

Appendix D: Watershed Opportunities Technical Memorandum



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MEMORANDUM

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To: Save the Sound and Westchester County Department of Planning and Soil & Water Conservation District

From: Biohabitats, Inc.

Subject: Watershed Opportunities Technical Memorandum - Final

Biohabitats conducted field assessments within the Hutchinson River watershed to identify opportunities to improve watershed health. Identification of watershed restoration opportunities were completed through desktop analysis and field assessments in targeted subwatersheds. A prioritization framework was then utilized to identify opportunities to move forward in planning and design. A treatment analysis was conducted to evaluate the pollutant load potential associated with the identified opportunities.

This information will be incorporated into the Hutchinson Watershed Management Plan. The identified restoration opportunities, prioritization, and pollutant load reductions identified within this memo are key components of an United States Environmental Protection Agency (US EPA) nine element (9E) watershed plan. Watershed plans that address the nine elements are eligible for state and federal funding for project implementation.

This memorandum summarizes the methodology used during the field assessment, prioritization process, and treatment analysis.

FIELD ASSESSMENT

Throughout the week of April 24th, 2023, a two-person team from Biohabitats conducted upland field assessments for the Westchester County portion of the Hutchinson River watershed to identify water quality improvement and habitats enhancement opportunities. Due to the large size of the watershed, field efforts targeted priority subwatersheds identified through the Comparative Subwatershed Analysis (as presented in the Baseline Report) and input from Save the Sound, Westchester County, and the Watershed Steering Committee. Subwatersheds were selected that represented the subwatershed categories represented in the Comparative Subwatershed Analysis. Recommendations from these representative subwatersheds have application and carry over to other subwatersheds within the same category. The subwatersheds of focus for the field assessment included:

1. Reservoir Three (Subwatersheds with significant water bodies and/or parkland; this subwatershed was identified as having high restoration potential and high-medium flood potential)
2. Pelham Lake (Subwatersheds with significant water bodies and/or parkland; medium-high restoration and flood potential; also has high to medium high social vulnerability)
3. Sprague Terminal (Subwatersheds in heavily industrialized areas; high pollution and flooding potential)

4. Vernon Park (Subwatersheds in heavily industrialized areas; high pollution and flooding potential)

While field assessments were concentrated in these four subwatersheds, additional field assessments were conducted by Save the Sound staff in Arthur Manor, Vernon Park and Wolfs Lane Park. Results from this additional effort were combined with Biohabitats-identified sites and are also summarized within this memo.

All assessments were conducted on or from publicly accessible spaces such as commercial parking lots or rights-of-way. Privately-owned sites were assessed from roadways or the right-of-way. Additionally, schools were assessed from the right-of-way for safety purposes. Municipalities should work with local school boards to identify look into additional restoration opportunities on school campuses.

