II
B-6	Manage Nuisance Waterfowl Populations and Pet Waste to Reduce Pathogen Inputs	1, 11, 12	Nassau County; Town of North Hempstead; Villages; MBPC	O	$	B1e, J6f	I
B-7	Conduct a Tidal Flushing and Circulation Study for Manhasset Bay	1, 9, 10	MBPC; Town of North Hempstead	S	$-$$	J3c, B1l, K3g	II
B-8	Investigate Areas for Removal of Sediment from Manhasset Bay	1, 9	Town of North Hempstead; MBPC	M	$-$$$$	B1l, J2b, I1	III
B-9	Identify Areas for Open Space Preservation	7, 5	Town of North Hempstead; Villages; MBPC; Nassau County Planning; partners	S-M	$	B1n, G1b, H1b	I
Municipal Facilities Recommendations							
M-1	Complete a GIS-Based Mapping of the Stormwater Management System and Contributing Areas to the MS4 System.	1, 4	Nassau County; Town of North Hempstead; Villages	S	$-$$	B4m, B1l	I
M-2	Provide Training for Municipal Maintenance Personnel Regarding Stormwater Runoff and Water Pollution, Hazardous Materials Handling, Illicit Discharge Detection and Best Management Practices.	4	Nassau County; Town of North Hempstead; Villages; MBPC	O	$-$$	B1e, J2g	I
M-3	Provide Designated Areas in Municipal Facilities (DPW Yards, Police and Fire Stations, Vehicle Storage Yards, etc.) for Washing of Vehicles with Proper Filtration and Drainage to Prevent Toxic or Hazardous Materials from Entering the Watershed.	4	Nassau County; Town of North Hempstead; Villages	S	$	A1a, B1f	I
M-4	Ensure that All Municipal Operations within the Watershed Incorporate Best Management Practices (BMP)/Good Housekeeping Practices into Daily Operations.	4	Nassau County; Town of North Hempstead; Villages	O	$	B1e	I
M-5	Complete Regular Municipal Facility and Operations Audits.	4	Nassau County; Town of North Hempstead; Villages	O	$	B1e	I
M-6	Incorporate Projections Addressing Changing Climate into Municipal Facility Planning and Upgrades.	4, 12	Nassau County; Town of North Hempstead; Villages	O	$	B1l, I1	II
M-7	Enhance Municipal Trash Collection and Floatable Debris Control and Maintenance Across the Watershed.	4, 11	Nassau County; Town of North Hempstead; Villages; public landowners	O	$	B1e, J6f, K3h	I
M-8	Improve Public Access to Waterfront Areas through Infrastructure Upgrades and Recreational Amenities.	5, 7	Nassau County; Town of North Hempstead; Villages; partners	M-L	$-$$$	F1a, G1a, K3i, N1d	II

ID	Recommendation	Goal[1]	Involved Entities	Timeframe[2]	Cost Estimate[3]	Potential Funding Sources[4]	Priority[5] (I, II, III)
Wastewater Management							
W-1	Expand Sewer Connections and Eliminate Legacy Septic Systems	1, 2	Port Washington WPCD; Great Neck WPCD; Town of North Hempstead; Nassau County; Villages	L	$$-$$$$	A1b, J1a, M1	II
W-2	Incentivize and Require Upgrades to Innovative/Alternative Onsite Wastewater Treatment Systems (I/A OWTS)	1	Nassau County Dept. of Health; Town of North Hempstead; Villages	S–M	$-$$$	A1b, B1l	II
W-3	Develop a Program and Update Town and Village Codes to Identify and Require Regular Maintenance of Septic Systems in Areas with Shallow Depth to Groundwater and Poor Integrity/Not Properly Functioning	1, 3	Town of North Hempstead; Villages; MBPC	S	$	B1l	I
W-4	Upgrade and Optimize Wastewater Treatment Plant (WWTP) Performance	2	Port Washington WPCD; Great Neck WPCD	M–L	$$-$$$$	A1b, J1a	II
W-5	Promote and Implement Water Reuse and Resource Recovery	2	Port Washington WPCD; Great Neck WPCD; MBPC; Port Washington Water District; Manhasset-Lakeville Water District; Village of Sands Point Water District; Village of Plandome Water District; Roslyn Water District; Water Authority of Great Neck North; Golf Courses; other partners; community groups	M–L	$-$$$$	A1b, J2b	III
W-6	Enforcement and Education of Boat Pump-Out Practices	8, 11	Town of North Hempstead; Villages; MBPC	O	$	B1e, J6f	I
Water Quality Research and Monitoring							
R-1	Implement Targeted Source Tracking and Microbial Source Identification	1, 10, 11	MBPC; Nassau County ; partners	S	$-$$	J3c, B1l	II
R-2	Establish a Watershed-Wide Stormwater Outfall and Illicit Discharge Monitoring Program	1, 11	Nassau County DPW; Town of North Hempstead; Villages	O	$-$$	B1l, B4m	II
R-3	Conduct a Subwatershed-Scale Pollutant Loading and Trend Analysis	1, 11, 13	MBPC; Town of North Hempstead	O	$-$$$	J3c, O3g	II
R-4	Expand Citizen Science and Community-Based Monitoring	11, 12	MBPC; Non-profits; Villages	O	$	J6f, K1b, O3i, N1g	II
R-5	Monitor and Assess Climate Change Impacts on Water Quality	10, 12	MBPC; monitoring groups	O	$	B1l, J2b, O1a	II
R-6	Utilize a Centralized Water Quality Data Portal(s) for Manhasset Bay Data	11, 13	MBPC; monitoring groups	S	$	J3c, N1h	I
Watershed Planning and Regulatory Measures							
P-1	Encourage the Adoption/Update of Municipal Comprehensive/Master Plans	3	Nassau County; Town of North Hempstead; Villages	S	$	F1a	II
P-2	Strengthen Local Codes and Intermunicipal Coordination for Wastewater Management	3	Nassau County; Town of North Hempstead; Villages	S	$	B1l	II
P-3	Strengthen Local Codes and Intermunicipal Coordination for Protection of Wetlands Within the Watershed	3, 5	Nassau County; Town of North Hempstead; Villages	S	$	B1l	I
P-4	Update Municipal Codes for Commercial and Industrial Redevelopment	3	Town of North Hempstead; Villages	S	$	F1a	II

ID	Recommendation	Goal[1]	Involved Entities	Timeframe[2]	Cost Estimate[3]	Potential Funding Sources[4]	Priority[5] (I, II, III)
P-5	Update Municipal Codes to Include Minimum Riparian Buffer Width Requirements to Waterways	3, 5	Town of North Hempstead; Villages	S	$	B1l	I
P-6	Strengthen Municipal Oversight of Marina Operations	3, 8	Town of North Hempstead; Villages	S	$	B1l	I
P-7	Incorporate Municipal Code Amendments for Fertilizer and Pesticide Use Fertilizer-Dependent Vegetation Limits	3, 11	Nassau County; Town of North Hempstead; Villages	S	$	B1l	I
P-8	Incorporate Municipal Code Amendments for Vegetation Clearing Restrictions	3, 7	Town of North Hempstead; Villages	S	$	B1l	I
P-9	Incorporate Litter Reduction Strategies	3	Town of North Hempstead; Villages	S	$	B1e, K3h, N1e,	I
P-10	Enforce Illicit Discharge Ordinances	3, 4	Nassau County; Town of North Hempstead; Villages	O	$	B1e	I
Public Outreach and Stewardship							
O-1	Expand public education and signage within the watershed	11, 12	MBPC; Nassau County; Town of North Hempstead; Villages; partners	O	$-$$	J6f, B1e, K3i, N1d	I
O-2	Expand public access to Manhasset Bay for recreation	5, 7	NYS; Nassau County; Town of North Hempstead; Villages; partners	M-L	$-$$$$	F1a, G1a, K3i, N1d, O1b,c,	II
O-3	Implement a litter tracking portal	3, 11, 12	MBPC; Nassau County; Town of North Hempstead; partners	S	$	J6f, K3i, N1g	I

(1) See **Section 1.1.1** for description of Goals
(2) Timeframe Key: S = Short-term (1–2 years); M = Mid-term (2–5 years); L = Long-term (5+ years); O = Ongoing
(3) Cost Key: $ = $0-$50,000; $$ = $50,000–$100,000; $$$ = $100,000–$300,000; $$$$ = $300,000+
(4) See **Section 10.2** for description of Potential Funding Sources
(5) Priority Key: I = High Priority, II = Medium Priority, III = Low Priority

Table 10-2: Stormwater Recommendations Implementation Strategy

ID	Recommendation	Subwatershed	Goal[1]	Involved Entities	Timeframe[2]	Permit Required	Operational Maintenance Requirements	Cost Estimate[3]	Potential Funding Sources[4]	Priority[5] (I,II,III)
S-1	Green Infrastructure: Install Rain Gardens Throughout the Watershed	Baywide	1,10,12	Town of North Hempstead; Villages; Nassau County	O	Local approvals may be required. NYSDEC Freshwater Wetlands, Tidal Wetlands, USACE Section 404/10, and NYSDOS Coastal Consistency review may be required if located within regulated areas.	N/A General	$-$$$	A1a,B1f,B4l.F1,J6f, K3f, N1e	II
S-2	Green Infrastructure: Streambank Stabilization	Baywide	1,5 ,10,12	Town of North Hempstead; Nassau County; Villages	M	Yes. NYSDEC Article 24/25 permits may be required. USACE Section 404/10 and NYSDOS Coastal Consistency review may be required. Local approvals required.	Minimal once established	$$-$$$	A 1a, B4l, B5n, F1a, I1a, K3e, N1b	III-II
S-3	Green Infrastructure: Bioswales Along Right-of-Ways	Baywide	1, 10, 12	Town of North Hempstead;	M	Local approvals required such as Town Highway Department, Village Department of Public Works	Regular watering, clean-out, and maintenance	$-$$$	A1a, B1f, B4l, D1a, E1a, F1a, K3f, N1e	I-II

ID	Recommendation	Subwatershed	Goal[1]	Involved Entities	Timeframe[2]	Permit Required	Operational Maintenance Requirements	Cost Estimate[3]	Potential Funding Sources[4]	Priority[5] (I,II,III)
				Nassau County; Villages		(DPW), or County DPW. NYSDEC Article 24/25 and NYSDOS Coastal Consistency review may be required if within regulated areas.				
S-4	Green Infrastructure: Permeable Pavement	Baywide	1, 10, 12	Town of North Hempstead; Nassau County; Villages and partners	M	Local approvals required. NYSDEC Article 24/25 permits may be required if within regulated areas.	Annual maintenance once installed	$$-$$$	A1a, B1f, D1a, E1a, F1a, K3f, N1e	III
S-5	Outfall Retrofits	Baywide	1, 10, 11, 12	Town of North Hempstead; Nassau County; Villages	M	Yes. NYSDEC Article 24/25 permits, USACE Section 404/10 authorization, and NYSDOS Coastal Consistency review may be required. Local approvals required.	Regular clean-outs once installed	$$-$$$	A1a, B4l, B5n, F1a, I1a, J5e, K3f, N1e	I
S-6	Pre-Treatment Practices	Baywide	1, 10, 11	Town of North Hempstead; Nassau County; Villages; partners	M	Local approvals required. NYSDEC Article 24/25 permits may be required if within regulated areas.	Regular clean-outs once installed	$$-$$$	A1a, B4l, F1a, J2b, K3f, N1e	II
S-7	Culvert & Drainage Maintenance	Baywide	1, 4, 10, 12	Town of North Hempstead; Nassau County; Villages	O	No for routine maintenance. Permits may be required for repair/replacement within regulated areas (NYSDEC, USACE, NYSDOS).	N/A General	$	B1e, E1a, I1a, F1a	I
S-8: Sheets Creek Coastline and Watershed Activities										
S-8-1	Promote property owner/municipal best management practices (BMPs) (reducing fertilizer/pesticide use on lawn areas, educating the public on sustainable lawn maintenance and alternative landscapes, wetland buffers, native lawn alternatives; this connects with Recommendation O-1)	Sheets Creek North/East	1, 5, 10, 11, 12	Town of North Hempstead; Villages of Manorhaven & Port Washington North; Nassau County; MBPC; partners	S–M	No permits anticipated. Programmatic outreach/BMP promotion only. Local approvals not typically required.	N/A	$-$$	A1a, B1b, B4l, B5n, F1a, J6f, K1b, K3i, N1d	I
S-8-2	Complete regular outfall screening/illicit discharge detection; enhance enforcement of illicit discharges from adjacent/nearby commercial uses that directly discharge/overflow to municipal drainage systems.	Sheets Creek North/East	1, 5, 10, 11, 12	Town of North Hempstead; Villages of Manorhaven & Port Washington North; Nassau County	O	No permits anticipated for outfall screening/IDDE and enforcement activities. If follow-up work includes repair/retrofit within regulated wetland/coastal areas, NYSDEC/USACE/NYSDOS approvals may be required.	-Annual outfall screening	$	A1a, B1b, B4l, B5n, F1a, J6f, K1b	I
S-8-3	Investigate the feasibility of mussel mats within Creek.	Sheets Creek North/East	1, 5, 10, 11, 12	Town of North Hempstead; Village of	S–M	Yes. In-water mussel mat pilot/installation may require NYSDEC permit(s) (e.g., Tidal Wetlands Article 25 and/or Protection of Waters Article 15, as	-ongoing monitoring of mussel structures and surrounding water quality.	$$	A1a, B1b, B4l, B5n, F1a, J6f, K1b, K3f, N1a, O1c	II

ID	Recommendation	Subwatershed	Goal[1]	Involved Entities	Timeframe[2]	Permit Required	Operational Maintenance Requirements	Cost Estimate[3]	Potential Funding Sources[4]	Priority[5] (I,II,III)
				Manorhaven; Nassau County; MBPC; partners		applicable), USACE Section 10 (and/or 404 if fill is involved), and NYSDOS Coastal Consistency review. Local approvals may also apply.				
S-8-4	Locate culvert under Manhasset Avenue connecting Sheets Creek North and East and clean out to restore functionality	Sheets Creek North/East	1, 5	Town of North Hempstead; Village of Manorhaven; Nassau County	S	No for routine cleanout/maintenance of existing drains and culverts; local approvals required. If work involves excavation, repair/replacement, or occurs within regulated wetland/waterbody areas, NYSDEC Article 24/25 permits may be required; USACE Section 404/10 authorization and NYSDOS Coastal Consistency review may also be required where applicable.	-Biannually inspect. Refer to manufacturer's guidance for specific maintenance.	$	A1a, B4l, B5n, F1a, I1a, J2b, K3e	I
S-8-5	Install end of street rain gardens, remove invasive phragmites from adjacent wetlands/sediment basin on the east end of Sheets Creek and revegetate/stabilize shoreline areas with spartina/native species.	Sheets Creek North/East	1, 5, 10, 11, 12	Town of North Hempstead; Village of Manorhaven; Nassau County; MBPC	S–M	Yes (for wetland/shoreline work). End-of-street rain gardens. Generally, local approvals only unless in regulated areas. Invasive Phragmites treatment in wetlands typically requires NYSDEC Aquatic Pesticide Permit (6 NYCRR Parts 327–329) and/or NYSDEC wetland permit (Article 25 and/or Article 24, as applicable). Shoreline revegetation/stabilization may also require USACE Section 10/404 and NYSDOS Coastal Consistency review. Local approvals required such as municipal DPWs.	-Initial invasive species removal. Additional revegetation and invasive species removal may be required after installation. Monitor stabilization efforts during first 1-3 years of plant installation.	$$$	A1a, B1b, B4l, B5n, F1a, J6f, K1b, K3e,f, N1b,e, O1c	III
S-8-6	Install additional green infrastructure (GI) within parking lots adjacent to Sheets Creek.	Sheets Creek North/East	1, 5, 10, 11, 12	Town of North Hempstead; Village of Manorhaven; Nassau County; MBPC	S–M	No for upland/parking lot GI. Local approvals required. If GI is within regulated wetland/adjacent areas or involves disturbance near tidal waters, NYSDEC Article 24/25 permits and NYSDOS Coastal Consistency review may be required.	-Ensure temporary irrigation and monitor plant success during the first establishment year. Plant to fill holes as-needed.	$$	A1a, B1b, B4l, B5n, F1a, J6f, K1b, K3f, N1e	II
S-8-7	Wetland/shoreline restoration at Sagamore Hill Dr. and Sintsink Dr. E & W street ends.	Sheets Creek North/East	1, 5, 10, 11, 12	Town of North Hempstead; Village of Manorhaven; Nassau County; MBPC	S–M	Yes. Wetland/shoreline restoration at street ends likely requires NYSDEC Tidal Wetlands (Article 25) and/or Freshwater Wetlands (Article 24) permits (location dependent), USACE Section 10 (and/or 404), and NYSDOS Coastal Consistency review. Local approvals required.	-Monitoring for erosion during first 1-3 years of establishment.	$$	A1a, B1b, B4l, B5n, F1a, J6f, K1b, K3e, N1b, O1b,c	II
S-8-8	Conduct continuous water quality sampling at significant outfalls.	Sheets Creek North/East	1, 5, 10, 11, 12	Nassau County; Town of North Hempstead; Village of	S–M	No permits typically required for monitoring/sampling; however, an EPA/DEC-acceptable QAPP may be required for grant-funded monitoring. If installing permanent monitoring equipment/structures at outfalls or	N/A	$-$$	A1a, B1b, B4l, B5n, F1a, J6f, K1b	II

ID	Recommendation	Subwatershed	Goal[1]	Involved Entities	Timeframe[2]	Permit Required	Operational Maintenance Requirements	Cost Estimate[3]	Potential Funding Sources[4]	Priority[5] (I,II,III)
				Manorhaven; MBPC		within regulated areas, NYSDEC/USACE/NYSDOS approvals may be required.				
S-9: NE Residential Area Stormwater Abatement										
S-9-1	Create rain gardens and bioswales along rights-of-way where possible, or retrofit existing drainage systems with off-line hydrodynamic separators/media filter inlet inserts in above identified commercial and residential areas that directly discharge into Manhasset Bay.	Sheets Creek North/East, Mill/Baxter Ponds	1, 10, 11, 12	Nassau County; Town of North Hempstead; Villages of Manorhaven, Port Washington North, and Baxter Estates; MBPC	S–M	No for upland rain gardens, bioswales, and inlet inserts; local approvals required such as Town Highway Department, Village DPW, or County DPW. If work occurs within regulated freshwater/tidal wetlands, adjacent areas, or coastal zones, NYSDEC Article 24/25 permits, USACE Section 404/10 authorization, and NYSDOS Coastal Consistency review may be required.	-Ensure temporary irrigation and monitor plant success during the first establishment year. Plant to fill holes as needed.	$-$$$	A1a, A2b, B1b, B4l, F1a, J6f, K3f	I
S-9-2	Promote property owner/municipal BMPs (reducing fertilizer/pesticide use on lawn areas, educating the public on sustainable lawn maintenance and alternative landscapes, wetland buffers, native lawn alternatives).	Sheets Creek North/East, Mill/Baxter Ponds	1, 10, 11, 12	Town of North Hempstead; Villages of Manorhaven, Port Washington North, and Baxter Estates; Nassau County; MBPC; partners	S–M	None	N/A	$	A1a, A2b, B1b, B4l, F1a, J6f, K3i, N1d	I
S-9-3	Create and distribute educational materials to landscapers and landowners about the importance of proper fertilization practices and their effect on water quality.	Sheets Creek North/East, Mill/Baxter Ponds	1, 10, 11, 12	Town of North Hempstead; Villages of Manorhaven, Port Washington North, and Baxter Estates; Nassau County; MBPC	S–M	None	N/A	$	A1a, A2b, B1b, B4l, F1a, J6f, K3i, N1d	I
S-9-4	Encourage volunteer cleanups along the shorelines, especially through yacht club youth clubs.	Sheets Creek North/East, Mill/Baxter Ponds	1, 10, 11, 12	Town of North Hempstead; Villages of Manorhaven, Port Washington North, and Baxter Estates; Nassau County; MBPC; partners	S–M	Landowner permission and/or local permits are required for volunteer cleanups. Local coordination/authorization required. NYSDEC or USACE approvals may be required if debris removal involves excavation, sediment disturbance, or work within regulated wetland or coastal areas.	N/A	$	A1a, A2b, B1b, B4l, F1a, J6f, K3i, N1d	II
S-9-5	Continue and, where possible, expand programs such as the Town's Rain	Sheets Creek North/East,	1, 10, 11, 12	Town of North Hempstead;	S–M	None	N/A	$-$$$	A1a, A2b, B1b, B4l, F1a, J6f, K3i, N1d	II

ID	Recommendation	Subwatershed	Goal[1]	Involved Entities	Timeframe[2]	Permit Required	Operational Maintenance Requirements	Cost Estimate[3]	Potential Funding Sources[4]	Priority[5] (I,II,III)
	Barrel Program and others to capture rainwater from residences and other properties.	Mill/Baxter Ponds		Villages of Manorhaven, Port Washington North, and Baxter Estates; Nassau County; MBPC; partners						
S-10: Shore Rd Actions										
S-10-1	Install Bandalong-style litter traps, new trash receptacles that better secure trash, maintain and regularly empty the receptacles, and launch a signage/public education campaign.	Mill/Baxter Ponds	1, 10, 11, 12	Town of North Hempstead; Nassau County; Port Washington WPCD	S–M	No permits anticipated for litter traps, receptacles, maintenance, and signage/education. Local authorization required. If a litter trap is installed in/over a regulated waterbody, wetland, or at an outfall within tidal/freshwater wetland jurisdiction, NYSDEC permits and/or USACE Section 10/404 authorization and NYSDOS Coastal Consistency review may be required.	-Regularly remove captured debris-monthly or after major storms. Conduct routine inspections for structural integrity.	$	A1a, B1b, B4l, B5n, F1a, J6f, K3h, N1e	I
S-10-2	Install hydrodynamic separators in stormwater drainage systems connected to outfalls.	Mill/Baxter Ponds	1, 10, 11, 12	Nassau County	S–M	Yes. Installing hydrodynamic separators within a stormwater drainage system connected to outfalls typically requires local approvals and may require NYSDEC Article 24/25 permits if work occurs in regulated wetland/adjacent areas or involves discharge structures. USACE Section 404/10 authorization and NYSDOS Coastal Consistency review may be required where work occurs in tidal areas or affects navigable waters/outfalls.	-Biannually inspect. Refer to manufacturer's guidance for specific maintenance.	$$	A1a, B1b, B4l, B5n, F1a, J6f	I-II
S-10-3	Install green infrastructure practices within Sunset Park along Main Street to divert runoff from catch basins attached to the outfall.	Mill/Baxter Ponds	1, 10, 11, 12	Town of North Hempstead; Nassau County; Port Washington WPCD;	S–M	No for upland GI; local approvals required (park/ROW work). If GI is located within regulated wetland/adjacent areas or coastal zones, NYSDEC Article 24/25 permits and NYSDOS Coastal Consistency review may be required; USACE authorization may be required if work extends into jurisdictional waters.	-Ensure temporary irrigation and monitor plant success during the first establishment year. Plant to fill holes as-needed.	$$	A1a, B1b, B4l, B5n, F1a, J6f, K3f,i, N1e	I
S-11: Baxter Pond Watershed Stormwater Abatement										
S-11-1	Coordinate with Nassau County to remove sediment/trash/floatables and regularly maintain stormwater infrastructure.	Mill/Baxter Ponds	1, 10, 11, 12	Nassau County; MBPC	S–M	No for routine maintenance. If sediment removal, excavation, or debris removal occurs within regulated wetlands/waterbodies or alters drainage/outfalls, NYSDEC Article 24/25 permits may be required; USACE Section 404/10 authorization and NYSDOS Coastal Consistency	-Biannually inspect and annually vacuum clean accumulated debris.	$	A1a, B1b, B4l, F1a, I1a	I

ID	Recommendation	Subwatershed	Goal[1]	Involved Entities	Timeframe[2]	Permit Required	Operational Maintenance Requirements	Cost Estimate[3]	Potential Funding Sources[4]	Priority[5] (I,II,III)
						review may also be required. Local authorization required.				
S-11-2	Green infrastructure with rain guardians along Central Drive, as space allows, to collect debris before reaching catch basins.	Mill/Baxter Ponds	1, 10, 11, 12	Nassau County	S–M	No for upland rain guardians/GI; local approvals required such as Town Highway Department or Village Department of Public Works DPW. NYSDEC permits and NYSDOS Coastal Consistency review may be required if installed within regulated wetland/adjacent areas or coastal zones.	-Clean inlets/outlets of GI as needed. Ensure temporary irrigation and monitor plant success during the first establishment year. Plant to fill holes as-needed.	$$	A1a, B1b, B4l, F1a, I1a; K3h; N1e	II
S-11-3	Retain debris dragged by stormwater from Baxter Creek, using methods such as an upstream dam.	Mill/Baxter Ponds	1, 10, 11, 12	Nassau County	M	Yes—likely. Debris retention structures (e.g., upstream dam/impoundment) may require NYSDEC Protection of Waters (Article 15) and/or Article 24/25 permits depending on jurisdiction, and may require USACE Section 404 authorization. NYSDOS Coastal Consistency review may be required if within coastal zone. Local approvals required.	-Regularly inspect for structural integrity. Maintain on as-needed basis for erosion, vegetation overgrowth and riprap replacement.	$$$	A1a, B1b, B4l, F1a, I1a	III
S-11-4	Reshape the "stepped pool" Baxter Pond outfall to balance reducing stormwater erosion and minimizing low tide pools.	Mill/Baxter Ponds	1, 10, 11, 12	Nassau County	M	Yes—likely. Reshaping an outfall/“stepped pool” and modifying in-water/outfall features may require NYSDEC Article 24/25 permits (as applicable), and USACE Section 10/404 authorization; NYSDOS Coastal Consistency review may be required. Local approvals required.	-Regularly inspect for debris accumulation. Monitor flows to reduce fish entrapment.	$$	A1a, B1b, B4l, F1a, I1a	III
S-11-5	Replace the storm catch basin system at the north end of High Street.	Mill/Baxter Ponds	1, 10, 11, 12	Village of Baxter Estates	S–M	No if confined to upland catch basin replacement within existing roadway/ROW; local highway/municipal approvals required. If work affects regulated wetland/adjacent areas or alters an outfall/discharge to jurisdictional waters, NYSDEC permits and NYSDOS Coastal Consistency review may be required.	-Biannually inspect and annually vacuum clean accumulated debris on drains that receive high debris-flows.	$	A1a, B1b, B4l, F1a, I1a	III
S-12: Mill Pond Watershed Abatement										
S-12-1	Remove invasive species and revegetate with native wetland species.	Mill/Baxter Pond	1, 5, 10, 11, 12	Town of North Hempstead	S–M	Yes. Invasive removal and revegetation in wetlands typically requires NYSDEC wetland permit(s) (Article 24 and/or Article 25 depending on jurisdiction). If herbicide treatment is used in/near water, NYSDEC Aquatic Pesticide Permit (6 NYCRR Parts 327–329) may be required. USACE Section 404/10 authorization and NYSDOS Coastal Consistency review may be required for tidal wetland/shoreline work. Local approvals required.	-Initial invasive species removal. Additional revegetation and invasive species removal may be required after installation. Monitor stabilization efforts during first 1-3 years of plant installation.	$	A1a, B4l, B5n, F1a, J6f, K1b, K3e	II

ID	Recommendation	Subwatershed	Goal[1]	Involved Entities	Timeframe[2]	Permit Required	Operational Maintenance Requirements	Cost Estimate[3]	Potential Funding Sources[4]	Priority[5] (I,II,III)
S-12-2	Divert stormwater from Sandy Hollow Rd. and Harbor Rd. into rain gardens/bioswales with rain guardians at the open space northeast/east side of Mill Pond.	Mill/Baxter Pond	1, 5, 10, 11, 12	Town of North Hempstead; Nassau County; Village of Port Washington North	S–M	No for upland rain gardens/bioswales and rain guardians; local approvals required. If constructed within regulated wetland/adjacent areas or coastal zones near Mill Pond, NYSDEC Article 24/25 permits and NYSDOS Coastal Consistency review may be required; USACE authorization may be required if work extends into jurisdictional waters.	-Clean inlets/outlets of GI as needed. Ensure temporary irrigation and monitor plant success during the first establishment year. Plant to fill holes as-needed.	$$	A1a, B4l, B5n, F1a, J6f, K1b	II
S-12-3	Retrofit stormwater systems within Harbor Rd. and Sandy Hollow Rd. with hydrodynamic separators or drainage inlet media filters to remove pollutants from upland residential, park and commercial land uses.	Mill/Baxter Pond	1, 5, 10, 11, 12	Town of North Hempstead; Nassau County; Village of Port Washington North	S–M	Yes—may be required. Installing hydrodynamic separators/inlet filters within drainage systems connected to outfalls typically requires local approvals and may require NYSDEC Article 24/25 permits if within regulated areas or involving discharge structures. USACE Section 10/404 authorization and NYSDOS Coastal Consistency review may be required where work affects tidal waters/outfalls.	-Biannually inspect. Refer to manufacturer's guidance for specific maintenance.	$$	A1a, B4l, B5n, F1a, J6f, K1b	I
S-13: Leeds Pond Stormwater Abatement										
S-13-1	Clean out stormwater drains and culverts (sediment and vegetation removal).	Leeds Pond	1, 5, 10, 11, 12	Villages of Plandome and Plandome Manor; Nassau County	S–M	No for routine cleanout/maintenance of existing drains and culverts; local approvals required. If work involves excavation, repair/replacement, or occurs within regulated wetland/waterbody areas, NYSDEC Article 24/25 permits may be required; USACE Section 404/10 authorization and NYSDOS Coastal Consistency review may also be required where applicable.	-Biannually inspect. Refer to manufacturer's guidance for specific maintenance.	$	A1a, B4l, B5n, F1a, I1a, J2b	I
S-13-2	Removal of phragmites / invasive vegetation along the streambank and replant with native vegetation to restore vistas, enhanced habitat function, stabilize shorelines from erosion and reduce sedimentation of the stream, and provide shade.	Leeds Pond	1, 5, 10, 11, 12	Town of North Hempstead; Villages of Plandome and Plandome Manor; Nassau County; MBPC; partners; homeowners	S–M	Yes—likely if invasive removal/replanting occurs within or adjacent to regulated wetlands/waterbodies. NYSDEC Article 24/25 permits may be required; if herbicide is applied in/near water, NYSDEC Aquatic Pesticide Permit (6 NYCRR Parts 327–329) may be required. NYSDOS Coastal Consistency review and USACE authorization may be required if within coastal/tidal jurisdiction. Local approvals required including Town and/or Village approval.	-Initial invasive species removal. Additional revegetation and invasive species removal may be required after installation. Monitor stabilization efforts during first 1-3 years of plant installation.	$-$$	A1a, B4l, B5n, F1a, I1a, J2b, K3e,i	II
S-13-3	Increase the width/vegetation density of the buffer at the southwest corner of Plandome Country Club, along the pond's edge.	Leeds Pond	1, 5, 10, 11, 12	Village of Plandome Manor; Nassau County; partners	S–M	Not for buffer enhancement on upland/private property; local approvals may be required (site disturbance/landscaping). If the buffer work occurs	-Monitor plant cover during first establishment year and fill empty areas	$	A1a, B4l, B5n, F1a, I1a, J2b	III

ID	Recommendation	Subwatershed	Goal[1]	Involved Entities	Timeframe[2]	Permit Required	Operational Maintenance Requirements	Cost Estimate[3]	Potential Funding Sources[4]	Priority[5] (I,II,III)
						within regulated wetland/adjacent areas, NYSDEC Article 24/25 permits may be required.	as necessary to ensure stabilization of buffer.			
S-13-4	Add bioretention practices along the roadsides at Plandome Rd, Stonytown Rd., and Rockhollow Rd. to provide pollutant load removal prior to discharges (marked in Purple).	Leeds Pond	1, 5, 10, 11, 12	Villages of Plandome Manor and Plandome; Nassau County; local private road owners	S–M	Not for roadside bioretention in uplands; local/ROW approvals required. If practices are constructed within regulated wetlands/adjacent areas or coastal zones, NYSDEC Article 24/25 permits and NYSDOS Coastal Consistency review may be required.	-Ensure temporary irrigation and monitor plant success during the first establishment year. Plant to fill holes as-needed.	$$	A1a, B4l, B5n, F1a, I1a, J2b, K3h	II-I
S-13-5	Conduct a subwatershed/engineering study of the Leeds Pond watershed.	Leeds Pond	1, 5, 10, 11, 12	Town of North Hempstead; Nassau County; MBPC; partners	S–M	No permits anticipated. Planning/engineering study only.	N/A	$-$$	A1a, B4l, B5n, F1a, I1a, J2b, K3g	I
S-14: Gristmill Ln/Papermill Dr Actions										
S-14-1	Clean culvert's inlet and outlet as well as Gristmill Ln and Papermill Rd outfalls to restore function and check for damages along drainage pipe. Repair as necessary and install a more substantial filtration system, as the current system is a chain link fence.	Leeds Pond	1, 10, 11, 12	Village of Plandome Manor; partners	S	Not for routine maintenance. Permits may be required for repair/replacement within regulated areas (NYSDEC, USACE, NYSDOS).	-When culvert pipes are 20% full, pressure clean accumulated sediment, check for cracks and remove overgrown vegetation. -Inspect outfalls annually and after major storms. Remove debris every 5 – 10 years.	$-$$$	A1a, B4l, E1a, I1a, F1a	I
S-14-2	Evaluate the extent of floatables and debris clogging inlet, and install culvert sediment traps or debris deflector inlet, dependent on debris type, to prevent build-up and prioritize regular maintenance/debris removal.	Leeds Pond	1, 10, 11, 12	Nassau County	S	Not for installation of debris deflectors or sediment traps in upland drainage systems. NYSDEC Article 24/25 permits and/or USACE authorization may be required if work occurs within regulated wetlands, waterbodies, or outfalls	-Conduct post-storm inspections to vacuum or shovel out accumulated sediment from traps. Regularly inspect annually for sediment build-up.	$	A1a, B4l, E1a, I1a, F1a	I
S-14-3	Install stabilized rock revetment to prevent erosion.	Leeds Pond	1, 10, 11, 12	Nassau County; Villages of Plandome and Plandome Manor	S	Yes. Installation of stabilized rock revetment may require NYSDEC Article 24 or 25 permits, USACE Section 404/10 authorization, and NYSDOS Coastal Zone Consistency review	-Inspect and replenish displaced armor stone if erosion begins to occur.	$$$	A1a, B4l, E1a, I1a, F1a	II-III
S-14-4	Install bioswales/rain gardens/infiltration practices or filter inserts along ROW/public lands prior to existing directly discharging drainage infrastructure.	Leeds Pond	1, 10, 11, 12	Nassau County; Villages of Plandome and Plandome Manor	S	Not for upland rain gardens/bioswales and rain guardians; local approvals required such as Town Highway Department, Village DPW, or County DPW.	-Ensure temporary irrigation and monitor plant success during the first establishment year. Plant to fill holes as-needed. Biannually	$$$	A1a, B4l, E1a, I1a, F1a, K3d	II

ID	Recommendation	Subwatershed	Goal[1]	Involved Entities	Timeframe[2]	Permit Required	Operational Maintenance Requirements	Cost Estimate[3]	Potential Funding Sources[4]	Priority[5] (I,II,III)
							inspect proprietary filter. Refer to manufacturer's guidance for specific maintenance.			
S-15: Whitney Pond Stormwater Abatement										
S-15-1	Install native vegetative buffers by converting lawn to unfertilized native meadows within the Whitney Pond Park to reduce nitrogen/pathogen inputs from geese/waterfowl and improve pollutant removal before entering the waterbody.	Whitney Pond	1, 5, 10, 11, 12	Town of North Hempstead; Nassau County; partners	S–M	Not for routine maintenance. Permits may be required for repair/replacement within regulated areas (NYSDEC, USACE, NYSDOS).	-Ensure temporary irrigation and monitor plant success during the first establishment year. Plant to fill holes as-needed.	$$$	A1a, B4l, B5n, F1a, J6f, K1b, K3e	II
S-15-2	Install rain gardens/bioswales within Whitney Pond Park and around the parking lot, roadsides, and buildings that outfall to Whitney Pond.	Whitney Pond	1, 5, 10, 11, 12	Town of North Hempstead; Nassau County	S–M	Local approvals required. If practices are constructed within regulated wetlands/adjacent areas, NYSDEC Article 24 permits may be required.	-Ensure temporary irrigation and monitor plant success during the first establishment year. Plant to fill holes as-needed.	$$	A1a, B4l, B5n, F1a, J6f, K1b, K3f	II
S-15-3	Install bioretention basins and additional leaching structures along right-of-ways to intercept stormwater runoff from commercial land uses and large parking lots.	Whitney Pond	1, 5, 10, 11, 12	Town of North Hempstead; Nassau County	S–M	Local approvals required. If practices are constructed within regulated wetlands/adjacent areas, NYSDEC Article 24 permits may be required.	-Ensure temporary irrigation and monitor plant success during the first establishment year. Plant to fill holes as-needed.	$	A1a, B4l, B5n, F1a, J6f, K1b, K3f	I
S-15-4	Install bioswales along Community Drive East to intercept and treat stormwater prior to storm drains that connect to outfalls to Whitney Pond.	Whitney Pond	1, 5, 10, 11, 12	Town of North Hempstead; Nassau County	S–M	Local approvals required (except roadway work permits within right of way). If practices are constructed within regulated wetlands/adjacent areas, NYSDEC Article 24 permits may be required.	-Ensure temporary irrigation and monitor plant success during the first establishment year. Plant to fill holes as-needed.	$$	A1a, B4l, B5n, F1a, J6f, K1b, K3d	I
S-15-5	Install permeable pavement or green infrastructure/infiltration practices for nearby parking lots.	Whitney Pond	1, 5, 10, 11, 12	Town of North Hempstead; Nassau County	S–M	Not for upland permeable pavement or green infrastructure installations within existing parking lots. Local approvals required. NYSDEC Article 24 or Article 25 permits and NYSDOS Coastal Zone	-Vacuum sweep in spring and fall or 1-4 times a year. Avoid sand in winter as to not clog joints.	$$-$$$	A1a, B4l, B5n, F1a, J6f, K1b, K3d	III

ID	Recommendation	Subwatershed	Goal[1]	Involved Entities	Timeframe[2]	Permit Required	Operational Maintenance Requirements	Cost Estimate[3]	Potential Funding Sources[4]	Priority[5] (I,II,III)
						Consistency review may be required if work occurs within regulated freshwater or tidal wetlands, adjacent areas, or coastal zones.				
S-15-6	Evaluate the need for streambank stabilization and additional shade tree installation.	Whitney Pond	1, 5, 10, 11, 12	Town of North Hempstead; Nassau County; MBPC; partners	S–M	Evaluation only: no permits required. If streambank stabilization, tree installation, or in-water work is implemented within regulated freshwater or tidal wetlands or waterbodies, NYSDEC Article 24 or Article 25 permits, USACE Section 404/10 authorization, and NYSDOS Coastal Zone Consistency review may be required.	-Ensure temporary irrigation and monitor plant success during the first establishment year. Plant to fill holes as-needed.	$$	A1a, B4l, B5n, F1a, J6f, K1b, K3e, g, O1b,c	II
S-15-7	Regularly repair and clean out outfalls into Whitney Pond	Whitney Pond	1, 5, 10, 11, 12	Town of North Hempstead; Nassau County	S–M	Not for routine inspection and maintenance. NYSDEC Article 24 or Article 25 permits, USACE Section 404/10 authorization, and NYSDOS Coastal Zone Consistency review may be required if repairs involve excavation, structural modification, or in-water work within regulated wetlands or waterbodies.	-Inspect annual and after major storms. Remove debris every 5 – 10 years.	$	A1a, B4l, B5n, F1a, J6f, K1b	I
S-15-8	Evaluate feasibility of in-stream solutions through a subwatershed/engineering study of the Whitney Pond subwatershed.	Whitney Pond	1, 5, 10, 11, 12	Town of North Hempstead; Nassau County; MBPC; partners	S–M	No permits required for planning or engineering studies. Permits would be evaluated and obtained during subsequent design and implementation phases, if recommended.	N/A	$-$$$	A1a, B4l, B5n, F1a, J6f, K1b, K3e, g, O1b,c	II
S-16: Southern Residential Area Stormwater Abatement										
S-16-1	Create rain gardens and bioswales along right-of-ways where possible, or retrofit existing drainage systems with off-line hydrodynamic separators/media filter inlet inserts in the above identified residential and commercial/industrial uses.	Whitney Pond	1, 10, 11, 12	Town of North Hempstead; Village of Thomaston; Nassau County; MBPC	S–M	Not for upland rain gardens, bioswales, and inlet inserts; local approvals required. If work occurs within regulated freshwater/tidal wetlands, adjacent areas, or coastal zones, NYSDEC Article 24/25 permits, USACE Section 404/10 authorization, and NYSDOS Coastal Consistency review may be required.	-Ensure temporary irrigation and monitor plant success during the first establishment year. Plant to fill holes as-needed. Biannually inspect hydrodynamic separators. Refer to manufacturer's guidance for specific maintenance.	$$	A1a, A2b, B1b, B4l, F1a, J6f, K3d	II-I

ID	Recommendation	Subwatershed	Goal[1]	Involved Entities	Timeframe[2]	Permit Required	Operational Maintenance Requirements	Cost Estimate[3]	Potential Funding Sources[4]	Priority[5] (I,II,III)
S-16-2	Promote property owner/municipal BMPs (reducing fertilizer/pesticide use on lawn areas, educating the public on sustainable lawn maintenance and alternative landscapes, wetland buffers, native lawn alternatives)	Whitney Pond	1, 10, 11, 12	Town of North Hempstead; Village of Thomaston; Nassau County; MBPC; partners	S–M	No permits anticipated. Programmatic outreach/BMP promotion only. Local approvals not typically required.	N/A	$-$$	A1a, A2b, B1b, B4l, F1a, J6f, K3i	I
S-16-3	Create and distribute educational materials to landscapers and landowners about the importance of proper fertilization practices and their effect on water quality.	Whitney Pond	1, 10, 11, 12	Town of North Hempstead; Village of Thomaston; Nassau County; MBPC	S–M	None	N/A	$	A1a, A2b, B1b, B4l, F1a, J6f, K3i	I
S-16-4	Encourage volunteer cleanups along the shorelines, especially through yacht club youth clubs.	Whitney Pond	1, 10, 11, 12	Town of North Hempstead; Village of Thomaston; Nassau County; MBPC; partners	S–M	Landowner permission and/or local permits are required for volunteer cleanups. Local coordination/authorization required. NYSDEC or USACE approvals may be required if debris removal involves excavation, sediment disturbance, or work within regulated wetland or coastal areas.	N/A	$	A1a, A2b, B1b, B4l, F1a, J6f, K3i	II
S-16-5	Continue and, where possible, expand programs such as the Town's Rain Barrel Program and others to capture rainwater from residences and other properties.	Whitney Pond	1, 10, 11, 12	Town of North Hempstead; Village of Thomaston; Nassau County; MBPC; partners	S–M	None	N/A	$-$$$	A1a, A2b, B1b, B4l, F1a, J6f	III
S-17: Southern Watershed Stormwater Abatement										
S-17-1	Create rain gardens and bioswales along right-of-way's where possible, or retrofit existing drainage systems with off-line hydrodynamic separators/media filter inlet inserts in the above identified residential and commercial/industrial uses.	Plandome Heights, Kensington, Whitney Pond	1, 10, 11, 12	Town of North Hempstead; Villages of Great Neck, Kensington, Plandome Heights, Kings Point, and Thomaston; Nassau County; MBPC	S–M	Not for upland rain gardens, bioswales, and inlet inserts; local approvals required, including Town Highway Department or Village/County DPWs. If work occurs within regulated freshwater/tidal wetlands, adjacent areas, or coastal zones, NYSDEC Article 24/25 permits, USACE Section 404/10 authorization, and NYSDOS Coastal Consistency review may be required.	-Ensure temporary irrigation and monitor plant success during the first establishment year. Plant to fill holes as-needed.	$-$$$	A1a, A2b, B1b, B4l, F1a, J6f, K3d	III
S-17-2	Promote property owner/municipal BMPs	Plandome Heights,	1, 10, 11, 12	Town of North Hempstead; Villages of Great	S–M	No permits anticipated. Programmatic outreach/BMP promotion only. Local approvals not typically required.	N/A	$-$$	A1a, A2b, B1b, B4l, F1a, J6f, K3i	I

ID	Recommendation	Subwatershed	Goal[1]	Involved Entities	Timeframe[2]	Permit Required	Operational Maintenance Requirements	Cost Estimate[3]	Potential Funding Sources[4]	Priority[5] (I,II,III)
		Kensington, Whitney Pond		Neck, Kensington, Plandome Heights, Kings Point, and Thomaston; Nassau County; MBPC; partners						
S-17-3	Install a vegetative or concrete curb and/or shoulder to act as an erosion control buffer along problematic roadways to prevent uncontrolled runoff gullies along the wooded/vegetated areas along the eastern shoreline. Install retention chambers or sediment traps at stormwater outfalls. $ (Short-term). See S-3 for maintenance/monitoring guidance.	Plandome Heights, Kensington, Whitney Pond	1, 10, 11, 12	Town of North Hempstead; Villages of Great Neck, Kensington, Plandome Heights, Kings Point, and Thomaston; Nassau County; MBPC	S–M	Not for buffer enhancement on upland/private property; local approvals may be required (site disturbance/landscaping), including Town Highway Department or Village/County DPWs. If the buffer work occurs within regulated wetland/adjacent areas, NYSDEC Article 24/25 permits may be required.	-Ensure temporary irrigation and monitor plant success during the first establishment year. Plant to fill holes as-needed. Inspect outfalls annually and after major storms. Remove debris every 5 – 10 years.	$	A1a, A2b, B1b, B4l, F1a, J6f	II
S-17-4	Create and distribute educational materials to landscapers and landowners about the importance of proper fertilization practices and their effect on water quality.	Plandome Heights, Kensington, Whitney Pond	1, 10, 11, 12	Town of North Hempstead; Villages of Great Neck, Kensington, Plandome Heights, Kings Point, and Thomaston; Nassau County; MBPC	S–M	None	N/A	$	A1a, A2b, B1b, B4l, F1a, J6f, K3i	I
S-17-5	Encourage volunteer cleanups along the shorelines, especially through yacht club youth clubs.	Plandome Heights, Kensington, Whitney Pond	1, 10, 11, 12	Town of North Hempstead; Villages of Great Neck, Kensington, Plandome Heights, Kings Point, and Thomaston; Nassau County; MBPC; partners	S–M	Landowner permission and/or local permits are required for volunteer cleanups. Local coordination/authorization required. NYSDEC or USACE approvals may be required if debris removal involves excavation, sediment disturbance, or work within regulated wetland or coastal areas.	N/A	$	A1a, A2b, B1b, B4l, F1a, J6f, K3i	II

ID	Recommendation	Subwatershed	Goal[1]	Involved Entities	Timeframe[2]	Permit Required	Operational Maintenance Requirements	Cost Estimate[3]	Potential Funding Sources[4]	Priority[5] (I,II,III)
S-17-6	Continue and, where possible, expand programs such as the Town's Rain Barrel Program and others to capture rainwater from residences and other properties.	Plandome Heights, Kensington, Whitney Pond	1, 10, 11, 12	Town of North Hempstead; Villages of Great Neck, Kensington, Plandome Heights, Kings Point, and Thomaston; Nassau County; MBPC; partners	S–M	None	N/A	$-$$$	A1a, A2b, B1b, B4l, F1a, J6f	III
S-18: Kings Point Watershed Stormwater Abatement										
S-18-1	Create rain gardens and bioswales along right-of-ways where possible, or retrofit existing drainage systems with off-line hydrodynamic separators/media filter inlet inserts in the above identified residential and commercial uses and in streets with drainage infrastructure that discharges into Kings Point Park/public lands/wetlands.	Kings Point Creek, Mitchell Creek, Kings Point Pond	1, 5, 10, 11, 12	Town of North Hempstead; Village of Kings Point; Nassau County; MBPC	S–M	Not for upland rain gardens, bioswales, and inlet inserts; local approvals required. If work occurs within regulated freshwater/tidal wetlands, adjacent areas, or coastal zones, NYSDEC Article 24/25 permits, USACE Section 404/10 authorization, and NYSDOS Coastal Consistency review may be required.	-Ensure temporary irrigation and monitor plant success during the first establishment year. Plant to fill holes as-needed. -Biannually inspect hydrodynamic . Refer to manufacturer's guidance for specific maintenance.	$-$$$	A1a, B4l, B5n, F1a, I1a, J6f, K1b, K3d	II-III
S-18-2	Promote property owner/municipal BMPs (reducing fertilizer/pesticide use on lawn areas, educating the public on sustainable lawn maintenance and alternative landscapes, wetland buffers, native lawn alternatives).	Kings Point Creek, Mitchell Creek, Kings Point Pond	1, 5, 10, 11, 12	Town of North Hempstead; Village of Kings Point; Nassau County; MBPC; partners	S–M	No permits anticipated. Programmatic outreach/BMP promotion only. Local approvals not typically required.	N/A	$-$$	A1a, B4l, B5n, F1a, I1a, J6f, K1b, K3i	I
S-18-3	Create and distribute educational materials to landscapers and landowners about the importance of proper fertilization practices and their effect on water quality.	Kings Point Creek, Mitchell Creek, Kings Point Pond	1, 5, 10, 11, 12	Town of North Hempstead; Village of Kings Point; Nassau County; MBPC	S–M	None	N/A	$	A1a, B4l, B5n, F1a, I1a, J6f, K1b, K3i	I
S-18-4	Encourage volunteer cleanups along the shorelines, especially through yacht club youth clubs.	Kings Point Creek, Mitchell Creek, Kings Point Pond	1, 5, 10, 11, 12	Town of North Hempstead; Villages of Kings Point & Great Neck; Nassau	S–M	Landowner permission and/or local permits are required for volunteer cleanups. Local coordination/authorization required. NYSDEC or USACE approvals may be required if debris removal	N/A	$	A1a, B4l, B5n, F1a, I1a, J6f, K1b, K3i	III