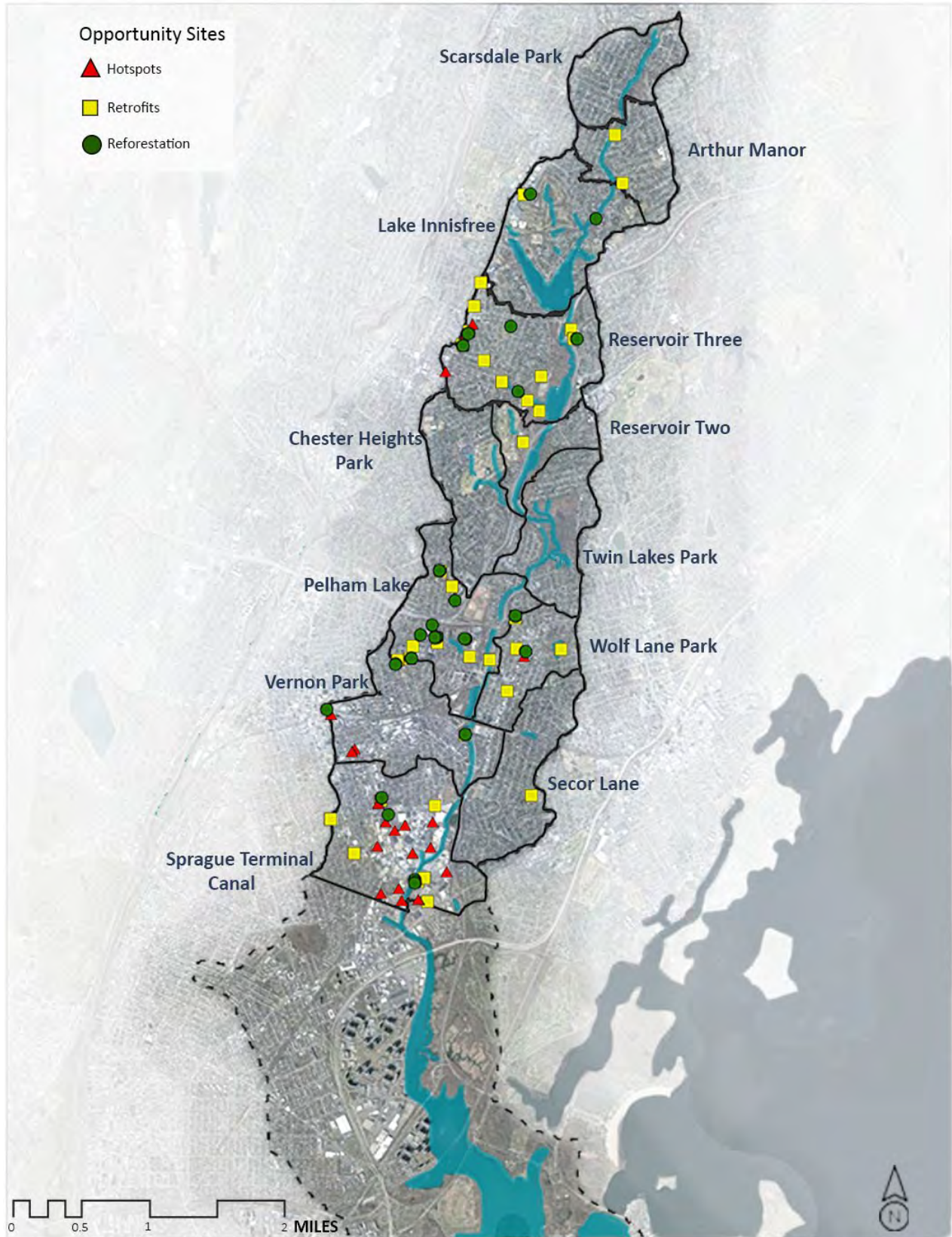
Types of field assessments were selected based on subwatershed conditions and identifying restoration opportunities with the greatest potential for improving water quality and meeting additional watershed goals. For example, the Hotspot Assessment was selected due to the high amount of industrial land use in Sprague Terminal and Vernon Park. Streams were not assessed due to the small amount of contiguous daylighted stream reaches located on publicly accessible land. Three types of assessments were conducted to facilitate a broad range of interventions: *Hotspots*, *Retrofits*, and *Reforestation*.

Hotspot Assessment: targeted locations that may be contributing large amounts of debris, eroding pavement, unruly bulk storage of materials, chemicals, or oil and grease into the watershed. These locations can contribute to the watershed's pollutants of concern including low dissolved oxygen and oil and grease.

Retrofit Assessment: targeted large areas of untreated impervious cover and examined opportunities to provide runoff reduction. For stormwater retrofit opportunities, climate resiliency considerations included larger stormwater opportunity footprints and sizing to account for larger storm events. Selected solutions leaned towards cost-effective practices known to be effective at volume management and that include an overflow system (e.g., bioretention areas and submerged gravel wetlands).

Reforestation Assessment: targeted areas with the potential to increase tree canopy cover and remove impervious cover. These sites also had the potential to provide co-benefits such as ecosystem services (i.e., heat island mitigation, habitat corridors), enhance community aesthetics, provide erosion control, and remove non-native invasive species.

Figure 1 shows the locations where opportunities were assessed.



The field assessment resulted in the evaluation of 20 hotspots, 37 stormwater retrofits, and 25 reforestation sites. Subwatersheds *Pelham Lake, Reservoir Three, Sprague Terminal Canal, and Vernon Park* were thoroughly analyzed to find the most advantageous sites prior to field work. Save the Sound supplemented Biohabitats' field assessments by analyzing and visiting opportunity sites in *Arthur Manor, Vernon Park, and Wolfs Lane Park*. Additional locations in other subwatersheds observed while out in the field were also included.