ID	Recommendation	Subwatershed	Goal[1]	Involved Entities	Timeframe[2]	Permit Required	Operational Maintenance Requirements	Cost Estimate[3]	Potential Funding Sources[4]	Priority[5] (I,II,III)
				County; MBPC; partners		involves excavation, sediment disturbance, or work within regulated wetland or coastal areas.				
S-18-5	Continue and, where possible, expand programs such as the Town's Rain Barrel Program and others to capture rainwater from residences and other properties.	Kings Point Creek, Mitchell Creek, Kings Point Pond	1, 5, 10, 11, 12	Town of North Hempstead; Village of Kings Point; Nassau County; MBPC; partners	S–M	None	N/A	$-$$$	A1a, B4l, B5n, F1a, I1a, J6f, K1b	III
S-19: Wildwood Village Parkland Actions										
S-19-1	Create bioretention practices and additional leaching structures (if necessary) in and around the proposed parking lot improvement to collect stormwater that will overflow into the Southeastern wetlands within Wildwood Village Parkland.	Kings Point Creek, Mitchell Creek	1, 5, 10, 11, 12	Village of Kings Point; Nassau County; partners	S–M	-Article 24 Freshwater Wetlands	-Ensure temporary irrigation and monitor plant success during the first establishment year. Plant to fill holes as-needed.	$$	A1a, B4l, B5n, F1a, J6f, K1b, K3d	II-III
S-19-2	Install native vegetative buffers by converting lawn areas to unfertilized native meadows within the proposed Wildwood Village Parkland to reduce runoff into the wetlands on the Western edge of the property.	Kings Point Creek, Mitchell Creek	1, 5, 10, 11, 12	Village of Kings Point; Nassau County; partners	S–M	Local approvals may be required (site disturbance/landscaping). If the buffer work occurs within regulated wetland/adjacent areas, NYSDEC Article 24/25 permits may be required.	-Ensure temporary irrigation and monitor plant success during the first establishment year. Plant to fill holes as-needed.	$$	A1a, B4l, B5n, F1a, J6f, K1b, K3d	II-III

(1) See Section 1.1.1 for description of Goals
(2) Timeframe Key: S = Short-term (1–2 years); M = Mid-term (2–5 years); L = Long-term (5+ years); O = Ongoing
(3) Cost Key: $ = $0-$50,000; $$ = $50,000–$100,000; $$$ = $100,000–$300,000; $$$$ = $300,000+
(4) See Section 10.2 for description of Potential Funding Sources
(5) Priority Key: I = High Priority, II = Medium Priority, III = Low Priority

Table 10-3: Natural Resource Recommendations Implementation Strategy

ID	Recommendation	Subwatershed	Goal[1]	Involved Entities	Timeframe[2]	Size of Restoration Area (S/M/L)[3]	Permit Required	Operational Maintenance Requirements	Cost Estimate[4]	Potential Funding Sources[5]	Priority6 (I,II,III)
N-1a Sheets Creek Habitat Restoration											
N-1a-1	Invasive plant removal within the Manorhaven nature preserve	Sheets Creek North	5	Nassau County; Town of North Hempstead;	S	L	- Article 25 Tidal Wetlands	-Annual treatment of invasive species	$-$$, $/Year	B3k, B5n, K1b-c	II

ID	Recommendation	Subwatershed	Goal[1]	Involved Entities	Timeframe[2]	Size of Restoration Area (S/M/L)[3]	Permit Required	Operational Maintenance Requirements	Cost Estimate[4]	Potential Funding Sources[5]	Priority6 (I,II,III)
				Village of Manorhaven			- Aquatic Pesticide Permit (Title 6 NYCRR Part 327/328/329)				
N-1a-2	Removal/treatment of invasives and planting of native species as a continuation of already completed shoreline restoration along Sheets Creek. Annual monitoring and invasive plant treatment.	Sheets Creek North	5	Nassau County; Town of North Hempstead; Village of Manorhaven	S	S	- Article 25 Tidal Wetlands - Aquatic Pesticide Permit (Title 6 NYCRR Part 327/328/329)	- Annual treatment of invasive species -Native Plant Replacement and Adaptive Management.	$-$$, $/Year	B3k, B5n, K1b-c	II
N-1a-3	Install a native vegetated buffer from industrial property that abuts the nature preserve to prevent sedimentation from the unvegetated dirt lot and any potential contamination sources. Determine if encroachment is occurring from this property. Annual maintenance includes invasive plant treatment and potential replanting of unsuccessful vegetation until successful establishment of plantings.	Sheets Creek North	1,10	Nassau County; Town of North Hempstead; Village of Manorhaven	S	S	- Article 25 Tidal Wetlands - USACE 404 - USACE Section 10 - Coastal Zone Management Consistency Review	- Invasive species inspections & treatment. -Native Plant Replacement and Adaptive Management.	$-$$, $/Year	A1a, B1c, B4l, F1a, K3e, N1b	I
N-1a-4	Continued shoreline stabilization into the nature preserve to the east of Manorhaven Beach Town Park in the back of Sheets Creek North. Annual monitoring and maintenance of native plantings until successful establishment and invasive plant treatment.	Sheets Creek North	10,13	Nassau County; Town of North Hempstead; Village of Manorhaven	M	L	- Article 25 Tidal Wetlands - USACE 404 - USACE Section 10 - Coastal Zone Management Consistency Review - 401 Water Quality Certification	- Annual maintenance of shoreline stabilization features. - Can be coupled with invasive species treatment.	$$$$	A1a, A4c, B1f, B4l, B5n, F1a, G1a, H1a, I1a, J5e, J6F, K1b, K3e, N1b	II-III
N-1a-5	Stormwater outfall water quality sampling at all outfalls after storm events to determine point and nonpoint sources of pollution and nutrient loading.	Sheets Creek North	1,11	Nassau County; Town of North Hempstead; Village of Manorhaven	L	N/A	No	None	$	A2b, B1e, B4l, J7g	II
N-1a-6	Conduct a feasibility study for sediment removal in both creeks	Sheets Creek North	10	Nassau County; Town of North Hempstead; Village of Manorhaven; MBPC	S	L	- Article 24 Freshwater Wetlands and/or Article 25 Tidal Wetlands - USACE 404 - USACE Section 10	None	$$-$$$	B1d, B4l, B5n, F1a, H1c, I1a	III

ID	Recommendation	Subwatershed	Goal[1]	Involved Entities	Timeframe[2]	Size of Restoration Area (S/M/L)[3]	Permit Required	Operational Maintenance Requirements	Cost Estimate[4]	Potential Funding Sources[5]	Priority6 (I,II,III)
							- Coastal Zone Management Consistency Review - 401 Water Quality Certification				
N-1b Sheets Creek East Habitat Restoration											
N-1b-1	Removal/treatment of invasives and planting of native species as a continuation of already completed restoration in Sheets Creek. Annual monitoring and invasive plant treatment.	Sheets Creek East	5	Nassau County; Town of North Hempstead; Village of Manorhaven; partners	S	S	- Article 25 Tidal Wetlands - Aquatic Pesticide Permit (Title 6 NYCRR Part 327/328/329)	- Annual treatment of invasive species -Native Plant Replacement and Adaptive Management.	$-$$, $/Year	B3k, B5n, K1b-c, K3e, N1b	II
N-1b-2	Conduct a feasibility study for sediment removal in both creeks.	Sheets Creek East	10	Nassau County; Town of North Hempstead; Village of Manorhaven; MBPC	S	L	-Article 24 Freshwater Wetlands and/or Article 25 Tidal Wetlands - USACE 404 - USACE Section 10 - Coastal Zone Management Consistency Review - 401 Water Quality Certification	None	$$-$$$	B1d, B4l, B5n, F1a, H1c, I1a	III
N-2 Mill Pond Habitat Restoration											
N-2-1	Planting of appropriate species and increased vegetation on the land along the northern pond shoreline to limit waterfowl resting habitat. Annual maintenance includes invasive plant treatment/removal and continued seeding for increased success rates until established.	Mill/Baxter Pond	1,7	Nassau County; Town of North Hempstead; Village of Port Washington North	S	M	Article 24 Freshwater Wetlands (Regulated Adjacent Area)	- Annual treatment of invasive species - Reduced lawn maintenance	$	B4l, H1c, H1e, K2c, K3e	I
N-2-2	Removal, treatment, and proper disposal of invasive species on the east side of the pond. Annual monitoring and invasive plant treatment.	Mill/Baxter Pond	5	Nassau County; Town of North Hempstead;	S,L	S	- Article 24 Freshwater Wetlands - Aquatic Pesticide Permit (Title 6 NYCRR Part 327/328/329)	- Annual treatment of invasive species	$	B3k, B5n, K1b-c	I
N-2-3	Installation & maintenance of floatable traps at spillway to prevent floatable/debris from entering Manhasset Bay.	Mill/Baxter Pond	1	Nassau County; Town of North Hempstead;	L	N/A	- Article 24 Freshwater Wetlands	- Removal of floatables & debris from traps	$, $/Year	A2-3b, B1c, B1e, B4l, F1a, H1c, J6f	I

ID	Recommendation	Subwatershed	Goal[1]	Involved Entities	Timeframe[2]	Size of Restoration Area (S/M/L)[3]	Permit Required	Operational Maintenance Requirements	Cost Estimate[4]	Potential Funding Sources[5]	Priority6 (I,II,III)
								- Maintenance of traps to ensure proper function			
N-2-4	Feasibility study for the installation & maintenance of aeration methods for the pond. Annual maintenance to ensure proper function and cleaning of aeration components.	Mill/Baxter Pond	5	Nassau County; Town of North Hempstead; MBPC	L	S	- Article 24 Freshwater Wetlands - USACE 404 - USACE Section 10	- Annual maintenance of fountain components	$, $/Year	A2-3b, B1c, B1e, B4l, F1a, H1c, J6f, K3g, O1b,c	II
N-2-5	Investigate the feasibility of seeding Oysters and Clams.	Mill/Baxter Pond	5	Nassau County; Town of North Hempstead; MBPC	L	M	- NYSDEC Marine Hatchery Permit - USACE 404 - Coastal Zone Management Consistency Review - 401 Water Quality Certification	- Maintenance of aquaculture components - Removal and installation of components. -Reseeding efforts, as needed.	$$-$$$$	B1d, B4l, H1c, J5e	III
N-2-6	Implementation of salt alternatives on roads around aquatic habitats.	Mill/Baxter Pond	1,3	Nassau County; Town of North Hempstead; Villages; MBPC	L	N/A	No	None	$/Year	A2b, B1c, B4l, B5g, F1a K3h	III
N-2-7	Conduct a feasibility study on sediment removal for hydrological/habitat connectivity, sediment management, and potential invasive plant root mass removal to improve water quality.	Mill/Baxter Pond	10	Nassau County; Town of North Hempstead; MBPC	S	L	- Article 24 Freshwater Wetlands and/or Article 25 Tidal Wetlands - USACE 404 - USACE Section 10 - Coastal Zone Management Consistency Review - 401 Water Quality Certification	None	$$-$$$	B1d, B4l, B5n, F1a, H1c, I1a, K3e, O1c	III
N-2-8	Targeted education to homes around the pond about the importance of tall, vegetated buffers	Mill/Baxter Pond	7,11	Nassau County; Town of North Hempstead; Villages of Baxter Estates and Port	O	N/A	No	None	$	J6f, K1b, K2c K3i	I

ID	Recommendation	Subwatershed	Goal[1]	Involved Entities	Timeframe[2]	Size of Restoration Area (S/M/L)[3]	Permit Required	Operational Maintenance Requirements	Cost Estimate[4]	Potential Funding Sources[5]	Priority6 (I,II,III)
				Washington North; MBPC; partners							
N-3 Baxter Pond Habitat Restoration											
N-3-1	Installation & maintenance of fountains	Mill/Baxter Pond	5	Nassau County	L	S	- Article 24 Freshwater Wetlands - USACE 404 - USACE Section 10	- Annual maintenance of fountain components	$-$$, $/Year	A2-3b, B1c, B1e, B4l, F1a, H1c, J6f	II-III
N-3-2	Planting of native wildflower seed mix and increased non-grass vegetation on the northern shoreline to limit waterfowl resting habitat and stabilize slope.	Mill/Baxter Pond	1,7	Nassau County; Village of Baxter Estates; MBPC; partners	S	M	- Article 24 Freshwater Wetlands (Regulated Adjacent Area)	- Annual treatment of invasive species	$	B4l, H1c, H1e, K2c	I
N-3-3	Installation & maintenance of floatable traps at spillway to prevent floatables/debris from entering Manhasset Bay.	Mill/Baxter Pond	1	Nassau County	S,L	N/A	No	- Removal of floatables & debris from traps - Maintenance of traps to ensure proper function	$, $/Year	A2-3b, B1c, B1e, B4l, F1a, H1c, J6f	I
N-3-4	Conduct a feasibility study of sediment removal for hydrological/habitat connectivity, sediment management, and potential invasive plant root mass removal to improve water quality.	Mill/Baxter Pond	10	Nassau County; Village of Baxter Estates; MBPC	S	L	- Article 24 Freshwater Wetlands - USACE 404 - USACE Section 10 - Coastal Zone Management Consistency Review - 401 Water Quality Certification	None	$$-$$$	B1d, B4l, B5n, F1a, H1c, I1a	II-III
N-3-5	Remove fallen trees and debris from Baxter Brook	Mill/Baxter Pond	5,10	Nassau County	O	S	None	Periodic inspection and debris removal, especially after storm events	$	B4l, F1a	I
N-4 Shore Road Habitat Restoration											

ID	Recommendation	Subwatershed	Goal[1]	Involved Entities	Timeframe[2]	Size of Restoration Area (S/M/L)[3]	Permit Required	Operational Maintenance Requirements	Cost Estimate[4]	Potential Funding Sources[5]	Priority6 (I,II,III)
N-4-1	Installation of living shoreline features/shoreline stabilization	Mill/Baxter Pond	10,13	Nassau County; Village of Baxter Estates	L	L	- Article 24 Freshwater Wetlands - USACE 404 -USACE Section 10 - Coastal Zone Management Consistency Review - 401 Water Quality Certification	- Annual maintenance of shoreline stabilization features. - Can be coupled with invasive species treatment.	$$$$, $/Year	A1a, A4c, B1f, B4l, B5n, F1a, G1a, H1a, I1a, J5e, J6F, K1b	III
N-5 Leeds Pond Habitat Restoration											
N-5	Overall comprehensive management/restoration plan	Leeds Pond	12,14	Nassau County; Town of North Hempstead; Village of Plandome Manor; MBPC; partners	L	L	See Below	See Below	$$$$, $/Year	See Below	II
N-5-1	Removal/treatment of invasive/nuisance species and plant native vegetation along stream banks, pond margins, and locations in the upper watershed.	Leeds Pond	5	Nassau County; Town of North Hempstead; Village of Plandome Manor; partners	S	L	- Article 24 Freshwater Wetlands - Article 25 Tidal Wetlands - Aquatic Pesticide Permit (Title 6 NYCRR Part 327/328/329)	- Annual treatment of invasive species	$-$$	B3k, B5n, K1b-c	I
N-5-2	Investigate green infrastructure solution(s) for stormwater management on Stonytown Road where stormwater runoff is directly input into stream connected to Leeds Pond.	Leeds Pond	1	Nassau County; Village of Plandome Manor	S,M	N/A	No	None	$-$$$	A1a, A2b, B1b, B4l, F1a, J6f, K3n, O1b	I
N-5-3	Establish wetlands along tributaries to trap sediment/nutrients and provide wildlife habitat.	Leeds Pond	5	Nassau County; Village of Plandome Manor; Partners	M	L	- Article 24 Freshwater Wetlands - Article 25 Tidal Wetlands - USACE 404 - Coastal Zone Management Consistency Review	- Annual treatment of invasive species	$-$$	B1d, B1e, B4l, B5n, F1a, J1a, J2b, K1c, K3e	II
N-5-4	Determine feasibility of seeding oysters and clams to improve water quality.	Leeds Pond	5	Nassau County; Town of North Hempstead;	M,L	N/A	No	None	$,$$$$	B1d, B4l, H1c, J5e, J7g	III

ID	Recommendation	Subwatershed	Goal[1]	Involved Entities	Timeframe[2]	Size of Restoration Area (S/M/L)[3]	Permit Required	Operational Maintenance Requirements	Cost Estimate[4]	Potential Funding Sources[5]	Priority6 (I,II,III)
				Village of Plandome Manor; partners							
N-5-5	Install a fish ladder at the pond's outlet to help migratory fish like alewife and herring reach upstream spawning areas.	Leeds Pond	5	Nassau County; Town of North Hempstead; Village of Plandome Manor; partners	L	M	- Article 25 Tidal Wetlands - Article 24 Freshwater Wetlands - USACE 404 - USACE Section 10 - Coastal Zone Management Consistency Review - 401 Water Quality Certification	-Annual maintenance of fish ladder components.	$$$$	B1d, B4l, H1c, J5e, K3e, O1c	III
N-5-6	Conduct a feasibility study for sediment removal in the pond and tributaries	Leeds Pond	10	Nassau County; Town of North Hempstead; Village of Plandome Manor; MBPC	S	L	- Article 25 Tidal Wetlands - Article 24 Freshwater Wetlands - USACE 404 - USACE Section 10 - Coastal Zone Management Consistency Review - 401 Water Quality Certification	None	$$-$$$	B1d, B4l, B5n, F1a, H1c, I1a	III
N-6 Plandome Park Habitat Restoration											
N-6-1	Continued native vegetation planting around the pond.	Leeds Pond	5	Town of North Hempstead; Village of Plandome Heights	S	S	- Article 25 Tidal Wetlands (Regulated Adjacent Area)	- Annual treatment of invasive species	$-$$, $/Year	B4l, H1c, H1e, K2c, K3e	II
N-6-2	Conversion of some mowed areas into native wildflower meadows.	Leeds Pond	1,7	Town of North Hempstead; Village of Plandome Heights	S	M	No	- Annual treatment of invasive species	$, $/Year	B4l, H1c, H1e, K2c, K3e	I
N-7 Stannard's Brook Habitat Restoration											
N-7-1	Removal of debris and stream obstructions, such as fallen trees and branches.	Stannard's Brook	5,10	Nassau County; partners	S	N/A	No	None	$	B4l, F1a	I

ID	Recommendation	Subwatershed	Goal[1]	Involved Entities	Timeframe[2]	Size of Restoration Area (S/M/L)[3]	Permit Required	Operational Maintenance Requirements	Cost Estimate[4]	Potential Funding Sources[5]	Priority6 (I,II,III)
N-7-2	Installation & maintenance of floatables/debris traps on stormwater culverts from the adjacent streets to the north of Stannard's Brook.	Stannard's Brook	1	Nassau County	S,L	N/A	- Article 24 Freshwater Wetlands - USACE 404 - USACE Section 10	- Removal of floatables & debris from traps - Maintenance of traps to ensure proper function	$$, $/Year	A2-3b, B1c, B1e, B4l, F1a, H1c, J6f	I
N-7-3	Removal/treatment of invasive species and replacement with native species.	Stannard's Brook	5	Nassau County; partners	S	M	- Article 24 Freshwater Wetlands - Aquatic Pesticide Permit (Title 6 NYCRR Part 327/328/329)	- Annual treatment of invasive species	$$, $/Year	B3k, B5n, K1b-c	I
N-7-4	Explore the possibility of creating wetlands within the park to hold back runoff and capture sediments	Stannard's Brook	10,13	Nassau County; MBPC	S,M	M	- Article 24 Freshwater Wetlands - USACE 404 - USACE Section 10 - Coastal Zone Management Consistency Review - 401 Water Quality Certification	- Annual maintenance of shoreline stabilization features. - Can be coupled with invasive species treatment.	$$-$$$$, $/Year	A1a , B4l, B5n, F1a, G1a, H1a, I1a, J5e, J6F, K1b, K3e, O1c	II
N-8 Manhasset Valley Park Habitat Restoration											
N-8-1	Conversion of mowed areas into native wildflower meadows.	Whitney Pond	1,7	Town of North Hempstead	S	M	No	- Annual treatment of invasive species	$	B4l, H1c, H1e, K2c, K3e	I
N-8-2	Feasibility study of sediment removal along the pond and lake bottoms	Whitney Pond	10, 11	Town of North Hempstead; MBPC	S	N/A	No	None	$$$	B4l, J3c, J2b, J7g, K1a-c	III
N-8-3	Installation of bioswale along west side of the pond in Manhasset Valley Park.	Whitney Pond	1,10,13	Town of North Hempstead	S	M	- Article 24 Freshwater Wetlands - USACE 404 - Coastal Zone Management Consistency Review - 401 Water Quality Certification	- Annual maintenance of the bioswale. Can be coupled with invasive species treatment	$-$$$	A1a , B4l, B5n, F1a, G1a, H1a, I1a, J5e, J6F, K1b, K3d	II
N-8-4	Invasive plant removal/treatment and replacement with native vegetation on the island in Manhasset	Whitney Pond	5	Town of North Hempstead; MBPC; partners	M,L	L	- Article 24 Freshwater Wetlands	- Annual treatment of invasive species	$$, $/Year	B3k, B5n, K1b-c, K3e	I

ID	Recommendation	Subwatershed	Goal[1]	Involved Entities	Timeframe[2]	Size of Restoration Area (S/M/L)[3]	Permit Required	Operational Maintenance Requirements	Cost Estimate[4]	Potential Funding Sources[5]	Priority6 (I,II,III)
	Valley Park and around the ponds within Whitney Park.						- Aquatic Pesticide Permit (Title 6 NYCRR Part 327/328/329)				
N-8-5	Maintenance and potential replanting of forebay on the west side of the pond in Manhasset Valley Park.	Whitney Pond	1,5	Town of North Hempstead	S,L	S	- Article 24 Freshwater Wetlands - USACE 404 - USACE Section 10 - Coastal Zone Management Consistency Review - 401 Water Quality Certification	- Annual maintenance of forebay.	$$	B3k, B5n, K1b-c	II
N-8-6	Feasibility study about right-sizing culverts or installing passages for wildlife where needed	Whitney Pond	12	Nassau County; Town of North Hempstead; MBPC; partners	L	N/A	No	None	$$	J6f, K1c, K2c, K3g, O1c	III
N-8-7	Educational outreach & signage around the ponds and associated streams	Whitney Pond	12	Nassau County; Town of North Hempstead; MBPC; partners	L	N/A	No	None	$	J6f, K1c, K2c, K3i	I
N-9 Whitney Pond Habitat Restoration											
N-9-1	Installation & maintenance of fountains.	Whitney Pond	5	Town of North Hempstead	L	N/A	- Article 25 Tidal Wetlands - USACE 404 - USACE Section 10	- Annual maintenance of fountain components	$$	A2-3b, B1c, B1e, B4l, F1a, H1c, J6f	II
N-9-2	Removal/replacement of the dilapidated dock within Whitney Lake.	Whitney Pond	12	Town of North Hempstead; partners	S	S	- Article 24 Freshwater Wetlands - USACE 404 - Coastal Zone Management Consistency Review - 401 Water Quality Certification	None	$	J6f, K3i	III
N-9-3	Water quality sampling to determine impacts of rust laden stormwater runoff/ potential illicit discharges.	Whitney Pond	11	Town of North Hempstead; MBPC; partners	S	N/A	No	None	$	B4l, J3c, J2b, J7g, K1a-c	II

ID	Recommendation	Subwatershed	Goal[1]	Involved Entities	Timeframe[2]	Size of Restoration Area (S/M/L)[3]	Permit Required	Operational Maintenance Requirements	Cost Estimate[4]	Potential Funding Sources[5]	Priority6 (I,II,III)
N-9-4	Feasibility study about right-sizing culverts or installing passage for wildlife where needed	Whitney Pond	12	Nassau County; Town of North Hempstead; MBPC; partners	S	N/A	No	None	$$	J6f, K1c, K2c, K3g, O1b	III
N-9-5	Educational outreach & signage around the ponds and associated streams	Whitney Pond	12	Nassau County; Town of North Hempstead; MBPC; partners	L	N/A	No	None	$	J6f, K1c, K2c, K3i	I
N-9-6	Education of municipal staff about proper maintenance techniques, illicit discharges, etc.	Whitney Pond	12	Town of North Hempstead	L	N/A	No	None	$	J6f, K1c, K2c, K3i	I
N-10 Kings Point Park Habitat Restoration											
N-10-1	Feasibility study to assess access constraints and management options for dense invasive species (predominately Common Reed (Phragmites australis)) along Split Rock Drive for future project development, including invasive plant treatment and habitat connectivity development.	Mitchell's Creek	11	Nassau County; Village of Kings Point; MBPC	S	N/A	No	None	$-$$	K1a, J3c, K3i, O1c	II
N-10-2	Invasive plant removal/treatment and native vegetation planting.	Mitchell's Creek	5	Nassau County; Town of North Hempstead; Village of Kings Point; partners	S,L	L	- Article 24/25 Freshwater Wetland/Tidal Wetlands - Aquatic Pesticide Permit (Title 6 NYCRR Part 327/328/329)	- Annual treatment of invasive species	$, $/Year	B3k, B5n, K1b-c	II
N-10-3	Plant native vegetation along streambanks	Mitchell's Creek	5	Nassau County; Village of Kings Point; partners	S	L	- Article 25 Tidal Wetlands - USACE 404 - Coastal Zone Management Consistency Review - 401 Water Quality Certification	- Annual maintenance of plantings. - Can be coupled with invasive species treatment.	$, $/Year	B3k, B5n, K1b-c, K3i	II
N-10-4	Educational outreach & signage around the freshwater streams in Kings Point Park	Mitchell's Creek	12	Village of Kings Point; MBPC; partners	L	N/A	TBD. Wetland Permit may be required for installation of signs within any regulated	None	$	J6f, K1c, K2c, G1c, K3i	I

ID	Recommendation	Subwatershed	Goal[1]	Involved Entities	Timeframe[2]	Size of Restoration Area (S/M/L)[3]	Permit Required	Operational Maintenance Requirements	Cost Estimate[4]	Potential Funding Sources[5]	Priority6 (I,II,III)
							wetland adjacent areas				
N-10-5	Determine feasibility of removing sediment in the mouth of Mitchell Creek to improve tidal flow and allow wildlife passage.	Mitchell's Creek	10,11	Nassau County; Town of North Hempstead; MBPC	S,M	N/A	No	None	$$	K1a, J3c, K3e, O1c	III
N-11 Mitchells Pond Habitat Restoration											
N-11-1	Wetland inventory and restoration	Mitchell's Creek	5,11	Nassau County; Town of North Hempstead; Village of Kings Point; MBPC; partners	S	N/A	No	None	$-$$	B4l, K1a, J3c, K3e, O1c	II
N-11-2	Invasive plant removal/treatment and native planting	Mitchell's Creek	5	Nassau County; Town of North Hempstead; Village of Kings Point	S,L	M	- Article 25 Tidal Wetlands - Aquatic Pesticide Permit (Title 6 NYCRR Part 327/328/329)	- Annual treatment of invasive species	$-$$, $/Year	B3k, B5n, K1b-c	II
N-11-3	Development of water quality study of the pond.	Mitchell's Creek	11	Nassau County; Village of Kings Point; MBPC; partners	S	N/A	No	None	$-$$	B4l, J3c, J2b, J7g, K1a-c, K3g	III
N-11-4	Development of native habitat buffers on the pond's margins.	Mitchell's Creek	1,5	Nassau County; Village of Kings Point	S,M	M	- Article 25 Tidal Wetlands - USACE 404 - Coastal Consistency - 401 Water Quality Certification	-Maintenance of pond margin. Can be coupled with annual invasive species treatment	$-$$, $/Year	A1a, B1c, B4l, F1a, K3e	II
N-11-5	Conduct a feasibility study to evaluate the condition of the outlet gate and potential replacements.	Mitchell's Creek	10,11	Nassau County; Town of North Hempstead; Village of Kings Point; MBPC	S	N/A	No	None	$$	J3c, K1a, K3e, O1c	II
N-11-6	Investigate the feasibility of adding areas for marsh migration	Mitchell's Creek	12, 13	Nassau County; Village of Kings Point; MBPC; partners	S–M	S/M	- Article 25 Tidal Wetlands - USACE 404 - Coastal Consistency - 401 Water Quality Certification	Adaptive management if implemented	$-$$	A4c, B5n, I1a, K1c, K3e, O1c	II

ID	Recommendation	Subwatershed	Goal[1]	Involved Entities	Timeframe[2]	Size of Restoration Area (S/M/L)[3]	Permit Required	Operational Maintenance Requirements	Cost Estimate[4]	Potential Funding Sources[5]	Priority6 (I,II,III)
N-11-7	Conduct a feasibility study for sediment removal in the pond.	Mitchell's Creek	10	Nassau County; Village of Kings Point; MBPC	S	L	(If Implemented) Article 24 Freshwater Wetlands	None	$$	J3c, B4l, I1a	III
N-12	Consideration of Wildlife Crossings and Water Flow During Road Work and Infrastructure Improvements	Baywide	10,12,13	Nassau County; Town of North Hempstead; Villages	O	N/A	None	None	$$	J3c, B4l, I1a	II
N-13	Canada Geese Management	Baywide	1, 12	Nassau County; Town of North Hempstead; Villages; partners	O	N/A	None	None	$/year	B1e, J6f	I

(1) See Section 1.1.1 for description of Goals
(2) Timeframe Key: S = Short-term (1–2 years); M = Mid-term (2–5 years); L = Long-term (5+ years); O = Ongoing
(3) Restoration Area size is relative, based on comparison of projects to one another
(4) Cost Key: $ = $0-$50,000; $$ = $50,000–$100,000; $$$ = $100,000–$300,000; $$$$ = $300,000+
(5) See Section 10.2 for description of Potential Funding Sources
(6) Priority Key: I = High Priority, II = Medium Priority, III = Low Priority

10.2 Funding Sources

The potential funding sources table (**Table 10-4**) is directly linked to the implementation table for the specified recommendations. "Potential Funding Sources" given in **Tables 10-1** through **10-3** are labeled as their "Identification Number (ID No.)" letter, "Program" number, and "Eligible Activities" letter from **Table 10-4**. For example, B1e refers to the (B) New York State Department of Environmental Conservation's (NYSDEC) (1) Water Quality Improvement Project (WQIP) program under (e) Water Quality Management. For each project recommendation, it is advised that the appropriate Town, Village, Manhasset Bay Protection Committee (MBPC) officials, or other applicants contact agency representatives to discuss funding priorities and specific eligibility requirements.

Many of the recommended projects may be eligible for funding under the Environmental Protection Agency's Clean Water Act programs, which in New York State are primarily administered through the New York State Environmental Facilities Corporation (NYSEFC). This program offers loans and grants for projects that score highly in the State's Intended Use Plan (IUP), which is updated annually and serves as the first step in the funding process. Because the New York State Department of State has supported the development of this WQIP, implementation projects recommended in this plan may also be highly competitive for Environmental Protection Fund (EPF) grants. Additional opportunities include New York State Member Item Funding, the Multi-Modal Program, and other state and federal sources. It is recommended that the Town, Villages, and MBPC coordinate with their New York State and federal representatives to pursue these funding opportunities, and to do so well in advance of the annual State budget cycle, which takes effect on April 1st of every year.

The following table outlines potential funding sources applicable to the implementation of the Manhasset Bay WQIP. Each source includes the program name and eligible activities that support water quality, stormwater management, habitat restoration, wastewater infrastructure, and coastal resilience. Town, Village, MBPC officials, and other applicants are encouraged to contact program administrators to confirm eligibility and application requirements.

Table 10-4: Potential Funding Sources

ID No.	Funding Sources	Program	Eligible Activities
A	New York State Environmental Facilities Corporation	1. Green Innovation Grant Program	a. Innovative Stormwater Management projects: structural & non-structural practices for sediment, pesticide and fertilizer control that may include permeable pavement, bio-retention, stormwater street trees, etc, Funding available at 90% federal and 10% local.
		<u>Clean Water State Revolving Fund</u> 2. Federal Section 212- Point Source – Loan Financing 3. Federal Section 319- Non Point Source-Loan Financing	b. Water Quality improvement Projects- Loans and Grants for Point Source projects such as STPs and Sewers and Non-Point Source projects for stormwater management, land acquisition if related to preserving water quality- projects must be municipally owned-bio-retention, permeable surfaces. Provision for non-municipal projects. Low-interest Loans- for green or non-green projects/Low Interest loans for short and long-term financing. STPs Sewers-Design & Construction
		4. New York State Infrastructure Improvement Act	c. New Program that is incorporated into the State Revolving Fund. Grants available for the above.
B	New York State Department of Environmental Conservation (NYSDEC)	1. Water Quality Improvement Project (WQIP)	a. Municipal Wastewater Treatment b. Municipal Separate Storm Sewer Systems (MS4s) c. Nonagricultural Nonpoint Source Abatement and Control d. Aquatic Habitat Restoration e. Water Quality Management f. Green Innovation Practices
		2. Urban Forestry Grant Program	g. 50/50 cost Share for tree planting along streams
		3. Invasive Species Grant Program	h. Aquatic Invasive Species Spread Prevention or Boat Decontamination i. Terrestrial and Aquatic Invasive Species Rapid Response and Control

ID No.	Funding Sources	Program	Eligible Activities
		4. Non-Agricultural Nonpoint Source Planning and MS4 Mapping Grant	j. Terrestrial and Aquatic Invasive Species Research k. Restoration and Resiliency of Sites Impacted by Invasive Species l. Initial planning of non-agricultural nonpoint source water quality improvement projects. e.g., Decentralized Wastewater Treatment Facilities for Failing On-Site Treatment Systems, Green Infrastructure, Stormwater Retrofits, Streambank/Shoreline Stabilization, Comprehensive Stream Corridor Assessment, Stream Sediment and Debris Management Plan, In-Waterbody Controls for Nutrients, Bathing Beach Restoration, Stream Culvert Repair and Replacement, Berm Removal, Floodplain Creation/Restoration/Reconnection, Wetland Creation/Restoration, Coastal Storm Erosion Risk Management, Winter Road Maintenance, Dam Safety Repair/Rehabilitation and Dam Removal, Sanitary Survey for Alternative Waste Management, Riparian Corridor Restoration and Enhancement. (limited to 5 applications per round, 10% local match of grant request) m. Mapping of regulated traditional MS4s
		5. Environmental Protection Fund (EPF)	n. Capital projects that protect the environment and enhance communities. e.g., Purchasing land for the NYS Forest Preserve, Restoring historic sites, Conserving farmland, Restoring habitat, Controlling invasive species, Upgrading municipal sewage treatment plants, Cleaning up waterfront property and creating a public park, Helping businesses develop ways to recycle material.
D	Federal Highway Administration (FHWA) administered by NYS Department of Transportation (DOT)	MAP-21 1. Surface Transportation System (STS)	a. Road Reconstruction and Drainage/Impervious Surfaces Stormwater Outflow devices. Roads must be designated on Federal Aid Urban system Maps

ID No.	Funding Sources	Program	Eligible Activities
	through Nassau County's Department of Public Works (DPW)-Federal Funding administered by NYS DOT / New York Metropolitan Planning Council (NYMTCC)	2. Transportation Alternatives Program	b. Enhancements to the Transportation System-streetscapes, historic preservation, environmental improvements
E	New York State Dept. of Transportation	1. Consolidated Highway Improvement Program (CHIPS) 2. Multi-Modal Program	a. Drainage curb, sidewalks, permeable paving b. Drainage, curb, sidewalks, permeable paving
F	New York State Department of State (NYSDOS)	1. Local Waterfront Revitalization Program (LWRP) - Environmental Protection Funding (EPF)	a. Water Quality Improvement Projects are eligible if part of overall improvement project-planning & implementation e.g. Storm Drain inserts, various projects that protect harbors, education projects and studies
G	New York State Office of Parks, Recreation & Historic Preservation	1. Environmental Protection Fund (and available federal funding)	a. Parks Development Funding b. Land Acquisition for park purposes c. Recreational Trails Program
H	Long Island Community Foundation	1. Competitive Grant Program (Environmental Category)	a. Promote sustainable land use, land management, and transportation alternatives b. Support and strengthen open space and farmland preservation efforts c. Improve and protect the health of the region's bodies of water

ID No.	Funding Sources	Program	Eligible Activities
			d. Protect drinking water quality e. Preserve biological diversity through habitat conservation and protection f. Minimize climate change by reducing greenhouse gas emissions through the development of alternative energy sources and energy conservation, research and public education
I	Federal Emergency Management Agency (FEMA) through NYS Division of Homeland Security & Emergency Services (DHSES) (formally NYS SEMO)	1. Flood Mitigation Assistance Program 2. Hazard Mitigation Grant Program	a. Various projects to prevent flooding and protect public and private resources, e.g. road and property elevations, culverts, buyouts, projects must have a positive benefit-cost ratio, (75/25 funding)
J	U.S. Environmental Protection Agency (EPA) (Note on EPA Water Quality Projects- QAPP- Quality Assurance Protection Plan must be EPA adopted at the time that application is submitted)	1. Targeted Watersheds Grants Program 2. Surveys, Studies, Investigations, Demonstrations and Training Grants 3. Assessment and Watershed Protection Program Grants	a. 75/25 federal funding for protecting and restoring water uses, forming partnerships using new technologies, market incentives and results-oriented strategies/capacity building grants are available. Drainage, Resurfacing, Permeable paving. b. Planning, Wetlands Protection, Coastal and Estuarine Planning Treatment technologies. Examples: Development of Water Protection Guides for Communities Demonstration Projects c. Innovative Water Quality Assessment and Modeling Techniques, Training Handbooks

ID No.	Funding Sources	Program	Eligible Activities
		4. Pesticide Environmental Stewardship Regional Grants	d. Integrated Pest Management Approaches that Reduce the Risks Associated with Pesticide Use in Non-Agricultural Settings
		5. Section 320- National Estuary Program	e. Protection of Water Quality Supplies, Protection and Propagation of a balanced , indigenous population of shellfish, fish and wildlife and Habitat Restoration
		6. Urban Waters Small Grants Program	f. Water Quality Improvement Projects – Stewardship, Public Education and Awareness
		7. Wetland Program Development Grants	g. Research, investigations, experiments, training, demonstrations, surveys and studies related to water pollution
K	National Fish and Wildlife Foundation	1. National Wetland Program Development Grants and Five-Star Restoration Training Grants	Protect, Manage and Restore Wetlands and Streams by a. Monitoring & Assessment b Volunteers Wetland Restoration & Protection, and c. Wetland-Specific Water Quality Standards Partnership with Businesses, Community & Schools Projects that Benefit Multiple Species.
		2. Native Plant Conservation Initiative	Achieve a Variety of Habitat Degradation/High Priority Critical Conservation Need/Demo Projects with a High Level of Public Involvement/Leverage Funding Involving Partnerships
		3. Long Island Sound Futures Fund (LISFF)	d. Water Quality Improvement Projects – various initiatives and priorities e. Habitat restoration design, planning, or implementation projects f. Coastal resilience projects g. Watershed planning h. Community resilience/sustainability/natural hazard mitigation plans i. Outreach, Education and Public Participation Projects

ID No.	Funding Sources	Program	Eligible Activities
M	NYS Member Item Funding	1. Various- through NYS Legislators	a. All initiatives
N	Restore America's Estuaries, EPA, Long Island Sound Partnership	1. Long Island Sound Community Impact Fund	Provides technical and financial assistance to environmentally distressed communities, to address environmental health impacts and to improve the quality and accessibility of Long Island Sound: a. Projects that result in quantifiable pollutant prevention or reduction. b. Restoring habitat within the Important Coastal Habitat Types. c. Projects that foster a diverse balance and abundant populations of fish, birds, and wildlife. d. Public engagement, knowledge and stewardship. e. Projects that enhance community resilience and sustainability. f. Planning and design that sets–the-stage for implementation of water quality projects, eligible habitat restoration projects and resilience projects. g. Community-based science projects. h. Data management and integration projects. i. Similar activities consistent with section 119 of the Clean Water Act.
O	EPA through Long Island Sound Partnership and managed by NY & CT Sea Grants	1. Long Island Sound Resilience Planning Support Program	The program matches communities with qualified contractors to: a. Assess local climate risks b. Conceptualize project ideas c. Conduct preliminary planning efforts Communities that receive awards can receive support for project scoping and planning at the local or regional level. No match requirement

11.0 MONITORING AND TRACKING

Successful implementation of the Manhasset Bay WQIP requires a collaborative framework that ensures recommendations are translated into action, progress is tracked, and the plan remains responsive to new information and changing conditions.

A comprehensive Monitoring and Tracking program will be established to document implementation progress, evaluate the effectiveness of water quality improvement actions, support adaptive management, and determine whether water quality goals and objectives are being achieved. The Monitoring and Tracking program is intended to establish baseline conditions, measure environmental responses to implementation actions, and provide a framework for periodic plan updates and guide future investment decisions. The Monitoring and Tracking program is organized around four primary components:

- Implementation Tracking
- Water Quality and Environmental Monitoring
- Data Management and Reporting
- Adaptive Management and Plan Evaluation

11.1 Implementation Team

The implementation of the WQIP will be led by a multi-stakeholder Implementation Team, coordinated by the Manhasset Bay Protection Committee (MBPC). The team will include representatives from:

- Town of North Hempstead
- Nassau County
- Villages
- NYSDEC and other relevant state agencies
- Non-profit partners
- Community stakeholders and citizen science groups

Roles and Responsibilities:

- MBPC: Serve as the central coordinating body, facilitate inter-municipal communication, oversee progress reporting, and convene regular meetings.

- Municipal Representatives: Lead implementation of municipal-specific actions, provide annual "check-ins" on local progress, and coordinate with MBPC on funding and technical needs. These will likely be the representatives already serving on MBPC.
- State and Federal Agencies: Provide regulatory guidance, technical support, and facilitate access to funding streams.
- Non-profit and Academic Partners: Support public education, outreach, stewardship, and technical training.
- Community Stakeholders: Participate in citizen science, stewardship, and public engagement activities.

The Implementation Team will meet at least once every six months to review progress, address challenges, and update priorities as needed. These meetings will be open to the public and a part of the regularly scheduled MBPC meetings.

11.2 Mechanisms for Tracking Implementation

Centralized implementation tracking tables shall be maintained by the MBPC on the Committee's website in coordination with member municipalities and project partners. The tracking system will serve as a record of implementation activities and will be updated regularly to document progress toward achieving the goals and objectives identified in this WQIP.

A transparent and systematic approach to tracking implementation is essential for adaptive management and accountability. The following mechanisms are suggested:

- Centralized Implementation Tracking Table: The WQIP's Tables 10-1 through 10-3 (Implementation Strategy) will be maintained as a living document, updated at least annually to reflect the status of each recommendation (e.g., not started, in progress, completed, ongoing, costs). These tables will be housed publicly on the MBPC website and should track:
    - Project status (as mentioned above)
    - Access design and permit information
    - The schedule for inspection, maintenance, and monitoring after complete
    - Whether the project meets federal/state stormwater implementation or water quality goals
    - Final project costs

- Annual Progress Reports: The MBPC will prepare a short annual implementation progress report summarizing actions completed, ongoing activities, monitoring findings (if relevant), budget updates (including grant awards), partner involvement, challenges encountered, and recommendations for adaptive management. It will be distributed

through the MBPC newsletter and give a sense of how well the plan is being implemented. It will also serve to demonstrate how much has actually been accomplished. This Annual Progress Report can be used by all MBPC members for their annual MS4 submission.

- Performance Metrics: Specific performance indicators will be tracked such as (but not limited to):
  - number of green infrastructure projects installed,
  - acres of wetlands restored,
  - number of volunteers,
  - pollutant load reductions (estimated).
- GIS-Based Project Mapping (suggested): As appropriate, all implemented projects could be mapped and tracked using GIS to visualize spatial progress and identify gaps.
- Trend Monitoring: MBPC already manages an annual summer water quality monitoring program that is performed consistently. This monitoring will be continued and a report on trends for indicator bacteria counts should be completed every five years.
- MBPC will reach out to the Long Island Sound Partnership for any relevant updates they can provide.

11.3 Water Quality and Environmental Monitoring

Monitoring of water quality and natural resources within the watershed is essential to establish baseline watershed conditions and evaluate whether implementation actions are resulting in measurable improvements to water quality. Monitoring data from other groups, such as IEC, are readily available and should be incorporated into trends analysis.

Water quality monitoring, as recommended in Recommendation **B-1**, should continue at the already established fixed locations throughout the Bay and expanded, as feasible, to selected tributaries, ponds, wetlands, and stormwater outfalls.

Habitat monitoring should be conducted for restoration projects by the entity who led the project to assess ecological effectiveness and maintenance needs. Restoration projects should include post-construction monitoring and maintenance periods sufficient to evaluate project success and establishment of planted vegetation (typically a minimum of three years).

11.4 Data Management and Reporting

It is recommended that a centralized water quality data portal be utilized to facilitate regional analysis and reporting at a watershed-wide scale over the long-term. This publicly accessible, centralized online portal will be utilized to compile, visualize, and share all water quality data collected by municipalities, agencies, academic partners, and citizen scientists.

As part of longer-term planning, the MBPC could work with watershed municipalities to establish a formal data-sharing framework that allows relevant MS4 information to be incorporated into a watershed-wide tracking system. Data could be compiled annually and integrated into the centralized watershed database and GIS platform. This watershed-wide tracking system would facilitate inter-municipal coordination and data-driven decision-making, improve transparency and public engagement, reduce duplication of effort, and ensure data consistency.

MS4 program data can serve as watershed performance indicators and provide measurable benchmarks for implementation success. Tracking trends in municipal maintenance activities, outfall conditions, illicit discharge investigations, and green infrastructure implementation can help quantify progress toward reducing pollutant loading and improving water quality. T While annual compilation of MS4 data is not required as part of Monitoring and Tracking of the WQIP, it should be considered as a long-term goal in the future.

Monitoring results and implementation progress should be evaluated on a recurring basis to support adaptive management. Reporting could and, in some cases, should include:

- Annual implementation progress reports
- Annual summaries of water quality monitoring results
- Periodic public presentations and stakeholder updates
- Updates to online dashboards and data portals
- Five-year implementation progress and status evaluations based on Implementation Tracking Table

11.5 Adaptive Management and Plan Evaluation

Information collected through the Monitoring and Tracking program should be thoroughly evaluated as needed in order to reprioritize implementation projects, refine monitoring strategies, identify new funding opportunities, update pollution reduction estimates, modify management actions as necessary, and inform future updates to the WQIP.

Reviewing and, if warranted, updating the WQIP should be considered in response to triggering events such as changes in regulatory policies, emerging contaminants, new technologies, innovative management practices, expanded monitoring data, or updated modeling tools.

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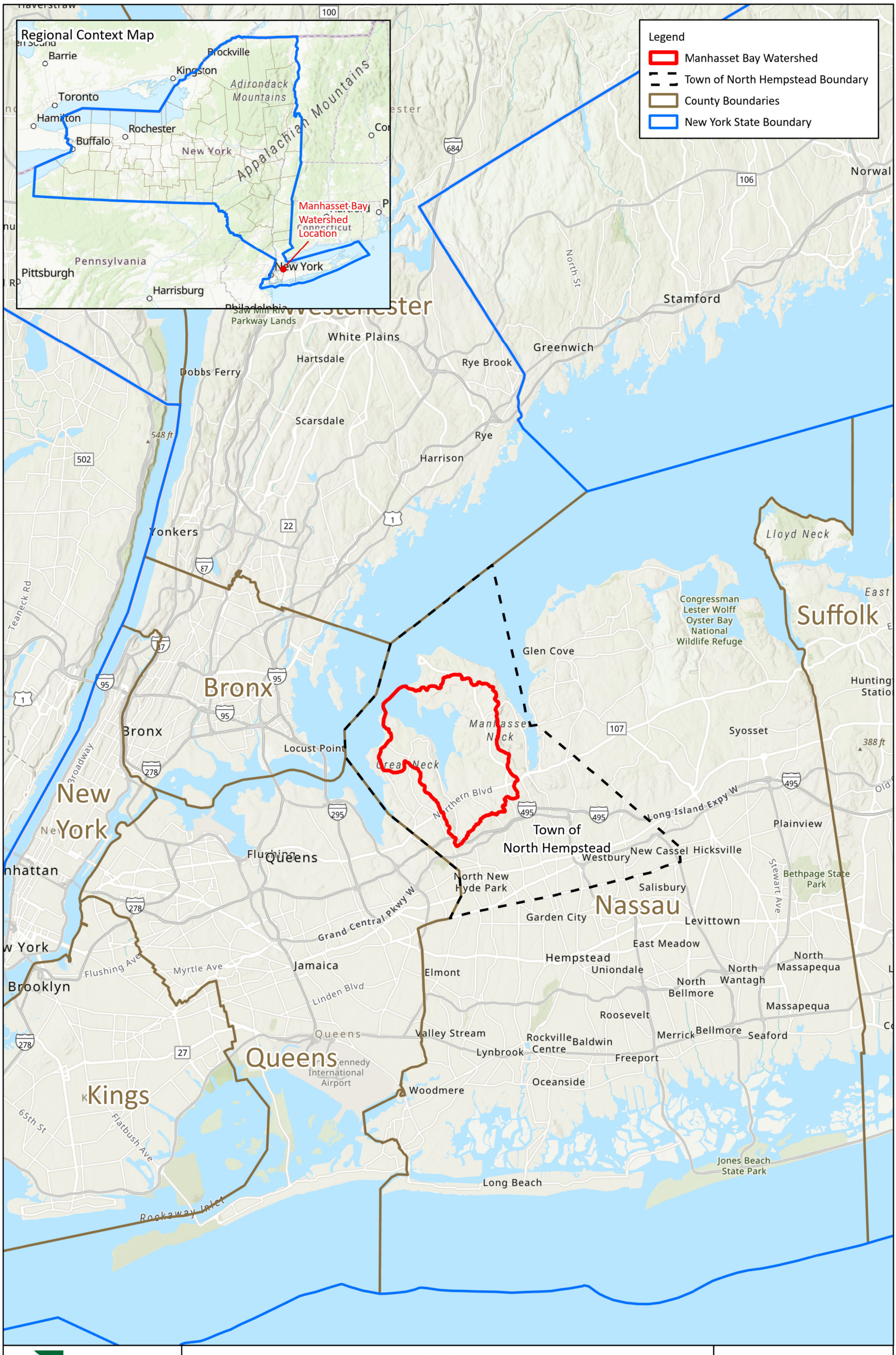
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FIGURES



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FIGURE 1-1
REGIONAL LOCATION MAP

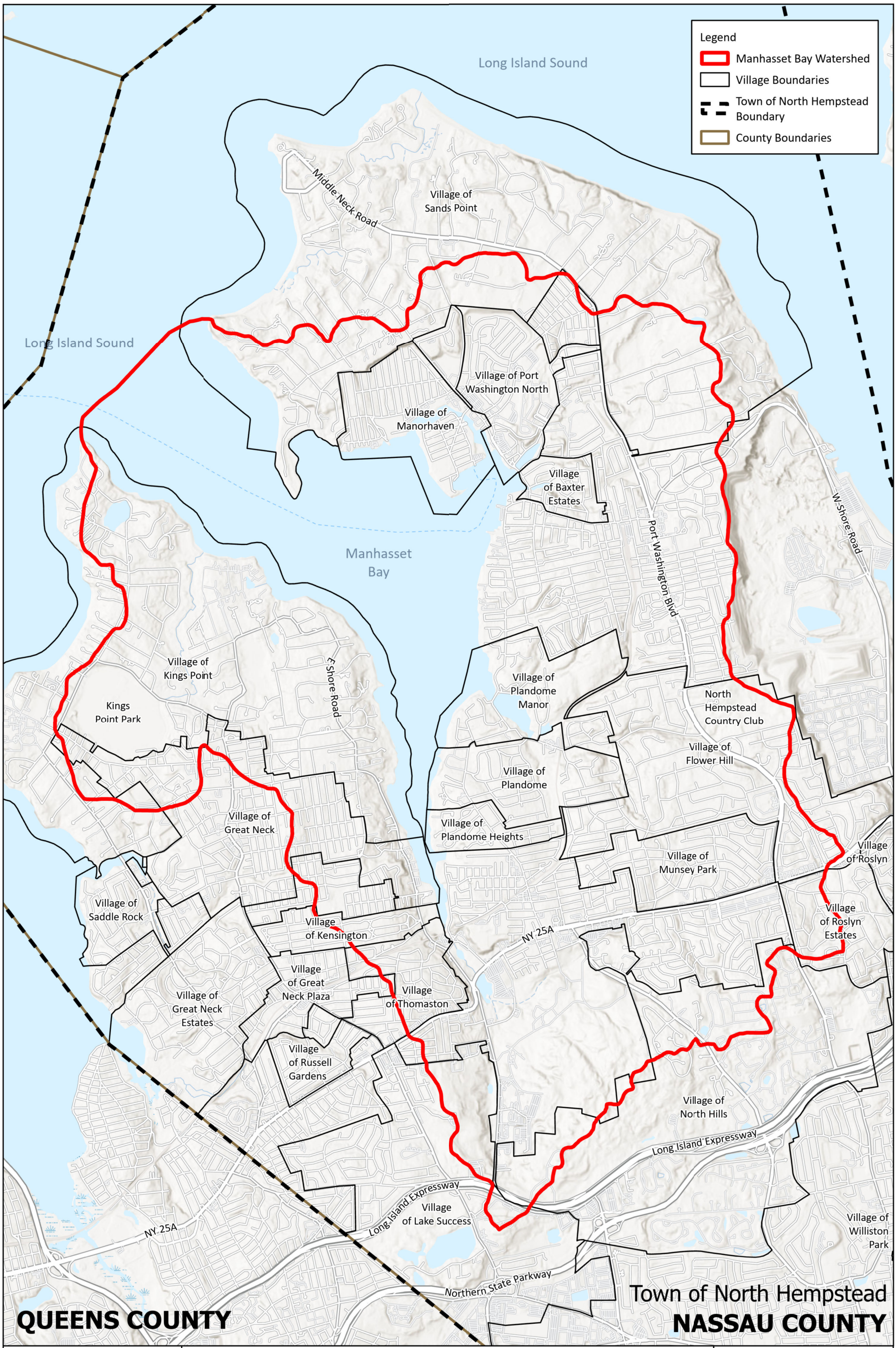
Sources: ESRI Topographic Map, 2023; USGS Watershed Boundary, 2022; NYS Civil Boundaries 2022
Scale: 1 inch equals 17,000 feet

N

Manhasset Bay
Water Quality Improvement Plan

North Hempstead, NY

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FIGURE 1-2
WATERSHED LOCATION MAP

Sources: ESRI Terrain Map, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022
Scale: 1 inch equals 3,000 feet

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North Hempstead, NY

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ID	Subwatershed Name	Acreage
1	North East Shore	239.3
2	Sheets Creek N	357.9
3	Sheets Creek E	543.4
4	Mill/Baxter Ponds	1052.9
5	Stannard's Brook	374.3
6	Leeds Pond	2169.3
7	Plandome Heights	134.5
8	Whitney Pond	2388.5
9	Kensington	389.7
10	Kings Point Creek	826.7
11	Mitchell Creek	946.5
12	Kings Point Pond	168.5
	Total	9591.7

Legend
- Manhasset Bay Watershed
- Manhasset Bay Shoreline
- Subwatersheds
- Village Boundaries
- Town of North Hempstead Boundary
- County Boundaries

Long Island Sound
Long Island Sound
Middle Neck Road
Village of Sands Point
1
2
3
4
5
6
7
8
9
10
11
12
Sheets Creek
Village of Manorhaven
Mill Pond
Baxter Pond
Village of Baxter Estates
Village of Port Washington North
Mitchell's Pond
Manhasset Bay
Mitchell's Creek
Kings Point Creek
Port Washington Blvd
W Shore Road
E Shore Road
Village of Kings Point
Kings Point Park
Mitchell's Creek
Village of Plandome Manor
Leeds Pond
North Hempstead Country Club
Village of Plandome
Village of Flower Hill
Village of Great Neck
Village of Plandome Heights
Village of Munsey Park
Village of Roslyn
Village of Saddle Rock
Village of Kensington
Kensington Park Pond
Manhasset Valley Pond
NY 25A
Village of Roslyn Estates
Village of Great Neck Plaza
Village of Great Neck Estates
Village of Thomaston
Whitney Pond
Village of Russell Gardens
Village of North Hills
Long Island Expressway
Long Island Expressway
Village of Lake Success
NY 25A
Northern State Parkway
QUEENS COUNTY
Town of North Hempstead
NASSAU COUNTY

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FIGURE 4-1
SUBWATERSHEDS MAP

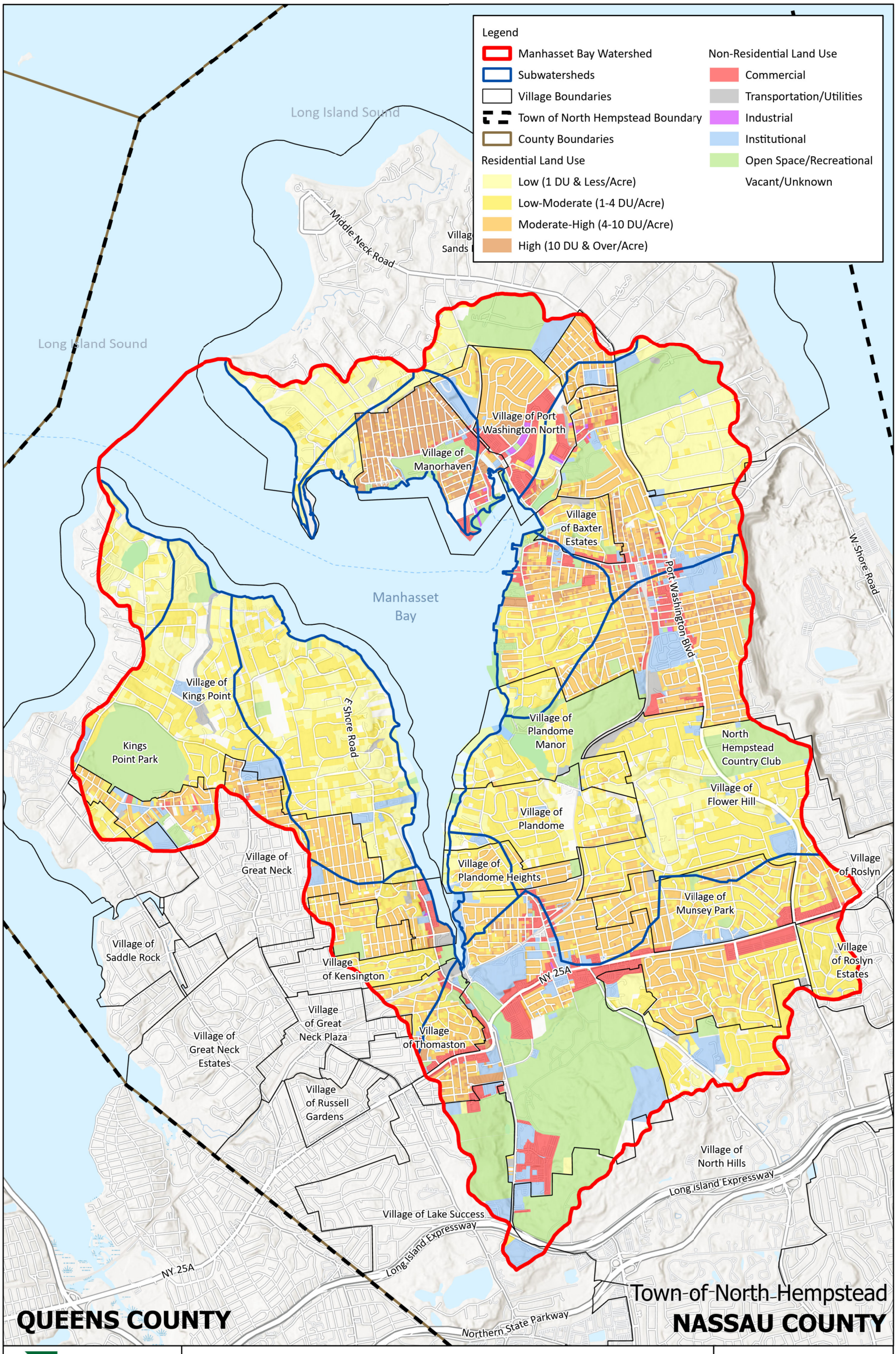
Sources: NYS Orthoimagery, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; Fuss & O'Neill, 2016
Scale: 1 inch equals 3,000 feet

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North Hempstead, NY

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FIGURE 4-2
LAND USE MAP

Sources: ESRI Terrain Map, 2023; USGS Watershed Boundary Dataset, 2022; NYS Civil Boundaries, 2022; NRCS Parcels, 2017
Scale: 1 inch equals 3,000 feet

N

Manhasset Bay Water Quality Improvement Plan

North Hempstead, NY

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Legend

- Manhasset Bay Watershed
- Village Boundaries
- Town of North Hempstead Boundary
- County Boundaries

Zoning

- Residence A
- Residence AA
- Residence B
- Residence C
- Multiple Residence
- Residence, Public Housing
- Business- A
- Business- AA
- Business- B
- Commuity Facility
- Hospital
- Town Hall
- Golden Age Residence District
- Industrial B
- Transporation
- Parking
- Residence Open Space
- Planned Unit Development - Golf and Recreational
- Aquifer Protection District
- No Zoning Available

Zoning Maps for Additonal Municipalities Within Manhasset Bay Watershed are Provided in Appendix X.

Long Island Sound

Long Island Sound

Manhasset Bay

Sands Point

Village of Port Washington North

Village of Manorhaven

Village of Baxter Estates

Port Washington Blvd

W Shore Road

Village of Sea Cliff

Village of Kings Point

Kings Point Park

E Shore Road

Village of Great Neck

Village of Saddle Rock

Village of Kensington

Village of Great Neck Plaza

Village of Great Neck Estates

Village of Russell Gardens

Village of Thomaston

Village of Plandome Manor

Village of Plandome

Village of Plandome Heights

Village of Munsey Park

North Hempstead Country Club

Village of Flower Hill

Village of Roslyn

Village of Roslyn Estates

Village of North Hills

Village of Lake Success

AQUIFER PROTECTION DISTRICT

NY 25A

Long Island Expressway

QUEENS COUNTY

Town of North Hempstead

NASSAU COUNTY

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FIGURE 4-3
TOWN OF NORTH HEMPSTEAD ZONING MAP

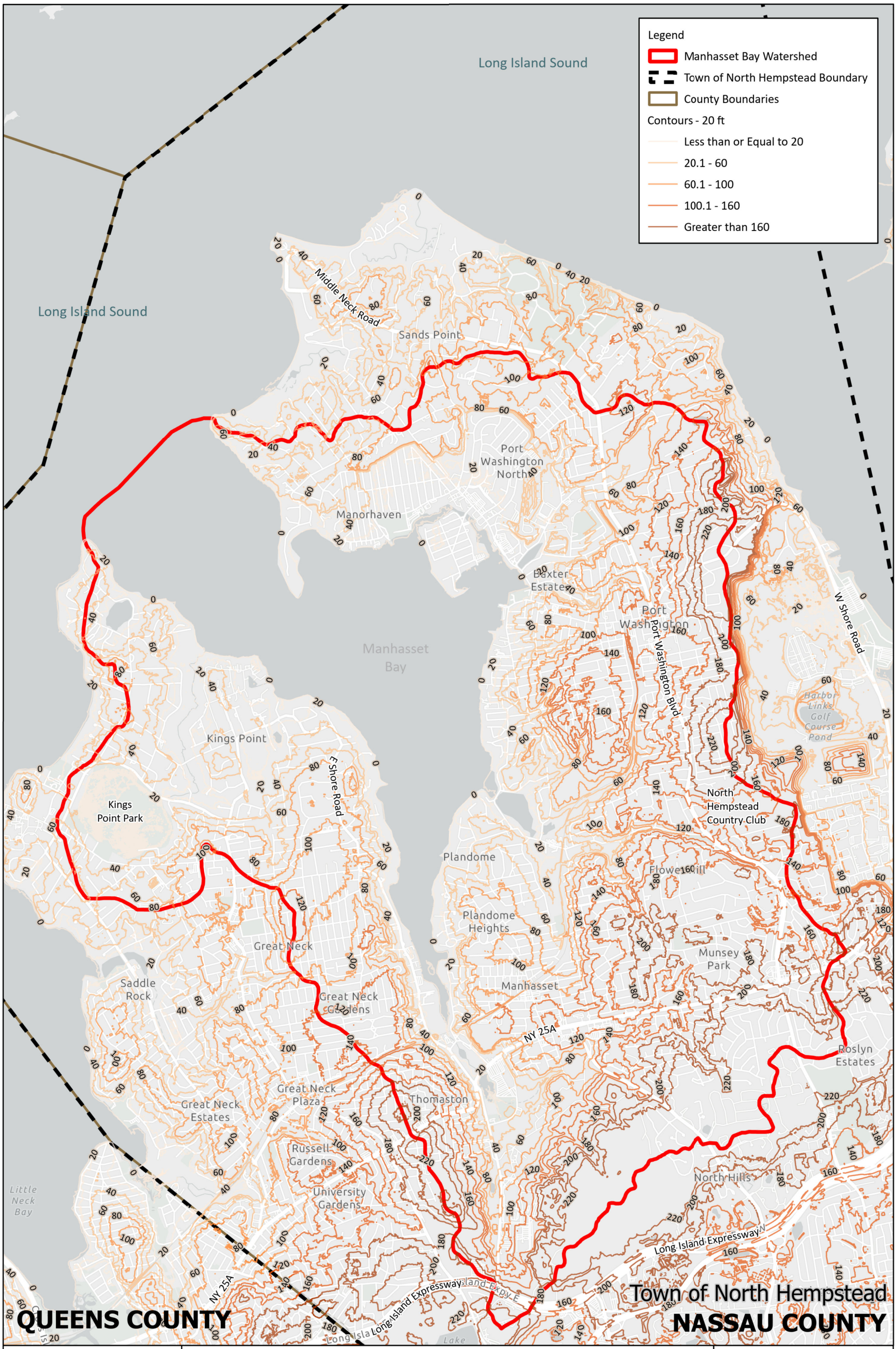
Sources: ESRI Terrain Map, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; Town of North Hempstead, 2024
Scale: 1 inch equals 3,000 feet

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North Hempstead, NY

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FIGURE 4-4
TOPOGRAPHY MAP

Sources: NYS Orthoimagery, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; USGS; 2011
Scale: 1 inch equals 3,000 feet

N

Manhasset Bay
Water Quality Improvement Plan

North Hempstead, NY

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Legend

- Manhasset Bay Watershed
- Town of North Hempstead Boundary
- County Boundaries
- Subwatersheds

ID	Subwatershed Name	Acreage
1	North East Shore	239.3
2	Sheets Creek N	357.9
3	Sheets Creek E	543.4
4	Mill/Baxter Ponds	1052.9
5	Stannard's Brook	374.3
6	Leeds Pond	2169.3
7	Plandome Heights	134.5
8	Whitney Pond	2388.6
9	Kensington	389.7
10	Kings Point Creek	826.7
11	Mitchell Creek	946.6
12	Kings Point Pond	168.5
	Total	9591.7

Long Island Sound

Manhasset Bay

Middle Neck Road

Port Washington Blvd

E Shore Road

W Shore Road

NY 25A

Long Island Expressway

Northern State Parkway

QUEENS COUNTY

Town of North Hempstead

NASSAU COUNTY

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FIGURE 4-5a

MANHASSET BAY WATERSHED SOILS MAP

Sources: ESRI Terrain Map, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; SSURGO NRCS, 2013

Scale: 1 inch equals 3,000 feet

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Manhasset Bay Water Quality Improvement Plan

North Hempstead, NY

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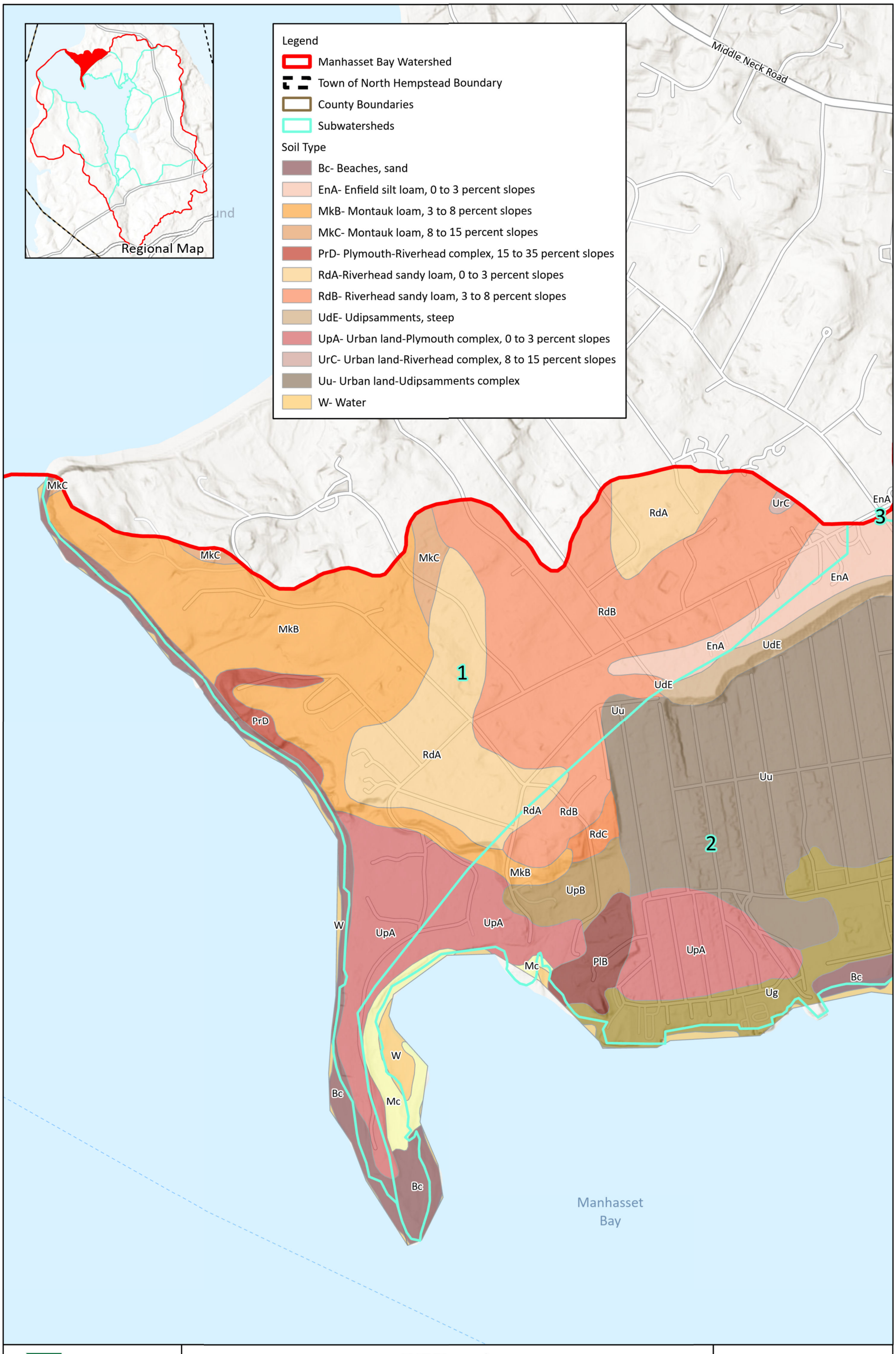


FIGURE 4-5b
NORTH EAST SHORE SOILS MAP

Sources: ESRI Terrain Map, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; SSURGO NRCS, 2013

Scale: 1 inch equals 700 feet

N

Manhasset Bay
Water Quality Improvement Plan

North Hempstead, NY

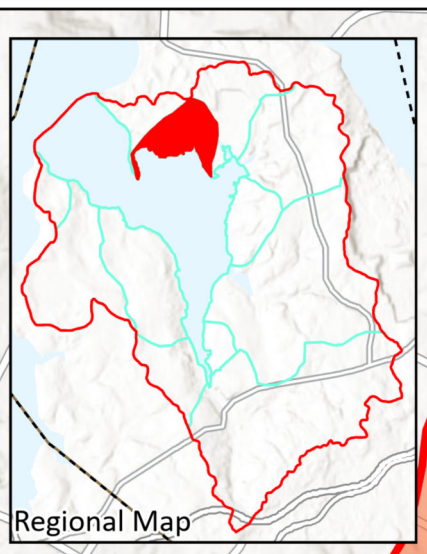
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Legend

- Manhasset Bay Watershed
- Town of North Hempstead Boundary
- County Boundaries
- Subwatersheds

Soil Type

- Bc- Beaches, sand
- EnA- Enfield silt loam, 0 to 3 percent slopes
- Ip- Ipswich mucky peat, 0 to 2 percent slopes, very frequently flooded
- Mc- Matunuck mucky peat, 0 to 2 percent slopes, very frequently flooded
- MkB- Montauk loam, 3 to 8 percent slopes
- PlB- Plymouth loamy coarse sand, 3 to 8 percent slopes
- RdA-Riverhead sandy loam, 0 to 3 percent slopes
- RdB- Riverhead sandy loam, 3 to 8 percent slopes
- RdC- Riverhead sandy loam, 8 to 15 percent slopes
- UdE- Udipsamments, steep
- Ue- Udipsamments, wet substratum
- Ug- Urban land
- UpA- Urban land-Plymouth complex, 0 to 3 percent slopes
- UpB- Urban land-Plymouth complex, 3 to 8 percent slopes
- UrB- Urban land-Riverhead complex, 3 to 8 percent slopes
- Uu- Urban land-Udipsamments complex
- W- Water



1

2

3

Manhasset Bay

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FIGURE 4-5c
SHEETS CREEK NORTH SOILS MAP

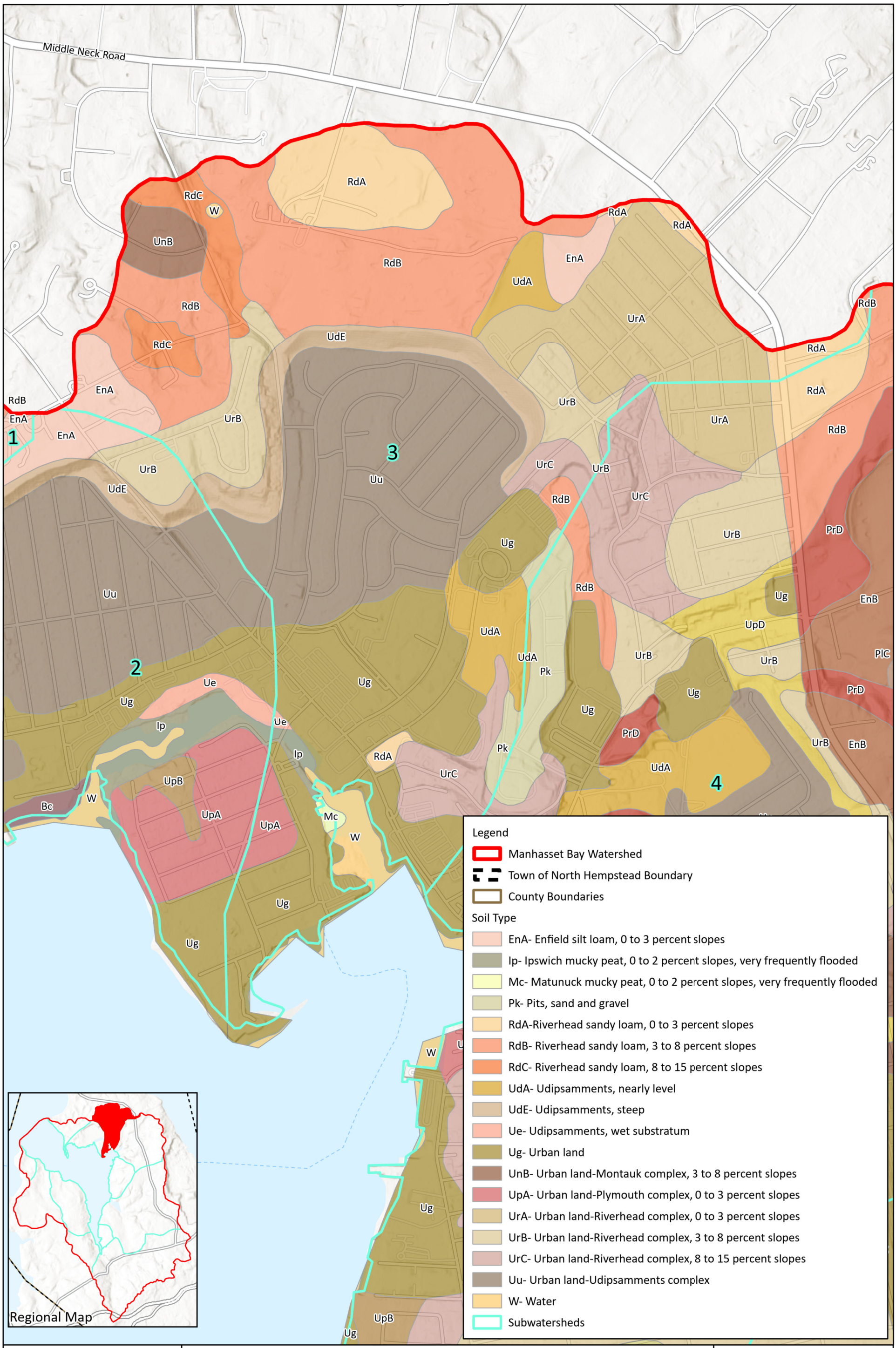
Sources: ESRI Terrain Map, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; SSURGO NRCS, 2013
Scale: 1 inch equals 700 feet

N

Manhasset Bay Water Quality Improvement Plan

North Hempstead, NY

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FIGURE 4-5d
SHEETS CREEK EAST SOILS MAP

Sources: ESRI Terrain Map, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; SSURGO NRCS, 2013
Scale: 1 inch equals 800 feet

N

Manhasset Bay
Water Quality Improvement Plan

North Hempstead, NY

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Legend

- Manhasset Bay Watershed
- Town of North Hempstead Boundary
- County Boundaries

Soil Type

- EnB- Enfield silt loam, 3 to 8 percent slopes
- MkB- Montauk loam, 3 to 8 percent slopes
- MkD- Montauk loam, 15 to 25 percent slopes
- Pk- Pits, sand and gravel
- PlC- Plymouth loamy coarse sand, 8 to 15 percent slopes
- PrD- Plymouth-Riverhead complex, 15 to 35 percent slopes
- RdA-Riverhead sandy loam, 0 to 3 percent slopes
- RdB- Riverhead sandy loam, 3 to 8 percent slopes
- RdC- Riverhead sandy loam, 8 to 15 percent slopes
- UdA- Udipsamments, nearly level
- Ug- Urban land
- UnB- Urban land-Montauk complex, 3 to 8 percent slopes
- UpA- Urban land-Plymouth complex, 0 to 3 percent slopes
- UpB- Urban land-Plymouth complex, 3 to 8 percent slopes
- UpC- Urban land-Plymouth complex, 8 to 15 percent slopes
- UpD- Urban land-Plymouth complex, 15 to 25 percent slopes
- UrA- Urban land-Riverhead complex, 0 to 3 percent slopes
- UrB- Urban land-Riverhead complex, 3 to 8 percent slopes
- UrC- Urban land-Riverhead complex, 8 to 15 percent slopes
- Uu- Urban land-Udipsamments complex
- W- Water
- Subwatersheds

Regional Map

Manhasset Bay

Port Washington Blvd

4

5

6

FIGURE 4-5e
MILL/BAXTER PONDS SOILS MAP

Sources: ESRI Terrain Map, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; SSURGO NRCS, 2013

Scale: 1 inch equals 900 feet

N

Manhasset Bay
Water Quality Improvement Plan

North Hempstead, NY

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Legend

Manhasset Bay Watershed

Town of North Hempstead Boundary

County Boundaries

Soil Type

Bc- Beaches, sand

Mc- Matunuck mucky peat, 0 to 2 percent slopes, very frequently flooded

MkB- Montauk loam, 3 to 8 percent slopes

MkC- Montauk loam, 8 to 15 percent slopes

Pa- Pawcatuck mucky peat, 0 to 2 percent slopes, very frequently flooded

Ue- Udipsamments, wet substratum

Ug- Urban land

UnB- Urban land-Montauk complex, 3 to 8 percent slopes

UnC- Urban land-Montauk complex, 8 to 15 percent slopes

UpA- Urban land-Plymouth complex, 0 to 3 percent slopes

UpB- Urban land-Plymouth complex, 3 to 8 percent slopes

UpC- Urban land-Plymouth complex, 8 to 15 percent slopes

UpD- Urban land-Plymouth complex, 15 to 25 percent slopes

UrB- Urban land-Riverhead complex, 3 to 8 percent slopes

UrC- Urban land-Riverhead complex, 8 to 15 percent slopes

W- Water

Subwatersheds

Regional Map

Manhasset Bay

4

5

6

FIGURE 4-5f
STANNARDS BROOK SOILS MAP

Sources: ESRI Terrain Map, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; SSURGO NRCS, 2013

Scale: 1 inch equals 600 feet

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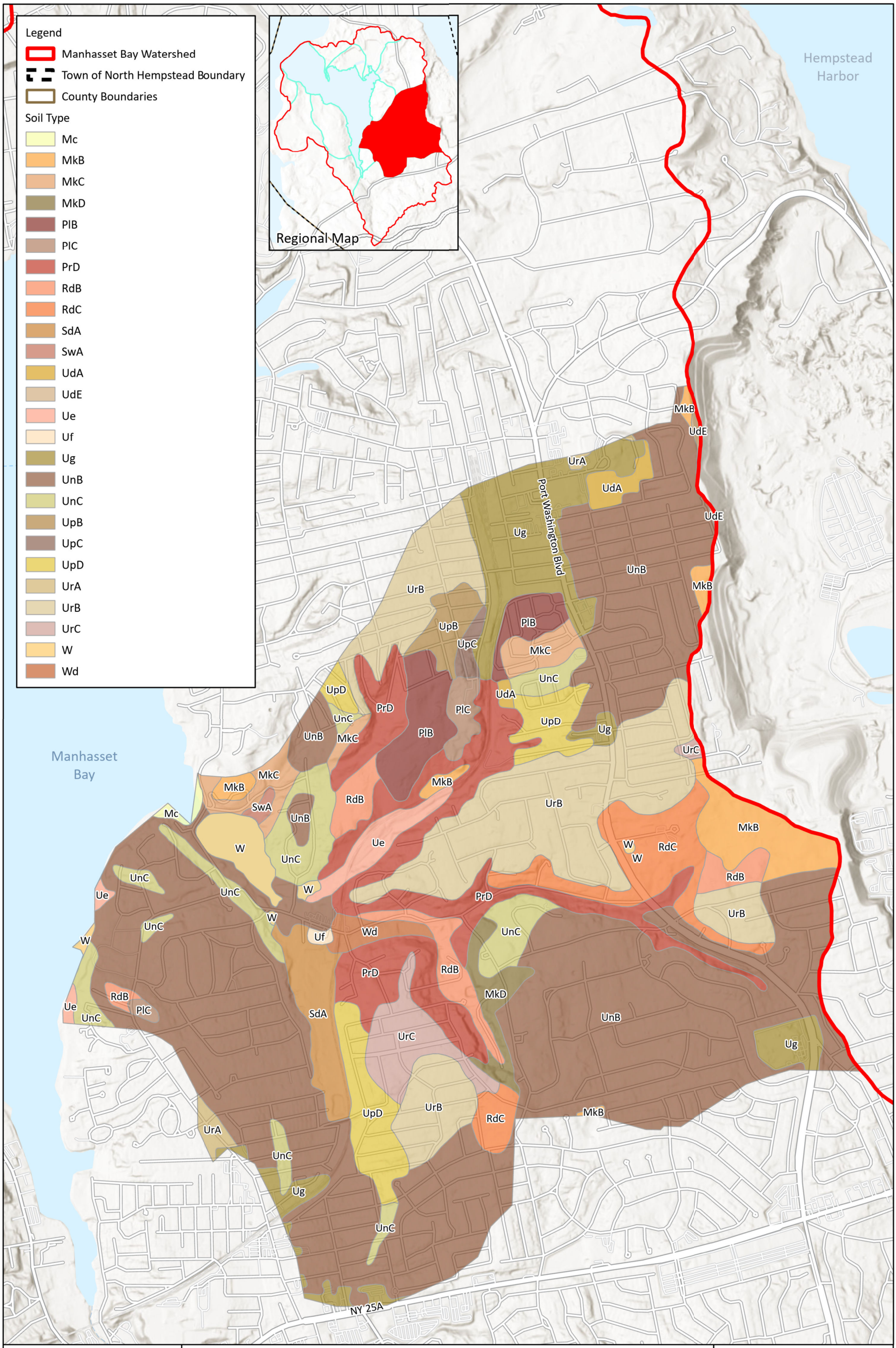
Manhasset Bay Water Quality Improvement Plan

North Hempstead, NY

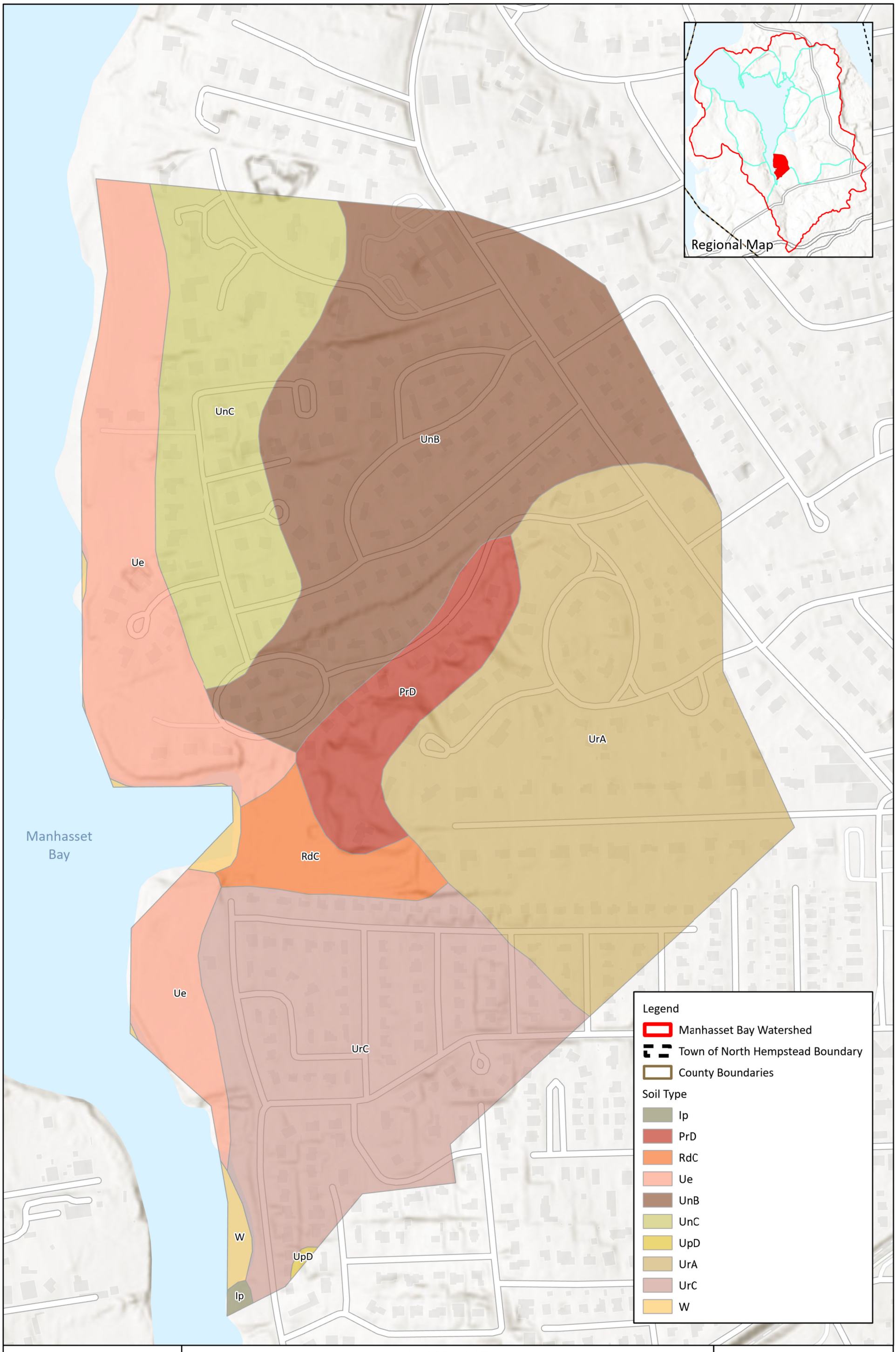
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NPV	**FIGURE 4-5g** **LEEDS POND SOILS MAP**	**Manhasset Bay** **Water Quality Improvement Plan**
	Sources: ESRI Terrain Map, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; SSURGO NRCS, 2013 Scale: 1 inch equals 1,400 feet N	**North Hempstead, NY**



NPV

FIGURE 4-5h
PLANDOME HEIGHTS SOILS MAP

Sources: ESRI Terrain Map, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; SSURGO NRCS, 2013
Scale: 1 inch equals 300 feet

N

Manhasset Bay
Water Quality Improvement Plan

North Hempstead, NY

Manhasset Bay

Long Island Expressway

Northern State Parkway

Regional Map

QUEENS COUNTY

Town of North Hempstead

NASSAU COUNTY

Legend

- Manhasset Bay Watershed
- Town of North Hempstead Boundary
- County Boundaries

Soil Type

- Ip
- MkA
- MkB
- MkC
- MkD
- Pg
- PlB
- PlC
- PrD
- RdB
- RdC
- RdD
- SdA
- Su
- Ua
- UdE
- Ue
- Ug
- UnB
- UnC
- UpD
- UrA
- UrB
- UrC
- W
- Wa

NPV

FIGURE 4-5i
WHITNEY POND SOILS MAP

Sources: ESRI Terrain Map, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; SSURGO NRCS, 2013
Scale: 1 inch equals 1,600 feet

N

Manhasset Bay
Water Quality Improvement Plan

North Hempstead, NY

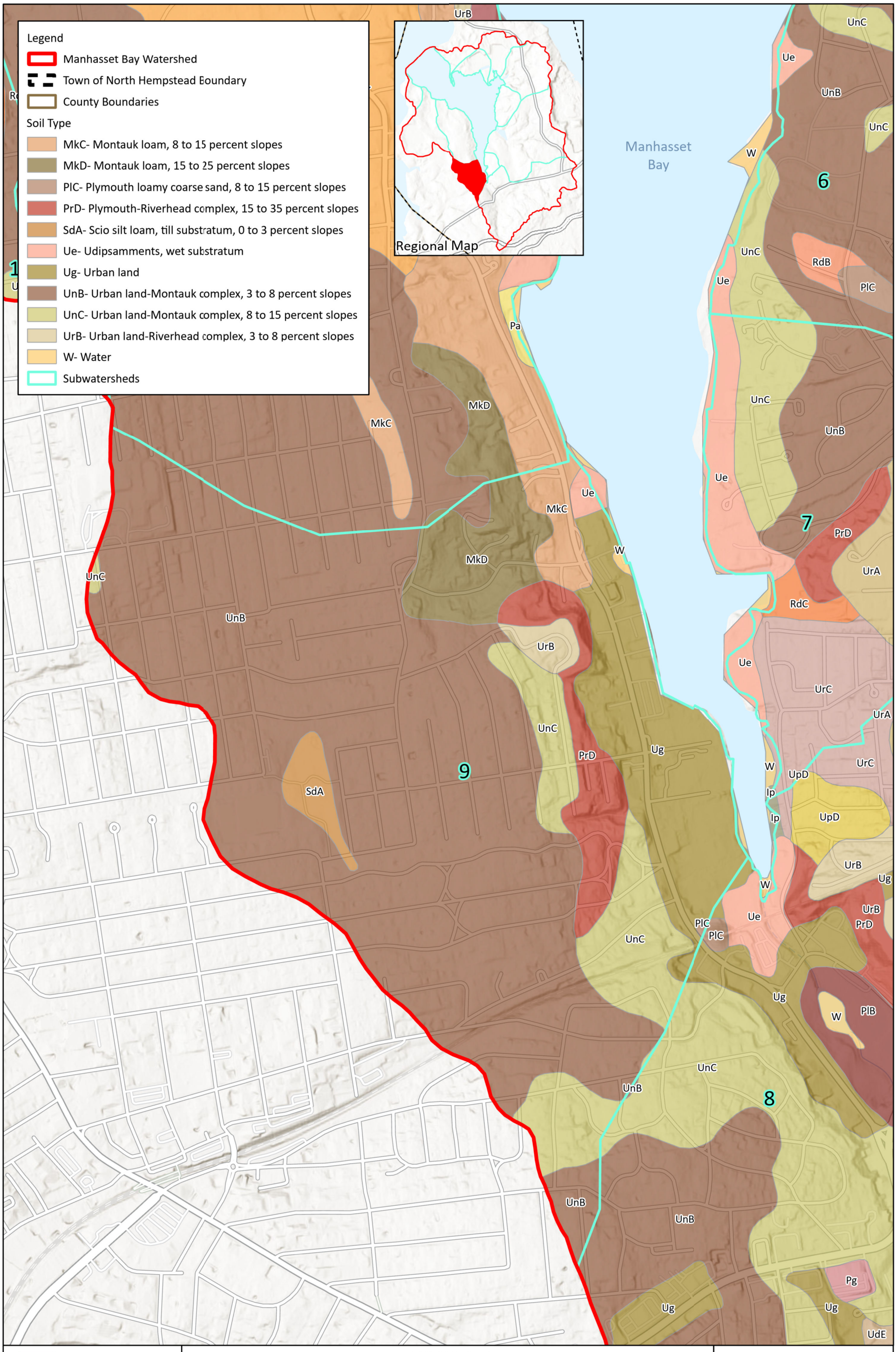


FIGURE 4-5j
KENSINGTON SOILS MAP

Sources: ESRI Terrain Map, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; SSURGO NRCS, 2013
Scale: 1 inch equals 700 feet

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Manhasset Bay Water Quality Improvement Plan

North Hempstead, NY

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FIGURE 4-5k
KINGS POINT CREEK SOILS MAP

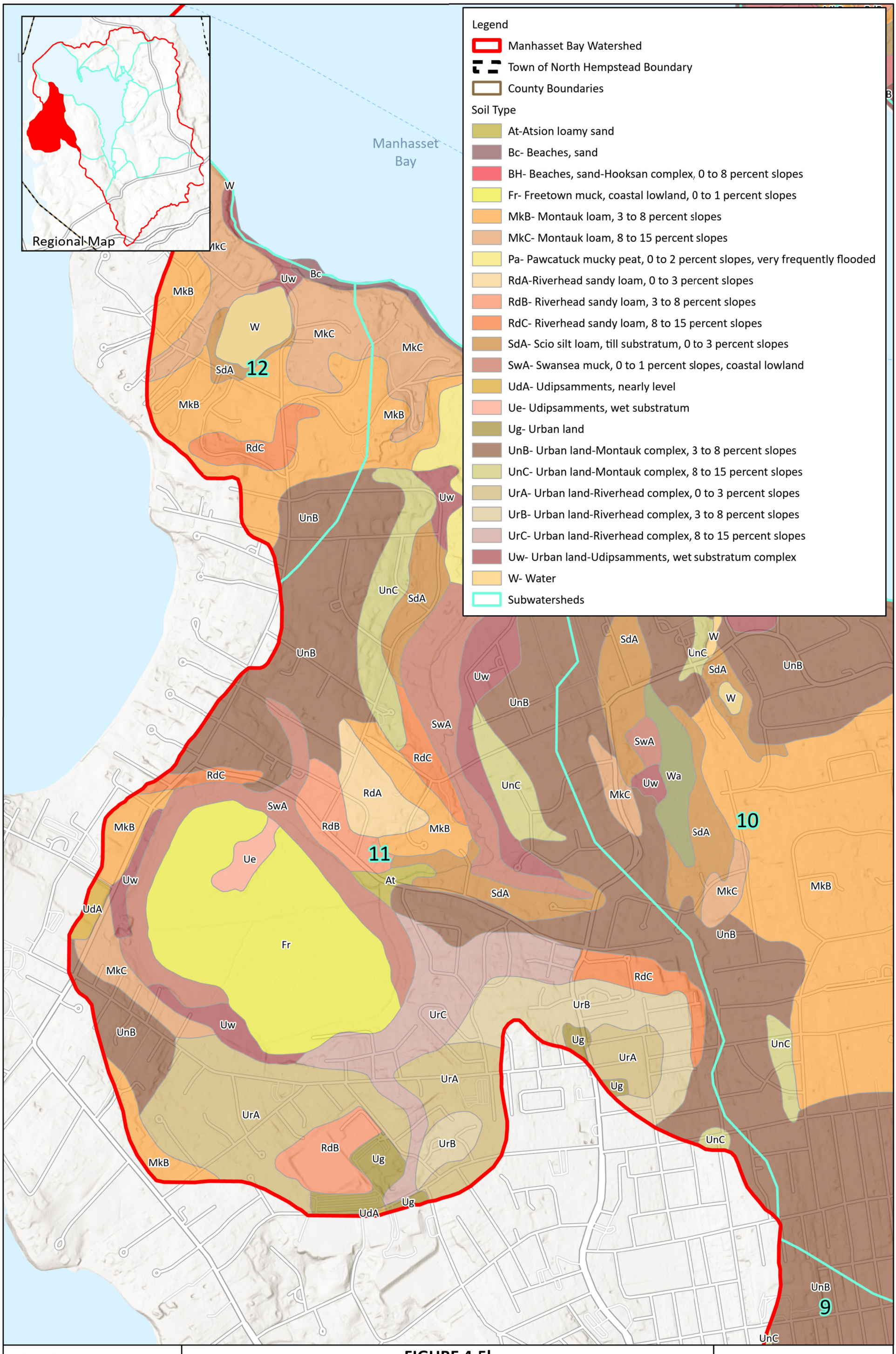
Sources: ESRI Terrain Map, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; SSURGO NRCS, 2013

Scale: 1 inch equals 800 feet

Manhasset Bay Water Quality Improvement Plan

North Hempstead, NY

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FIGURE 4-5l
MITCHELL CREEK SOILS MAP

Sources: ESRI Terrain Map, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; SSURGO NRCS, 2013
Scale: 1 inch equals 1,000 feet

N

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North Hempstead, NY

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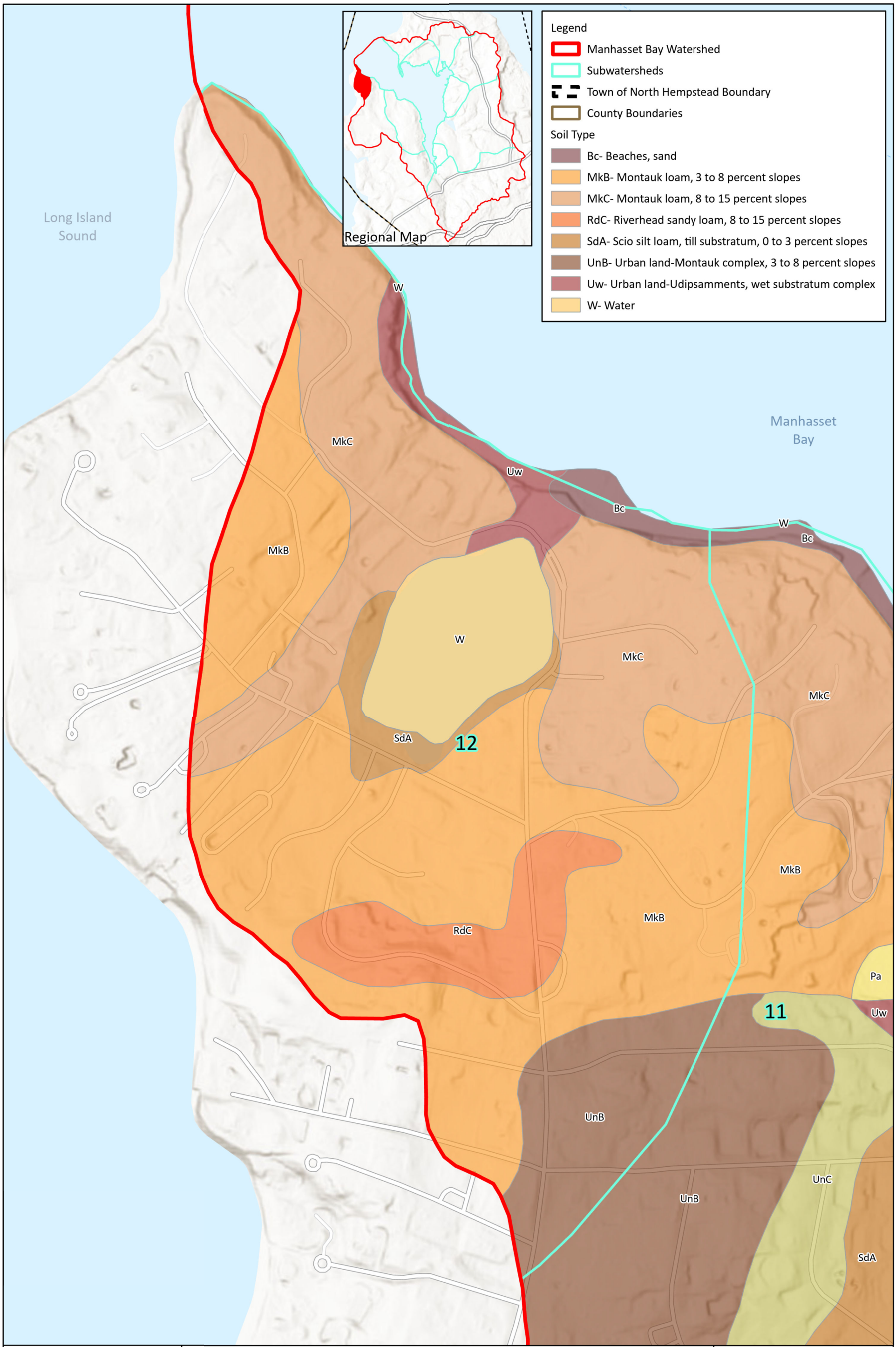


FIGURE 4-5m
KINGS POINT POND SOILS MAP

Sources: ESRI Terrain Map, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; SSURGO NRCS, 2013
Scale: 1 inch equals 400 feet

N

Manhasset Bay Water Quality Improvement Plan

North Hempstead, NY

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ID	Name
1	North East Shore
2	Sheets Creek N
3	Sheets Creek E
4	Mill/Baxter Ponds
5	Stannard's Brook
6	Leeds Pond
7	Plandome Heights
8	Whitney Pond
9	Kensington
10	Kings Point Creek
11	Mitchell Creek
12	Kings Point Pond

Legend

- Manhasset Bay Watershed
- Subwatersheds
- Village Boundaries
- Town of North Hempstead Boundary
- County Boundaries

DEC Tidal Wetland Classifications

- Littoral Zone
- Coastal Shoals, Bars and Mudflats
- Intertidal Marsh
- Formerly Connected

Showing All DEC Tidal Wetland Classifications Only Within Manhasset Bay Watershed

Village of Sands Point
Village of Manorhaven
Village of Port Washington North
Village of Baxter Estates
Manhasset Bay
Village of Kings Point
Kings Point Park
E Shore Road
Village of Plandome Manor
Village of Plandome
Village of Great Neck
Village of Plandome Heights
Village of Flower Hill
Village of Munsey Park
Village of Kensington
NY 25A
Village of North Hills
Village of Great Neck Plaza
Village of Thomaston
Town of North Hempstead
QUEENS COUNTY
NASSAU COUNTY

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FIGURE 4-6
NYSDEC WETLAND MAP

Sources: NYS Orthoimagery, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; NYSDEC, 2023
Scale: 1 inch equals 2,000 feet

N

Manhasset Bay Water Quality Improvement Plan

North Hempstead, NY

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ID	Name
1	North East Shore
2	Sheets Creek N
3	Sheets Creek E
4	Mill/Baxter Ponds
5	Stannard's Brook
6	Leeds Pond
7	Plandome Heights
8	Whitney Pond
9	Kensington
10	Kings Point Creek
11	Mitchell Creek
12	Kings Point Pond
	Total

Legend

- Manhasset Bay Watershed
- Subwatersheds
- Village Boundaries
- Town of North Hempstead Boundary
- County Boundaries

NWI Wetland Classifications

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine

Long Island Sound

Long Island Sound

Middle Neck Road

Village of Sands Point

1

2

3

4

5

6

7

8

9

10

11

12

Village of Manorhaven

Village of Port Washington North

Mill Pond

Baxter Pond

Village of Baxter Estates

Port Washington Blvd

W Shore Road

Manhasset Bay

Village of Kings Point

Kings Point Park

E Shore Road

Village of Plandome Manor

Leeds Pond

North Hempstead Country Club

Village of Plandome

Village of Flower Hill

Village of Great Neck

Village of Plandome Heights

Village of Munsey Park

Village of Roslyn

Village of Saddle Rock

Village of Kensington

NY 25A

Village of Roslyn Estates

Village of Great Neck Estates

Village of Great Neck Plaza

Village of Thomaston

Village of Russell Gardens

Village of North Hills

Long Island Expressway

Long Island Expressway

Village of Lake Success

NY 25A

Northern State Parkway

QUEENS COUNTY

Town of North Hempstead

NASSAU COUNTY

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FIGURE 4-7

NATIONAL WETLANDS INVENTORY MAP

Sources: NYS Orthoimagery, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; USFWF, 2021

Scale: 1 inch equals 3,000 feet

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Manhasset Bay Water Quality Improvement Plan

North Hempstead, NY

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Zone A-Areas subject to inundation by the 1% annual chance flood
Zone AE- Areas subject to inundation by the 1% annual chance flood, with BFEs determined.
Zone AO-Areas of shallow flooding (usually sheet flow) with average depths between 1 and 3 feet.
Zone VE-Coastal areas subject to inundation by the 1% annual chance flood with additional hazards due to storm-induced velocity wave action.