Table 1. Summary of Field Assessment Findings

Assessment	General Findings
Hotspot	<ul style="list-style-type: none"> • Twenty hotspot sites investigated • Assessed areas from windshield or right-of-way • Types of business assessed included: <ul style="list-style-type: none"> ○ Auto body shops ○ Shopping centers ○ Scrap metal ○ Stockpiling areas ○ Asphalt production • Common recommendations included street sweeping, dumpster replacement, future education, follow-up outreach meetings/site visits, bulk material management, oil and grease separator installation, and pavement replacement
Stormwater Retrofit	<ul style="list-style-type: none"> • Thirty-seven potential retrofit sites investigated • Focused on water quality, nuisance flooding, and impervious area treatment • Assessed mainly large parking lots, schools, playgrounds, and land owned by institutions (i.e., religious centers, schools) • Types of retrofits included bioretention, stormwater wetlands, and regenerative stormwater conveyance
Reforestation	<ul style="list-style-type: none"> • Twenty-five potential reforestation sites investigated • Focus on impervious areas and forest/grasses in poor condition • Noted invasive presence for invasive removal recommendations • Types of recommendations included reforestation, conservation landscaping, and street trees

Hotspot Assessment

The hotspot assessment, based on the Center for Watershed Protection's Hotspot Site Investigation¹, evaluated commercial, industrial, municipal, and transportation sites with high potential to contribute contaminated runoff to the storm drain system or receiving waters. At hotspot sites, field crews looked at vehicle operations, outdoor materials storage, waste management, building conditions, turf and landscaping, and stormwater infrastructure to evaluate potential pollution sources. Table 2 includes a list of the types of hotspots sites assessed.

¹ Wright, T., C. Swann, K. Capiella, T. Schueler. 2004. *Unified Subwatershed and Site Reconnaissance: A User's Manual*. Manual 11 in the Urban Subwatershed Restoration Manual Series. Center for Watershed Protection. Ellicott City, MD.

Table 2. Types of Hotspot Sites Assessed

Category	Description
Commercial	<ul style="list-style-type: none"> • Auto Repair Shops • Car Washes • Gas stations • Dry Cleaners
Industrial	<ul style="list-style-type: none"> • Equipment and chemical storage • Manufacturing plants • Distribution Centers
Transportation Related	<ul style="list-style-type: none"> • Bus parking • Train stations

Summary of Sites Assessed

While field crews were unable to assess all potential hotspot locations in the watershed, those considered provide a representative group of hotspot types. Recommendations from assessed hotspot sites can be applied to other sites with similar activities. Each hotspot site’s severity was assessed based on the types and extent of pollutants observed, exposure to rainfall, and the size of the impacted area. Each hotspot was evaluated for the following improvement opportunities:

- Future education: on proper pollution prevention practices, spill prevention, and basic stormwater management.
- Follow up: provide outreach to address the observed site conditions.
- Oil and grease separator installation
- Street sweeping: routine street sweeping to prevent debris from entering the storm drain system and nearby waterbodies.
- Trash management: education and methods for placing trash in the proper receptacles; trash receptacle location (away from storm drains where possible); and trash prevention planning.
- Dumpster replacement: replace dumpsters with larger, more sturdy ones that have lids that can close and retain more of the waste and reduce leakage to the storm drain system.
- Bulk material management: reorganization of bulk materials either inside, under cover, or with perimeter controls to prevent the migration of materials to the storm drain system and nearby waterbodies.
- Permeable pavers: replace degraded pavement with permeable pavers to allow for water to reenter the ground and slow runoff. In some cases, repaving the parking area may be warranted (vs utilizing permeable pavers).

Sites where the hotspot assessment was conducted are identified in Figure 2 and Table 3. A geodatabase of the field assessment data was delivered to the Westchester County and Save the Sound in July 2023.



Figure 2. Assessed Hotspot Locations in the Hutchinson River Watershed

Table 3. Summary of Assessed Hotspot Locations

Hotspot ID	Site Name	Subwatershed
HtSpt_01	Hardware Store	Reservoir Three
HtSpt_02	Train Yard	Vernon Park
HtSpt_03	Laundromat	Vernon Park
HtSpt_04	East Third Street Businesses	Vernon Park
HtSpt_05	Scrap Metal Service	Sprague Terminal Canal
HtSpt_06	Pavement Facility	Sprague Terminal Canal
HtSpt_07	Asphalt Production 2	Sprague Terminal Canal
HtSpt_08	Recycling Center	Sprague Terminal Canal
HtSpt_09	Asphalt Production 1	Sprague Terminal Canal
HtSpt_10	Shopping Center Dumpster Area	Reservoir Three
HtSpt_11	Shopping Center Dumpster Area 3	Reservoir Three
HtSpt_13	Concrete Production	Sprague Terminal Canal
HtSpt_14	Parking Lot	Sprague Terminal Canal
HtSpt_15	Pavement Facility 2	Sprague Terminal Canal
HtSpt_16	Pavement Facility 3	Sprague Terminal Canal
HtSpt_17	Shopping Center Dumpster Area 2	Sprague Terminal Canal
HtSpt_18	Materials Storage	Sprague Terminal Canal
HtSpt_19	Parking Lot Storage	Sprague Terminal Canal
HtSpt_20	Auto Service Shop	Wolfs Lane Park
HtSpt_21	Shipping Terminal	Wolfs Lane Park