Long Island Sound
Middle Neck Road
Village of Sands Point
Village of Port Washington North
Village of Manorhaven
Village of Baxter Estates
Manhasset Bay
Village of Kings Point
E Shore Road
Kings Point Park
Village of Plandome Manor
Village of Plandome
Village of Great Neck
Village of Plandome Heights
Village of Flower Hill
Village of Munsey Park
Village of Kensington
NY 25A
Village of North Hills
Village of Thomaston
Village of Great Neck Plaza
Village of Great Neck Estates
Village of Russell Gardens
Village of Lake Success
QUEENS COUNTY
Town of North Hempstead
NASSAU COUNTY

Legend
- Manhasset Bay Watershed
- Village Boundaries
- Town of North Hempstead Boundary
- County Boundaries

FEMA Flood Zones
- A
- AE
- AO
- VE

Showing All FEMA Flood Zones Only Within Manhasset Watershed
All Unshaded Land Within Manhasset Bay Watershed Is In Flood Zone X

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FIGURE 4-8
FEMA HAZARD ZONE MAP

Sources: NYS Orthoimagery, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; Federal Emergency Management Agency, 2017
Scale: 1 inch equals 2,000 feet

N

Manhasset Bay Water Quality Improvement Plan

North Hempstead, NY

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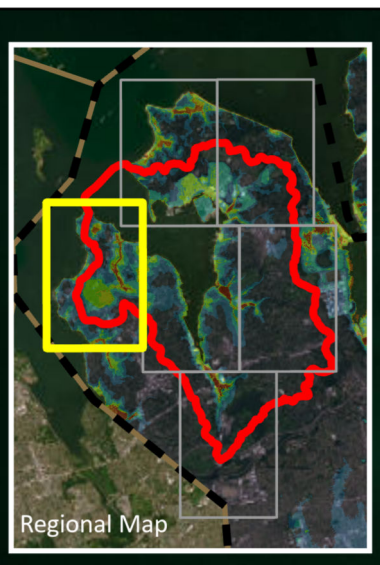
Legend

- Manhasset Bay Watershed
- Subwatersheds
- Town of North Hempstead Boundary
- County Boundaries

Depth to Groundwater (ft)

- ≤ 0
- 0.1 - 3
- 3.1 - 5
- 5.1 - 10
- 10.1 - 25
- 25.1 - 50
- 50 <

ID	Name
1	North East Shore
2	Sheets Creek N
3	Sheets Creek E
4	Mill/Baxter Ponds
5	Stannard's Brook
6	Leeds Pond
7	Plandome Heights
8	Whitney Pond
9	Kensington
10	Kings Point Creek



Manhasset Bay

Island Sound

12

11

10

QUEENS COUNTY

Town of North Hempstead
NASSAU COUNTY

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FIGURE 4-9a
DEPTH TO GROUNDWATER MAP

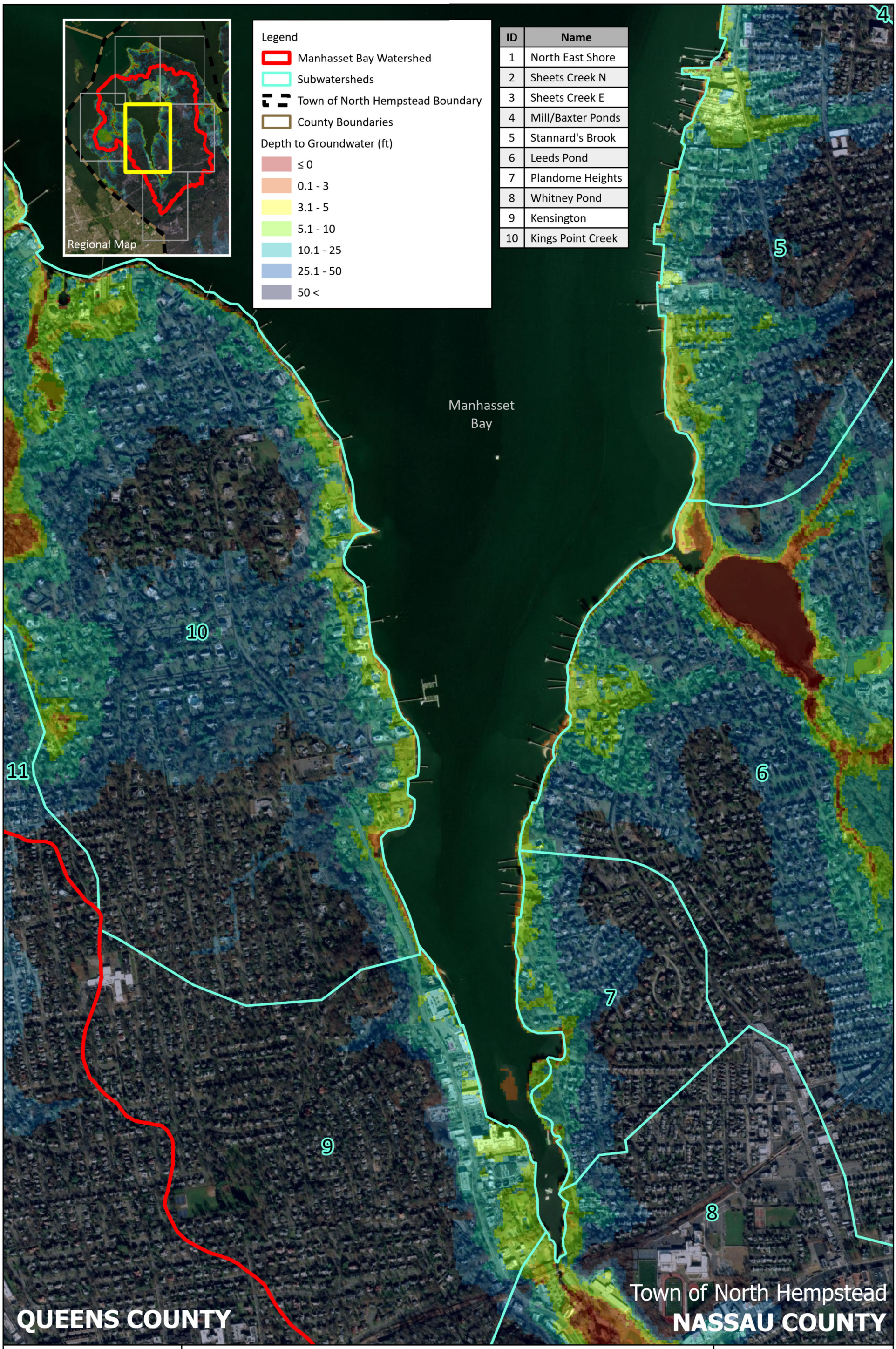
Sources: NYS Orthoimagery, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; USGS Depth to Groundwater Data, 2016
Scale: 1 inch equals 1,000 feet

N

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FIGURE 4-9b
DEPTH TO GROUNDWATER MAP

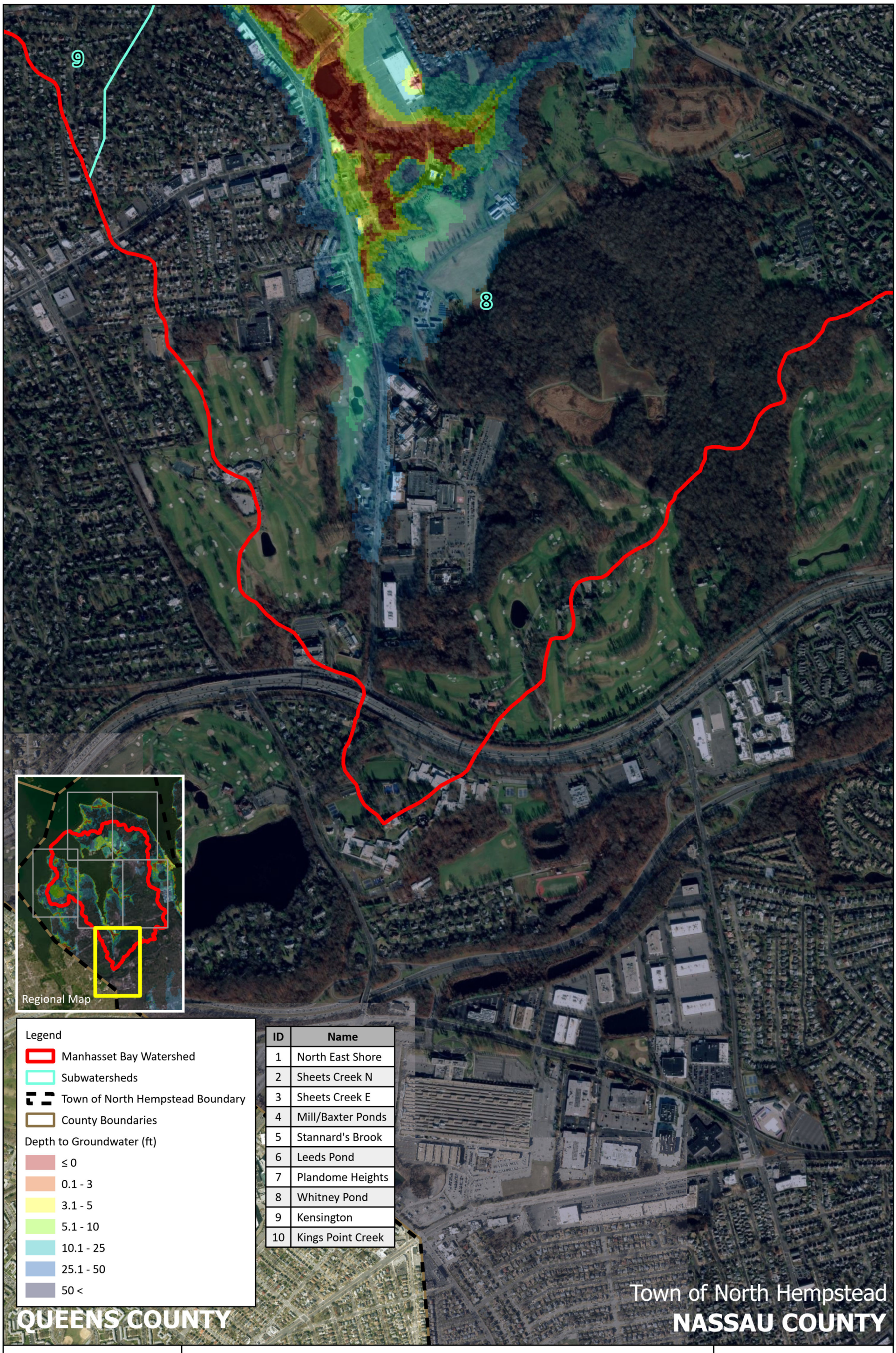
Sources: NYS Orthoimagery, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; USGS Depth to Groundwater Data, 2016
Scale: 1 inch equals 1,000 feet

N

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North Hempstead, NY

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FIGURE 4-9c
DEPTH TO GROUNDWATER MAP

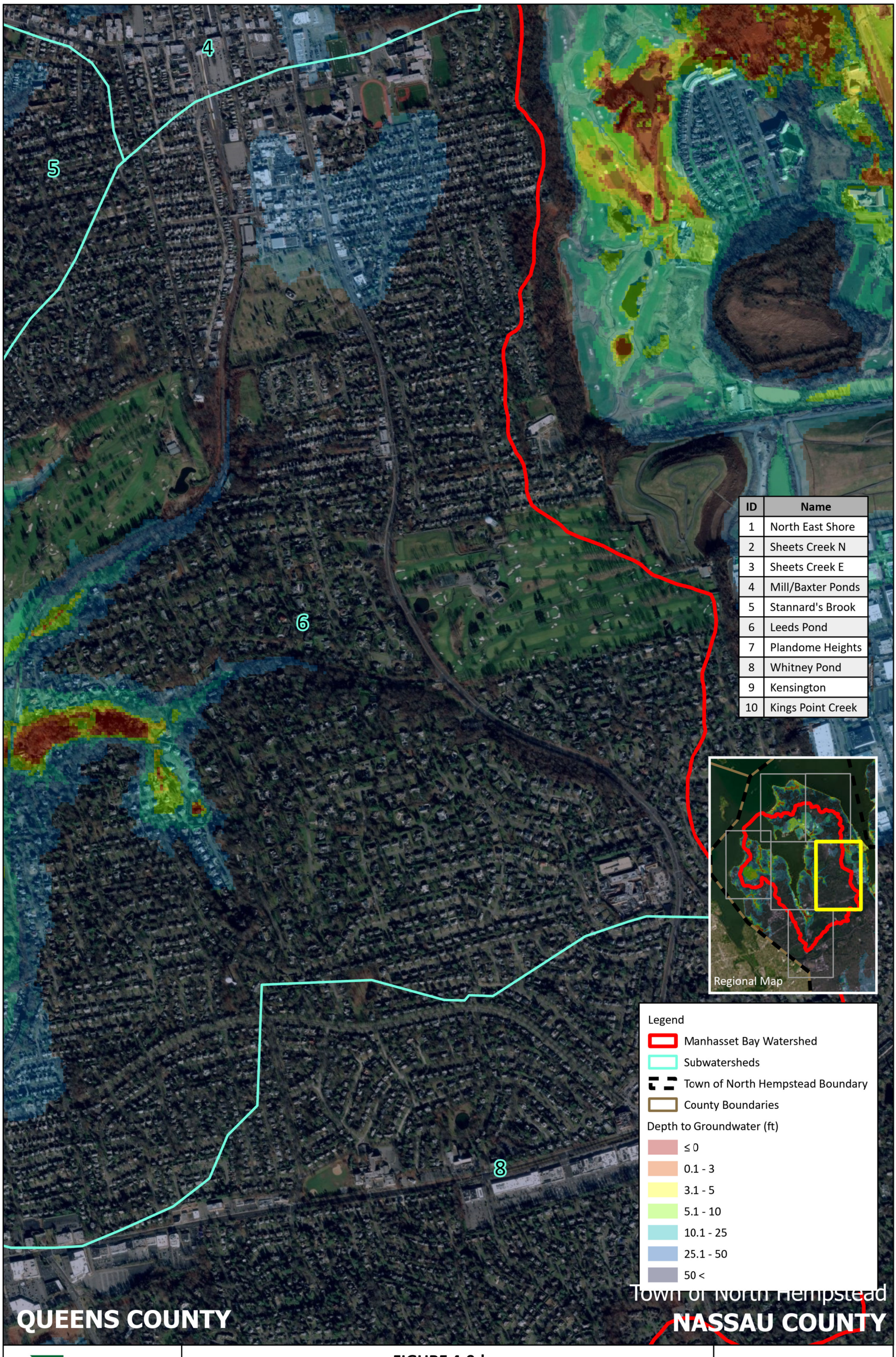
Sources: NYS Orthoimagery, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; USGS Depth to Groundwater Data, 2016
Scale: 1 inch equals 1,000 feet

N

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FIGURE 4-9d
DEPTH TO GROUNDWATER MAP

Sources: NYS Orthoimagery, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022;
USGS Depth to Groundwater Data, 2016
Scale: 1 inch equals 1,000 feet

N

Manhasset Bay
Water Quality Improvement Plan

North Hempstead, NY

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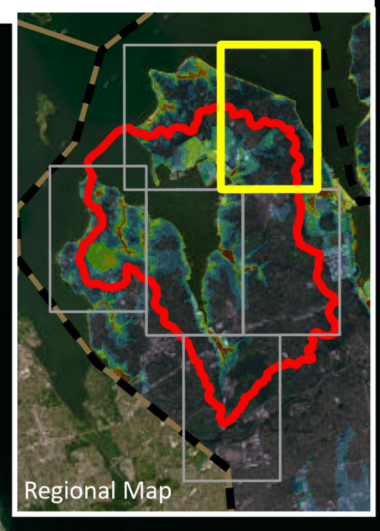
ID	Name
1	North East Shore
2	Sheets Creek N
3	Sheets Creek E
4	Mill/Baxter Ponds
5	Stannard's Brook
6	Leeds Pond
7	Plandome Heights
8	Whitney Pond
9	Kensington
10	Kings Point Creek

Legend

- Manhasset Bay Watershed
- Subwatersheds
- Town of North Hempstead Boundary
- County Boundaries

Depth to Groundwater (ft)

- ≤ 0
- 0.1 - 3
- 3.1 - 5
- 5.1 - 10
- 10.1 - 25
- 25.1 - 50
- 50 <



Long Island Sound

Hempstead Harbor

3

4

5

6

QUEENS COUNTY

Town of North Hempstead

NASSAU COUNTY

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FIGURE 4-9e

DEPTH TO GROUNDWATER MAP

Sources: NYS Orthoimagery, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; USGS Depth to Groundwater Data, 2016

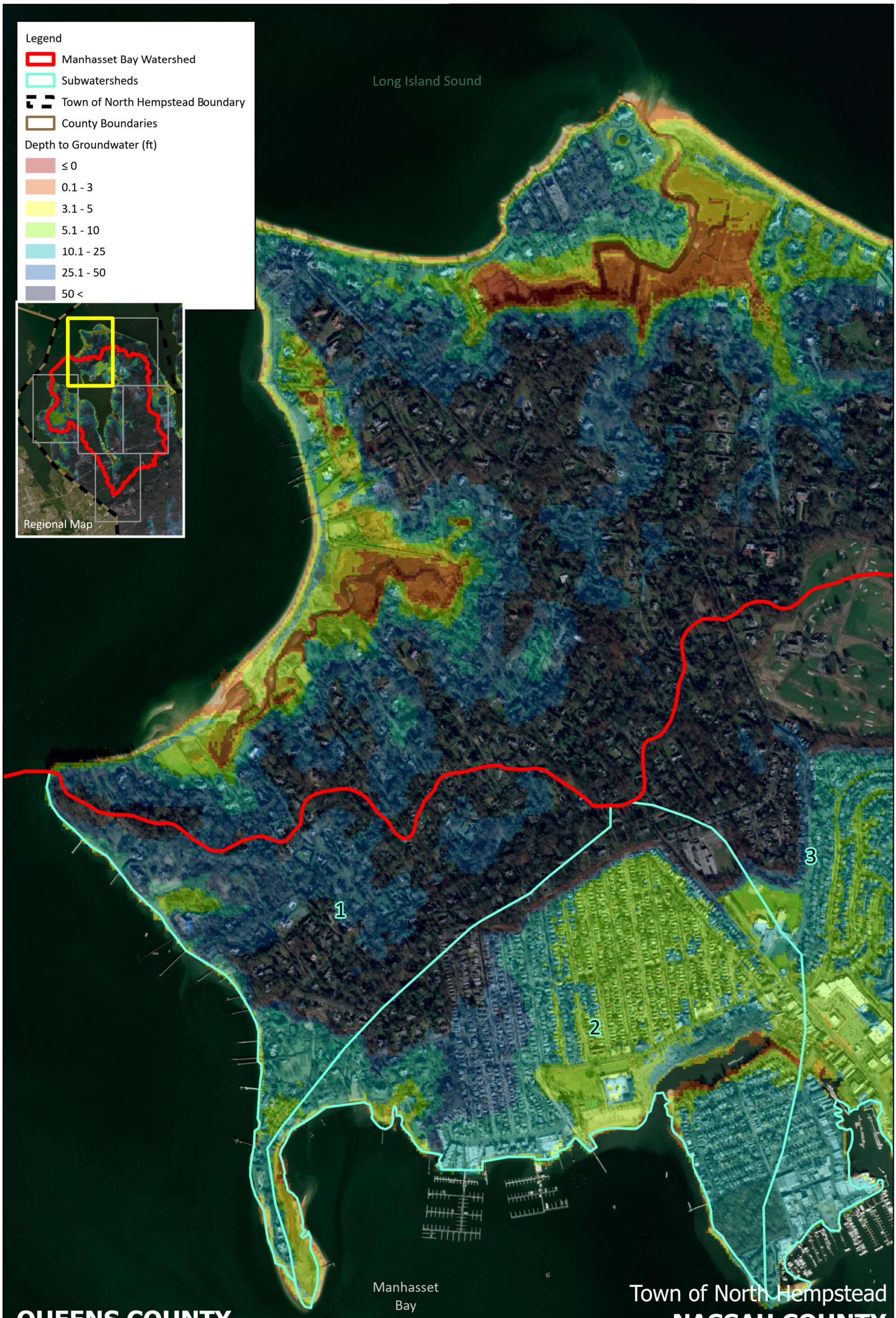
Scale: 1 inch equals 1,000 feet

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FIGURE 4-9f
DEPTH TO GROUNDWATER MAP

Sources: NYS Orthoimagery, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022;
USGS Depth to Groundwater Data, 2016
Scale: 1 inch equals 1,000 feet

N

Manhasset Bay
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North Hempstead, NY

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FIGURE 4-10
NYSDOT ROAD JURISDICTION MAP

Sources: NYS Orthoimagery, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; NYS Department of Transportation, 2023
Scale: 1 inch equals 3,000 feet

N

Manhasset Bay Water Quality Improvement Plan

North Hempstead, NY

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ID	NAME
1	North East Shore
2	Sheets Creek N
3	Sheets Creek E
4	Mill/Baxter Ponds
5	Stannard's Brook
6	Leeds Pond
7	Plandome Heights
8	Whitney Pond
9	Kensington
10	Kings Point Creek

Legend
- Manhasset Bay Watershed
- Subwatersheds
- Town of North Hempstead Boundary
- County Boundaries
- Drainage Areas
- DPW Basins
- Recharge Basins

Long Island Sound
Middle Neck Road
Long Island Sound
Manhasset Bay
Kings Point Park
Shore Road
Port Washington Blvd
W Shore Road
North Hempstead Country Club
NY 25A
Long Island Expressway
Long Island Expressway
NY 25A
Northern State Parkway
QUEENS COUNTY
Town of North Hempstead
NASSAU COUNTY

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FIGURE 4-11a
STORMWATER INFRASTRUCTURE: DRAINAGE BASINS MAP

Sources: NYS Orthoimagery, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; Manhasset Bay Protection Committee, 2023
Scale: 1 inch equals 3,000 feet

N

Manhasset Bay Water Quality Improvement Plan

North Hempstead, NY

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ID	NAME
1	North East Shore
2	Sheets Creek N
3	Sheets Creek E
4	Mill/Baxter Ponds
5	Stannard's Brook
6	Leeds Pond
7	Plandome Heights
8	Whitney Pond
9	Kensington
10	Kings Point Creek

Legend
- Manhasset Bay Watershed
- Subwatersheds
- Town of North Hempstead Boundary
- County Boundaries
- Stream Corridors
- Natural Drainage
- Drainage Pipes
- Pipes - Hempstead Harbor
- Drainage Outfalls
- Culverts

Long Island Sound
Long Island Sound
Middle Neck Road
Manhasset Bay
Port Washington Blvd
W Shore Road
F Shore Road
Kings Point Park
North Hempstead Country Club
NY 25A
Long Island Expressway
Long Island Expressway
NY 25A
Northern State Parkway
QUEENS COUNTY
Town of North Hempstead
NASSAU COUNTY

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FIGURE 4-11b
STORMWATER INFRASTRUCTURE: DRAINAGE PIPES AND STREAM CORRIDORS MAP

Sources: NYS Orthoimagery, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; Manhasset Bay Protection Committee, 2023
Scale: 1 inch equals 3,000 feet

N

Manhasset Bay Water Quality Improvement Plan

North Hempstead, NY

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ID	NAME
1	North East Shore
2	Sheets Creek N
3	Sheets Creek E
4	Mill/Baxter Ponds
5	Stannard's Brook
6	Leeds Pond
7	Plandome Heights
8	Whitney Pond
9	Kensington
10	Kings Point Creek

Legend
- Manhasset Bay Watershed
- Subwatersheds
- Town of North Hempstead Boundary
- County Boundaries
- Drainage Improvements
- Drainage Outfalls
- Drainage Structures

Long Island Sound
Long Island Sound
Middle Neck Road
Manhasset Bay
Port Washington Blvd
W Shore Road
Shore Road
Kings Point Park
North Hempstead Country Club
NY 25A
Long Island Expressway
Long Island Expressway
NY 25A
Northern State Parkway
1
2
3
4
5
6
7
8
9
10
11
12
QUEENS COUNTY
Town of North Hempstead
NASSAU COUNTY

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FIGURE 4-11c
STORMWATER INFRASTRUCTURE: DRAINAGE STRUCTURES/IMPROVEMENTS MAP

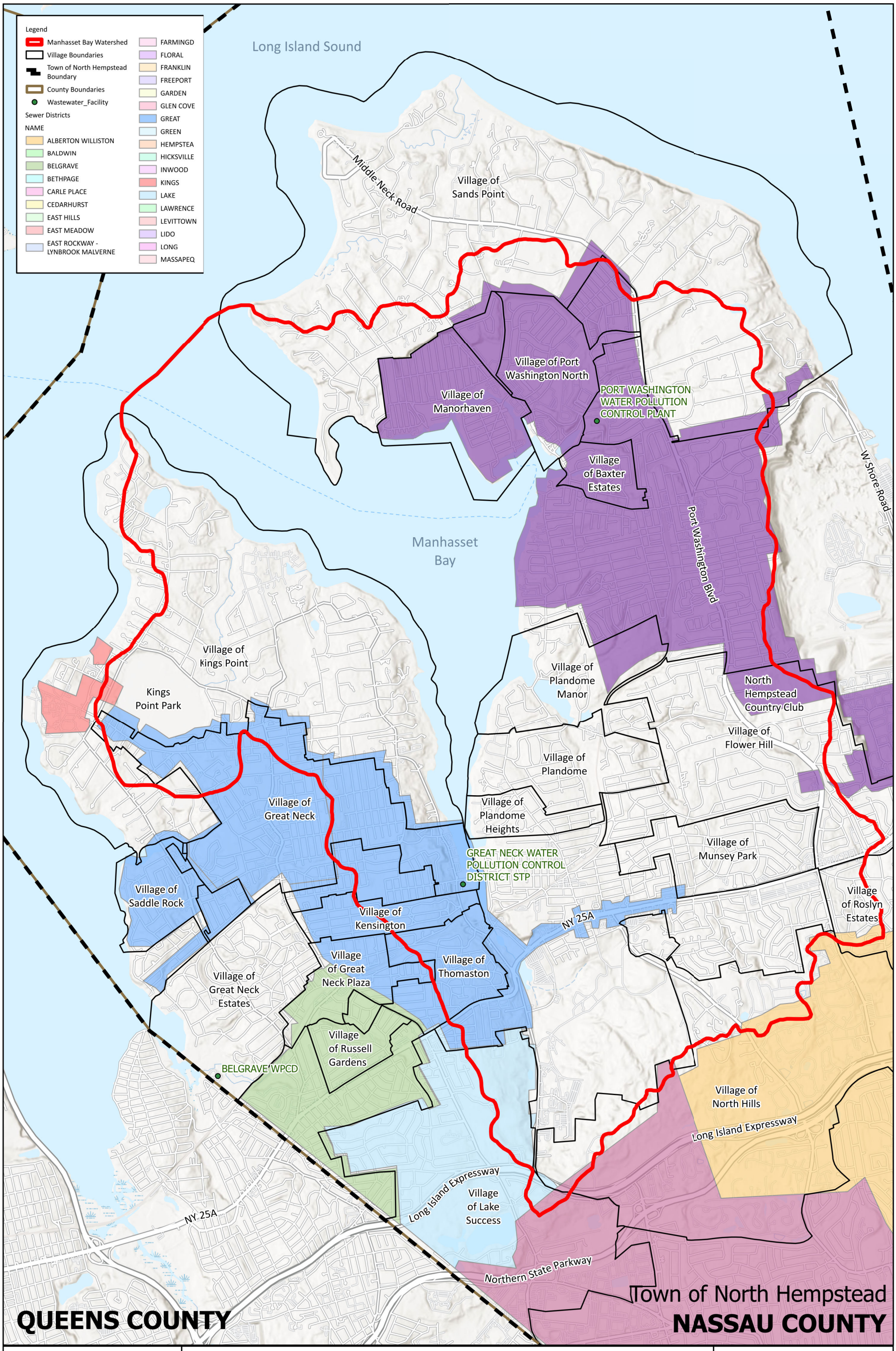
Sources: NYS Orthoimagery, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; Manhasset Bay Protection Committee, 2023
Scale: 1 inch equals 3,000 feet

N

Manhasset Bay Water Quality Improvement Plan

North Hempstead, NY

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FIGURE 4-12
WASTEWATER INFRASTRUCTURE MAP

Sources: ESRI Terrain Map, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; Nassau County, 2013

Scale: 1 inch equals 3,000 feet

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Manhasset Bay Water Quality Improvement Plan

North Hempstead, NY

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Legend
Manhasset Bay Watershed
Town of North Hempstead Boundary
County Boundaries
Water Districts
Public Wells

Long Island Sound
Long Island Sound
Manhasset Bay
Middle Neck Road
Village of Sands Point Water District
Village of Sands Point Water District
Port Washington Water District
Port Washington Blvd
W Shore Road
Water Authority of Great Neck North
E Shore Road
Kings Point Park
Manhasset-Lakeville Water District
North Hempstead Country Club
Village of Plandome Water District
Roslyn Water District
NY 25A
Manhasset-Lakeville Water District
Long Island Expressway
Long Island Expressway
NY 25A
Northern State Parkway
Town of North Hempstead
QUEENS COUNTY
NASSAU COUNTY

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FIGURE 4-13
PUBLIC WATER SUPPLY MAP

Sources: ESRI Terrain Map, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; Nassau County, 2013; USGS, 2024
Scale: 1 inch equals 3,000 feet

N

Manhasset Bay Water Quality Improvement Plan

North Hempstead, NY

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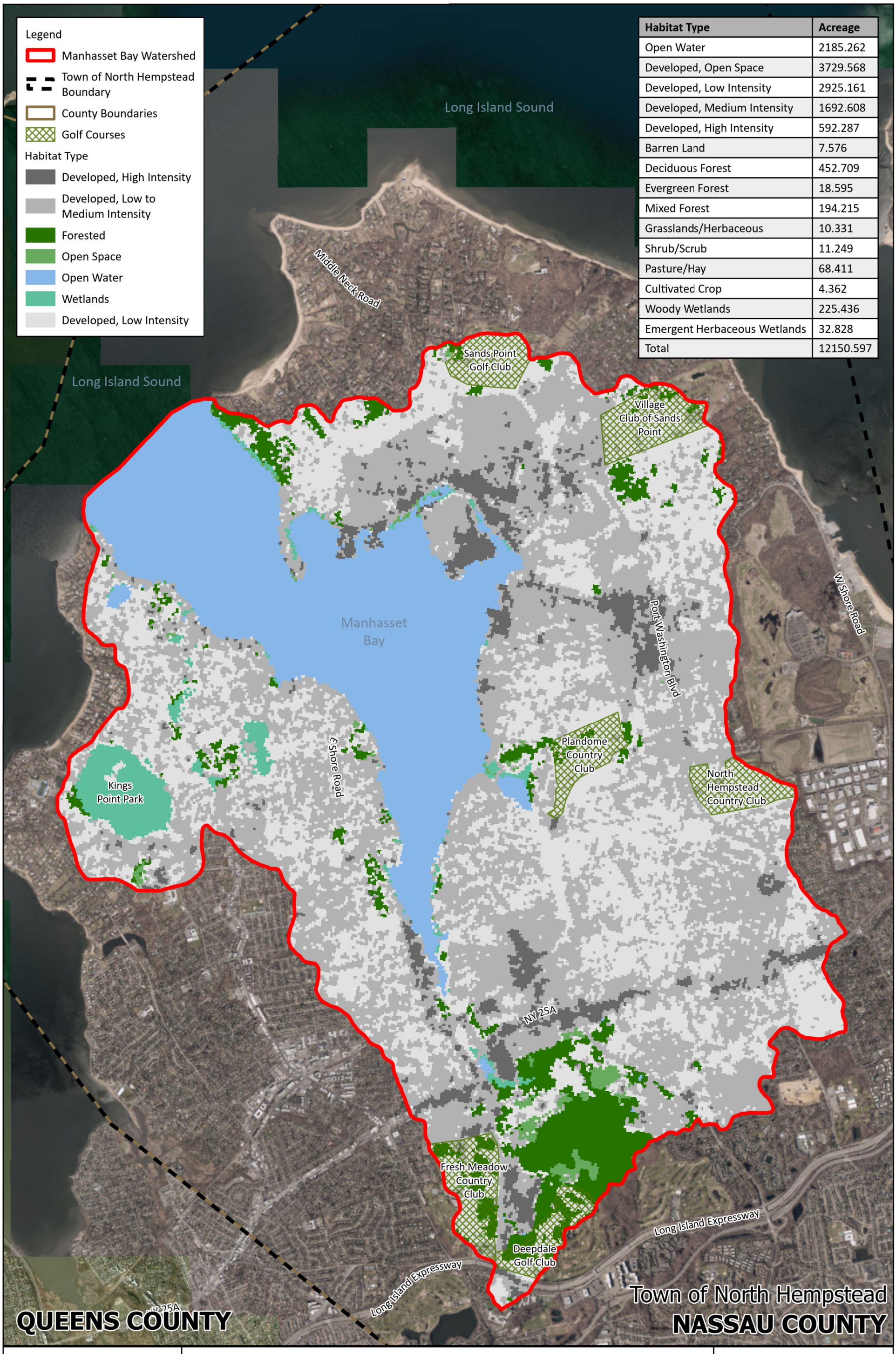
Legend

- Manhasset Bay Watershed
- Town of North Hempstead Boundary
- County Boundaries
- Golf Courses

Habitat Type

- Developed, High Intensity
- Developed, Low to Medium Intensity
- Forested
- Open Space
- Open Water
- Wetlands
- Developed, Low Intensity

Habitat Type	Acreage
Open Water	2185.262
Developed, Open Space	3729.568
Developed, Low Intensity	2925.161
Developed, Medium Intensity	1692.608
Developed, High Intensity	592.287
Barren Land	7.576
Deciduous Forest	452.709
Evergreen Forest	18.595
Mixed Forest	194.215
Grasslands/Herbaceous	10.331
Shrub/Scrub	11.249
Pasture/Hay	68.411
Cultivated Crop	4.362
Woody Wetlands	225.436
Emergent Herbaceous Wetlands	32.828
Total	12150.597



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FIGURE 5-1
HABITAT MAP

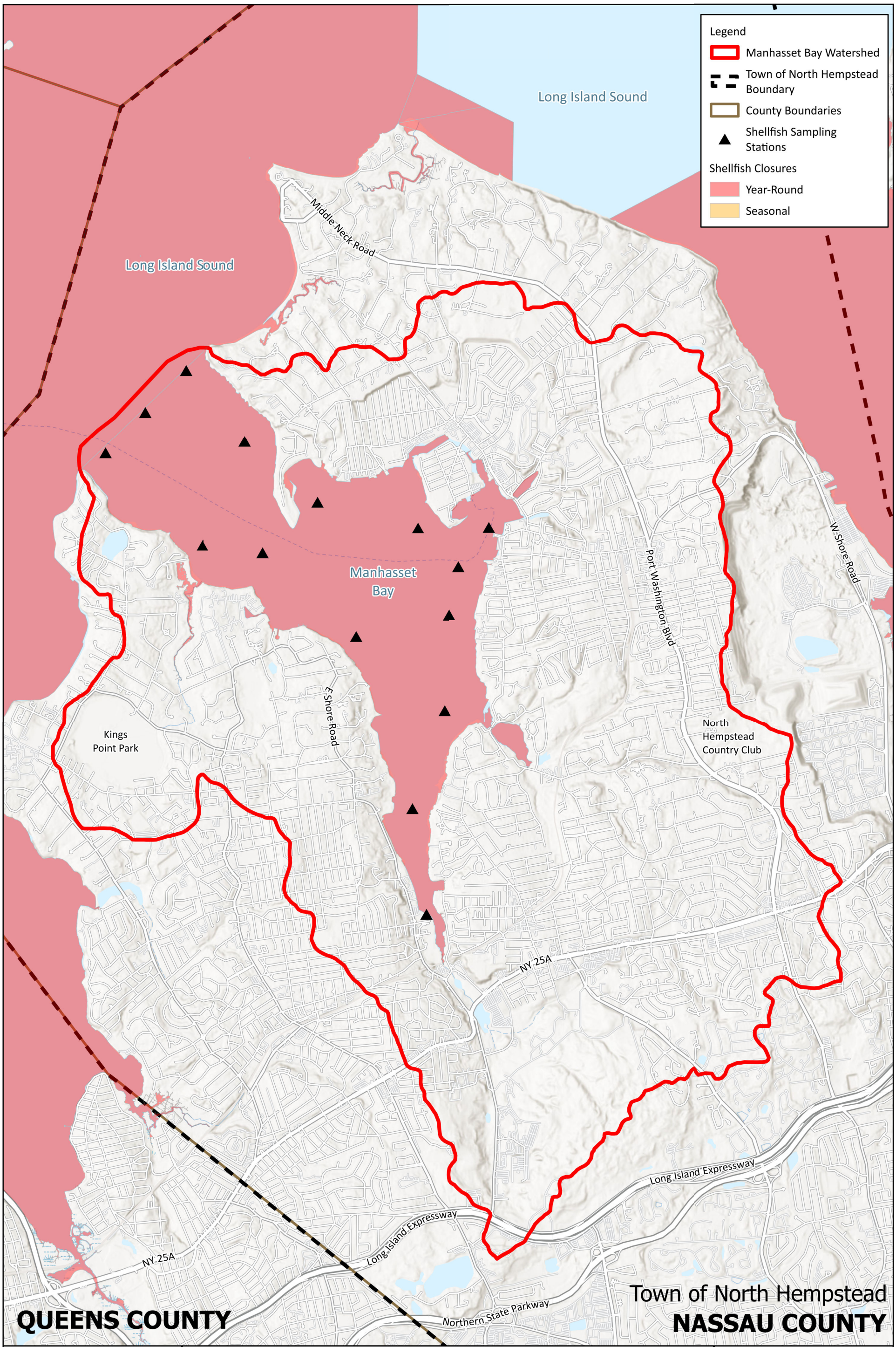
Sources: ESRI Terrain Map, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; NLCD, 2021
Scale: 1 inch equals 3,000 feet

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Manhasset Bay
Water Quality Improvement Plan

North Hempstead, NY

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FIGURE 5-2
SHELLFISH CLOSURES MAP

Sources: ESRI Terrain Map, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; NYS DEC Bureau of Marine Resources, 2024
Scale: 1 inch equals 3,000 feet

N

Manhasset Bay Water Quality Improvement Plan

North Hempstead, NY

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ID	Subwatershed Name	Acreage
1	North East Shore	239.3
2	Sheets Creek N	357.9
3	Sheets Creek E	543.4
4	Mill/Baxter Ponds	1052.9
5	Stannard's Brook	374.3
6	Leeds Pond	2169.3
7	Plandome Heights	134.5
8	Whitney Pond	2388.6
9	Kensington	389.7
10	Kings Point Creek	826.7
11	Mitchell Creek	946.6
12	Kings Point Pond	168.5
	Total	9591.7

Legend
- Manhasset Bay Watershed
- Town of North Hempstead Boundary
- County Boundaries
- Subwatersheds

Water Quality Classifications
- SA
- SB
- SC

Long Island Sound
Middle Neck Road
SA
SB
SC
ID: 1702-0021
ID: 1702-0141
ID: 1702-0142
1
2
3
4
5
6
7
8
9
10
11
12
Manhasset Bay
Kings Point Park
Port Washington Blvd
W Shore Road
E Shore Road
North Hempstead Country Club
NY 25A
Long Island Expressway
Northern State Parkway
QUEENS COUNTY
Town of North Hempstead
NASSAU COUNTY

WATER QUALITY CLASSIFICATIONS DEFINITIONS:
SA- Shellfishing for market purposes, primary and secondary contact recreation and fishing. These waters shall be suitable for fish, shellfish and wildlife propagation and survival.
SB- Primary and secondary contact recreation and fishing. These waters shall be suitable for fish, shellfish and wildlife propagation and survival.
SC-Fishing. These waters shall be suitable for fish, shellfish and wildlife propagation and survival. The water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes.

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FIGURE 5-3
WATER QUALITY CLASSIFICATIONS MAP

Sources: NYS Orthoimagery, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; NYS DEC, 2024
Scale: 1 inch equals 3,000 feet

N

Manhasset Bay Water Quality Improvement Plan

North Hempstead, NY

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ID	Subwatershed Name
1	North East Shore
2	Sheets Creek N
3	Sheets Creek E
4	Mill/Baxter Ponds
5	Stannard's Brook
6	Leeds Pond
7	Plandome Heights
8	Whitney Pond
9	Kensington
10	Kings Point Creek
11	Mitchell Creek
12	Kings Point Pond

Legend
- Manhasset Bay Watershed
- Subwatersheds
- Town of North Hempstead Boundary
- County Boundaries
- Remediation Sites

Long Island Sound
Middle Neck Road
Long Island Sound
1
2
3
4
5
6
7
8
9
10
11
12
Chez Valet Dry Cleaners
Former Thypin Steel Plant
Former Munsey Cleaners
Plaza Cleaners
Port Washington N12 (LIRR)
W Shore Road
Port Washington Blvd
Manhasset Bay
E Shore Road
Kings Point Park
Alert Fire Company Site
North Hempstead Country Club
The Moorings at Kings Point
Manhasset N10 (LIRR)
NY 25A
Mt. Olive Former LILCO/Hortonsphere site
100-150 Community Drive Site
Long Island Expressway
Long Island Expressway
NY 25A
Northern State Parkway
QUEENS COUNTY
Town of North Hempstead
NASSAU COUNTY

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FIGURE 5-4a
POTENTIAL POINT SOURCES MAP: REMEDIATION SITES

Sources: NYS Orthoimagery, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; NYS DEC, 2024
Scale: 1 inch equals 3,000 feet

N

Manhasset Bay Water Quality Improvement Plan

North Hempstead, NY

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ID	NAME
1	North East Shore
2	Sheets Creek N
3	Sheets Creek E
4	Mill/Baxter Ponds
5	Stannard's Brook
6	Leeds Pond
7	Plandome Heights
8	Whitney Pond
9	Kensington
10	Kings Point Creek
11	Mitchell Creek
12	Kings Point Pond

Legend
- Manhasset Bay Watershed
- Subwatersheds
- Town of North Hempstead Boundary
- County Boundaries
- Chemical Bulk Storage Facility
- Petroleum Bulk Storage Facility

Long Island Sound
Long Island Sound
Middle Neck Road
Manhasset Bay
Kings Point Park
North Hempstead Country Club
Port Washington Blvd
W Shore Road
F Shore Road
NY 25A
Long Island Expressway
Long Island Expressway
Northern State Parkway
NY 25A
QUEENS COUNTY
Town of North Hempstead
NASSAU COUNTY

FIGURE 5-4b
POTENTIAL POINT SOURCES MAP: CHEMICAL AND PETROLEUM BULK STORAGE FACILITIES

Sources: NYS Orthoimagery, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; NYS DEC, 2024
Scale: 1 inch equals 3,000 feet

Manhasset Bay Water Quality Improvement Plan

North Hempstead, NY

This document was prepared with funding provided by the New York State Department of State under title 11 of the Environmental Protection Fund

ID	Subwatershed Name
1	North East Shore
2	Sheets Creek N
3	Sheets Creek E
4	Mill/Baxter Ponds
5	Stannard's Brook
6	Leeds Pond
7	Plandome Heights
8	Whitney Pond
9	Kensington
10	Kings Point Creek
11	Mitchell Creek
12	Kings Point Pond

Legend
- Manhasset Bay Watershed
- Subwatersheds
- Town of North Hempstead Boundary
- County Boundaries
- MSGP (Multi-Sector General Permits) Sites
- SPDES (State Pollutant Discharge Elimination System) Sites

Long Island Sound
Long Island Sound
Middle Neck Road
Manhasset Bay
Kings Point Park
W Shore Road
Port Washington Blvd
North Hempstead Country Club
W Shore Road
NY 25A
Long Island Expressway
Long Island Expressway
NY 25A
Northern State Parkway
QUEENS COUNTY
Town of North Hempstead
NASSAU COUNTY

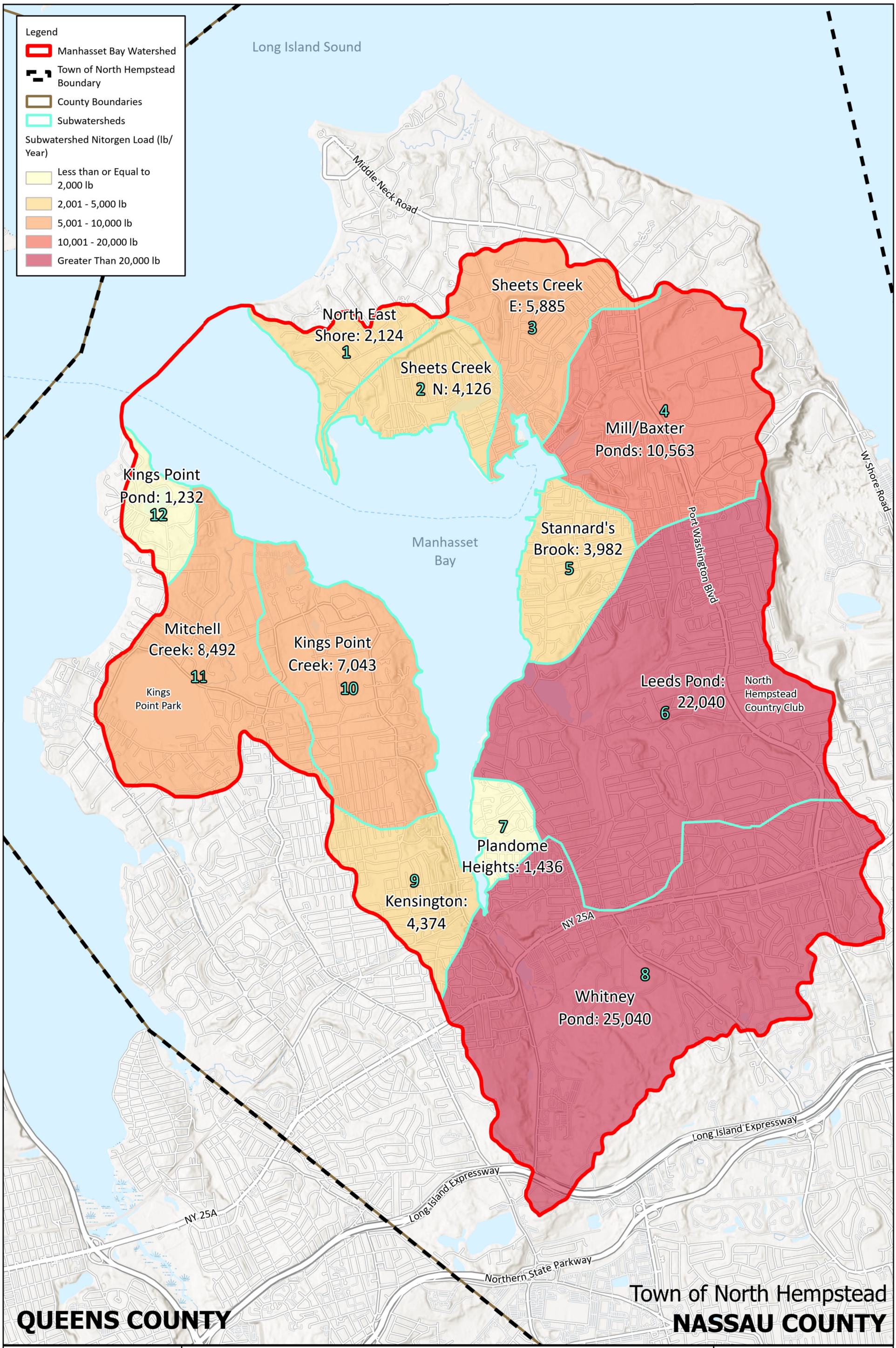
FIGURE 5-4c
POTENTIAL POINT SOURCES MAP: STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM (SPDES), SOLID WASTE, & MULTI-SECTOR GENERAL PERMITS (MSGP) SITES

Sources: NYS Orthoimagery, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; NYS DEC, 2024
Scale: 1 inch equals 3,000 feet

Manhasset Bay Water Quality Improvement Plan

North Hempstead, NY

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FIGURE 6-1a
POLLUTION LOAD BY SUBWATERSHED

Sources: ESRI Terrain Map, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; Nassau County, 2013; Town of North Hempstead; CWP WTM; Suffolk County Real Property
Scale: 1 inch equals 3,000 feet

N

Manhasset Bay Water Quality Improvement Plan

North Hempstead, NY

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Legend

- Manhasset Bay Watershed
- Town of North Hempstead Boundary
- County Boundaries
- Subwatersheds

Subwatershed Nitrogen Load (lb/Year) by Acre

- Less than 8.0
- 8.0 - 8.9
- 9.0 - 10.9
- 11.0 and Greater

Nitrogen Load (lb/Year) Normalized by Area of Each Subwatershed

Long Island Sound

Middle Neck Road

North East Shore: 8.56
1

Sheets Creek
2 N: 11.22

Sheets Creek E: 10.63
3

4
Mill/Baxter Ponds: 10.01

W Shore Road

Kings Point Pond: 7.29
12

Manhasset Bay

Stannard's Brook: 10.58
5

Port Washington Blvd

Mitchell Creek: 8.92
11

Kings Point Park

Kings Point Creek:8.52
10

Leeds Pond: 10.15 6

North Hempstead Country Club

7
Plandome Heights: 10.38

9
Kensington: 11.24

NY 25A

8
Whitney Pond: 10.47

Long Island Expressway

Long Island Expressway

NY 25A

Northern State Parkway

Town of North Hempstead
NASSAU COUNTY

QUEENS COUNTY

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FIGURE 6-1b
POLLUTION LOAD CONCENTRATION BY SUBWATERSHED

Sources: ESRI Terrain Map, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; Nassau County, 2013; Town of North Hempstead; CWP WTM; Suffolk County Real Property
Scale: 1 inch equals 3,000 feet

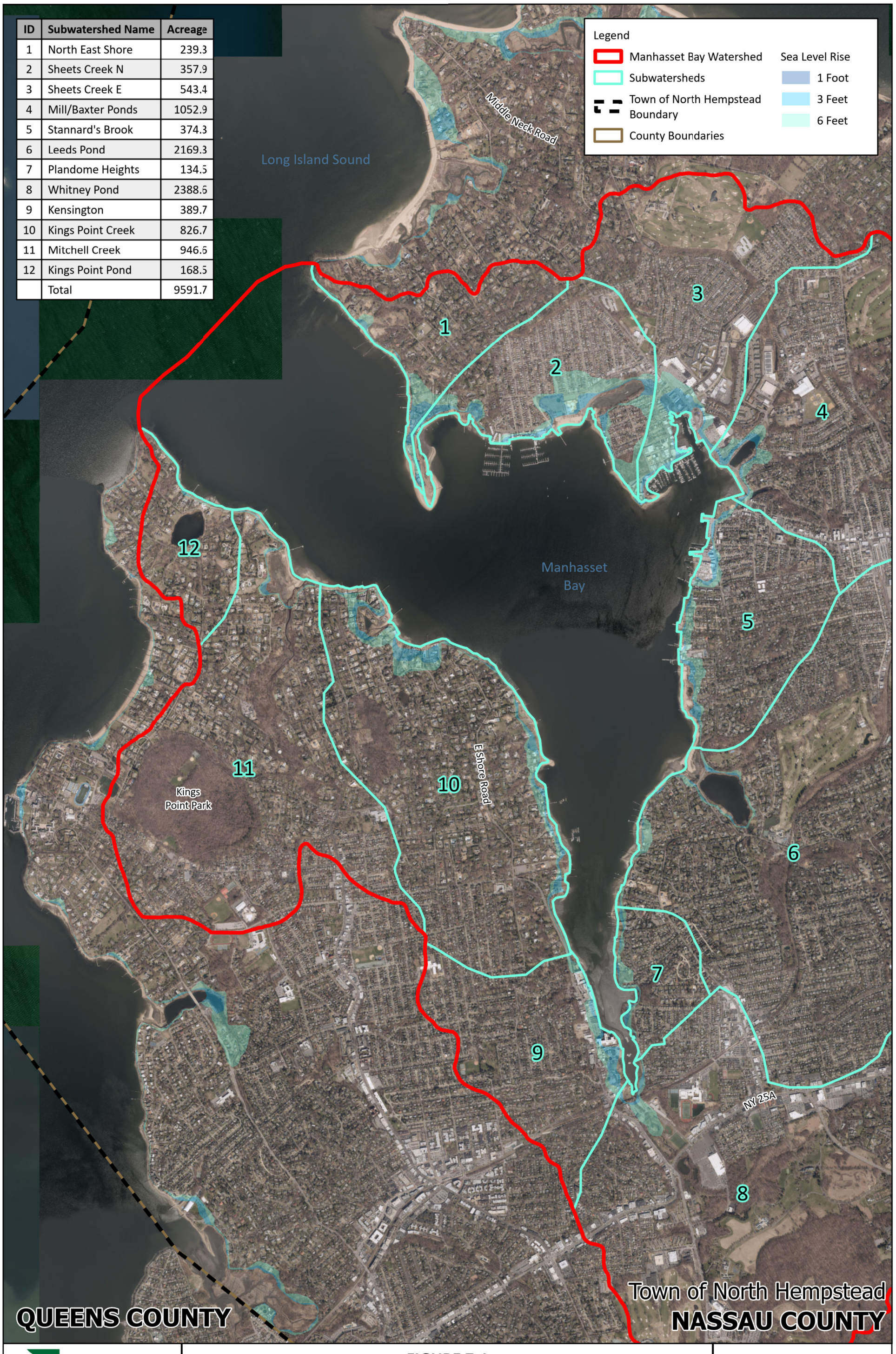
N

Manhasset Bay Water Quality Improvement Plan

North Hempstead, NY

This document was prepared with funding provided by the New York State Department of State under title 11 of the Environmental Protection Fund

ID	Subwatershed Name	Acreage
1	North East Shore	239.3
2	Sheets Creek N	357.9
3	Sheets Creek E	543.4
4	Mill/Baxter Ponds	1052.9
5	Stannard's Brook	374.3
6	Leeds Pond	2169.3
7	Plandome Heights	134.5
8	Whitney Pond	2388.5
9	Kensington	389.7
10	Kings Point Creek	826.7
11	Mitchell Creek	946.5
12	Kings Point Pond	168.5
	Total	9591.7



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FIGURE 7-1
SEA LEVEL RISE MAP

Sources: ESRI Terrain Map, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; NYSERDA, 2024
Scale: 1 inch equals 2,200 feet

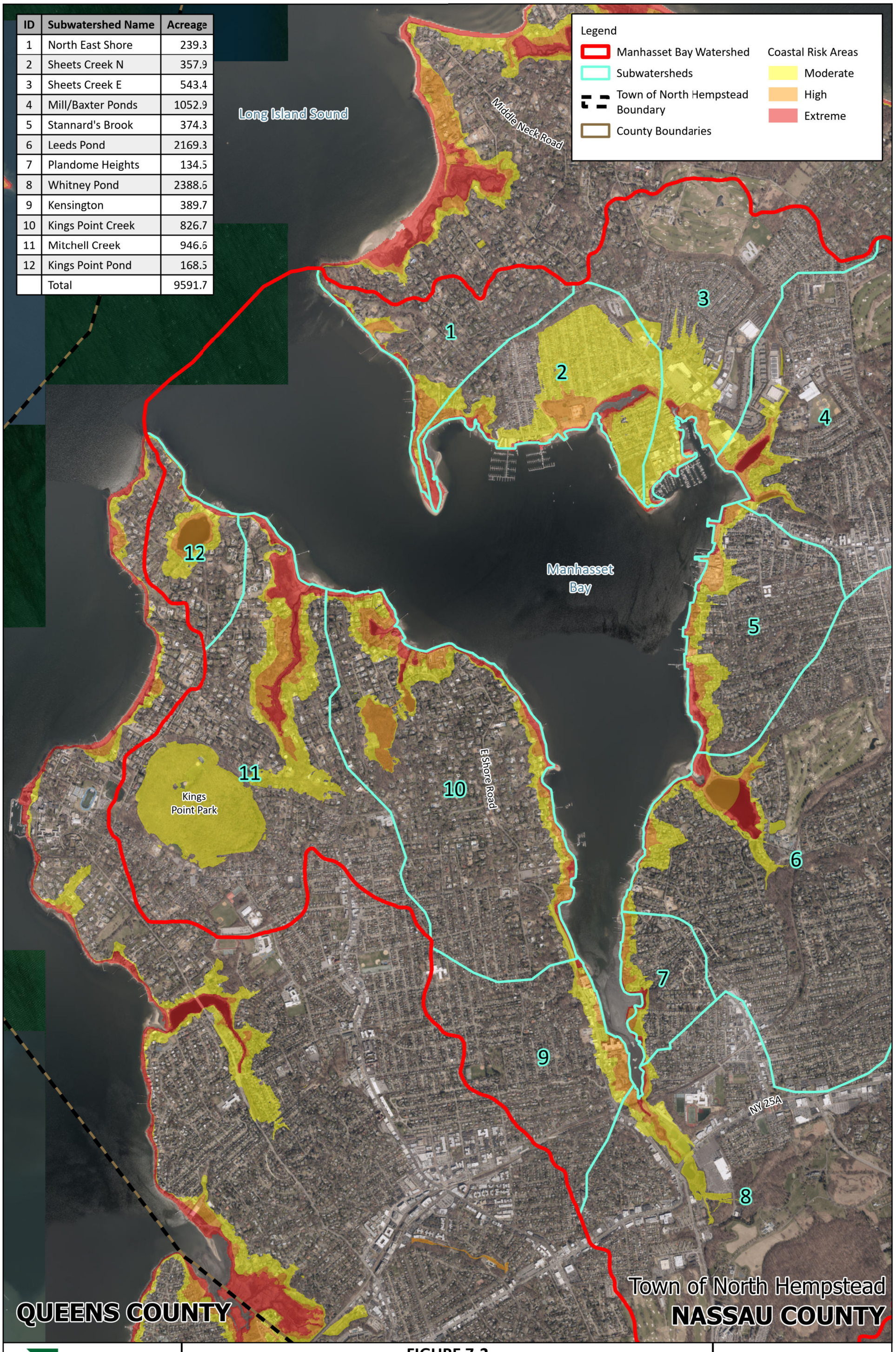
N

Manhasset Bay Water Quality Improvement Plan

North Hempstead, NY

This document was prepared with funding provided by the New York State Department of State under title 11 of the Environmental Protection Fund

ID	Subwatershed Name	Acreage
1	North East Shore	239.3
2	Sheets Creek N	357.9
3	Sheets Creek E	543.4
4	Mill/Baxter Ponds	1052.9
5	Stannard's Brook	374.3
6	Leeds Pond	2169.3
7	Plandome Heights	134.5
8	Whitney Pond	2388.5
9	Kensington	389.7
10	Kings Point Creek	826.7
11	Mitchell Creek	946.5
12	Kings Point Pond	168.5
	Total	9591.7



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FIGURE 7-2
COASTAL RISK AREAS MAP

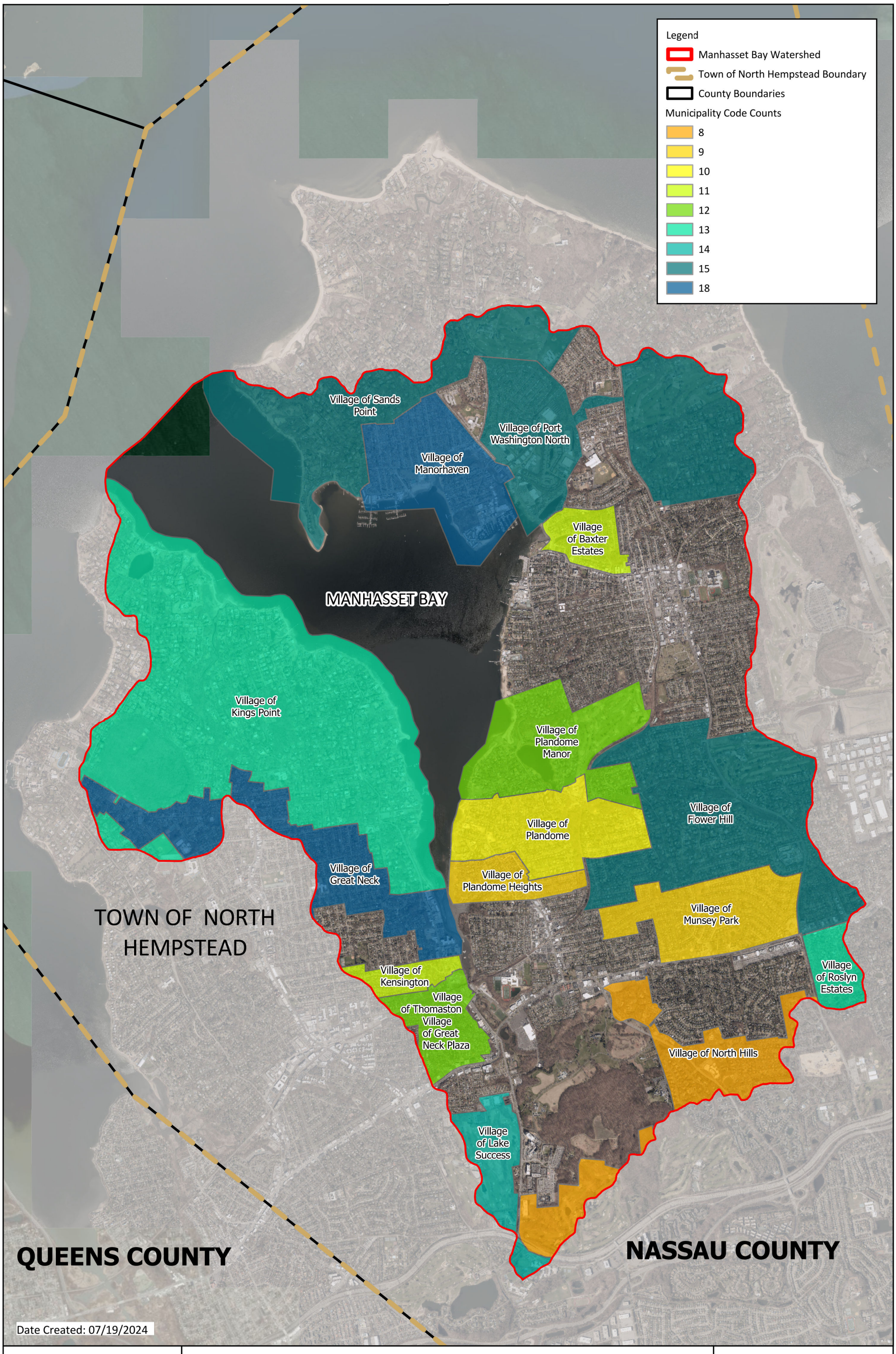
Sources: ESRI Terrain Map, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; NYSDOS, 2024
Scale: 1 inch equals 2,200 feet

N

Manhasset Bay
Water Quality Improvement Plan

North Hempstead, NY

This document was prepared with funding provided by the New York State Department of State under title 11 of the Environmental Protection Fund



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FIGURE 8-1
VILLAGE WATER QUALITY PROTECTIVE REGULATION COUNT

Sources: NYS Orthoimagery, 2023; NYS Civil Boundaries, 2024
Scale: 1 inch equals 3,000 ft

Manhasset Bay Water Quality Improvement Plan

North Hempstead, NY

Subwatershed Name	ID	Acreage
North East Shore	1	239.3
Sheets Creek N	2	357.9
Sheets Creek E	3	543.4
Mill/Baxter Ponds	4	1052.9
Stannard's Brook	5	374.3
Leeds Pond	6	2169.3
Plandome Heights	7	134.5
Whitney Pond	8	2388.6
Kensington	9	389.7
Kings Point Creek	10	826.7
Mitchell Creek	11	946.6
Kings Point Pond	12	168.5
Total		9591.7

Legend

Manhasset Bay Watershed

Subwatersheds

Stormwater Flow Accumulation

Flow Quanitity

1 (Lowest)

2

3

4

5 (Highest)

TownofHempsteadBoundary

MUNITYCODE

Town of North Hempstead Boundary

County Boundaries

2023 Orthoimagery Boundary

1 2 3 4 5 6 7 8 9 10 11 12

Vantor, NYS ITS Geospatial Services, Westchester County GIS

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FIGURE 9-1

STORMWATER FLOW ACCUMULATION MAP

Sources: NYS Orthoimagery, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; Manhasset Bay Protection Committee, 2023

Manhasset Bay
Water Quality Improvement Plan

North Hempstead, NY

This document was prepared with funding provided by the New York State Department of State under title 11 of the Environmental Protection Fund

Legend

- Town of North Hempstead Boundary
- County Boundaries
- Village Boundaries
- Manhasset Bay Watershed
- Subwatersheds
- Priority Opportunity Areas

ID	Subwatershed Name	Acreage
1	North East Shore	239.3
2	Sheets Creek N	357.9
3	Sheets Creek E	543.4
4	Mill/Baxter Ponds	1052.9
5	Stannard's Brook	374.3
6	Leeds Pond	2169.3
7	Plandome Heights	134.5
8	Whitney Pond	2388.6
9	Kensington	389.7
10	Kings Point Creek	826.7
11	Mitchell Creek	946.6
12	Kings Point Pond	168.5
	Total	9591.7

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FIGURE 9-2
STORMWATER RECOMMENDATION LOCATIONS

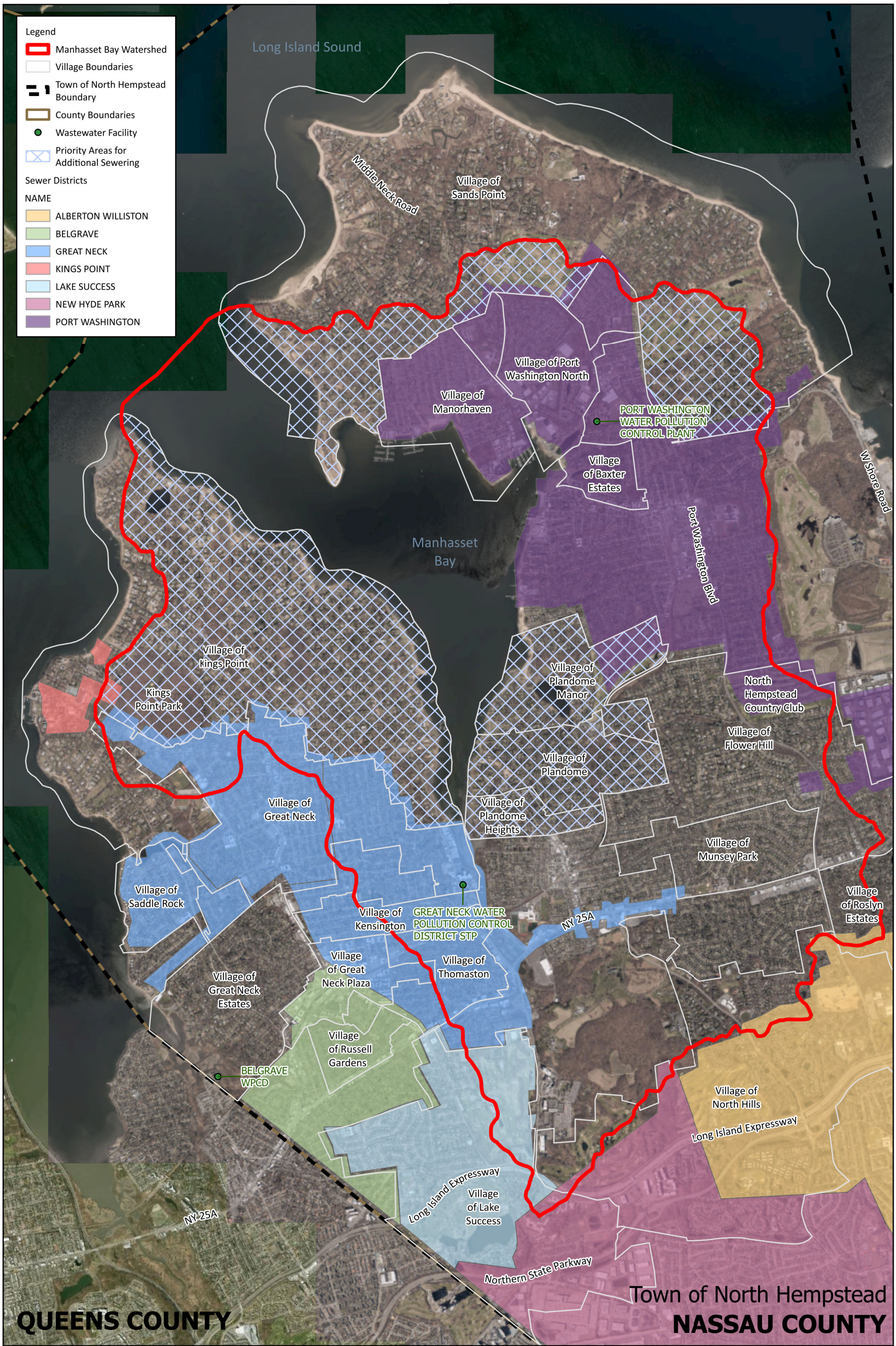
Sources: ESRI Terrain Map, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022;
Scale: 1 inch equals 3,000 feet

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Manhasset Bay Water Quality Improvement Plan

North Hempstead, NY

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FIGURE 9-3
PRIORITY AREAS FOR ADDITIONAL SEWERING

Sources: ESRI Terrain Map, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022; Nassau County, 2013

Scale: 1 inch equals 3,000 feet

N

Manhasset Bay Water Quality Improvement Plan

North Hempstead, NY

This document was prepared with funding provided by the New York State Department of State under title 11 of the Environmental Protection Fund

Legend

- Town of North Hempstead Boundary
- County Boundaries
- Village Boundaries
- Manhasset Bay Watershed
- Subwatersheds
- Approximate Project Areas

ID	Subwatershed Name	Acreage
1	North East Shore	239.3
2	Sheets Creek N	357.9
3	Sheets Creek E	543.4
4	Mill/Baxter Ponds	1052.9
5	Stannard's Brook	374.3
6	Leeds Pond	2169.3
7	Plandome Heights	134.5
8	Whitney Pond	2388.6
9	Kensington	389.7
10	Kings Point Creek	826.7
11	Mitchell Creek	946.6
12	Kings Point Pond	168.5
	Total	9591.7

Long Island Sound
Middle Neck Road
Village of Sands Point
Village of Port Washington North
Village of Manorhaven
Village of Baxter Estates
Manhasset Bay
Port Washington Blvd
W Shore Road
Village of Kings Point
E Shore Road
Village of Great Neck
Village of Plandome
Village of Plandome Manor
Village of Flower Hill
Village of Plandome Heights
Village of Munsey Park
Village of Roslyn
Village of Saddle Rock
Village of Kensington
Village of Great Neck Plaza
Village of Great Neck Estates
Village of Thomaston
Village of Roslyn Estates
NY 25A
Village of North Hills
Long Island Expressway
Village of Lake Success
Northern State Parkway
QUEENS COUNTY
Town of North Hempstead
NASSAU COUNTY

N-1a, N-1b, N-2, N-3, N-4, N-5, N-6, N-7, N-8, N-9, N-10, N-11

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

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FIGURE 9-4
NATURAL RESOURCE RECOMMENDATION LOCATIONS

Sources: ESRI Terrain Map, 2023; USGS Watershed Boundary, 2023; NYS Civil Boundaries, 2022;
Scale: 1 inch equals 3,000 feet

N

Manhasset Bay
Water Quality Improvement Plan

North Hempstead, NY

This document was prepared with funding provided by the New York State Department of State under title 11 of the Environmental Protection Fund

APPENDICES

APPENDIX A

FINAL COMMUNITY & PUBLIC OUTREACH PLAN

UPDATED WATER QUALITY IMPROVEMENT PLAN
FOR MANHASSET BAY

FINAL COMMUNITY OUTREACH & PARTICIPATION PLAN
JULY 2023

For Information, Contact:

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PREPARED BY:

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LAST REVISED: July 11, 2023

This document was prepared with funding provided by the New York State Department of State under Title 11 of the Environmental Protection Fund.

1.0 Introduction

This Community Outreach & Participation Plan has been prepared by the Manhasset Bay Protection Committee (MBPC), with funding from the New York State Department of State (NYSDOS) under Title 11 of the Environmental Protection Fund, and technical assistance from Nelson, Pope & Voorhis, LLC (NPV). The purpose of this document is to provide an overview of the outreach methods and protocol standards for obtaining and utilizing input from community members to assist in the preparation of the updated Manhasset Bay Water Quality Improvement Plan (WQIP). The MBPC is building upon the goals and objectives of the Manhasset Bay WQIP completed in 1999, in three phases: 1) inventory natural resources and land uses within the watershed of Manhasset Bay; 2) assess natural features, physical conditions, existing water pollution controls and ordinances pertaining to the Bay and its watershed; and 3) develop a program of recommendations to enhance water quality conditions in the Bay, including an evaluation of the status of projects recommended in the 1999 WQIP.

The Long Island Sound Study recognizes that Manhasset Bay was an important resource for fishing and shellfish harvesting used by the Algonquin Matinecock tribe in the 1600s, and subsequently served as the largest oystering harbor on the North Shore of Long Island in the late 1800s, nicknaming the Bay as "the shellfish garden of New York City." Manhasset Bay continues to support commercial and recreational boating uses today, while also being designated as a Significant Coastal Fish and Wildlife habitat, providing significant feeding and nursery habitat for striped bass, winter flounder, bluefish, menhaden, and other forage species. Additionally, the Bay has been identified by the Long Island Sound Study as a Stewardship area, providing nesting areas for Least Tern, a threatened species in New York, and acting as one of five major waterfowl winter areas on the North Shore of Long Island.

The water quality of Manhasset Bay has been significantly impacted due to stormwater runoff discharges and groundwater underflow generated in the surrounding watershed, along with prevalent recreational boating activities. While the 1999 WQIP outlined projects that could improve Manhasset Bay's water quality and reduce contaminant inputs, the updated plan being prepared by the MBPC seeks to identify progress that has been made through completed projects, investigate projects that have not been completed to determine if they are still suitable, and identify additional projects and other actions that can protect Manhasset Bay and its wildlife and habitats, while also preserving its aesthetic and recreational appeals.

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Community outreach and participation is crucial to the success of the updated Manhasset Bay WQIP, as residents and other community members have local knowledge and insight on issues and potential solutions for the Bay and its watershed. Community members will be engaged in learning additional information about Manhasset Bay and what a watershed is, as well as how upland and boating uses can impact both the Bay and the community.

2.0 Manhasset Bay Protection Committee

The MBPC was established in the spring of 1998 with the goal of improving the quality of Manhasset Bay's waters and its watershed. Shortly thereafter, the MBPC was awarded an Environmental Protection Fund grant from New York State to prepare its first WQIP, which was completed in 1999. At the time of the 1999 WQIP, there were eleven local municipalities that voluntarily joined the MBPC, which subsequently was expanded to fifteen municipal members, as listed below:

Members of the Manhasset Bay Protection Committee
County of Nassau
Town of North Hempstead
Village of Baxter Estates
Village of Flower Hill
Village of Great Neck
Village of Kensington
Village of Kings Point
Village of Manorhaven
Village of Munsey Park
Village of Plandome
Village of Plandome Heights
Village of Plandome Manor
Village of Port Washington North
Village of Sands Point
Village of Thomaston

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The MBPC is engaged to prepare the Updated WQIP for Manhasset Bay and will function as the Project Steering Committee. Along with the Executive Director, whose contact information is provided on the cover of this document, each member municipality has a representative who participates in MBPC activities on behalf of their respective community and who will contribute to the preparation of the updated WQIP as part of the Steering Committee. The work of the MBPC in preparing the WQIP, including this Community Outreach & Participation Plan, is being

overseen by the representatives identified below. It is noted that the Town of North Hempstead has been awarded the contract that has been issued by the State to prepare the updated WQIP and is managing that grant on behalf of the MBPC.

Name	Affiliation	Contact Information
Sarah Deonarine	Executive Director, Manhasset Bay Protection Committee	mbpcexec@gmail.com
Kevin Braun	MBPC and Town of North Hempstead, Environmental Control Specialist	braunk@northhempsteadny.gov

NPV will prepare all work products related to this Community Outreach & Public Participation Program, with guidance and input, and final sign-off, from the MBPC (and NYSDOS). The MBPC will serve as the point of contact for communication with the community.

3.0 Public Participation Techniques

Key stakeholders and members of the public will be invited to participate in the Manhasset Bay WQIP discussion and planning process through outreach meetings, where community members can gather (either in person or through an online forum) and express their concerns regarding the water quality within the Bay, discuss completed projects and if notable progress has been made, identify more changes they would like to see in their communities and other potential solutions they would like to see to reduce pollution within Manhasset Bay and the watershed. It is expected at this time that the WQIP outreach initiative will include the following sample organizations and others:

- Elected officials
- Libraries
- School districts
- Science Museum of Long Island
- Long Island Sound Study
- Local civic associations
- Local environmental organizations such as the Waterfront Advisory Committee, Marine-focused groups, etc.

(A separate list of all the groups to be contacted will be prepared prior to and for use in outreach for the first public workshop and other community engagement)

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The preliminary public outreach list above will be expanded/refined as the project progresses. The specific methods of outreach to facilitate public engagement are outlined in the following sections of this document.

3.1 Information Techniques

Manhasset Bay Protection Committee Website – The MBPC website contains numerous resources that community members can utilize to learn more about the Bay, including the history of the MBPC, the 1999 Manhasset Bay WQIP document, how community members can do their part to reduce contaminants entering the Bay, and ways to volunteer and get involved with events planned by the MBPC. The website includes a link specifically devoted to the updated WQIP (https://manhassetbayprotectioncommittee.org/wqip.html) which includes an email address for the receipt of public comments (baycomments@gmail.com).

Town of North Hempstead Website and Television Station – The Town's homepage includes a series of current news items which can include updates on the WQIP. The Town's television station, NHTV, is accessible at https://www.mynhtv.com and provides a range of public information broadcasting of interest to the community. The MBPC can also create a video loop(s) with information on the WQIP, which can be made available for play at marinas and other appropriate locations.

Email – The MBPC will send emails to interested community members regarding upcoming meetings, volunteer activities within Manhasset Bay and the watershed area, and status updates on local projects such as wetland reconstruction, stormwater runoff mitigation, and other actions to improve the overall water quality of the Bay. Emails will be sent to stakeholders, based on a list compiled by the MBPC, as appropriate. The MBPC also prepares a newsletter which is distributed to a list of subscribers who have been receiving, and will continue to receive, WQIP information.

Press Releases – Both MBPC and the Town of North Hempstead have relationships with the print media. Press releases will be prepared with information on notable events and milestones for the WQIP.

Social Media – Social media platforms (e.g., Instagram, Twitter, and Facebook) will be used to spread information regarding Project status and public meetings throughout the process of preparing the updated Manhasset Bay WQIP and provide updates on projects and activities within Manhasset Bay and the watershed. The MBPC manages a Twitter account, and both the MBPC and the Town of North Hempstead manage Facebook pages on which this information can be posted.

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Informational Fliers – Handouts and brochures will be made available at public events and/or community meetings to further engage and educate participants; and such informational materials will be made available at key public locations, such as libraries, schools, and municipal offices (especially Town and Village Halls). Fliers and handouts also will be provided as downloadable PDFs on the MBPC web site for wider availability.

Signage – Suitable signage will be posted at public locations or in informational kiosks or other formats to alert the public to WQIP activities also covered by any of the other media described above.

3.2 Interactive Techniques

Community Meetings – Public meetings will be conducted in a manner that maximizes attendance and participation by all interested members of the Manhasset Bay community. MBPC will coordinate with key stakeholders to minimize the potential for scheduling conflicts with other local events. These meetings can be held in-person, in a virtual format (through Zoom or another online meeting platform), or in hybrid format to be determined by the Committee. The purpose will be to gather community input, information, and ideas for the updated WQIP. An open public comment period will be publicized. Three community meetings are planned at this time, described as follows:

- The first public meeting will be held during the initial characterization of Manhasset Bay and the watershed. This meeting will provide a platform to introduce the project and gather input from community members on issues they face related to water quality in Manhasset Bay and its watershed, as well as the draft WQIP Vision and Goals. Informational surveys or comment cards can be distributed to the attendees at an in-person meeting, and/or an exit survey or online forum can be created to gather feedback and responses to questions from online participants. It is anticipated that the first public outreach meeting will be held in the early fall 2023, after the summer vacation season, when school is back in session.

- The second community meeting will be directed primarily at providing an update of Project activities that have been completed since the initial community meeting, and to gather input on a preliminary list of recommended projects and programs for the improvement of Manhasset Bay and the watershed. In conjunction with the second meeting, a proposed sequence and timeline for Projects will be provided and discussed with the attendees to identify priorities. It is anticipated that the second public outreach meeting will be held approximately four months after the first public meeting.

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- The third community meeting will be geared primarily for receiving feedback on the full draft updated Manhasset Bay WQIP. A presentation will be provided to summarize the WQIP and an extended public comment period will be provided to receive additional written input on the WQIP. It is anticipated that the third public outreach meeting will be held approximately four months after the second public meeting.

(The timeline for public meetings may be subject to change. The meetings are interdependent on the type of feedback received, the coordination and response strategy that the MBPC chooses to take and the time necessary to adequately prepare for the workshops so that they can achieve the outcomes intended in the planning process).

Surveys – Surveys may be used to gather information from the community in a more broad-based format. Community members who are interested in being involved in the WQIP discussions but may not be able to attend scheduled meetings can still participate in the process by sharing their insight and opinions in these online surveys. Links to surveys will be shared on social media platforms, through emails, and on the MBPC website and other means.

Citizen Engagement – The MBPC will organize events that are centered around volunteer opportunities and awareness of water quality issues within Manhasset Bay and the watershed and will participate in already-scheduled events such as festivals, street fairs or Earth Day events (such as has successfully been sponsored by the Port Washington Library). These events can serve multiple purposes by providing an opportunity to receive input on the WQIP, while also educating attendees about why continued efforts are necessary to preserve the ecological integrity and aesthetic appeal of the Bay.

FINAL

References

- Long Island Sound Study (2012). “Manhasset Bay,” https://longislandsoundstudy.net/2012/11/manhasset-bay/
- Manhasset Bay Protection Committee (1999) “Manhasset Bay Water Quality Improvement Plan” https://manhassetbayprotectioncommittee.org/uploads/1/3/7/6/137685843/manhasset_bay_water_quality_improvement_plan_1999.pdf

APPENDIX B
LAND USE CHANGE AERIALS



Photo 1a: 2020 aerial of Sands Point westernmost shoreline.



Photo 1b: 2023 aerial of Sands Point westernmost shoreline demonstrating an increased number of single-family homes.



Photo 2a: 2000 aerial of a wooded area in Port Washington.



Photo 2b: 2023 aerial of Mill Pond Acres, a community of approximately 200 condos located in Port Washington.



Photo 3a: 2000 aerial of an industrial use in Port Washington adjacent to the bay.



Photo 3b: 2023 aerial of commercial shopping center in Port Washington adjacent to the bay.

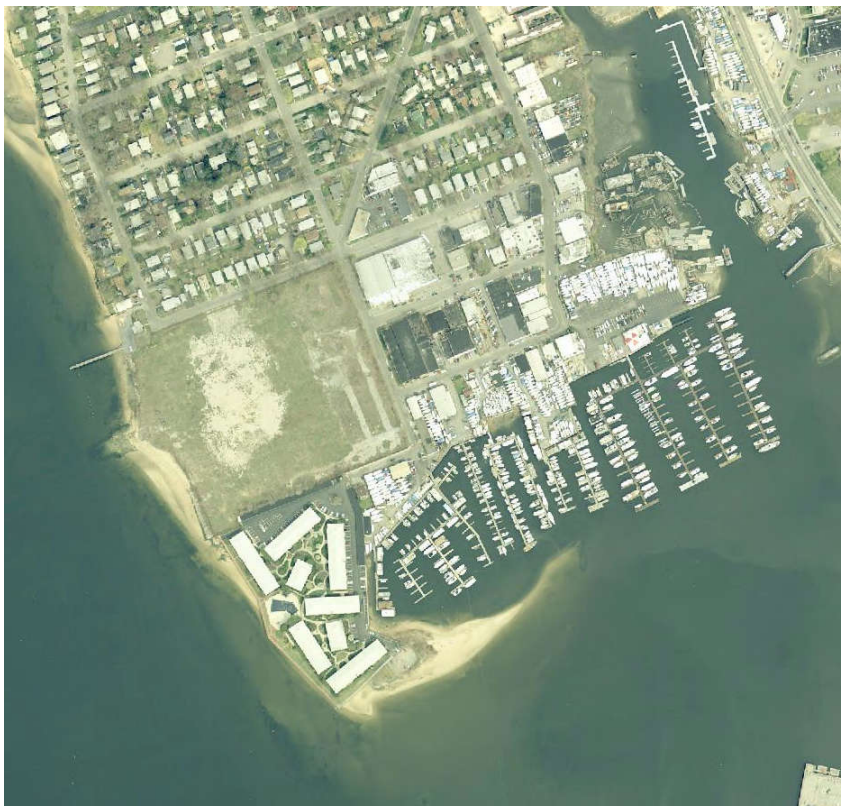


Photo 4a: 2000 aerial of the former Thypin Steel Plant, a designated State Superfund Site.



Photo 4b: 2023 aerial of the former Thypin Steel Plant, a designated State Superfund Site.



Photo 5a: 2000 aerial of the northern portion of Kings Point.



Photo 5b: : 2023 aerial of the northern portion of Kings Point, demonstrating an increased number of large single-family developments and an increased number of pools.



Photo 6a: 2000 aerial of the eastern coastline of Great Neck.



Photo 6b: 2023 aerial of the eastern coastline of Great Neck demonstrating an increased number of large single-family homes.

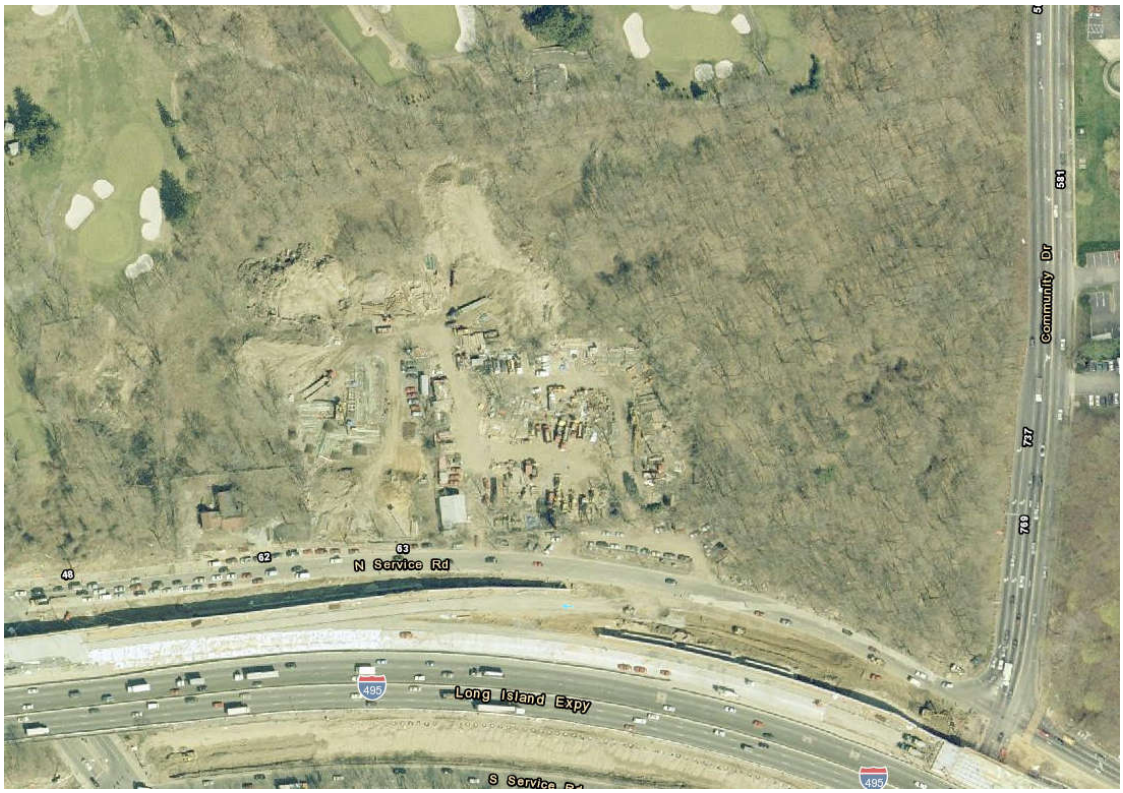


Photo 7a: 2000 aerial of a development site just north of the Long Island Expressway.



Photo 7b: 2023 aerial of North Shore Hebrew Academy High School and The Bristal at Lake Success – A Memory Care Community.

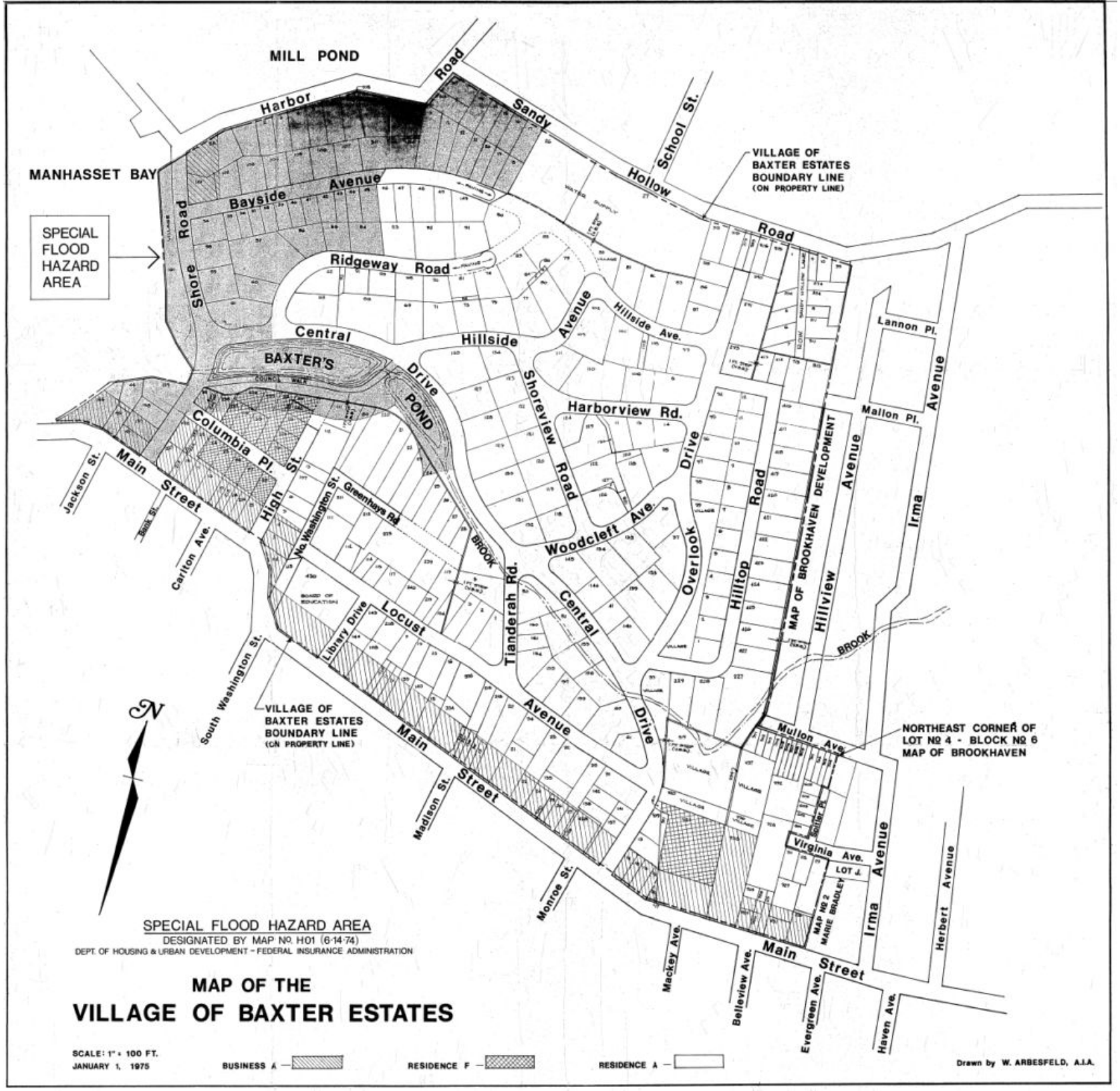


Photo 8a: 2000 aerial of Great Neck, adjacent to the southernmost portion of Manhasset Bay.



Photo 8b: 2023 aerial of Great Neck, adjacent to the southernmost portion of Manhasset Bay. New development between the years 2000 and 2023 includes a large single-family home, USPS building, and Avalon Great Neck (a six story 191-unit apartment building).

APPENDIX C
MUNICIPAL ZONING MAPS


MILL POND
Harbor Road
Sandy Hollow Road
School St.
MANHASSET BAY
SPECIAL FLOOD HAZARD AREA
Bayside Avenue
Shore Road
Ridgeway Road
Central Hillside Avenue
Hillside Ave.
BAXTER'S POND
Drive
Columbia Pl.
Shoreview Road
Harborview Rd.
Overlook Drive
Hilltop Road
Hillview Avenue
Lannon Pl.
Mallon Pl.
Irma Avenue
MAP OF BROOKHAVEN DEVELOPMENT
Jackson St.
Main Street
Bank St.
Carlton Ave.
High St.
No Washington St.
Greenhaya Rd.
BROOK
Woodcleft Ave.
Tianderah Rd.
Central Avenue
Locust Avenue
Library Drive
South Washington St.
Madison St.
Monroe St.
Mackey Ave.
Belleview Ave.
Evergreen Ave.
Haven Ave.
Herbert Avenue
Mullon Ave.
Virginia Ave.
LOT J.
MAP NO 2 MARIE BRADLEY
VILLAGE OF BAXTER ESTATES BOUNDARY LINE (ON PROPERTY LINE)
VILLAGE OF BAXTER ESTATES BOUNDARY LINE (ON PROPERTY LINE)
NORTHEAST CORNER OF LOT Nº 4 - BLOCK Nº 6 MAP OF BROOKHAVEN
N
SPECIAL FLOOD HAZARD AREA
DESIGNATED BY MAP Nº. H01 (6-14-74)
DEPT. OF HOUSING & URBAN DEVELOPMENT - FEDERAL INSURANCE ADMINISTRATION
MAP OF THE
VILLAGE OF BAXTER ESTATES
SCALE: 1" = 100 FT.
JANUARY 1, 1975
BUSINESS A
RESIDENCE F
RESIDENCE A
Drawn by W. ARBESFELD, A.I.A.

VILLAGE OF GREAT NECK

BUILDING ZONE MAP

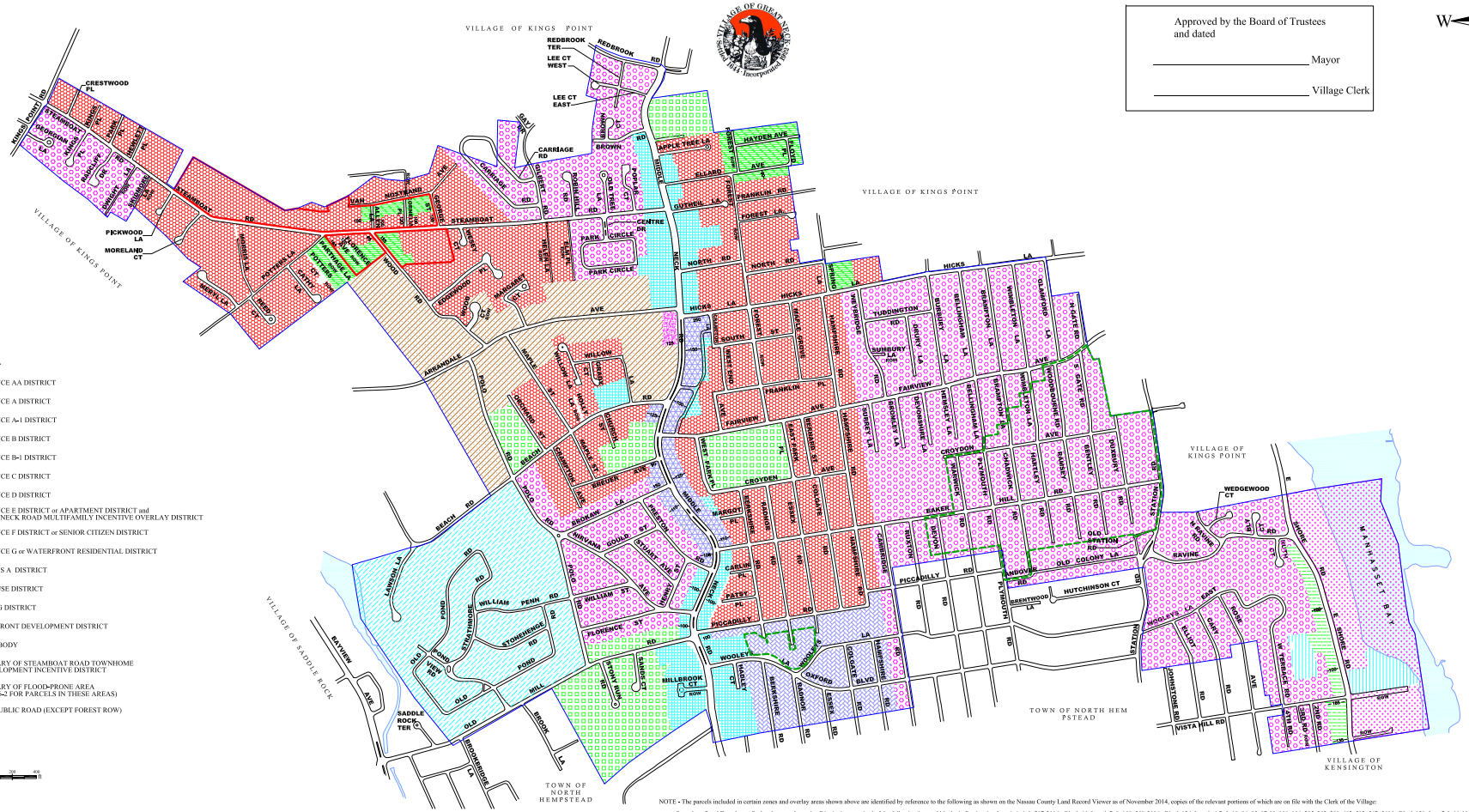
NASSAU COUNTY, NEW YORK

Approved by the Board of Trustees
and dated

_____ Mayor

_____ Village Clerk

N
W E
S



LEGEND

- RESIDENCE AA DISTRICT
- RESIDENCE A DISTRICT
- RESIDENCE A-1 DISTRICT
- RESIDENCE B DISTRICT
- RESIDENCE B-1 DISTRICT
- RESIDENCE C DISTRICT
- RESIDENCE D DISTRICT
- RESIDENCE E DISTRICT or APARTMENT DISTRICT and MIDDLE NECK ROAD MULTIFAMILY INCENTIVE OVERLAY DISTRICT
- RESIDENCE F DISTRICT or SENIOR CITIZEN DISTRICT
- RESIDENCE G or WATERFRONT RESIDENTIAL DISTRICT
- BUSINESS A DISTRICT
- MIXED USE DISTRICT
- PARKING DISTRICT
- WATERFRONT DEVELOPMENT DISTRICT
- WATER BODY
- BOUNDARY OF STEAMBOAT ROAD TOWNHOME REDEVELOPMENT INCENTIVE DISTRICT
- BOUNDARY OF FLOOD-PRONE AREA (SEE §296-2 FOR PARCELS IN THESE AREAS)
- ROW — NOT A PUBLIC ROAD (EXCEPT FOREST ROW)

200 100 0 200 400 ft

NOTE - The parcels included in certain zones and overlay areas shown above are identified by reference to the following as shown on the Nassau County Land Record Viewer as of November 2014, copies of the relevant portions of which are on file with the Clerk of the Village:

Steamboat Road Townhouse Redevelopment Incentive District is comprised of the following lots and blocks in Section 1 -- Lots 1-4, 6, 8, 207-211 in Block 64, Lots 1-7, 9, 108, 208-210 in Block 124, Lots 1, 4-7, 9, 10, 94, 95, 97-99, 108, 196, 295, 302, 308, 402, 502, 547, 548 in Block 128, Lots 7-8, 11-18, 21, 41, 344, 345 in Block 129, Lots 1-18, 22-30 in Block 198, and Lots 1-9, 57, 58 in Block 199.

The Residence E parcels on the east side of Middle Neck Road between Apple Tree Lane and Hicks Lane are the following lots and blocks in Section 1 -- Lots 17, 18 in Block 182, Lots 1, 116, 117 in Block 106-2, Lots 7, 8, 9, 13, 216, 317, 318, 322, 323, 334 in Block 106-3, and Lots 2, 3, 4, 5, 10, 101, 106, 325, 326 in Block 1.

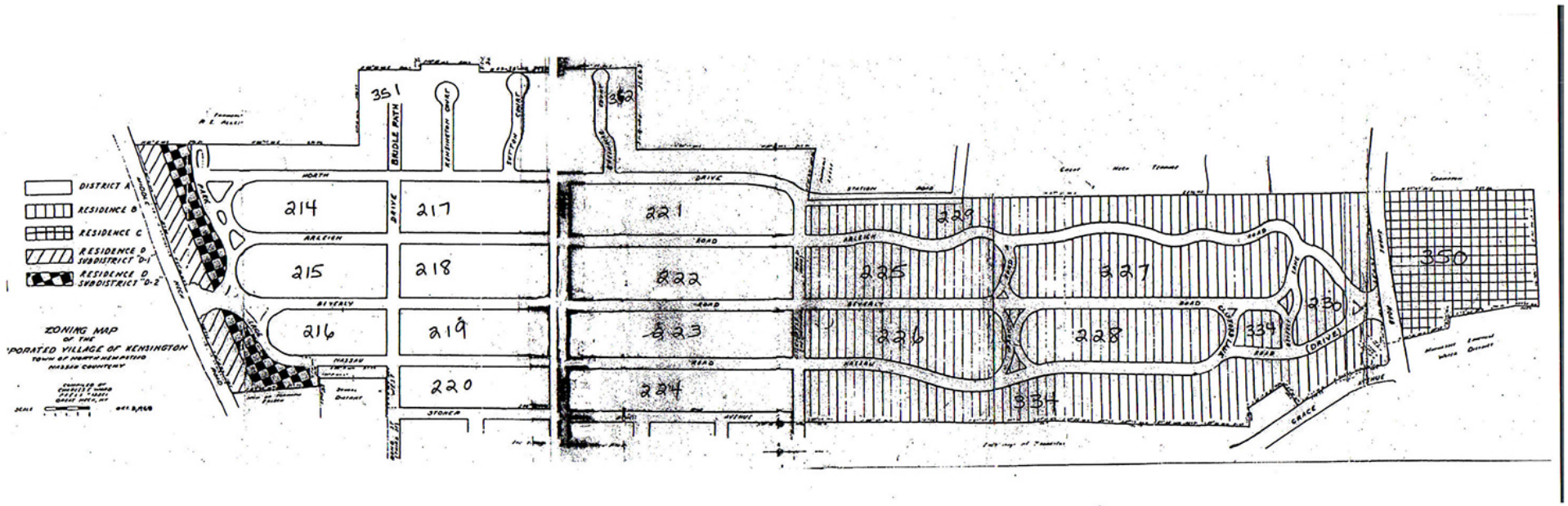
The Residence E parcels at the corner of Middle Neck Road and Brown Road are the following lots in Section 1 -- Lots 70-72 in Block 142.

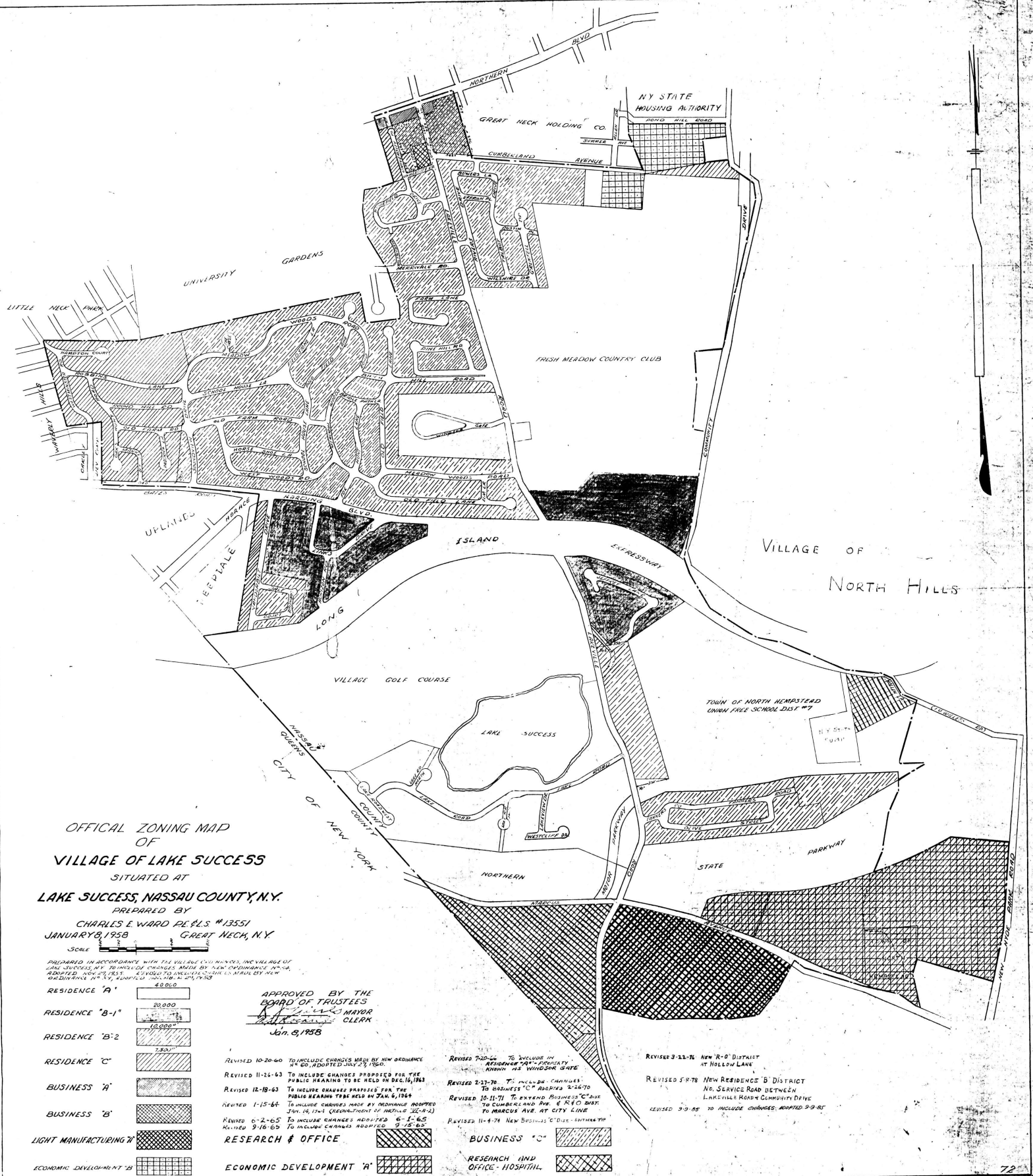
The Residence E parcels on the west side of Middle Neck Road between Steamboat Road and Arrandale Avenue are the following lots in Section 1 -- Lots 34, 146, 244, 292, 525-527, 529, 531-538, 602-607 in Block 128.

Residence G is comprised of Section 2 -- Lots 9 and 10 in Block 349.

HARMAP COPYRIGHT 2003, COUNTY OF NASSAU, NY

N:\code\GENERIC\Engr\Cartography\ZONING MAPS\Zoning Map 2020.dwg, Last Modified: May 12, 2021 - 3:08pm, Plotted on: May 12, 2021 - 3:08pm, By: mcarullo


DISTRICT A
RESIDENCE B
RESIDENCE C
RESIDENCE D SUBDISTRICT "D-1"
RESIDENCE D SUBDISTRICT "D-2"
ZONING MAP
OF THE
'PORATED VILLAGE OF KENSINGTON
TOWN OF NORTH HEMPSTEAD
NASSAU COUNTY
351
352
BRIDLE PATH
KENSINGTON COURT
FITCH COURT
NORTH
DRIVE
STATION ROAD
214
217
221
329
ARLEIGH
ROAD
215
218
222
225
327
350
BEVERLY
216
219
223
226
228
334
336
(DRIVE)
220
224
337
GRACE
AVENUE
STONER



OFFICAL ZONING MAP OF VILLAGE OF LAKE SUCCESS

SITUATED AT

LAKE SUCCESS, NASSAU COUNTY, N.Y.

PREPARED BY

CHARLES E WARD PE & LS #13551

JANUARY 8, 1958 GREAT NECK, N.Y.

SCALE

PREPARED IN ACCORDANCE WITH THE VILLAGE ORDINANCES, INC VILLAGE OF LAKE SUCCESS, N.Y. TO INCLUDE CHANGES MADE BY NEW ORDINANCE No 64, ADOPTED JUNE 29, 1953. REVISED TO INCLUDE CHANGES MADE BY NEW ORDINANCE No 67, ADOPTED JANUARY 24, 1958

RESIDENCE 'A'	40,000
RESIDENCE "B-1"	20,000
RESIDENCE 'B-2	10,000"
RESIDENCE 'C'	7,500"
BUSINESS 'A'	
BUSINESS 'B'	
LIGHT MANUFACTURING 'A'	
ECONOMIC DEVELOPMENT 'B'	

APPROVED BY THE BOARD OF TRUSTEES

[signature] MAYOR

[signature] CLERK

Jan. 8, 1958

Revised 10-20-60 To include changes made by new ordinance No 60, adopted July 29, 1960.

Revised 11-26-63 To include changes proposed for the public hearing to be held on Dec. 16, 1963

Revised 12-18-63 To include changes proposed for the public hearing to be held on Jan. 6, 1964

Revised 1-15-64 To include changes made by ordinance adopted Jan. 14, 1964 (Reenactment of Article XI-A-2)

Revised 6-2-65 To include changes adopted 6-1-65

Revised 9-16-65 To include changes adopted 9-15-65

RESEARCH & OFFICE

ECONOMIC DEVELOPMENT 'A'

Revised 7-20-66 To include in Residence "A" - property known as "Windsor Gate"

Revised 2-27-70 To include changes to Business "C" adopted 2-26-70

Revised 10-11-71 To extend Business "C" dist to Cumberland Ave. & R.R.O. dist. to Marcus Ave. at City Line

Revised 11-4-74 New Business 'C' Dist - Southerly

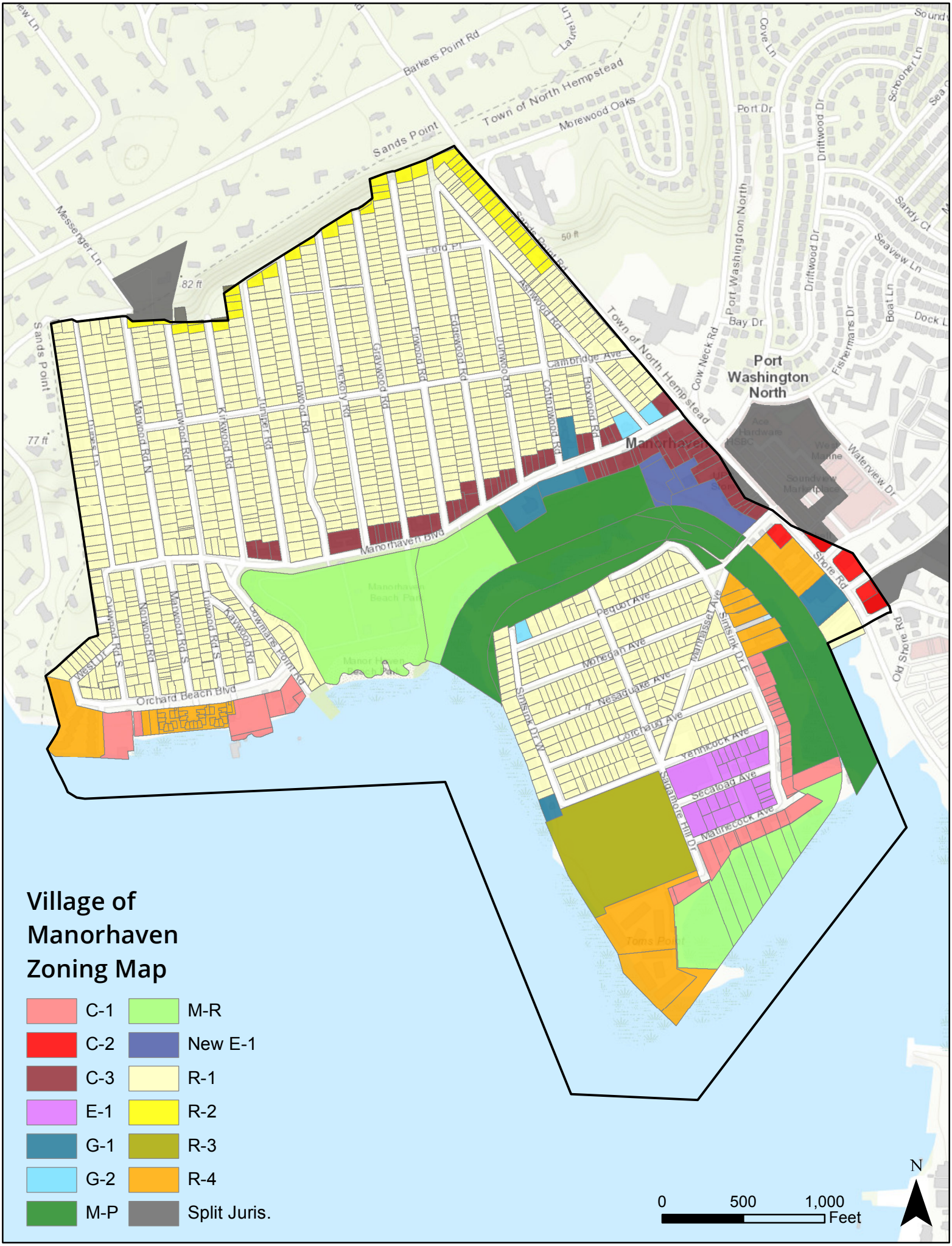
BUSINESS "C"

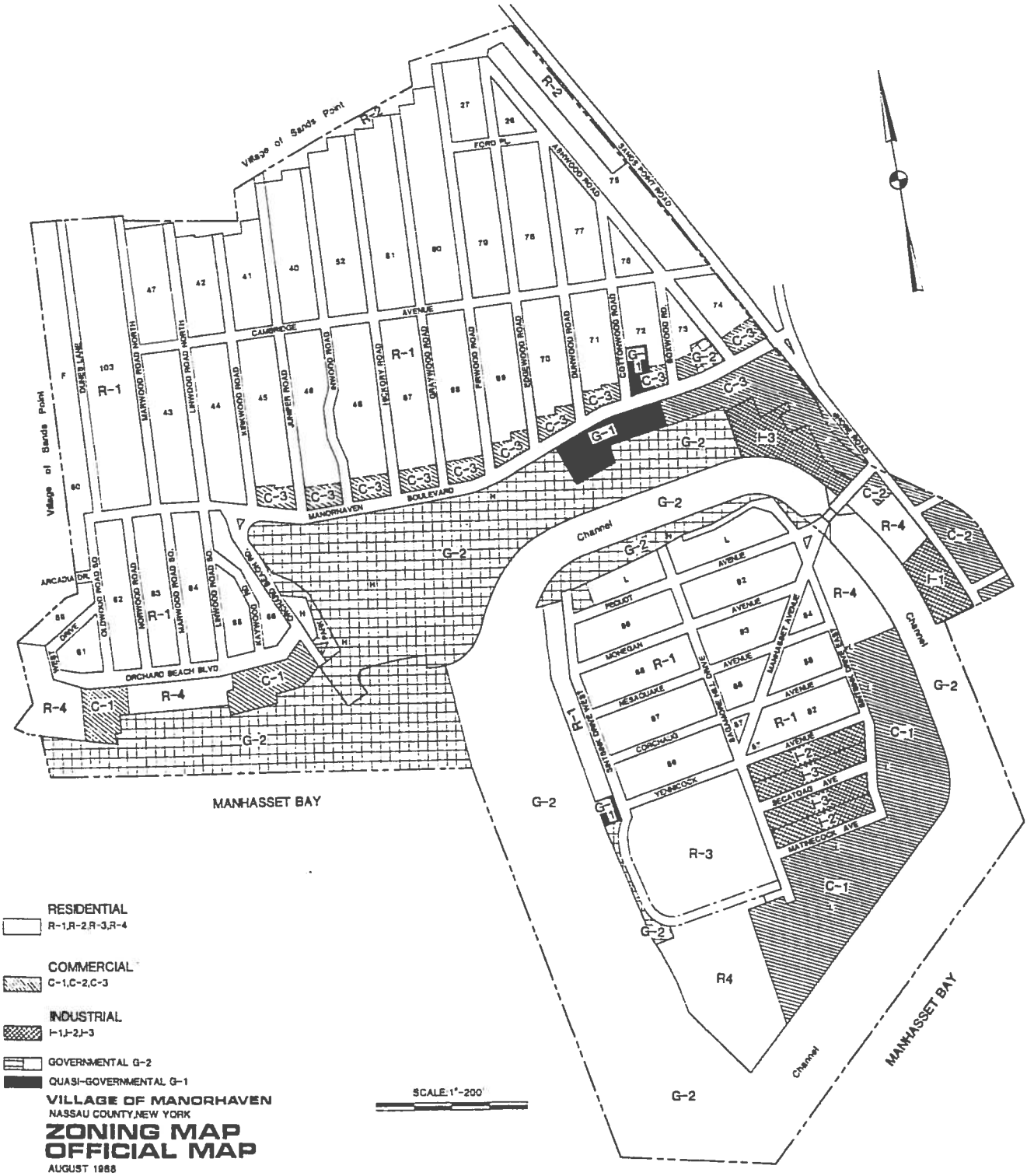
RESEARCH AND OFFICE - HOSPITAL

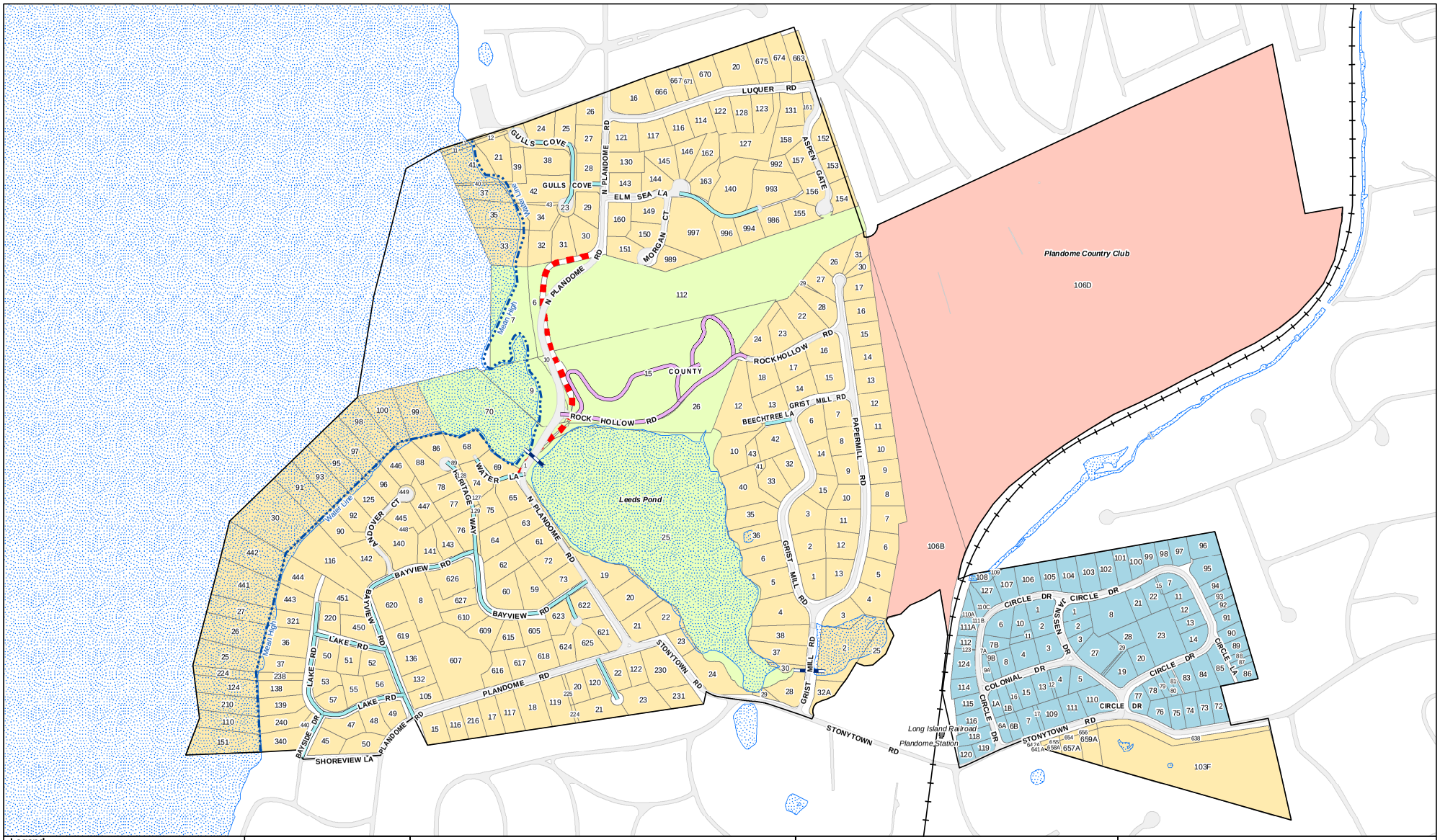
Revised 3-22-76 New 'R-0' District at Hollow Lane

Revised 5-8-78 New Residence 'B' District No. Service Road between Lakeville Road & Community Drive

Revised 9-9-85 to include changes adopted 9-9-85


Village of
Manorhaven
Zoning Map
C-1
C-2
C-3
E-1
G-1
G-2
M-P
M-R
New E-1
R-1
R-2
R-3
R-4
Split Juris.
0
500
1,000
Feet
N
Barkers Point Rd
Town of North Hempstead
Sands Point
Morewood Oaks
Port Dr
Cove Ln
Driftwood Dr
Schooner Ln
Sandy Ct
Seaview Ln
Boat Ln
Dock Ln
Port Washington North
Bay Dr
Cow Neck Rd
Fishermans Dr
Messenger Ln
82 ft
77 ft
50 ft
Ford Pl
Ashwood Rd
Cambridge Ave
Boxwood Rd
Cottonwood Rd
Lynwood Rd
Edgewood Rd
Firwood Rd
Graywood Rd
Hickory Rd
Inwood Rd
Juniper Rd
Kirkwood Rd
Linwood Rd N
Manwood Rd N
Manwood Rd S
Linwood Rd S
Norwood Rd
Oakwood Rd S
Westcott Rd S
Kenwood Rd
Townmans Point Rd
Orchard Beach Blvd
Manorhaven Blvd
Manorhaven Beach Park
Manor Haven Beach Park
Pequot Ave
Mohegan Ave
Nesaquake Ave
Cotchaug Ave
Yennicock Ave
Secatoag Ave
Matinecock Ave
Sunnyside Hill Dr
Sunnyside Dr
Sunnyside Dr N
Matinnecock Ave
Shore Rd
Old Shore Rd
Waterview Dr
Soundview Marketplace
Ace Hardware
HSBC
West Marine
Toms Point


Village of Sands Point
R-2
R-1
R-4
C-1
C-2
C-3
G-1
G-2
I-1
I-2
I-3
MANHASSET BAY
Channel
SCALE:1"=200'
RESIDENTIAL
R-1,R-2,R-3,R-4
COMMERCIAL
C-1,C-2,C-3
INDUSTRIAL
I-1,I-2,I-3
GOVERNMENTAL G-2
QUASI-GOVERNMENTAL G-1
VILLAGE OF MANORHAVEN
NASSAU COUNTY,NEW YORK
ZONING MAP
OFFICIAL MAP
AUGUST 1988



Legend

Village Boundry	Railroad	**Lots**	
Streets	Roadway	**Zoning**	
Owner Code	Water Features	R-110	
County Driveways	Mean High Water Line	R-15	
Private Roads	Culvert	R-22	
Railroad Station	ROW In Question	R-220	

Keymap

Village of Plandome Manor

Incorporated Village of PLANDOME MANOR

Geographic Information System

μ

1 inch equals 500 feet

0 125 250 500 750 1,000 Feet

Nassau County

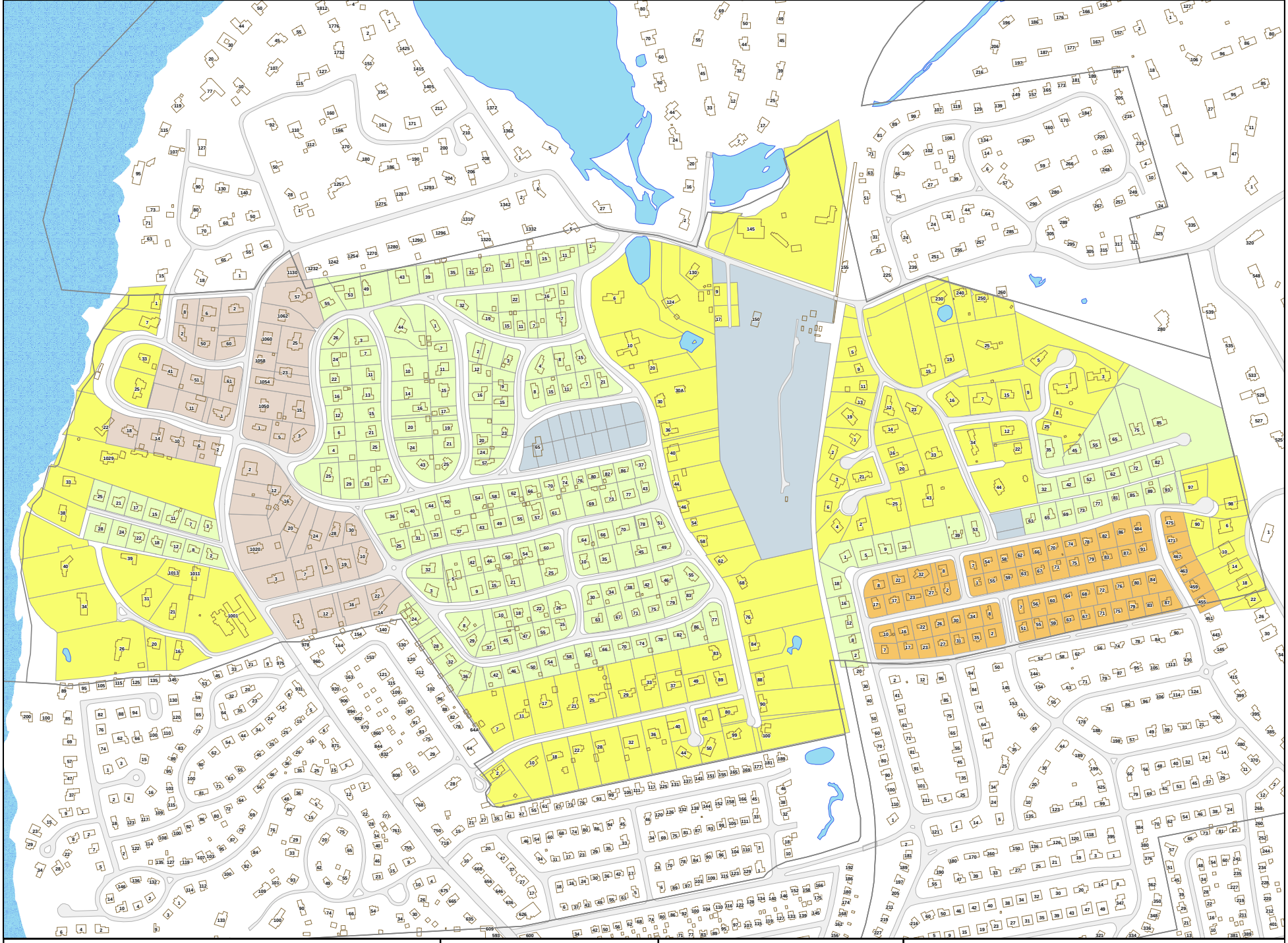
Geographic Information System

Date: October 10, 2007

Copyright 1993 - 2007
County of Nassau, New York

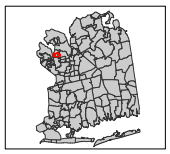
The Geographic Information System (GIS) information, mapability and related data and attributes represented in the information layers are provided by Nassau County "as is" without warranty of any kind, either expressed or implied, concerning the accuracy, completeness, timeliness, or rights to use such information. Nassau County shall not be liable for any damages arising from the use of such information, or the reuse of such information by others.

Browne Management Systems Inc.
235 East Jericho Turnpike
Mineola, NY 11501
Phone: 516-746-8500
Fax: 516-746-8501
www.brownegroup.com



Legend

- Village Line
- Buildings
- Roadway
- NASSAU.AddressPoints
- Water
- Inland Water
- District A
- District B
- District C
- District D
- Village - Municipal / Park



Keymap

Village of Plandome

μ

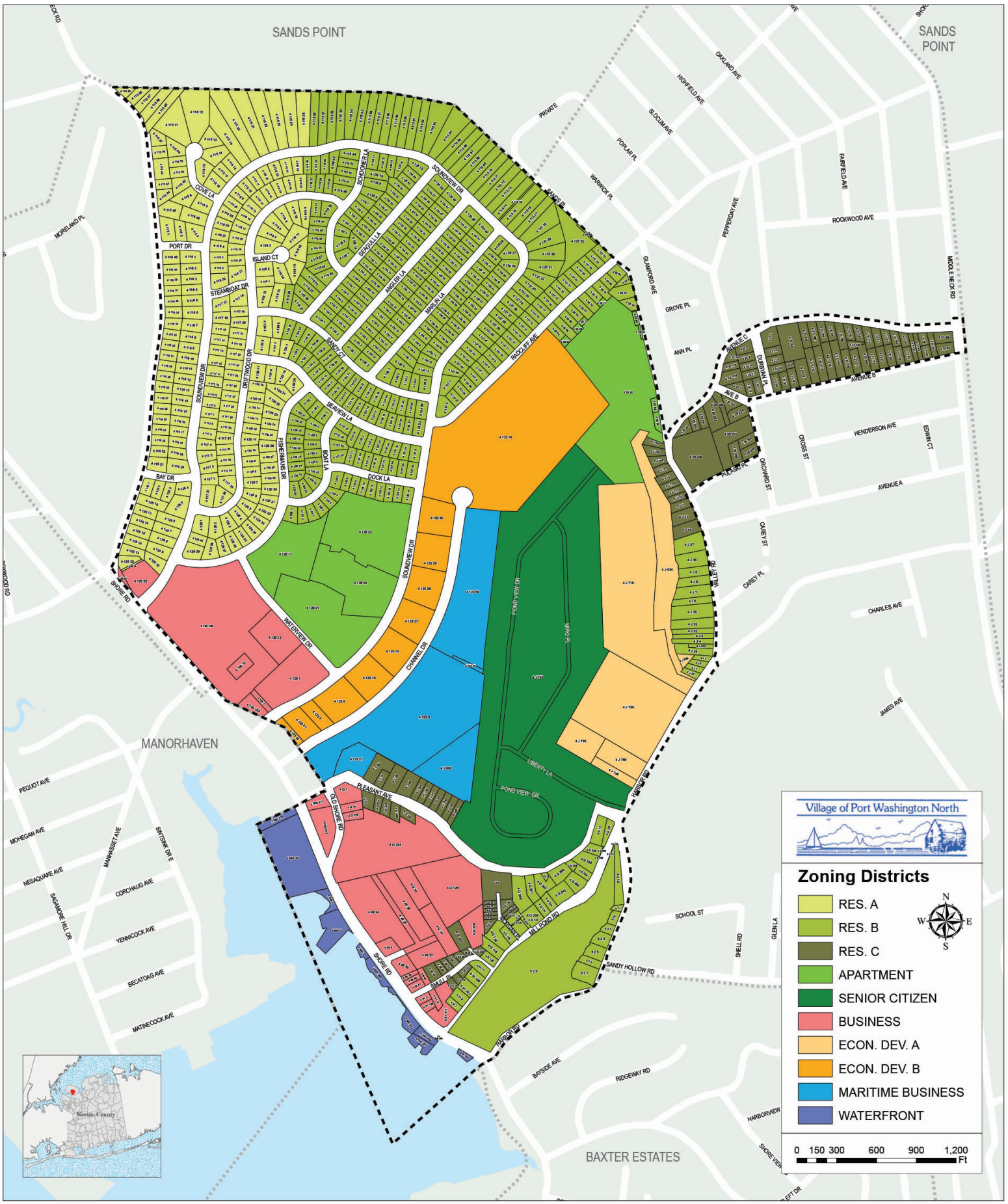
1 inch = 200 feet

Geographic Information System

Date: January 6, 2005

Copyright 2001, County of Nassau, New York

Bowne Management Systems, Inc.
235 East Jericho Turnpike
Mineola, NY 11501
Phone: 516-746-2350
Fax: 516-747-1396
www.bownegroup.com



Zoning Map

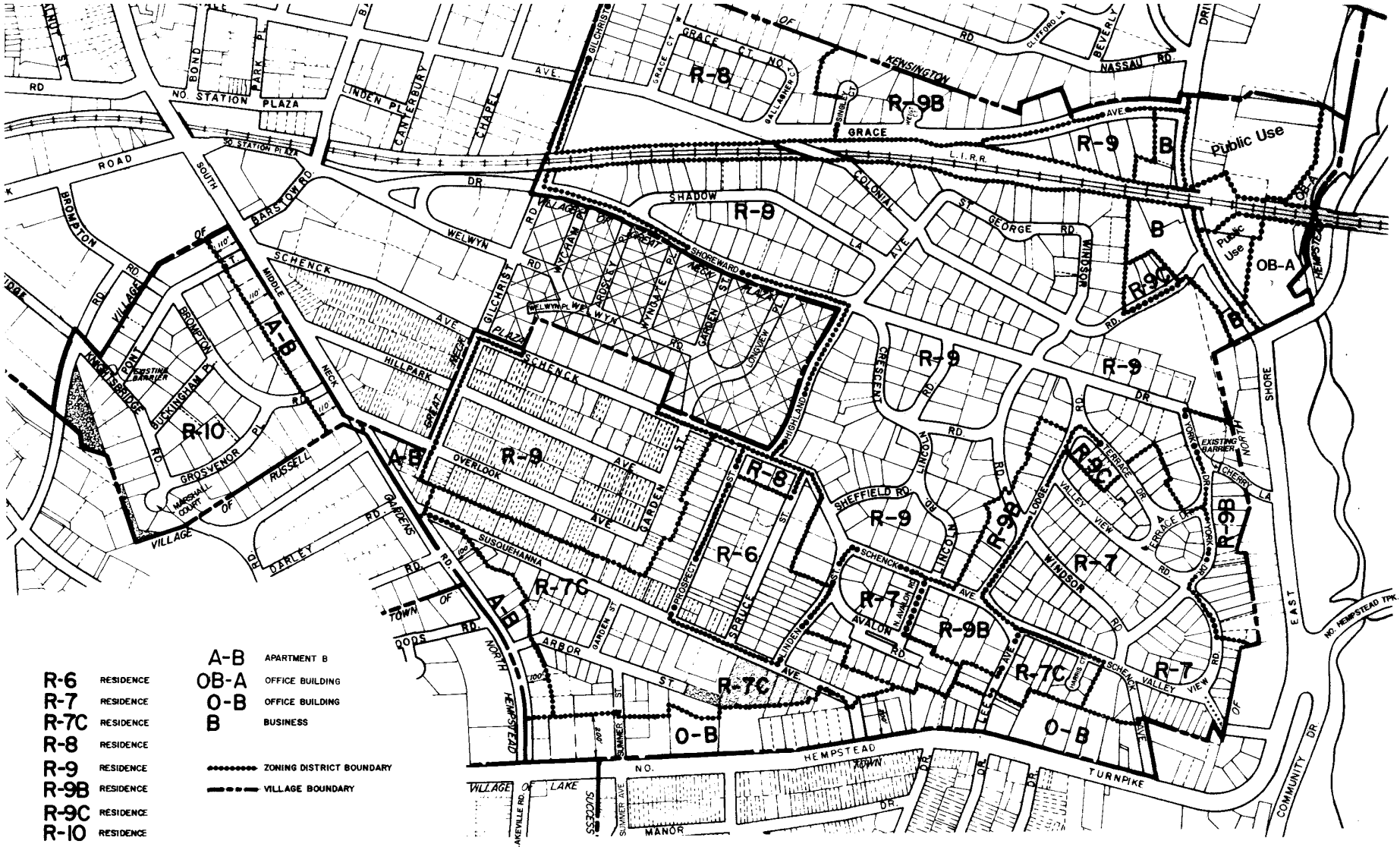
Port Washington North
Nassau County

GIS Sources: Nassau County GIS Department, Village of Port Washington North

Village of Port Washington North

Holzmacher, McLendon & Murrell, P.C
575 Broad Hollow Road
Melville, New York, 11747
p: (631) 756-8000 / f: (631)694-4122
www.h2m.com

April 2013



R-6 RESIDENCE
R-7 RESIDENCE
R-7C RESIDENCE
R-8 RESIDENCE
R-9 RESIDENCE
R-9B RESIDENCE
R-9C RESIDENCE
R-10 RESIDENCE

A-B APARTMENT B
OB-A OFFICE BUILDING
O-B OFFICE BUILDING
B BUSINESS

ZONING DISTRICT BOUNDARY
VILLAGE BOUNDARY

EXISTING STREETS
EXISTING BARRIER
EXISTING PARKS

NOTE:
Location and dimensions of all roads on this map are approximate only. Refer to tax maps, field subdivision plots, recorded deeds and recorded engineering surveys for further details. In the absence of any recorded information, locations and dimensions shall be determined from permanent markers or monuments on abutting property. In the absence of any recorded information or markers, the centerline of the road shall be that of the travelled way.

200 0 200 400
FEET

George M. Raymond Associates, Inc.
Planning Consultants October, 1993

GREAT NECK REGION NASSAU COUNTY, NEW YORK

ZONING MAP
VILLAGE OF THOMASTON

APPENDIX D
ESSENTIAL FISH HABITAT MAPPER REPORT

EFH Mapper Report

EFH Data Notice

Essential Fish Habitat (EFH) is defined by textual descriptions contained in the fishery management plans developed by the regional fishery management councils. In most cases mapping data can not fully represent the complexity of the habitats that make up EFH. This report should be used for general interest queries only and should not be interpreted as a definitive evaluation of EFH at this location. A location-specific evaluation of EFH for any official purposes must be performed by a regional expert. Please refer to the following links for the appropriate regional resources.

Greater Atlantic Regional Office
Atlantic Highly Migratory Species Management Division

Query Results

Degrees, Minutes, Seconds: Latitude = 40º 49' 20" N, Longitude = 74º 17' 11" W
Decimal Degrees: Latitude = 40.822, Longitude = -73.713

The query location intersects with spatial data representing EFH and/or HAPCs for the following species/management units.

*** W A R N I N G ***

Please note under "Life Stage(s) Found at Location" the category "ALL" indicates that all life stages of that species share the same map and are designated at the queried location.

EFH

Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
		Atlantic Butterfish	Adult, Eggs, Juvenile, Larvae	Mid-Atlantic	Atlantic Mackerel, Squid,& Butterfish Amendment 11
		Atlantic Herring	Adult, Juvenile	New England	Amendment 3 to the Atlantic Herring FMP
		Atlantic Mackerel	Adult, Eggs, Juvenile, Larvae	Mid-Atlantic	Atlantic Mackerel, Squid,& Butterfish Amendment 11
		Black Sea Bass	Juvenile	Mid-Atlantic	Summer Flounder, Scup, Black Sea Bass
		Bluefish	Adult, Juvenile	Mid-Atlantic	Bluefish
		Little Skate	Adult, Juvenile	New England	Amendment 2 to the Northeast Skate Complex FMP

Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
		Longfin Inshore Squid	Adult, Eggs, Juvenile	Mid-Atlantic	Atlantic Mackerel, Squid,& Butterfish Amendment 11
		Pollock	Adult, Juvenile	New England	Amendment 14 to the Northeast Multispecies FMP
		Red Hake	Adult, Eggs/Larvae/Juvenile	New England	Amendment 14 to the Northeast Multispecies FMP
		Sand Tiger Shark	Neonate/Juvenile	Secretarial	Amendment 10 to the 2006 Consolidated HMS FMP: EFH
		Scup	Adult, Eggs, Juvenile, Larvae	Mid-Atlantic	Summer Flounder, Scup, Black Sea Bass
		Summer Flounder	Adult, Juvenile	Mid-Atlantic	Summer Flounder, Scup, Black Sea Bass
		Windowpane Flounder	Adult, Eggs, Juvenile, Larvae	New England	Amendment 14 to the Northeast Multispecies FMP
		Winter Flounder	Eggs, Juvenile, Larvae/Adult	New England	Amendment 14 to the Northeast Multispecies FMP
		Winter Skate	Adult, Juvenile	New England	Amendment 2 to the Northeast Skate Complex FMP

Pacific Salmon EFH

No Pacific Salmon Essential Fish Habitat (EFH) were identified at the report location.

Atlantic Salmon

No Atlantic Salmon were identified at the report location.

HAPCs

Link	Data Caveats	HAPC Name	Management Council
		Summer Flounder SAV	Mid-Atlantic Fishery Management Council

EFH Areas Protected from Fishing

No EFH Areas Protected from Fishing (EFHA) were identified at the report location.

Spatial data does not currently exist for all the managed species in this area. The following is a list of species or management units for which there is no spatial data.
****For links to all EFH text descriptions see the complete data inventory: open data inventory -->**

Spatial data does not currently exist for all the managed species in this area. The following is a list of species or management units for which there is no spatial data.
****For links to all EFH text descriptions see the complete data inventory: open data inventory -->**

All EFH species have been mapped for the Greater Atlantic region,
Atlantic Highly Migratory Species EFH,
Bigeye Sand Tiger Shark,
Bigeye Sixgill Shark,
Caribbean Sharpnose Shark,
Galapagos Shark,
Narrowtooth Shark,
Sevengill Shark,
Sixgill Shark,
Smooth Hammerhead Shark,
Smalltail Shark

APPENDIX E
IPaC ENDANGERED SPECIES MAPPER REPORT

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

NOT FOR CONSULTATION

Location

Nassau County, New York



Local office

Long Island Ecological Services Field Office

(631) 286-0485
(631) 286-4003

340 Smith Road
Shirley, NY 11967-2258

NOT FOR CONSULTATION

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

---

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office

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of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Northern Long-eared Bat Myotis septentrionalis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Endangered

Birds

NAME	STATUS
Piping Plover Charadrius melodus There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/6039	Threatened
Roseate Tern Sterna dougallii dougallii No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2083	Endangered
Rufa Red Knot Calidris canutus rufa Wherever found There is **proposed** critical habitat for this species. https://ecos.fws.gov/ecp/species/1864	Threatened

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the

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endangered species themselves.

There are no critical habitats at this location.

You are still required to determine if your project(s) may have effects on all above listed species.

Bald & Golden Eagles

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

There are bald and/or golden eagles in your project area.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON

NOT FOR CONSULTATION

Bald Eagle Haliaeetus leucocephalus — Breeds Oct 15 to Aug 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Golden Eagle Aquila chrysaetos — Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1680

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

NOT FOR CONSULTATION

3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

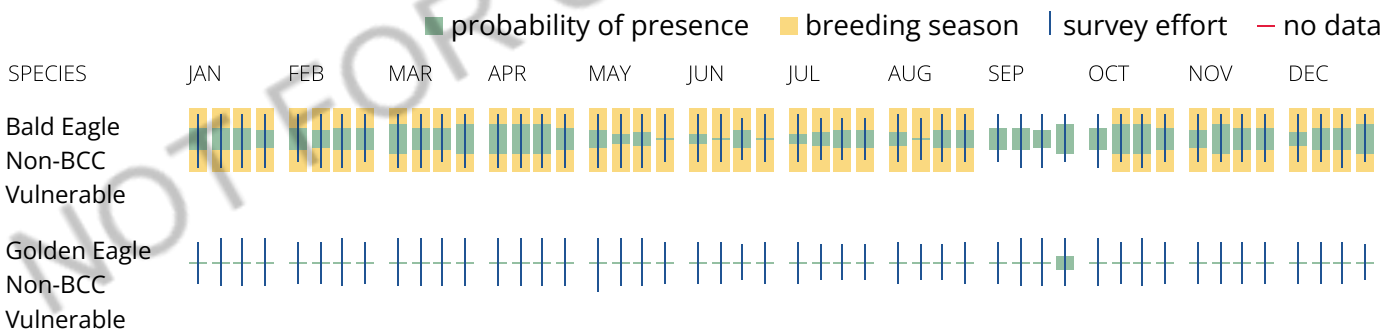
Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



NOT FOR CONSULTATION

What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply). To see a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs of bald and golden eagles in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur. Please contact your local Fish and Wildlife Service Field Office if you have questions.

NOT FOR CONSULTATION

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

The birds listed below are birds of particular concern either because they occur on the

USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

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NAME	BREEDING SEASON
American Oystercatcher Haematopus palliatus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8935	Breeds Apr 15 to Aug 31
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Oct 15 to Aug 31
Black Guillemot Cepphus grylle This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds May 15 to Sep 10
Black Scoter Melanitta nigra This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere

Black Skimmer Rynchops niger — Breeds May 20 to Sep 15
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/5234

Black-billed Cuckoo Coccyzus erythropthalmus — Breeds May 15 to Oct 10
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9399

Black-legged Kittiwake Rissa tridactyla — Breeds elsewhere
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Blue-winged Warbler Vermivora pinus — Breeds May 1 to Jun 30
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Bobolink Dolichonyx oryzivorus — Breeds May 20 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Canada Warbler Cardellina canadensis — Breeds May 20 to Aug 10
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Cerulean Warbler Dendroica cerulea — Breeds Apr 29 to Jul 20
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/2974

Chimney Swift Chaetura pelagica — Breeds Mar 15 to Aug 25
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

NOT FOR CONSULTATION

Common Eider Somateria mollissima — Breeds Jun 1 to Sep 30

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Common Loon gavia immer — Breeds Apr 15 to Oct 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/4464

Eastern Whip-poor-will Antrostomus vociferus — Breeds May 1 to Aug 20

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Golden Eagle Aquila chrysaetos — Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1680

Gull-billed Tern Gelochelidon nilotica — Breeds May 1 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9501

Kentucky Warbler Oporornis formosus — Breeds Apr 20 to Aug 20

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Lesser Yellowlegs Tringa flavipes — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9679

Long-eared Owl asio otus — Breeds Mar 1 to Jul 15

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/3631

NOT FOR CONSULTATION

Long-tailed Duck Clangula hyemalis — Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/7238

Pectoral Sandpiper Calidris melanotos — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Pomarine Jaeger Stercorarius pomarinus — Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Prairie Warbler Dendroica discolor — Breeds May 1 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Prothonotary Warbler Protonotaria citrea — Breeds Apr 1 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Purple Sandpiper Calidris maritima — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Razorbill Alca torda — Breeds Jun 15 to Sep 10

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Red-breasted Merganser Mergus serrator — Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

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Red-headed Woodpecker *Melanerpes erythrocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Red-necked Phalarope *Phalaropus lobatus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
Red-throated Loon *Gavia stellata* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
Ring-billed Gull *Larus delawarensis* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
Royal Tern *Thalasseus maximus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Apr 15 to Aug 31
Ruddy Turnstone *Arenaria interpres morinella* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Rusty Blackbird *Euphagus carolinus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Saltmarsh Sparrow *Ammodramus caudacutus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9719	Breeds May 15 to Sep 5

NOT FOR CONSULTATION

Short-billed Dowitcher Limnodromus griseus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9480	Breeds elsewhere
Sooty Tern Onychoprion fuscatus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Mar 10 to Jul 31
Surf Scoter Melanitta perspicillata This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
White-winged Scoter Melanitta fusca This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
Willet Tringa semipalmata This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 5
Wood Thrush Hylocichla mustelina This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

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Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s)

your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

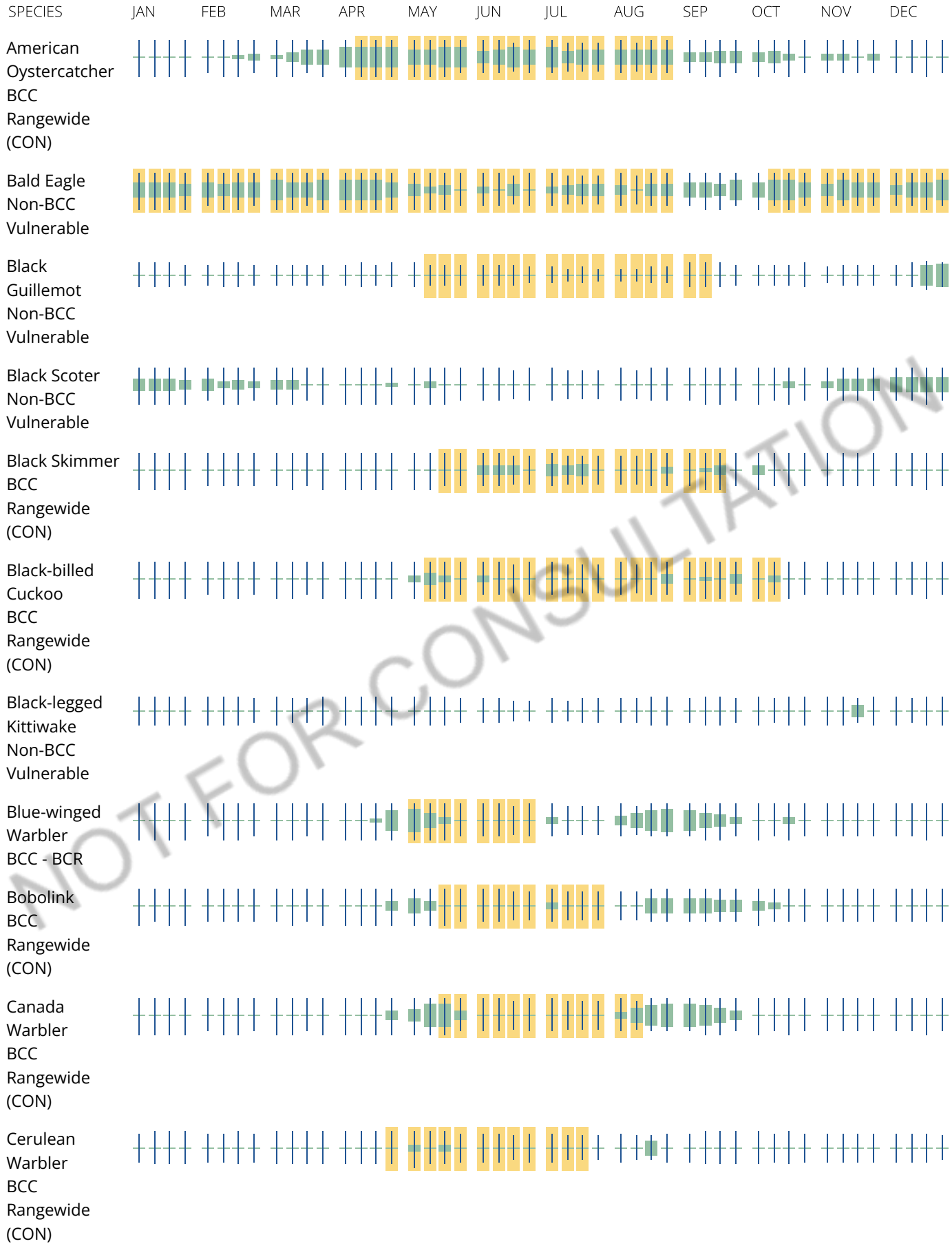
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

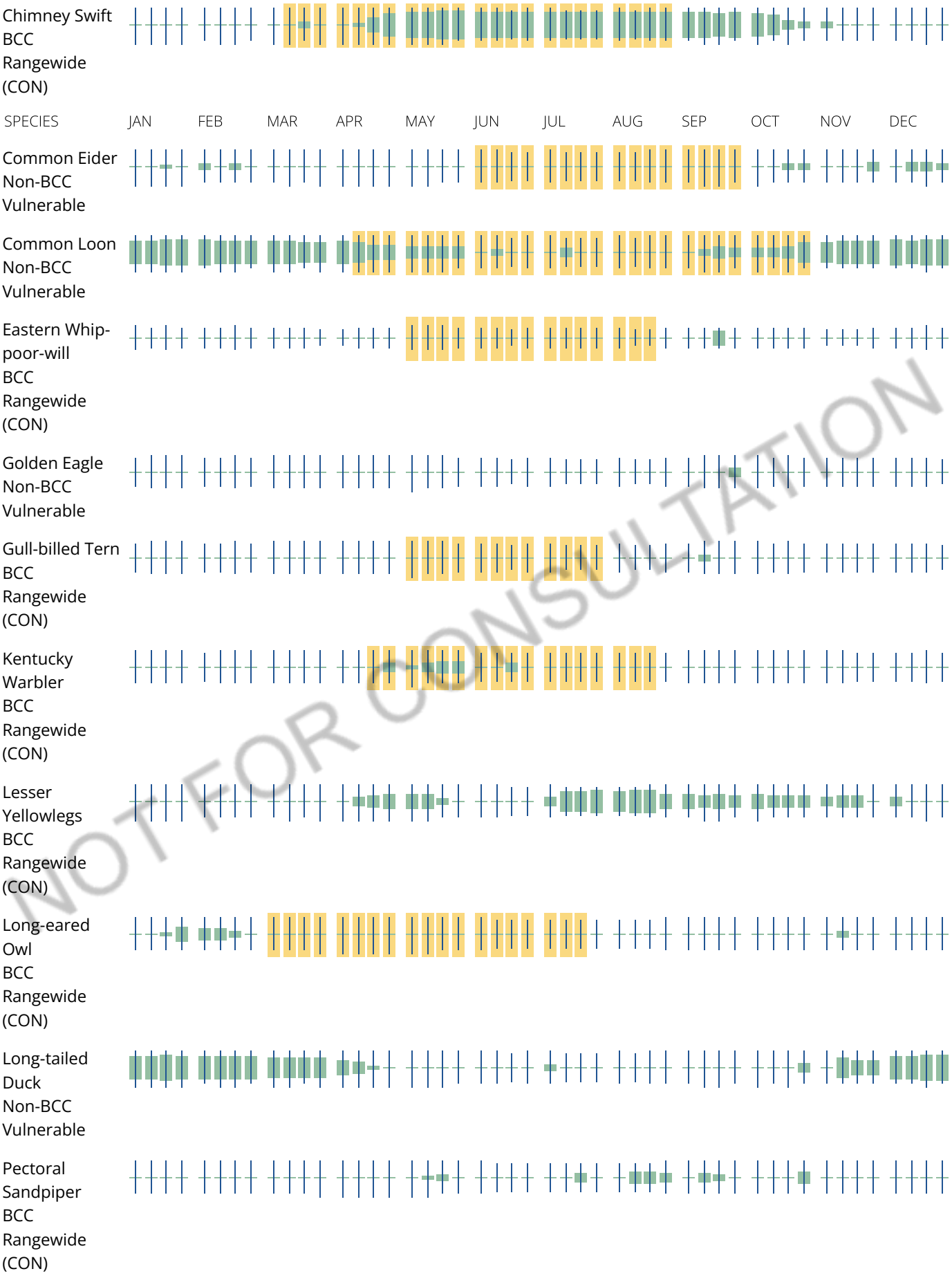
Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

▪ probability of presence ▪ breeding season | survey effort – no data

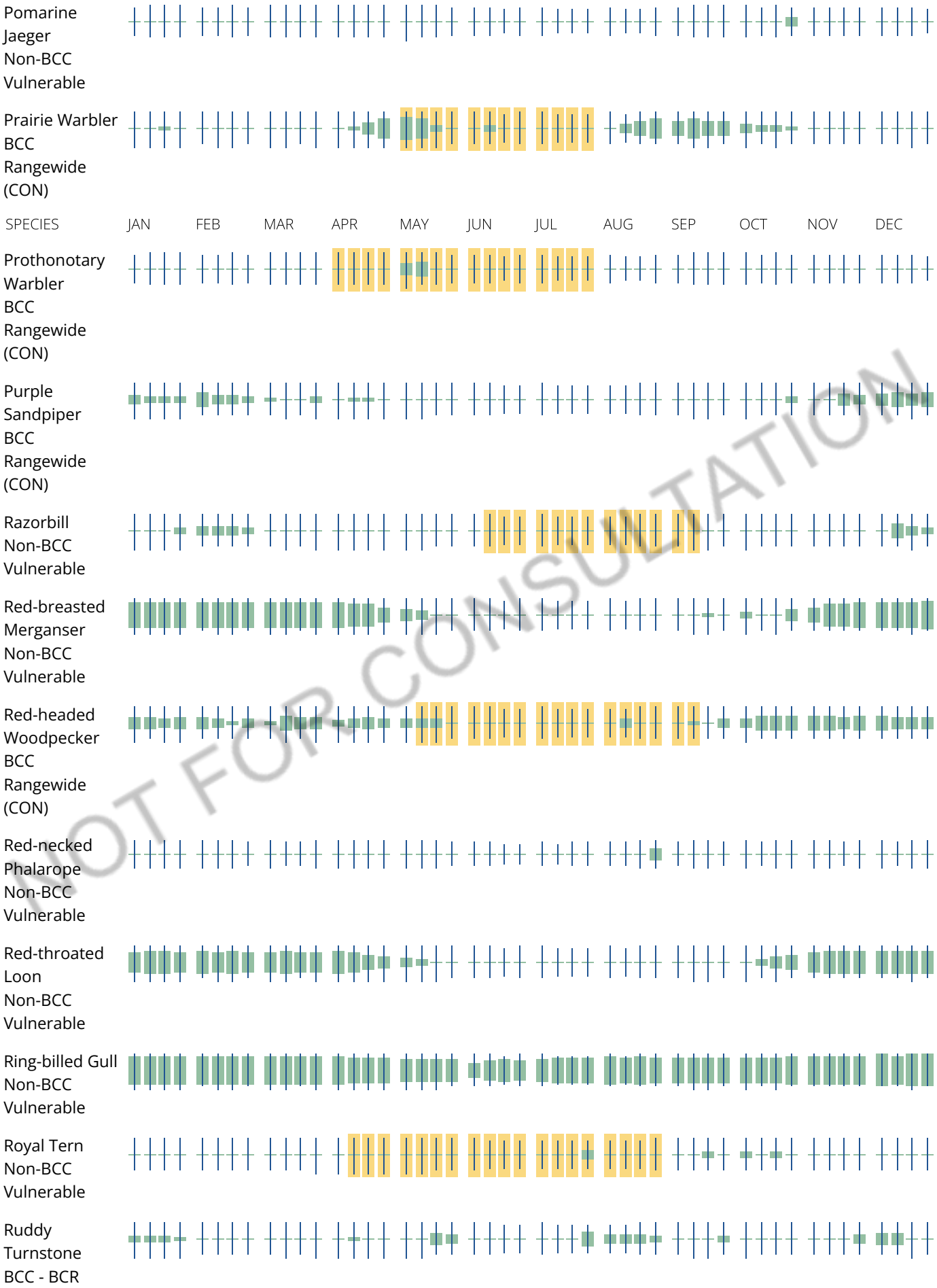
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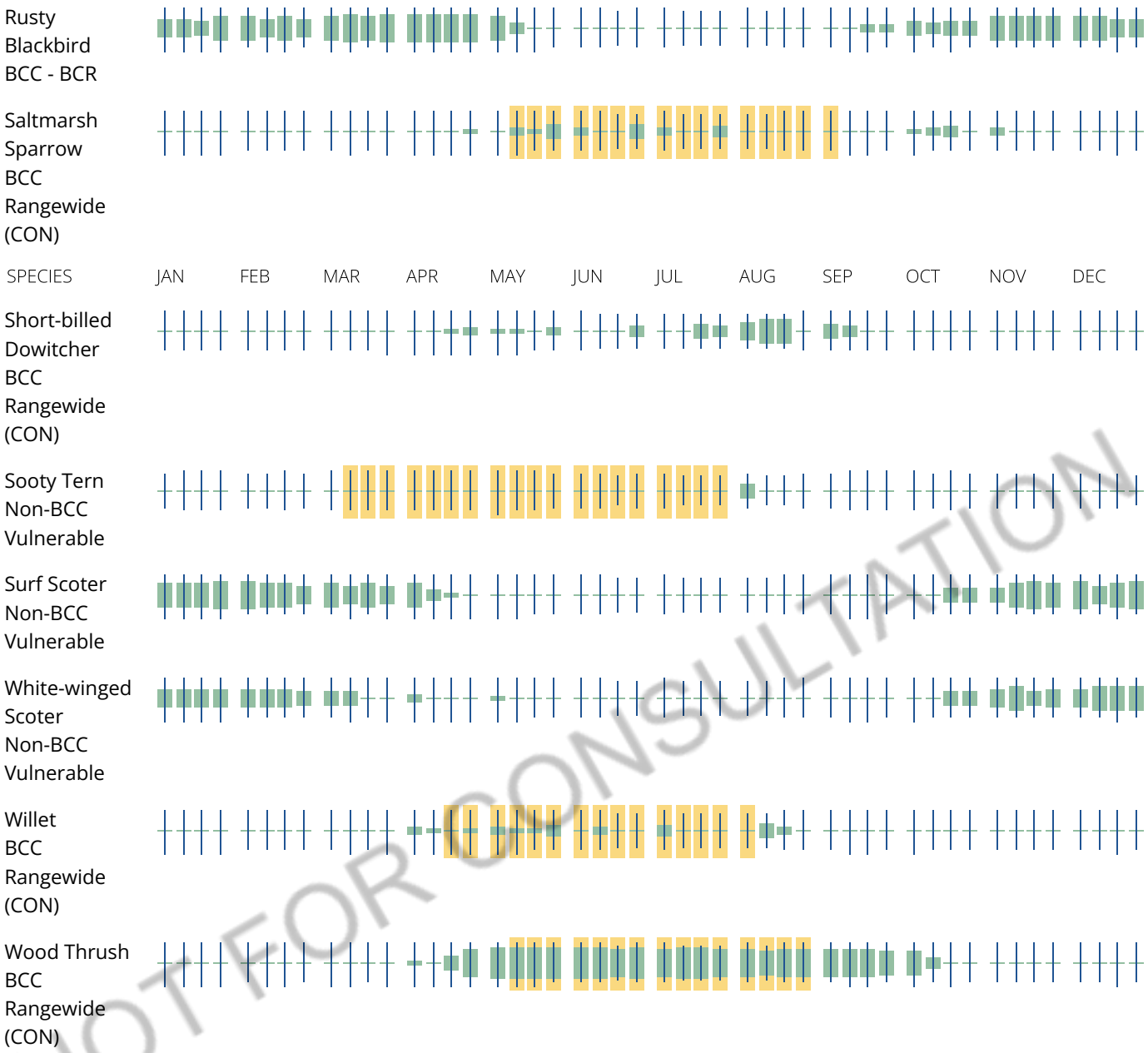
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Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other

species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid

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and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

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National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

ESTUARINE AND MARINE DEEPWATER

- E1UBL
- E1UBLx

ESTUARINE AND MARINE WETLAND

- E2US2N
- E2SS1P
- E2EM1P
- E2US2P

FRESHWATER EMERGENT WETLAND

NOT FOR CONSULTATION

PEM1C
PEM1E

FRESHWATER FORESTED/SHRUB WETLAND

PFO1E
PFO1A
PFO1/4A
PFO1C
PSS1A
PFO4C
PFO4/1C
PSS1C
PSS/FO1A
PSS1F
PFO1Fx

FRESHWATER POND

PUBHx
PUBHh
PUBH
PUBFx
PUBFh

LAKE

L1UBHh

RIVERINE

R2UBH
R5UBH

NOT FOR CONSULTATION

A full description for each wetland code can be found at the National Wetlands Inventory website

NOTE: This initial screening does **not** replace an on-site delineation to determine whether wetlands occur. Additional information on the NWI data is provided below.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image

analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NOT FOR CONSULTATION

APPENDIX F
ESTIMATED RUNOFF AND POLLUTANT LOAD ANALYSIS

Kensington Subwatershed Pollutant Load Model
Primary Sources - Land Use

PRIMARY SOURCES - Land Use

Watershed

				Concentrations				Annual Loading Rates			
		Area (Acres)	Impervious Cover (%)	Turf Cover (%)	TN (mg/l)	TP (mg/l)	TSS (mg/l)	FC (MPN/100 ml)	TN (lb/acre)	TP (lb/acre)	TSS (lbs/acre)
Category	**Detailed Description**										
Residential	**LDR (<1du/acre)**	4.9	12%	70%	2.1	0.31	49	20000	4.6	0.7	107
	MDR (1-4 du/acre)	103.99	21%	63%	2.1	0.31	49	20000	6.1	0.9	142
	HDR (>4 du/acre)	124.26	33%	54%	2.1	0.31	49	20000	8.1	1.2	190
	Multifamily	6	44%	45%	2.1	0.31	49	20000	10.0	1.5	233
				0%	2.1	0.31	49	20000	0.4	0.1	10
Recreation and Open Space		21.3	10%	90%	2.1	0.31	49	20000	4.7	0.7	110
		0	0%	0%	2.1	0.31	49	20000	0.4	0.1	10
Commercial	**Commercial**	18.64	72%	22%	2.1	0.22	43	20000	14.7	1.5	302
				0%	2.1	0.22	43	20000	0.4	0.0	8
Institutional		24.02	72%	22%	2.1	0.22	43	20000	14.7	1.5	302
				0%	2.1	0.22	43	20000	0.4	0.0	8
Roadway	**Roadway**	81.19	80%	16%	2.3	0.25	134	20000	17.6	1.9	1027
			50%	50%	2.3	0.25	134	20000	12.4	1.3	720
Industrial	**Industrial**	0.24	53%	38%	2.2	0.25	81	20000	12.1	1.4	444
				0%	2.2	0.25	81	20000	0.4	0.0	16
Vacant/Unknown	**Vacant/Unknown**	4.87	12%	70%	2.1	0.31	49	20000	4.6	0.7	100
									2.5	0.2	100
Open Water	**Open Water**	0							12.8	0.5	155
Active Construction	**Active Construction**				1	0.2	680	0	4.8816	0.97632	3319.488
Total	**Total Acres**	**389.4**	**165**	**184**					**10.04560604**	**1.270759711**	**358.1298331**
Stormwater Load											
Non-Stormwater Load											

Partitioning Coefficients for Rural and Forest Land

Pollutant	TN	TP	TSS	FC
Fraction as Storm Load	50%	70%	90%	100%

Watershed Data

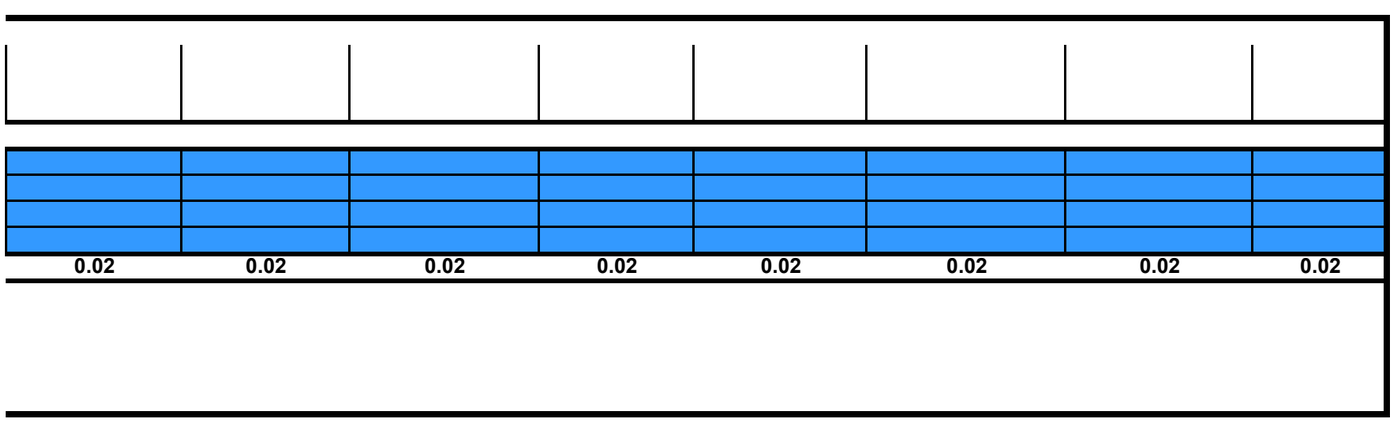
Annual Rainfall (inches)	48
Watershed Area (acres)	389
Stream Length (miles)	0

Soils Information	Soil Fraction(%)	Runoff Coefficients: Impervious	Turf	Forest	Rural	Land-Use Specific Runoff Coefficients: Active Construction					
HYDROLOGIC SOIL GROUP											
A Soils	**100%**	0.95	0.15	0.02	0.02	0.5					
B Soils	**0%**	0.95	0.20	0.03	0.03	0.5					
C Soils	0%	0.95	0.22	0.04	0.04	0.5					
D Soils	**0%**	0.95	0.25	0.05	0.05	0.5					
		0.95	**0.15**	**0.02**	**0.02**	**0.5**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**

DEPTH TO GROUNDWATER	
<3 Feet	**5%**
3-5 Feet	**5%**
>5 Feet	90%

Kensington Subwatershed Pollutant Load Model
Primary Sources - Land Use

Annual Load						Annual Runoff Volume	
FC (# billion/acre)	Runoff (in/year)	TN (lb/year)	TP (lb/year)	TSS (lbs/year)	FC (# billion/year)	(ac-inches)	(acre-feet)
199	10	22.4	3.3	523.0	972.9	47.2	3.9
265	13	634.2	93.6	14,798.2	27,527.8	1,336.3	111.4
353	17	1,010.4	149.1	23,574.9	43,854.4	2,128.9	177.4
434	21	60.0	8.9	1,399.1	2,602.7	126.3	10.5
18	1	0.0	0.0	0.0	0.0	0.0	0.0
205	10	100.4	14.8	2,343.7	4,359.7	211.6	17.6
18	1	0.0	0.0	0.0	0.0	0.0	0.0
640	31	274.7	28.8	5,624.3	11,922.2	578.7	48.2
18	1	0.0	0.0	0.0	0.0	0.0	0.0
639	31	353.7	37.1	7,242.3	15,352.2	745.3	62.1
18	1	0.0	0.0	0.0	0.0	0.0	0.0
698	34	1,430.8	155.5	83,360.2	56,703.8	2,752.6	229.4
489	24	0.0	0.0	0.0	0.0	0.0	0.0
500	24	2.9	0.3	106.6	120.0	5.8	0.5
18	1	0.0	0.0	0.0	0.0	0.0	0.0
39	10	22.4	3.4	487.0	189.9	46.9	3.9
12	-	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0
	22	0.0	0.0	0.0	0.0	0.0	0.0
420.1372444		**3,912**	**495**	**139,459**	**163,606**	**7,980**	**665**
		3,901	**494**	**139,411**	**163,606**	**7,980**	**665**
		11	**1**	**49**	**-**		



Kings Point Creek Subwatershed Pollutant Load Model
Primary Sources - Land Use

PRIMARY SOURCES - Land Use

Watershed

Category	Detailed Description	Area (Acres)	Impervious Cover (%)	Concentrations: Turf Cover (%)	Concentrations: TN (mg/l)	Concentrations: TP (mg/l)	Concentrations: TSS (mg/l)	Annual Loading Rates: FC (MPN/100 ml)	Annual Loading Rates: TN (lb/acre)	Annual Loading Rates: TP (lb/acre)	Annual Loading Rates: TSS (lbs/acre)
Residential	LDR (<1du/acre)	260.5	12%	70%	2.1	0.31	49	20000	4.6	0.7	107
	MDR (1-4 du/acre)	302.97	21%	63%	2.1	0.31	49	20000	6.1	0.9	142
	HDR (>4 du/acre)	60.36	33%	54%	2.1	0.31	49	20000	8.1	1.2	190
	Multifamily	8.13	44%	45%	2.1	0.31	49	20000	10.0	1.5	233
				0%	2.1	0.31	49	20000	0.4	0.1	10
Recreation and Open Space		8.76	10%	90%	2.1	0.31	49	20000	4.7	0.7	110
		0	0%	0%	2.1	0.31	49	20000	0.4	0.1	10
Commercial	Commercial	0	72%	22%	2.1	0.22	43	20000	14.7	1.5	302
				0%	2.1	0.22	43	20000	0.4	0.0	8
Institutional		17.96	72%	22%	2.1	0.22	43	20000	14.7	1.5	302
				0%	2.1	0.22	43	20000	0.4	0.0	8
Roadway	Roadway	104.72641	80%	16%	2.3	0.25	134	20000	17.6	1.9	1027
			50%	50%	2.3	0.25	134	20000	12.4	1.3	720
Industrial	Industrial	0	53%	38%	2.2	0.25	81	20000	12.1	1.4	444
				0%	2.2	0.25	81	20000	0.4	0.0	16
Vacant/Unknown	Vacant/Unknown	63.52	12%	70%	2.1	0.31	49	20000	4.6	0.7	100
									2.5	0.2	100
Open Water	Open Water	0							12.8	0.5	155
Active Construction	Active Construction				1	0.2	680	0	4.8816	0.97632	3319.488
Total	Total Acres	826.926	224	484					7.32229335	0.981941286	247.3300788
Stormwater Load											
Non-Stormwater Load											

Partitioning Coefficients for Rural and Forest Land

Pollutant	TN	TP	TSS	FC
Fraction as Storm Load	50%	70%	90%	100%

Watershed Data

Annual Rainfall (inches)	48
Watershed Area (acres)	827
Stream Length (miles)	0

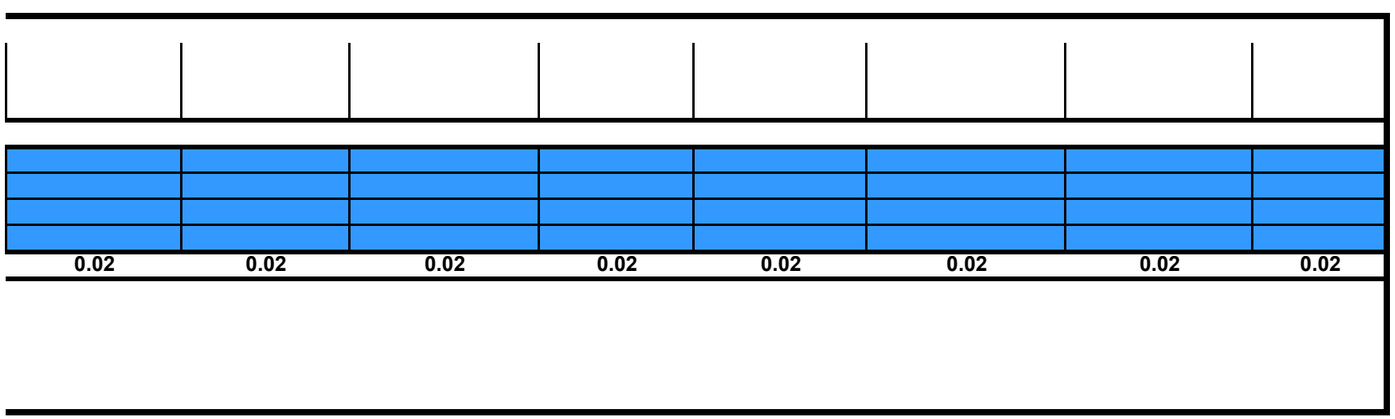
Soils Information

HYDROLOGIC SOIL GROUP	Soil Fraction(%)	Runoff Coefficients: Impervious	Turf	Forest	Rural	Land-Use Specific Runoff Coefficients: Active Construction					
A Soils	100%	0.95	0.15	0.02	0.02	0.5					
B Soils	0%	0.95	0.20	0.03	0.03	0.5					
C Soils	0%	0.95	0.22	0.04	0.04	0.5					
D Soils	0%	0.95	0.25	0.05	0.05	0.5					
		0.95	0.15	0.02	0.02	0.5	0.02	0.02	0.02	0.02	0.02

DEPTH TO GROUNDWATER	
<3 Feet	2%
3-5 Feet	0%
>5 Feet	98%

Kings Point Creek Subwatershed Pollutant Load Model
Primary Sources - Land Use

Annual Load						Annual Runoff Volume	
FC (# billion/acre)	Runoff (in/year)	TN (lb/year)	TP (lb/year)	TSS (lbs/year)	FC (# billion/year)	(ac-inches)	(acre-feet)
199	10	1,191.7	175.9	27,805.7	51,724.6	2,510.9	209.2
265	13	1,847.7	272.8	43,113.8	80,200.9	3,893.2	324.4
353	17	490.8	72.4	11,451.7	21,302.5	1,034.1	86.2
434	21	81.2	12.0	1,895.8	3,526.7	171.2	14.3
18	1	0.0	0.0	0.0	0.0	0.0	0.0
205	10	41.3	6.1	963.9	1,793.0	87.0	7.3
18	1	0.0	0.0	0.0	0.0	0.0	0.0
640	31	0.0	0.0	0.0	0.0	0.0	0.0
18	1	0.0	0.0	0.0	0.0	0.0	0.0
639	31	264.5	27.7	5,415.2	11,479.0	557.2	46.4
18	1	0.0	0.0	0.0	0.0	0.0	0.0
698	34	1,845.6	200.6	107,525.7	73,141.9	3,550.6	295.9
489	24	0.0	0.0	0.0	0.0	0.0	0.0
500	24	0.0	0.0	0.0	0.0	0.0	0.0
18	1	0.0	0.0	0.0	0.0	0.0	0.0
39	10	292.2	44.5	6,352.0	2,477.3	612.3	51.0
12	-	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0
	22	0.0	0.0	0.0	0.0	0.0	0.0
297.0588539		**6,055**	**812**	**204,524**	**245,646**	**12,417**	**1,035**
		5,909	**799**	**203,889**	**245,646**	**12,417**	**1,035**
		146	**13**	**635**	**-**		



Kings Point Pond Subwatershed Pollutant Load Model
Primary Sources - Land Use

PRIMARY SOURCES - Land Use

Watershed

Category	Detailed Description	Area (Acres)	Impervious Cover (%)	Concentrations: Turf Cover (%)	Concentrations: TN (mg/l)	Concentrations: TP (mg/l)	Concentrations: TSS (mg/l)	Annual Loading Rates: FC (MPN/100 ml)	Annual Loading Rates: TN (lb/acre)	Annual Loading Rates: TP (lb/acre)	Annual Loading Rates: TSS (lbs/acre)
Residential	LDR (<1du/acre)	81.37	12%	70%	2.1	0.31	49	20000	4.6	0.7	107
	MDR (1-4 du/acre)	32.96	21%	63%	2.1	0.31	49	20000	6.1	0.9	142
	HDR (>4 du/acre)	0.36	33%	54%	2.1	0.31	49	20000	8.1	1.2	190
	Multifamily	6.22	44%	45%	2.1	0.31	49	20000	10.0	1.5	233
Recreation and Open Space		0	10%	90%	2.1	0.31	49	20000	4.7	0.7	110
Commercial	Commercial	0	72%	22%	2.1	0.22	43	20000	14.7	1.5	302
				0%	2.1	0.22	43	20000	0.4	0.0	8
Institutional			72%	22%	2.1	0.22	43	20000	14.7	1.5	302
				0%	2.1	0.22	43	20000	0.4	0.0	8
Roadway	Roadway	18.35	80%	16%	2.3	0.25	134	20000	17.6	1.9	1027
			50%	50%	2.3	0.25	134	20000	12.4	1.3	720
Industrial	Industrial	0	53%	38%	2.2	0.25	81	20000	12.1	1.4	444
				0%	2.2	0.25	81	20000	0.4	0.0	16
Forest	Forest	14.45	0%	0%	2.1	0.22	43	20000	2.5	0.2	100
									2.5	0.2	100
Vacant/Unknown	Vacant/Unknown	15.54	12%	70%	2.1	0.31	49	20000	4.6	0.7	107
									4.6	0.7	100
Open Water	Open Water	0							12.8	0.5	155
Active Construction	Active Construction				1	0.2	680	0	4.8816	0.97632	3319.488
Total	Total Acres	169.250	36	95					6.315692898	0.843513962	217.6586353
Stormwater Load											
Non-Stormwater Load											

Partitioning Coefficients for Rural and Forest Land

Pollutant	TN	TP	TSS	FC
Fraction as Storm Load	50%	70%	90%	100%

Watershed Data

Annual Rainfall (inches)	48
Watershed Area (acres)	169
Stream Length (miles)	0

Soils Information

HYDROLOGIC SOIL GROUP	Soil Fraction(%)	Runoff Coefficients: Impervious	Turf	Forest	Rural	Land-Use Specific Runoff Coefficients: Active Construction					
A Soils	100%	0.95	0.15	0.02	0.02	0.5					
B Soils	0%	0.95	0.20	0.03	0.03	0.5					
C Soils	0%	0.95	0.22	0.04	0.04	0.5					
D Soils	0%	0.95	0.25	0.05	0.05	0.5					
		0.95	0.15	0.02	0.02	0.5	0.02	0.02	0.02	0.02	0.02

DEPTH TO GROUNDWATER	
<3 Feet	1%
3-5 Feet	0%
>5 Feet	99%

Kings Point Pond Subwatershed Pollutant Load Model
Primary Sources - Land Use

Annual Load						Annual Runoff Volume	
FC (# billion/acre)	Runoff (in/year)	TN (lb/year)	TP (lb/year)	TSS (lbs/year)	FC (# billion/year)	(ac-inches)	(acre-feet)
199	10	372.2	54.9	8,685.4	16,156.7	784.3	65.4
265	13	201.0	29.7	4,690.3	8,725.0	423.5	35.3
353	17	2.9	0.4	68.3	127.1	6.2	0.5
434	21	62.2	9.2	1,450.4	2,698.1	131.0	10.9
205	10	0.0	0.0	0.0	0.0	0.0	0.0
640	31	0.0	0.0	0.0	0.0	0.0	0.0
18	1	0.0	0.0	0.0	0.0	0.0	0.0
639	31	0.0	0.0	0.0	0.0	0.0	0.0
18	1	0.0	0.0	0.0	0.0	0.0	0.0
698	34	323.4	35.2	18,840.5	12,815.8	622.1	51.8
489	24	0.0	0.0	0.0	0.0	0.0	0.0
500	24	0.0	0.0	0.0	0.0	0.0	0.0
18	1	0.0	0.0	0.0	0.0	0.0	0.0
12	1	36.1	2.9	1,445.0	173.4	12.5	1.0
12	-	0.0	0.0	0.0	0.0	0.0	0.0
199	10	71.1	10.5	1,658.7	3,085.6	149.8	12.5
39	-	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0
	22	0.0	0.0	0.0	0.0	0.0	0.0
258.6810274		**1,069**	**143**	**36,839**	**43,782**	**2,129**	**177**
		1,015	**139**	**36,528**	**43,782**	**2,129**	**177**
		54	**4**	**310**	**-**		

		Vacant/Unknown					
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02

Leeds Pond Subwatershed Pollutant Load Model
Primary Sources - Land Use

PRIMARY SOURCES - Land Use

Watershed

Category	Detailed Description	Area (Acres)	Impervious Cover (%)	Concentrations: Turf Cover (%)	TN (mg/l)	TP (mg/l)	TSS (mg/l)	Annual Loading Rates: FC (MPN/100 ml)	TN (lb/acre)	TP (lb/acre)	TSS (lbs/acre)
Residential	LDR (<1du/acre)	211.97	12%	70%	2.1	0.31	49	20000	4.6	0.7	107
	MDR (1-4 du/acre)	612.45	21%	63%	2.1	0.31	49	20000	6.1	0.9	142
	HDR (>4 du/acre)	415.75	33%	54%	2.1	0.31	49	20000	8.1	1.2	190
	Multifamily	34.38	44%	45%	2.1	0.31	49	20000	10.0	1.5	233
				0%	2.1	0.31	49	20000	0.4	0.1	10
Recreation and Open Space		269.44	10%	90%	2.1	0.31	49	20000	4.7	0.7	110
		0	0%	0%	2.1	0.31	49	20000	0.4	0.1	10
Commercial	Commercial	51.41	72%	22%	2.1	0.22	43	20000	14.7	1.5	302
				0%	2.1	0.22	43	20000	0.4	0.0	8
Institutional		147.7	72%	22%	2.1	0.22	43	20000	14.7	1.5	302
				0%	2.1	0.22	43	20000	0.4	0.0	8
Roadway	Roadway	361.22	80%	16%	2.3	0.25	134	20000	17.6	1.9	1027
			50%	50%	2.3	0.25	134	20000	12.4	1.3	720
Industrial	Industrial	0.98	53%	38%	2.2	0.25	81	20000	12.1	1.4	444
				0%	2.2	0.25	81	20000	0.4	0.0	16
Vacant/Unknown	Vacant/Unknown	67.12	12%	70%	2.1	0.31	49	20000	4.6	0.7	107
									2.5	0.2	100
Open Water	Open Water	0							12.8	0.5	155
Active Construction	Active Construction				1	0.2	680	0	4.8816	0.97632	3319.488
Total	Total Acres	2172.42	774	1166					8.891720794	1.140495525	306.0371208
Stormwater Load											
Non-Stormwater Load											

Partitioning Coefficients for Rural and Forest Land

Pollutant	TN	TP	TSS	FC
Fraction as Storm Load	50%	70%	90%	100%

Watershed Data

Annual Rainfall (inches)	48
Watershed Area (acres)	2172
Stream Length (miles)	0

Soils Information

	Soil Fraction(%)	Runoff Coefficients: Impervious	Turf	Forest	Rural	Land-Use Specific Runoff Coefficients: Active Construction					
HYDROLOGIC SOIL GROUP											
A Soils	100%	0.95	0.15	0.02	0.02	0.5					
B Soils	0%	0.95	0.20	0.03	0.03	0.5					
C Soils	0%	0.95	0.22	0.04	0.04	0.5					
D Soils	0%	0.95	0.25	0.05	0.05	0.5					
		0.95	0.15	0.02	0.02	0.5	0.02	0.02	0.02	0.02	0.02

DEPTH TO GROUNDWATER	
<3 Feet	5%
3-5 Feet	5%
>5 Feet	90%

Leeds Pond Subwatershed Pollutant Load Model
Primary Sources - Land Use

Annual Load						Annual Runoff Volume	
FC (# billion/acre)	Runoff (in/year)	TN (lb/year)	TP (lb/year)	TSS (lbs/year)	FC (# billion/year)	(ac-inches)	(acre-feet)
199	10	969.7	143.1	22,625.7	42,088.5	2,043.1	170.3
265	13	3,735.2	551.4	87,154.0	162,125.1	7,870.1	655.8
353	17	3,380.5	499.0	78,877.2	146,728.3	7,122.7	593.6
434	21	343.6	50.7	8,017.1	14,913.4	724.0	60.3
18	1	0.0	0.0	0.0	0.0	0.0	0.0
205	10	1,270.6	187.6	29,646.8	55,149.4	2,677.2	223.1
18	1	0.0	0.0	0.0	0.0	0.0	0.0
640	31	757.6	79.4	15,512.0	32,882.0	1,596.2	133.0
18	1	0.0	0.0	0.0	0.0	0.0	0.0
639	31	2,174.9	227.8	44,533.5	94,401.1	4,582.6	381.9
18	1	0.0	0.0	0.0	0.0	0.0	0.0
698	34	6,365.8	691.9	370,875.2	252,279.4	12,246.6	1,020.5
489	24	0.0	0.0	0.0	0.0	0.0	0.0
500	24	11.8	1.3	435.4	489.9	23.8	2.0
18	1	0.0	0.0	0.0	0.0	0.0	0.0
199	10	307.0	45.3	7,164.4	13,327.3	647.0	53.9
12	-	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0
	22	0.0	0.0	0.0	0.0	0.0	0.0
374.8743228		**19,317**	**2,478**	**664,841**	**814,384**	**39,533**	**3,294**
		19,163	**2,464**	**664,125**	**814,384**	**39,533**	**3,294**
		154	**14**	**716**	**-**		

0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02

Mill/Baxter Pond Subwatershed Pollutant Load Model
Primary Sources - Land Use

PRIMARY SOURCES - Land Use

Watershed

Category	Detailed Description	Area (Acres)	Impervious Cover (%)	Concentrations: Turf Cover (%)	Concentrations: TN (mg/l)	Concentrations: TP (mg/l)	Concentrations: TSS (mg/l)	Annual Loading Rates: FC (MPN/100 ml)	Annual Loading Rates: TN (lb/acre)	Annual Loading Rates: TP (lb/acre)	Annual Loading Rates: TSS (lbs/acre)
Residential	LDR (<1du/acre)	241.98	12%	70%	2.1	0.31	49	20000	4.6	0.7	107
	MDR (1-4 du/acre)	128.6	21%	63%	2.1	0.31	49	20000	6.1	0.9	142
	HDR (>4 du/acre)	180.51	33%	54%	2.1	0.31	49	20000	8.1	1.2	190
	Multifamily	30.3	44%	45%	2.1	0.31	49	20000	10.0	1.5	233
				0%	2.1	0.31	49	20000	0.4	0.1	10
Recreation and Open Space		183.9	10%	90%	2.1	0.31	49	20000	4.7	0.7	110
		0	0%	0%	2.1	0.31	49	20000	0.4	0.1	10
Commercial	Commercial	54.28	72%	22%	2.1	0.22	43	20000	14.7	1.5	302
				0%	2.1	0.22	43	20000	0.4	0.0	8
Institutional		60.37	72%	22%	2.1	0.22	43	20000	14.7	1.5	302
				0%	2.1	0.22	43	20000	0.4	0.0	8
Roadway	Roadway	158.2	80%	16%	2.3	0.25	134	20000	17.6	1.9	1027
			50%	50%	2.3	0.25	134	20000	12.4	1.3	720
Industrial	Industrial	2.94	53%	38%	2.2	0.25	81	20000	12.1	1.4	444
				0%	2.2	0.25	81	20000	0.4	0.0	16
Vacant/Unknown	Vacant/Unknown	13.65	12%	70%	2.1	0.31	49	20000	4.6	0.7	107
									2.5	0.2	100
Open Water	Open Water	0							12.8	0.5	155
Active Construction	Active Construction				1	0.2	680	0	4.8816	0.97632	3319.488
Total	Total Acres	**1054.730**	**360**	**589**					**8.631277676**	**1.101490582**	**289.5987313**
Stormwater Load											
Non-Stormwater Load											

Partitioning Coefficients for Rural and Forest Land

Pollutant	TN	TP	TSS	FC
Fraction as Storm Load	50%	70%	90%	100%

Watershed Data

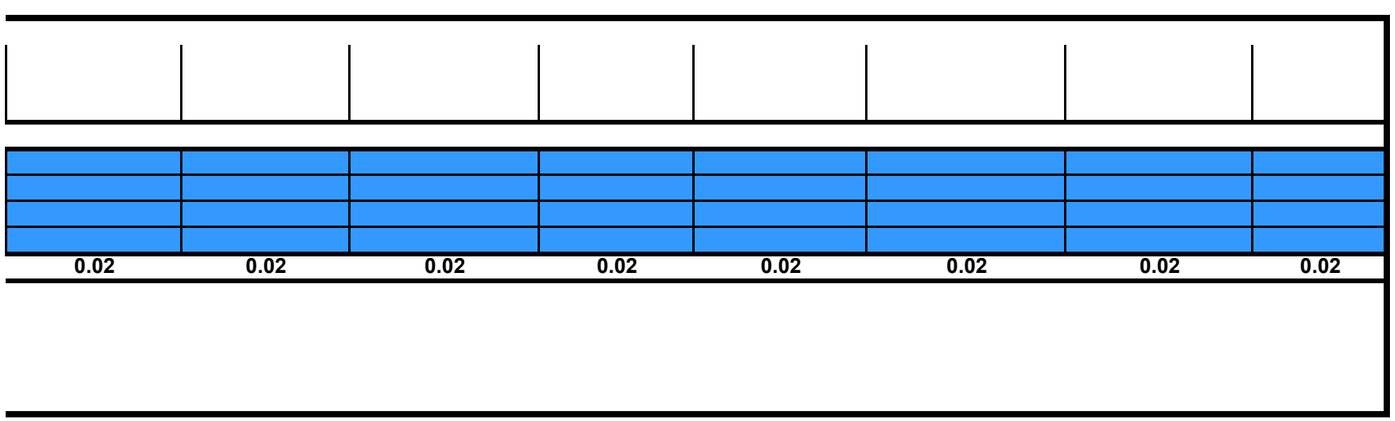
Annual Rainfall (inches)	48
Watershed Area (acres)	1055
Stream Length (miles)	0

Soils Information	Soil Fraction(%)	Runoff Coefficients: Impervious	Turf	Forest	Rural	Land-Use Specific Runoff Coefficients: Active Construction					
HYDROLOGIC SOIL GROUP											
A Soils	100%	0.95	0.15	0.02	0.02	0.5					
B Soils	0%	0.95	0.20	0.03	0.03	0.5					
C Soils	0%	0.95	0.22	0.04	0.04	0.5					
D Soils	0%	0.95	0.25	0.05	0.05	0.5					
		0.95	**0.15**	**0.02**	**0.02**	**0.5**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**

DEPTH TO GROUNDWATER	
<3 Feet	5%
3-5 Feet	5%
>5 Feet	90%

Mill/Baxter Pond Subwatershed Pollutant Load Model
Primary Sources - Land Use

Annual Load						Annual Runoff Volume	
FC (# billion/acre)	Runoff (in/year)	TN (lb/year)	TP (lb/year)	TSS (lbs/year)	FC (# billion/year)	(ac-inches)	(acre-feet)
199	10	1,107.0	163.4	25,828.9	48,047.3	2,332.4	194.4
265	13	784.3	115.8	18,300.3	34,042.4	1,652.5	137.7
353	17	1,467.7	216.7	34,246.8	63,706.4	3,092.5	257.7
434	21	302.8	44.7	7,065.6	13,143.6	638.0	53.2
18	1	0.0	0.0	0.0	0.0	0.0	0.0
205	10	867.2	128.0	20,234.7	37,640.9	1,827.2	152.3
18	1	0.0	0.0	0.0	0.0	0.0	0.0
640	31	799.9	83.8	16,378.0	34,717.7	1,685.3	140.4
18	1	0.0	0.0	0.0	0.0	0.0	0.0
639	31	889.0	93.1	18,202.3	38,584.9	1,873.1	156.1
18	1	0.0	0.0	0.0	0.0	0.0	0.0
698	34	2,788.0	303.0	162,428.6	110,488.3	5,363.5	447.0
489	24	0.0	0.0	0.0	0.0	0.0	0.0
500	24	35.5	4.0	1,306.1	1,469.8	71.4	5.9
18	1	0.0	0.0	0.0	0.0	0.0	0.0
199	10	62.4	9.2	1,457.0	2,710.3	131.6	11.0
12	-	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0
	22	0.0	0.0	0.0	0.0	0.0	0.0
364.597336		**9,104**	**1,162**	**305,448**	**384,552**	**18,668**	**1,556**
		9,072	**1,159**	**305,303**	**384,552**	**18,668**	**1,556**
		31	**3**	**146**	**-**		



Mitchell Creek Subwatershed Pollutant Load Model
Primary Sources - Land Use

PRIMARY SOURCES - Land Use

Watershed

Category	Detailed Description	Area (Acres)	Impervious Cover (%)	Concentrations: Turf Cover (%)	Concentrations: TN (mg/l)	Concentrations: TP (mg/l)	Concentrations: TSS (mg/l)	Annual Loading Rates: FC (MPN/100 ml)	Annual Loading Rates: TN (lb/acre)	Annual Loading Rates: TP (lb/acre)	Annual Loading Rates: TSS (lbs/acre)
Residential	LDR (<1du/acre)	155.52	12%	70%	2.1	0.31	49	20000	4.6	0.7	107
	MDR (1-4 du/acre)	246.93	21%	63%	2.1	0.31	49	20000	6.1	0.9	142
	HDR (>4 du/acre)	88.92	33%	54%	2.1	0.31	49	20000	8.1	1.2	190
	Multifamily	12.85	44%	45%	2.1	0.31	49	20000	10.0	1.5	233
Recreation and Open Space		184.88	10%	90%	2.1	0.31	49	20000	4.7	0.7	110
		0	0%	0%	2.1	0.31	49	20000	0.4	0.1	10
Commercial	Commercial	9.15	72%	22%	2.1	0.22	43	20000	14.7	1.5	302
				0%	2.1	0.22	43	20000	0.4	0.0	8
Institutional		89.53	72%	22%	2.1	0.22	43	20000	14.7	1.5	302
				0%	2.1	0.22	43	20000	0.4	0.0	8
Roadway	Roadway	90.98	80%	16%	2.3	0.25	134	20000	17.6	1.9	1027
			50%	50%	2.3	0.25	134	20000	12.4	1.3	720
Industrial	Industrial	0	53%	38%	2.2	0.25	81	20000	12.1	1.4	444
				0%	2.2	0.25	81	20000	0.4	0.0	16
Forest	Forest	15.2	0%	0%	2.1	0.22	43	20000	2.5	0.2	100
									2.5	0.2	100
Vacant/Unknown	Vacant/Unknown	57.71	12%	70%	2.1	0.31	49	20000	4.6	0.7	107
Open Water	Open Water	0							12.8	0.5	155
Active Construction	Active Construction				1	0.2	680	0	4.8816	0.97632	3319.488
Total	Total Acres	951.670	275	562					7.669834485	0.998495673	234.1101345
Stormwater Load											
Non-Stormwater Load											

Partitioning Coefficients for Rural and Forest Land

Pollutant	TN	TP	TSS	FC
Fraction as Storm Load	50%	70%	90%	100%

Watershed Data

Annual Rainfall (inches)	48
Watershed Area (acres)	952
Stream Length (miles)	0

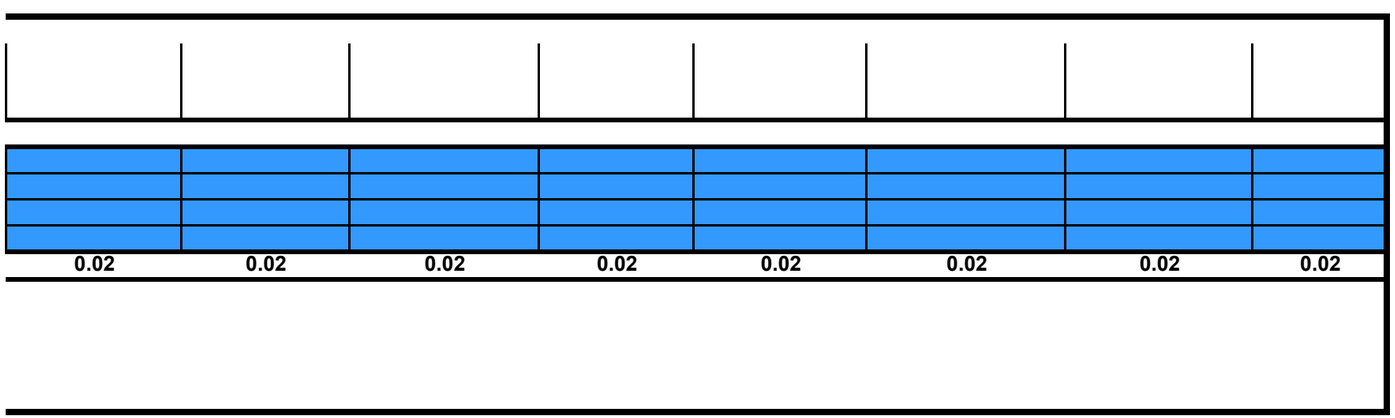
Soils Information

	Soil Fraction(%)	Runoff Coefficients: Impervious	Turf	Forest	Rural	Land-Use Specific Runoff Coefficients: Active Construction					
HYDROLOGIC SOIL GROUP											
A Soils	100%	0.95	0.15	0.02	0.02	0.5					
B Soils	0%	0.95	0.20	0.03	0.03	0.5					
C Soils	0%	0.95	0.22	0.04	0.04	0.5					
D Soils	0%	0.95	0.25	0.05	0.05	0.5					
		0.95	0.15	0.02	0.02	0.5	0.02	0.02	0.02	0.02	0.02

DEPTH TO GROUNDWATER	
<3 Feet	10%
3-5 Feet	10%
>5 Feet	80%

Mitchell Creek Subwatershed Pollutant Load Model
Primary Sources - Land Use

Annual Load						Annual Runoff Volume	
FC (# billion/acre)	Runoff (in/year)	TN (lb/year)	TP (lb/year)	TSS (lbs/year)	FC (# billion/year)	(ac-inches)	(acre-feet)
199	10	711.4	105.0	16,600.2	30,879.9	1,499.0	124.9
265	13	1,506.0	222.3	35,139.1	65,366.2	3,173.1	264.4
353	17	723.0	106.7	16,870.1	31,382.0	1,523.4	127.0
434	21	128.4	19.0	2,996.5	5,574.1	270.6	22.5
205	10	871.8	128.7	20,342.6	37,841.5	1,837.0	153.1
18	1	0.0	0.0	0.0	0.0	0.0	0.0
640	31	134.8	14.1	2,760.8	5,852.4	284.1	23.7
18	1	0.0	0.0	0.0	0.0	0.0	0.0
639	31	1,318.3	138.1	26,994.5	57,222.3	2,777.8	231.5
18	1	0.0	0.0	0.0	0.0	0.0	0.0
698	34	1,603.3	174.3	93,411.8	63,541.3	3,084.5	257.0
489	24	0.0	0.0	0.0	0.0	0.0	0.0
500	24	0.0	0.0	0.0	0.0	0.0	0.0
18	1	0.0	0.0	0.0	0.0	0.0	0.0
12	1	38.0	3.0	1,520.0	182.4	13.1	1.1
12	-	0.0	0.0	0.0	0.0	0.0	0.0
199	10	264.0	39.0	6,160.0	11,458.8	556.3	46.4
		0.0	0.0	0.0	0.0	0.0	0.0
	22	0.0	0.0	0.0	0.0	0.0	0.0
325.0085926		**7,299**	**950**	**222,796**	**309,301**	**15,019**	**1,252**
		7,148	**938**	**222,028**	**309,301**	**15,019**	**1,252**
		151	**13**	**768**	**-**		



North East Shore Subwatershed Pollutant Load Model
Primary Sources - Land Use

PRIMARY SOURCES - Land Use

Watershed

				Concentrations				Annual Loading Rates			
		Area (Acres)	Impervious Cover (%)	Turf Cover (%)	TN (mg/l)	TP (mg/l)	TSS (mg/l)	FC (MPN/100 ml)	TN (lb/acre)	TP (lb/acre)	TSS (lbs/acre)
Category	Detailed Description										
Residential	LDR (<1du/acre)	135.28	12%	70%	2.1	0.31	49	20000	4.6	0.7	107
	MDR (1-4 du/acre)	22.59	21%	63%	2.1	0.31	49	20000	6.1	0.9	142
	HDR (>4 du/acre)	0.94	33%	54%	2.1	0.31	49	20000	8.1	1.2	190
	Multifamily	47.48	44%	45%	2.1	0.31	49	20000	10.0	1.5	233
				0%	2.1	0.31	49	20000	0.4	0.1	10
Recreation and Open Space		0	10%	90%	2.1	0.31	49	20000	4.7	0.7	110
		0	0%	0%	2.1	0.31	49	20000	0.4	0.1	10
Commercial	Commercial	0	72%	22%	2.1	0.22	43	20000	14.7	1.5	302
				0%	2.1	0.22	43	20000	0.4	0.0	8
Institutional		2.02	72%	22%	2.1	0.22	43	20000	14.7	1.5	302
				0%	2.1	0.22	43	20000	0.4	0.0	8
Roadway	Roadway	26.92	80%	16%	2.3	0.25	134	20000	17.6	1.9	1027
			50%	50%	2.3	0.25	134	20000	12.4	1.3	720
Industrial	Industrial	0	53%	38%	2.2	0.25	81	20000	12.1	1.4	444
				0%	2.2	0.25	81	20000	0.4	0.0	16
Vacant/Unknown	Vacant/Unknown	13.01	12%	70%	2.1	0.31	49	20000	4.6	0.7	107
									2.5	0.2	100
Open Water	Open Water	0							12.8	0.5	155
Active Construction	Active Construction				1	0.2	680	0	4.8816	0.97632	3319.488
Total	Total Acres	248.240	67	145					7.260871808	0.992321441	235.8278386
Stormwater Load											
Non-Stormwater Load											

Partitioning Coefficients for Rural and Forest Land

Pollutant	TN	TP	TSS	FC
Fraction as Storm Load	50%	70%	90%	100%

Watershed Data

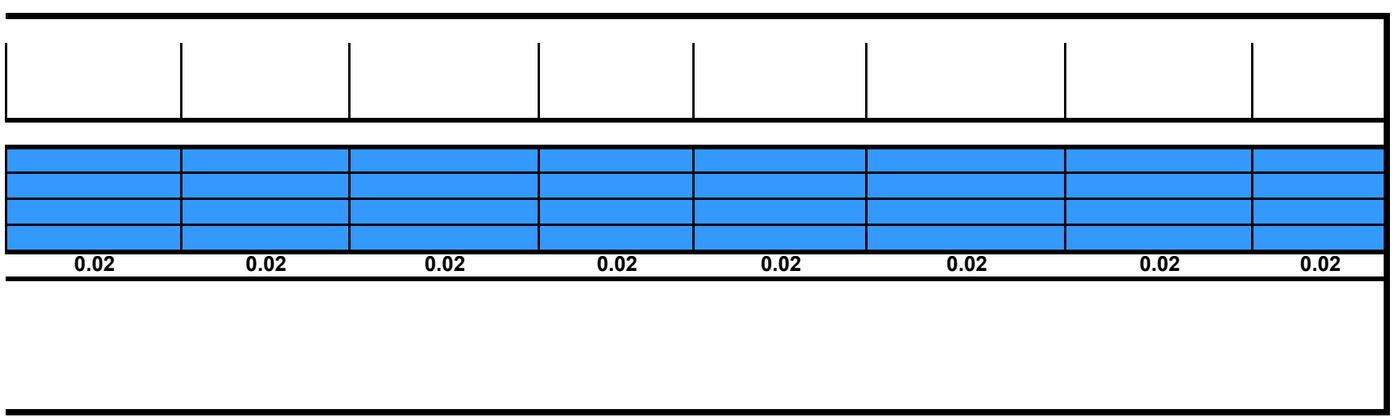
Annual Rainfall (inches)	48
Watershed Area (acres)	248
Stream Length (miles)	0

Soils Information	Soil Fraction(%)	Runoff Coefficients: Impervious	Turf	Forest	Rural	Land-Use Specific Runoff Coefficients: Active Construction					
HYDROLOGIC SOIL GROUP											
A Soils	100%	0.95	0.15	0.02	0.02	0.5					
B Soils	0%	0.95	0.20	0.03	0.03	0.5					
C Soils	0%	0.95	0.22	0.04	0.04	0.5					
D Soils	0%	0.95	0.25	0.05	0.05	0.5					
		0.95	0.15	0.02	0.02	0.5	0.02	0.02	0.02	0.02	0.02

DEPTH TO GROUNDWATER	
<3 Feet	1%
3-5 Feet	3%
>5 Feet	94%

North East Shore Subwatershed Pollutant Load Model
Primary Sources - Land Use

Annual Load						Annual Runoff Volume	
FC (# billion/acre)	Runoff (in/year)	TN (lb/year)	TP (lb/year)	TSS (lbs/year)	FC (# billion/year)	(ac-inches)	(acre-feet)
199	10	618.8	91.4	14,439.8	26,861.1	1,303.9	108.7
265	13	137.8	20.3	3,214.6	5,979.9	290.3	24.2
353	17	7.6	1.1	178.3	331.7	16.1	1.3
434	21	474.5	70.0	11,071.8	20,596.0	999.8	83.3
18	1	0.0	0.0	0.0	0.0	0.0	0.0
205	10	0.0	0.0	0.0	0.0	0.0	0.0
18	1	0.0	0.0	0.0	0.0	0.0	0.0
640	31	0.0	0.0	0.0	0.0	0.0	0.0
18	1	0.0	0.0	0.0	0.0	0.0	0.0
639	31	29.7	3.1	609.1	1,291.1	62.7	5.2
18	1	0.0	0.0	0.0	0.0	0.0	0.0
698	34	474.4	51.6	27,639.6	18,801.2	912.7	76.1
489	24	0.0	0.0	0.0	0.0	0.0	0.0
500	24	0.0	0.0	0.0	0.0	0.0	0.0
18	1	0.0	0.0	0.0	0.0	0.0	0.0
199	10	59.5	8.8	1,388.7	2,583.3	125.4	10.5
12	-	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0
	22	0.0	0.0	0.0	0.0	0.0	0.0
307.9448087		**1,802**	**246**	**58,542**	**76,444**	**3,711**	**309**
		1,773	**244**	**58,403**	**76,444**	**3,711**	**309**
		30	**3**	**139**	**-**		



Plandome Heights Subwatershed Pollutant Load Model
Primary Sources - Land Use

PRIMARY SOURCES - Land Use

Watershed

				Concentrations				Annual Loading Rates			
		Area (Acres)	Impervious Cover (%)	Turf Cover (%)	TN (mg/l)	TP (mg/l)	TSS (mg/l)	FC (MPN/100 ml)	TN (lb/acre)	TP (lb/acre)	TSS (lbs/acre)
Category	Detailed Description										
Residential	LDR (<1du/acre)	13.25	12%	70%	2.1	0.31	49	20000	4.6	0.7	107
	MDR (1-4 du/acre)	49.4	21%	63%	2.1	0.31	49	20000	6.1	0.9	142
	HDR (>4 du/acre)	33.73	33%	54%	2.1	0.31	49	20000	8.1	1.2	190
	Multifamily	0.02	44%	45%	2.1	0.31	49	20000	10.0	1.5	233
				0%	2.1	0.31	49	20000	0.4	0.1	10
Recreation and Open Space		0	10%	90%	2.1	0.31	49	20000	4.7	0.7	110
		0	0%	0%	2.1	0.31	49	20000	0.4	0.1	10
Commercial	Commercial	0	72%	22%	2.1	0.22	43	20000	14.7	1.5	302
				0%	2.1	0.22	43	20000	0.4	0.0	8
Institutional		15.3	72%	22%	2.1	0.22	43	20000	14.7	1.5	302
				0%	2.1	0.22	43	20000	0.4	0.0	8
Roadway	Roadway	22.49	80%	16%	2.3	0.25	134	20000	17.6	1.9	1027
			50%	50%	2.3	0.25	134	20000	12.4	1.3	720
Industrial	Industrial	0	53%	38%	2.2	0.25	81	20000	12.1	1.4	444
				0%	2.2	0.25	81	20000	0.4	0.0	16
Vacant/Unknown	Vacant/Unknown	4.19	12%	70%	2.1	0.31	49	20000	4.6	0.7	107
									2.5	0.2	100
Open Water	Open Water	0							12.8	0.5	155
Active Construction	Active Construction				1	0.2	680	0	4.8816	0.97632	3319.488
Total	Total Acres	138.380	53	69					9.229292127	1.181162293	310.7360622
Stormwater Load											
Non-Stormwater Load											

Partitioning Coefficients for Rural and Forest Land

Pollutant	TN	TP	TSS	FC
Fraction as Storm Load	50%	70%	90%	100%

Watershed Data

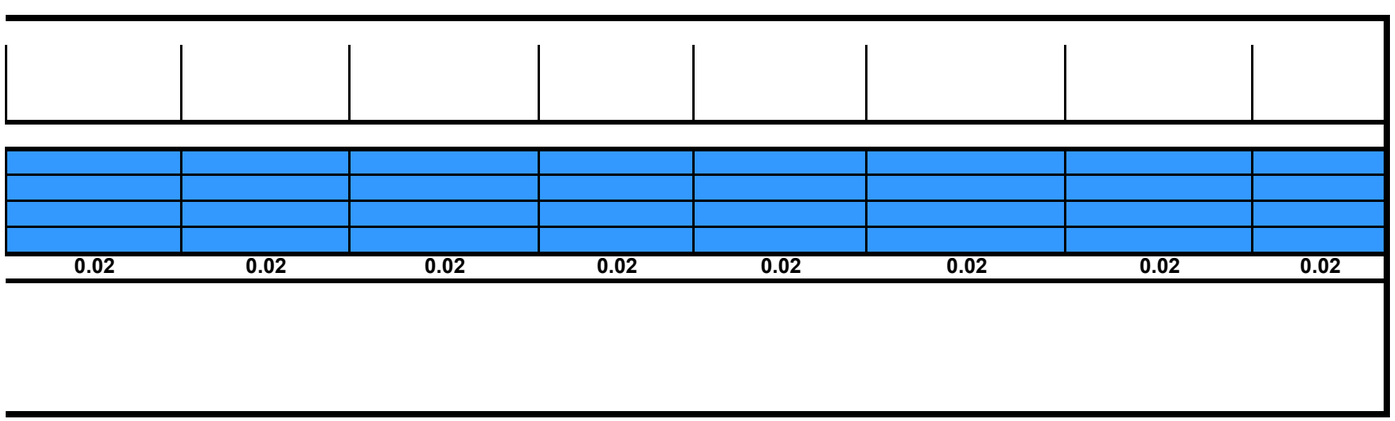
Annual Rainfall (inches)	48
Watershed Area (acres)	138
Stream Length (miles)	0

Soils Information	Soil Fraction(%)	Runoff Coefficients: Impervious	Turf	Forest	Rural	Land-Use Specific Runoff Coefficients: Active Construction					
HYDROLOGIC SOIL GROUP											
A Soils	100%	0.95	0.15	0.02	0.02	0.5					
B Soils	0%	0.95	0.20	0.03	0.03	0.5					
C Soils	0%	0.95	0.22	0.04	0.04	0.5					
D Soils	0%	0.95	0.25	0.05	0.05	0.5					
		0.95	0.15	0.02	0.02	0.5	0.02	0.02	0.02	0.02	0.02

DEPTH TO GROUNDWATER	
<3 Feet	1%
3-5 Feet	1%
>5 Feet	98%

Plandome Heights Subwatershed Pollutant Load Model
Primary Sources - Land Use

Annual Load						Annual Runoff Volume	
FC (# billion/acre)	Runoff (in/year)	TN (lb/year)	TP (lb/year)	TSS (lbs/year)	FC (# billion/year)	(ac-inches)	(acre-feet)
199	10	60.6	8.9	1,414.3	2,630.9	127.7	10.6
265	13	301.3	44.5	7,029.8	13,077.0	634.8	52.9
353	17	274.3	40.5	6,399.3	11,904.1	577.9	48.2
434	21	0.2	0.0	4.7	8.7	0.4	0.0
18	1	0.0	0.0	0.0	0.0	0.0	0.0
205	10	0.0	0.0	0.0	0.0	0.0	0.0
18	1	0.0	0.0	0.0	0.0	0.0	0.0
640	31	0.0	0.0	0.0	0.0	0.0	0.0
18	1	0.0	0.0	0.0	0.0	0.0	0.0
639	31	225.3	23.6	4,613.1	9,778.9	474.7	39.6
18	1	0.0	0.0	0.0	0.0	0.0	0.0
698	34	396.3	43.1	23,091.1	15,707.2	762.5	63.5
489	24	0.0	0.0	0.0	0.0	0.0	0.0
500	24	0.0	0.0	0.0	0.0	0.0	0.0
18	1	0.0	0.0	0.0	0.0	0.0	0.0
199	10	19.2	2.8	447.2	832.0	40.4	3.4
12	-	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0
	22	0.0	0.0	0.0	0.0	0.0	0.0
389.7868957		**1,277**	**163**	**43,000**	**53,939**	**2,618**	**218**
		1,268	**163**	**42,955**	**53,939**	**2,618**	**218**
		10	**1**	**45**	**-**		



Sheets Creek E Subwatershed Pollutant Load Model
Primary Sources - Land Use

PRIMARY SOURCES - Land Use

Watershed

				Concentrations				Annual Loading Rates			
		Area (Acres)	Impervious Cover (%)	Turf Cover (%)	TN (mg/l)	TP (mg/l)	TSS (mg/l)	FC (MPN/100 ml)	TN (lb/acre)	TP (lb/acre)	TSS (lbs/acre)
Category	Detailed Description										
Residential	LDR (<1du/acre)	48.31	12%	70%	2.1	0.31	49	20000	4.6	0.7	107
	MDR (1-4 du/acre)	43.59	21%	63%	2.1	0.31	49	20000	6.1	0.9	142
	HDR (>4 du/acre)	125.76	33%	54%	2.1	0.31	49	20000	8.1	1.2	190
	Multifamily	3.54	44%	45%	2.1	0.31	49	20000	10.0	1.5	233
				0%	2.1	0.31	49	20000	0.4	0.1	10
Recreation and Open Space		110.06	10%	90%	2.1	0.31	49	20000	4.7	0.7	110
		0	0%	0%	2.1	0.31	49	20000	0.4	0.1	10
Commercial	Commercial	82.05	72%	22%	2.1	0.22	43	20000	14.7	1.5	302
				0%	2.1	0.22	43	20000	0.4	0.0	8
Institutional		34.05	72%	22%	2.1	0.22	43	20000	14.7	1.5	302
				0%	2.1	0.22	43	20000	0.4	0.0	8
Roadway	Roadway	71.692	80%	16%	2.3	0.25	134	20000	17.6	1.9	1027
			50%	50%	2.3	0.25	134	20000	12.4	1.3	720
Industrial	Industrial	7.74	53%	38%	2.2	0.25	81	20000	12.1	1.4	444
				0%	2.2	0.25	81	20000	0.4	0.0	16
Vacant/Unknown	Vacant/Unknown	27.05	12%	70%	2.1	0.31	49	20000	4.6	0.7	107
									4.6	0.7	100
Open Water	Open Water	0							12.8	0.5	155
Active Construction	Active Construction				1	0.2	680	0	4.8816	0.97632	3319.488
Total	Total Acres	**553.8420**	**217**	**289**					**9.487882569**	**1.173712014**	**294.5108302**
Stormwater Load											
Non-Stormwater Load											

Partitioning Coefficients for Rural and Forest Land

Pollutant	TN	TP	TSS	FC
Fraction as Storm Load	50%	70%	90%	100%

Watershed Data

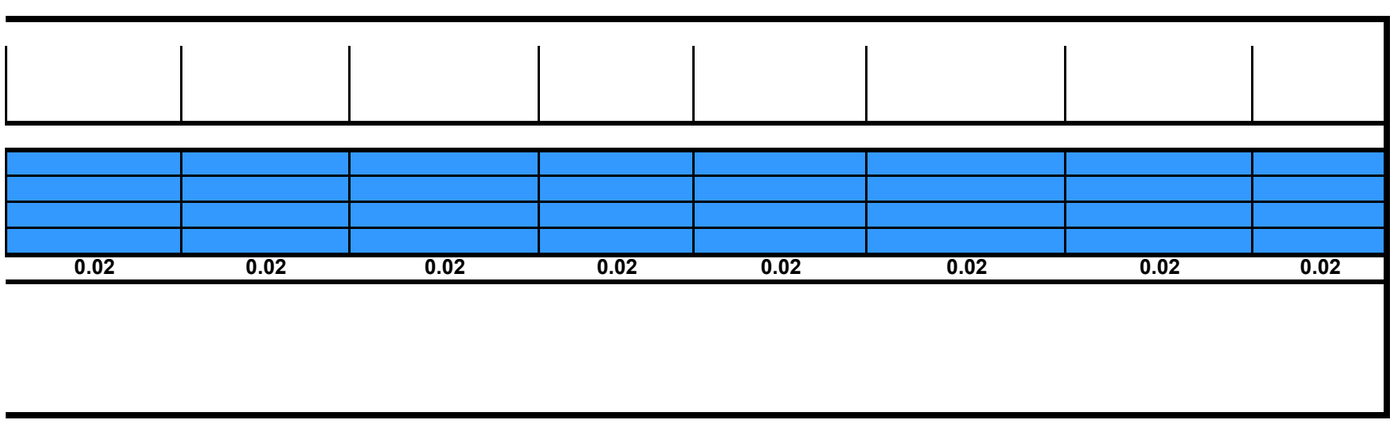
Annual Rainfall (inches)	48
Watershed Area (acres)	554
Stream Length (miles)	0

Soils Information	Soil Fraction(%)	Runoff Coefficients: Impervious	Turf	Forest	Rural	Land-Use Specific Runoff Coefficients: Active Construction					
HYDROLOGIC SOIL GROUP											
A Soils	100%	0.95	0.15	0.02	0.02	0.5					
B Soils	0%	0.95	0.20	0.03	0.03	0.5					
C Soils	0%	0.95	0.22	0.04	0.04	0.5					
D Soils	0%	0.95	0.25	0.05	0.05	0.5					
		0.95	**0.15**	**0.02**	**0.02**	**0.5**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**

DEPTH TO GROUNDWATER	
<3 Feet	1%
3-5 Feet	1%
>5 Feet	98%

Sheets Creek E Subwatershed Pollutant Load Model
Primary Sources - Land Use

Annual Load						Annual Runoff Volume	
FC (# billion/acre)	Runoff (in/year)	TN (lb/year)	TP (lb/year)	TSS (lbs/year)	FC (# billion/year)	(ac-inches)	(acre-feet)
199	10	221.0	32.6	5,156.6	9,592.4	465.6	38.8
265	13	265.8	39.2	6,203.0	11,539.0	560.1	46.7
353	17	1,022.6	150.9	23,859.5	44,383.8	2,154.6	179.5
434	21	35.4	5.2	825.5	1,535.6	74.5	6.2
18	1	0.0	0.0	0.0	0.0	0.0	0.0
205	10	519.0	76.6	12,110.0	22,527.3	1,093.6	91.1
18	1	0.0	0.0	0.0	0.0	0.0	0.0
640	31	1,209.1	126.7	24,757.1	52,479.5	2,547.5	212.3
18	1	0.0	0.0	0.0	0.0	0.0	0.0
639	31	501.4	52.5	10,266.5	21,762.7	1,056.4	88.0
18	1	0.0	0.0	0.0	0.0	0.0	0.0
698	34	1,263.4	137.3	73,608.3	50,070.4	2,430.6	202.5
489	24	0.0	0.0	0.0	0.0	0.0	0.0
500	24	93.4	10.6	3,438.6	3,869.5	187.8	15.7
18	1	0.0	0.0	0.0	0.0	0.0	0.0
199	10	123.7	18.3	2,887.3	5,371.0	260.7	21.7
39	-	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0
	22	0.0	0.0	0.0	0.0	0.0	0.0
402.8785369		**5,255**	**650**	**163,112**	**223,131**	**10,832**	**903**
		5,193	**645**	**162,824**	**223,131**	**10,832**	**903**
		62	**5**	**289**	**-**		



Sheets Creek N Subwatershed Pollutant Load Model
Primary Sources - Land Use

PRIMARY SOURCES - Land Use

Watershed

Category	Detailed Description	Area (Acres)	Impervious Cover (%)	Concentrations: Turf Cover (%)	Concentrations: TN (mg/l)	Concentrations: TP (mg/l)	Concentrations: TSS (mg/l)	Annual Loading Rates: FC (MPN/100 ml)	Annual Loading Rates: TN (lb/acre)	Annual Loading Rates: TP (lb/acre)	Annual Loading Rates: TSS (lbs/acre)
Residential	LDR (<1du/acre)	45.07	12%	70%	2.1	0.31	49	20000	4.6	0.7	107
	MDR (1-4 du/acre)	7.54	21%	63%	2.1	0.31	49	20000	6.1	0.9	142
	HDR (>4 du/acre)	42.81	33%	54%	2.1	0.31	49	20000	8.1	1.2	190
	Multifamily	100.34	44%	45%	2.1	0.31	49	20000	10.0	1.5	233
				0%	2.1	0.31	49	20000	0.4	0.1	10
Recreation and Open Space		44.14	10%	90%	2.1	0.31	49	20000	4.7	0.7	110
				0%	2.1	0.31	49	20000	0.4	0.1	10
Commercial	Commercial	14.11	72%	22%	2.1	0.22	43	20000	14.7	1.5	302
				0%	2.1	0.22	43	20000	0.4	0.0	8
Institutional		19.09	72%	22%	2.1	0.22	43	20000	14.7	1.5	302
				0%	2.1	0.22	43	20000	0.4	0.0	8
Roadway	Roadway	77.52	80%	16%	2.3	0.25	134	20000	17.6	1.9	1027
			50%	50%	2.3	0.25	134	20000	12.4	1.3	720
		0	20%	80%	2.3	0.25	134	20000	7.0	0.8	406
Industrial	Industrial	0	53%	38%	2.2	0.25	81	20000	12.1	1.4	444
				0%	2.2	0.25	81	20000	0.4	0.0	16
Vacant/Unknown	Vacant/Unknown	17.13	12%	70%	2.1	0.31	49	20000	4.6	0.7	107
Open Water	Open Water	0							12.8	0.5	155
Active Construction	Active Construction				1	0.2	680	0	4.8816	0.97632	3319.488
Total	Total Acres	**367.75**	**158**	**176**					**10.1827168**	**1.301578714**	**363.5475924**
Stormwater Load											
Non-Stormwater Load											

Partitioning Coefficients for Rural and Forest Land

Pollutant	TN	TP	TSS	FC
Fraction as Storm Load	50%	70%	90%	100%

Watershed Data

Annual Rainfall (inches)	48
Watershed Area (acres)	368
Stream Length (miles)	0

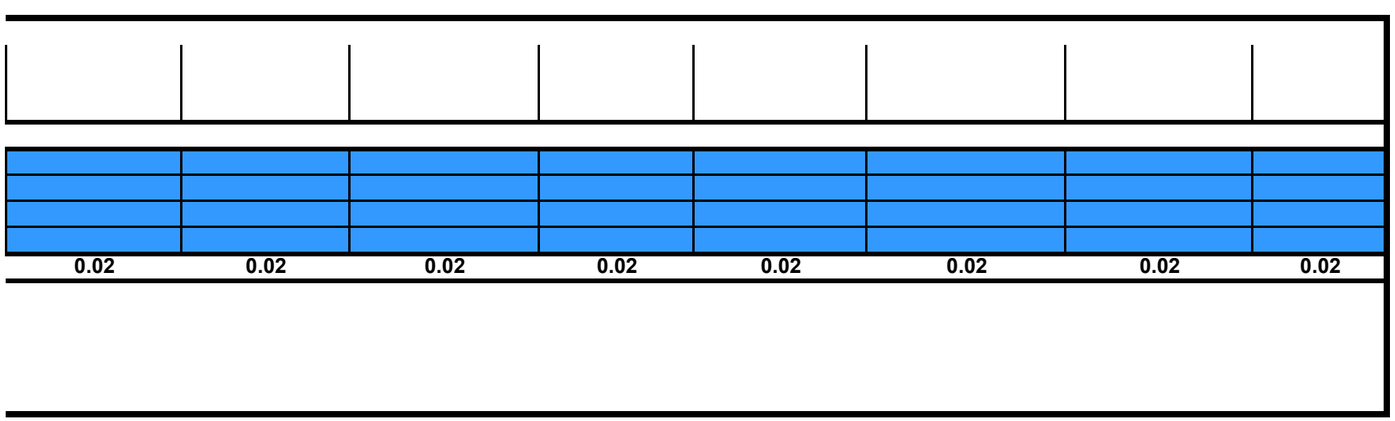
Soils Information

HYDROLOGIC SOIL GROUP	Soil Fraction(%)	Runoff Coefficients: Impervious	Turf	Forest	Rural	Land-Use Specific Runoff Coefficients: Active Construction					
A Soils	100%	0.95	0.15	0.02	0.02	0.5					
B Soils	0%	0.95	0.20	0.03	0.03	0.5					
C Soils	0%	0.95	0.22	0.04	0.04	0.5					
D Soils	0%	0.95	0.25	0.05	0.05	0.5					
		0.95	**0.15**	**0.02**	**0.02**	**0.5**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**

DEPTH TO GROUNDWATER	
<3 Feet	1%
3-5 Feet	1%
>5 Feet	98%

Sheets Creek N Subwatershed Pollutant Load Model
Primary Sources - Land Use

Annual Load						Annual Runoff Volume	
FC (# billion/acre)	Runoff (in/year)	TN (lb/year)	TP (lb/year)	TSS (lbs/year)	FC (# billion/year)	(ac-inches)	(acre-feet)
199	10	206.2	30.4	4,810.8	8,949.1	434.4	36.2
265	13	46.0	6.8	1,073.0	1,996.0	96.9	8.1
353	17	348.1	51.4	8,122.0	15,108.7	733.4	61.1
434	21	1,002.8	148.0	23,398.3	43,525.7	2,112.9	176.1
18	1	0.0	0.0	0.0	0.0	0.0	0.0
205	10	208.1	30.7	4,856.8	9,034.6	438.6	36.5
18	1	0.0	0.0	0.0	0.0	0.0	0.0
640	31	207.9	21.8	4,257.4	9,024.8	438.1	36.5
18	1	0.0	0.0	0.0	0.0	0.0	0.0
639	31	281.1	29.4	5,755.9	12,201.2	592.3	49.4
18	1	0.0	0.0	0.0	0.0	0.0	0.0
698	34	1,366.1	148.5	79,592.1	54,140.7	2,628.2	219.0
489	24	0.0	0.0	0.0	0.0	0.0	0.0
276	13	0.0	0.0	0.0	0.0	0.0	0.0
500	24	0.0	0.0	0.0	0.0	0.0	0.0
18	1	0.0	0.0	0.0	0.0	0.0	0.0
199	10	78.4	11.6	1,828.5	3,401.3	165.1	13.8
		0.0	0.0	0.0	0.0	0.0	0.0
	22	0.0	0.0	0.0	0.0	0.0	0.0
427.9594547		**3,745**	**479**	**133,695**	**157,382**	**7,640**	**637**
		3,706	**475**	**133,512**	**157,382**	**7,640**	**637**
		39	**3**	**183**	**-**		



Stannards Brook Subwatershed Pollutant Load Model
Primary Sources - Land Use

PRIMARY SOURCES - Land Use

Watershed

				Concentrations				Annual Loading Rates			
		Area (Acres)	Impervious Cover (%)	Turf Cover (%)	TN (mg/l)	TP (mg/l)	TSS (mg/l)	FC (MPN/100 ml)	TN (lb/acre)	TP (lb/acre)	TSS (lbs/acre)
Category	**Detailed Description**										
Residential	**LDR (<1du/acre)**	8.31	12%	70%	2.1	0.31	49	20000	4.6	0.7	107
	MDR (1-4 du/acre)	127.18	21%	63%	2.1	0.31	49	20000	6.1	0.9	142
	HDR (>4 du/acre)	76.49	33%	54%	2.1	0.31	49	20000	8.1	1.2	190
	Multifamily	20.17	44%	45%	2.1	0.31	49	20000	10.0	1.5	233
		0	0%	0%	2.1	0.31	49	20000	0.4	0.1	10
Recreation and Open Space		39.96	10%	90%	2.1	0.31	49	20000	4.7	0.7	110
		0	0%	0%	2.1	0.31	49	20000	0.4	0.1	10
Commercial	**Commercial**	23.91	72%	22%	2.1	0.22	43	20000	14.7	1.5	302
				0%	2.1	0.22	43	20000	0.4	0.0	8
Institutional		6.3	72%	22%	2.1	0.22	43	20000	14.7	1.5	302
				0%	2.1	0.22	43	20000	0.4	0.0	8
Roadway	**Roadway**	68.756	80%	16%	2.3	0.25	134	20000	17.6	1.9	1027
			50%	50%	2.3	0.25	134	20000	12.4	1.3	720
Industrial	**Industrial**	0	53%	38%	2.2	0.25	81	20000	12.1	1.4	444
				0%	2.2	0.25	81	20000	0.4	0.0	16
Vacant/Unknown	**Vacant/Unknown**	5.19	12%	70%	2.1	0.31	49	20000	4.6	0.7	107
Open Water	**Open Water**	0							12.8	0.5	155
Active Construction	**Active Construction**				1	0.2	680	0	4.8816	0.97632	3319.488
Total	**Total Acres**	**376.266**	**143**	**194**					**9.318215898**	**1.199504356**	**326.5219265**
Stormwater Load											
Non-Stormwater Load											

Partitioning Coefficients for Rural and Forest Land

Pollutant	TN	TP	TSS	FC
Fraction as Storm Load	50%	70%	90%	100%

Watershed Data

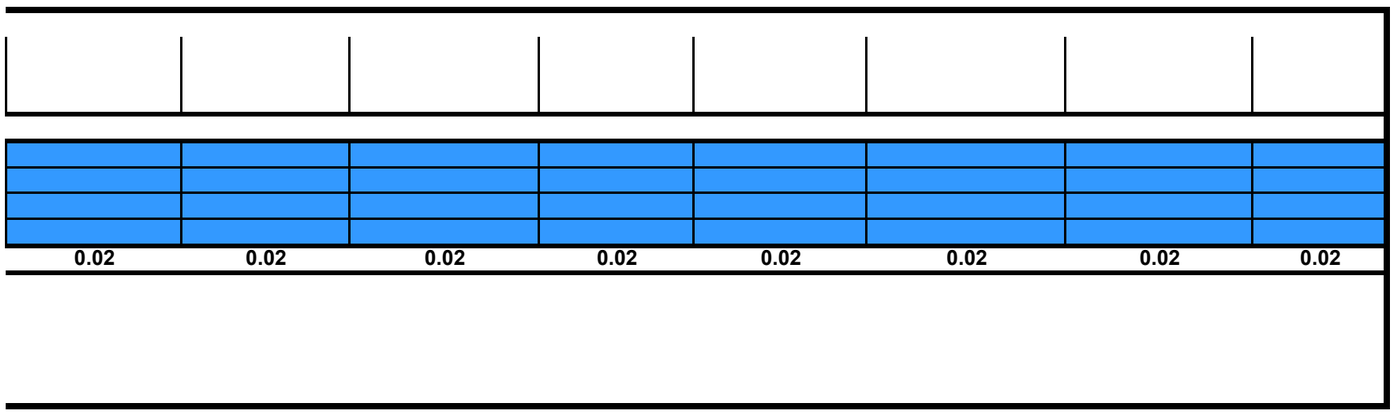
Annual Rainfall (inches)	48
Watershed Area (acres)	376
Stream Length (miles)	0

Soils Information	Soil Fraction(%)	Runoff Coefficients: Impervious	Turf	Forest	Rural	Land-Use Specific Runoff Coefficients: Active Construction					
HYDROLOGIC SOIL GROUP											
A Soils	**100%**	0.95	0.15	0.02	0.02	0.5					
B Soils	**0%**	0.95	0.20	0.03	0.03	0.5					
C Soils	0%	0.95	0.22	0.04	0.04	0.5					
D Soils	**0%**	0.95	0.25	0.05	0.05	0.5					
		0.95	**0.15**	**0.02**	**0.02**	**0.5**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**

DEPTH TO GROUNDWATER	
<3 Feet	**1%**
3-5 Feet	**1%**
>5 Feet	98%

Stannards Brook Subwatershed Pollutant Load Model
Primary Sources - Land Use

Annual Load						Annual Runoff Volume	
FC (# billion/acre)	Runoff (in/year)	TN (lb/year)	TP (lb/year)	TSS (lbs/year)	FC (# billion/year)	(ac-inches)	(acre-feet)
199	10	38.0	5.6	887.0	1,650.0	80.1	6.7
265	13	775.6	114.5	18,098.2	33,666.5	1,634.3	136.2
353	17	621.9	91.8	14,511.9	26,995.2	1,310.4	109.2
434	21	201.6	29.8	4,703.4	8,749.4	424.7	35.4
18	1	0.0	0.0	0.0	0.0	0.0	0.0
205	10	188.4	27.8	4,396.8	8,179.1	397.0	33.1
18	1	0.0	0.0	0.0	0.0	0.0	0.0
640	31	352.3	36.9	7,214.4	15,292.9	742.4	61.9
18	1	0.0	0.0	0.0	0.0	0.0	0.0
639	31	92.8	9.7	1,899.5	4,026.6	195.5	16.3
18	1	0.0	0.0	0.0	0.0	0.0	0.0
698	34	1,211.7	131.7	70,593.8	48,019.8	2,331.1	194.3
489	24	0.0	0.0	0.0	0.0	0.0	0.0
500	24	0.0	0.0	0.0	0.0	0.0	0.0
18	1	0.0	0.0	0.0	0.0	0.0	0.0
199	10	23.7	3.5	554.0	1,030.5	50.0	4.2
		0.0	0.0	0.0	0.0	0.0	0.0
	22	0.0	0.0	0.0	0.0	0.0	0.0
392.3024285		**3,506**	**451**	**122,859**	**147,610**	**7,166**	**597**
		3,494	**450**	**122,804**	**147,610**	**7,166**	**597**
		12	**1**	**55**	**-**		



Whitney Pond Subwatershed Pollutant Load Model
Primary Sources - Land Use

PRIMARY SOURCES - Land Use

Watershed

				Concentrations				Annual Loading Rates			
		Area (Acres)	Impervious Cover (%)	Turf Cover (%)	TN (mg/l)	TP (mg/l)	TSS (mg/l)	FC (MPN/100 ml)	TN (lb/acre)	TP (lb/acre)	TSS (lbs/acre)
Category	Detailed Description										
Residential	LDR (<1du/acre)	44.21	12%	70%	2.1	0.31	49	20000	4.6	0.7	107
	MDR (1-4 du/acre)	426.78	21%	63%	2.1	0.31	49	20000	6.1	0.9	142
	HDR (>4 du/acre)	304.45	33%	54%	2.1	0.31	49	20000	8.1	1.2	190
	Multifamily	39.93	44%	45%	2.1	0.31	49	20000	10.0	1.5	233
Recreation and Open Space		712.94	10%	90%	2.1	0.31	49	20000	4.7	0.7	110
		0	0%	0%	2.1	0.31	49	20000	0.4	0.1	10
Commercial	Commercial	223.36	72%	22%	2.1	0.22	43	20000	14.7	1.5	302
				0%	2.1	0.22	43	20000	0.4	0.0	8
Institutional		254.78	72%	22%	2.1	0.22	43	20000	14.7	1.5	302
				0%	2.1	0.22	43	20000	0.4	0.0	8
Roadway	Roadway	312.3619	80%	16%	2.3	0.25	134	20000	17.6	1.9	1027
			50%	50%	2.3	0.25	134	20000	12.4	1.3	720
Industrial	Industrial	0.4	53%	38%	2.2	0.25	81	20000	12.1	1.4	444
				0%	2.2	0.25	81	20000	0.4	0.0	16
Vacant/Unknown	Vacant/Unknown	72.25	12%	70%	2.1	0.31	49	20000	4.6	0.7	107
Open Water	Open Water	0							12.8	0.5	155
Active Construction	Active Construction				1	0.2	680	0	4.8816	0.97632	3319.488
Total	Total Acres	**2391.462**	**887**	**1331**					**9.167885155**	**1.137473567**	**285.927373**
Stormwater Load											
Non-Stormwater Load											

Partitioning Coefficients for Rural and Forest Land

Pollutant	TN	TP	TSS	FC
Fraction as Storm Load	50%	70%	90%	100%

Watershed Data

Annual Rainfall (inches)	48
Watershed Area (acres)	2391
Stream Length (miles)	0

Soils Information

		Runoff Coefficients				Land-Use Specific Runoff Coefficients					
	Soil Fraction(%)	Impervious	Turf	Forest	Rural	Active Construction					
HYDROLOGIC SOIL GROUP											
A Soils	100%	0.95	0.15	0.02	0.02	0.5					
B Soils	0%	0.95	0.20	0.03	0.03	0.5					
C Soils	0%	0.95	0.22	0.04	0.04	0.5					
D Soils	0%	0.95	0.25	0.05	0.05	0.5					
		0.95	**0.15**	**0.02**	**0.02**	**0.5**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**

DEPTH TO GROUNDWATER	
<3 Feet	5%
3-5 Feet	5%
>5 Feet	90%

Whitney Pond Subwatershed Pollutant Load Model
Primary Sources - Land Use

Annual Load						Annual Runoff Volume	
FC (# billion/acre)	Runoff (in/year)	TN (lb/year)	TP (lb/year)	TSS (lbs/year)	FC (# billion/year)	(ac-inches)	(acre-feet)
199	10	202.2	29.9	4,719.0	8,778.3	426.1	35.5
265	13	2,602.8	384.2	60,732.5	112,975.3	5,484.2	457.0
353	17	2,475.5	365.4	57,761.0	107,447.9	5,215.9	434.7
434	21	399.1	58.9	9,311.3	17,320.9	840.8	70.1
205	10	3,362.0	496.3	78,445.7	145,925.7	7,083.8	590.3
18	1	0.0	0.0	0.0	0.0	0.0	0.0
640	31	3,291.4	344.8	67,394.7	142,861.8	6,935.0	577.9
18	1	0.0	0.0	0.0	0.0	0.0	0.0
639	31	3,751.6	393.0	76,819.5	162,840.2	7,904.9	658.7
18	1	0.0	0.0	0.0	0.0	0.0	0.0
698	34	5,504.7	598.3	320,711.1	218,156.4	10,590.1	882.5
489	24	0.0	0.0	0.0	0.0	0.0	0.0
500	24	4.8	0.5	177.7	200.0	9.7	0.8
18	1	0.0	0.0	0.0	0.0	0.0	0.0
199	10	330.5	48.8	7,712.0	14,345.9	696.4	58.0
		0.0	0.0	0.0	0.0	0.0	0.0
	22	0.0	0.0	0.0	0.0	0.0	0.0
389.2399133		**21,925**	**2,720**	**683,784**	**930,852**	**45,187**	**3,766**
		21,759	**2,706**	**683,013**	**930,852**	**45,187**	**3,766**
		165	**15**	**771**	**-**		