General findings from the hotspot assessment include:

- There is a large variance in the severity of hotspot in the watershed ranging from very large industrial sites with large areas of exposed bulk materials to much smaller commercial sites with little to no outdoor activity.
- The biggest hotspots observed during the assessment included industrial asphalt production and large bulk storage facilities. Types of projects recommended for these sites include street sweeping, perimeter controls, and education projects.
- Many sites lacked dumpsters or had dumpsters in poor condition resulting in trash being left on the curb and overflowing from bags. Recommendations included targeted locations for dumpsters and better coordinated trash pick-up programs.
 - The watershed would benefit from either a dumpster replacement campaign and/or an education effort to keep dumpster lids closed/trash contained.
- Many locations' parking lots were in disrepair resulting in large amounts of debris entering the storm drain system. Repaving parking lots or replacing asphalt with permeable pavers would decrease the debris entering the storm drain system.

Figures 3 - 7 illustrate the findings described above.



Figure 3. Uncontained Asphalt Piles

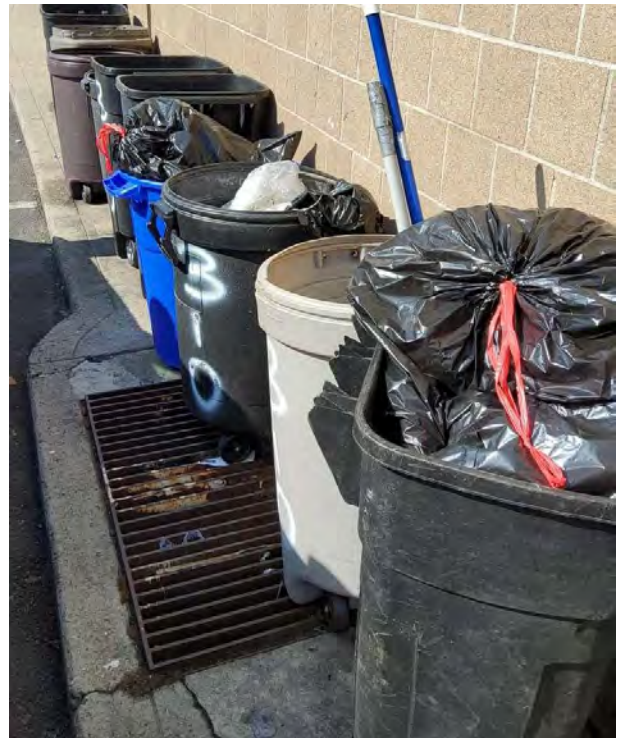


Figure 4. Poorly Located and Undersized Trash Containers



Figure 5. Exposed Materials throughout the Watershed



Figure 6. Unmaintained Pavement with Accumulating Debris



Figure 7. Large Grease Stains along Pavement

Stormwater Retrofit Assessment

The stormwater retrofit assessment identified opportunities throughout the watershed to treat local stormwater runoff.

Stormwater retrofits are the installation of stormwater management opportunities in areas where none previously existed, or the improvement of existing storm water management practices so that they provide a water quality function.

The retrofit assessment focused on specific stormwater management opportunities as follows:

Stormwater Wetlands: Constructed stormwater management opportunities, similar to stormwater ponds, that incorporate shallow zones and vegetation that remove pollutants through settling and biological uptake.

Bioretention: Shallow depressions with engineered soil media and dense vegetation designed to detain, retain, and clean stormwater before infiltration or discharge into the stormwater system.

Regenerative Stormwater Conveyance: Systems that convey and treat stormwater using a series of step pools to dissipate energy, provide water quality treatment, and stabilize erosive channels.

Application of these practices vary according to the impervious cover, land use, and restoration goals being pursued.

Summary of Sites Assessed

The field crew assessed the feasibility of stormwater management techniques at thirty-seven sites in the following categories: Commercial Sites, Institutional sites, one Train Station, Natural Spaces, Residential Sites, and Streets. Candidate sites were initially identified using aerial imagery, local input, impervious cover analysis, and land use.

Biohabitats identified management techniques to provide water quality treatment, address nuisance flooding, and mitigate known localized channel erosion areas. Field crews looked at drainage patterns, the amount of impervious cover, available space, and other site constraints, such as utilities, when evaluating a site.

Figure 8 and Table 4 identifies stormwater retrofit assessment areas. A geodatabase of the field assessment data was delivered to Westchester County and Save The Sound in July 2023.

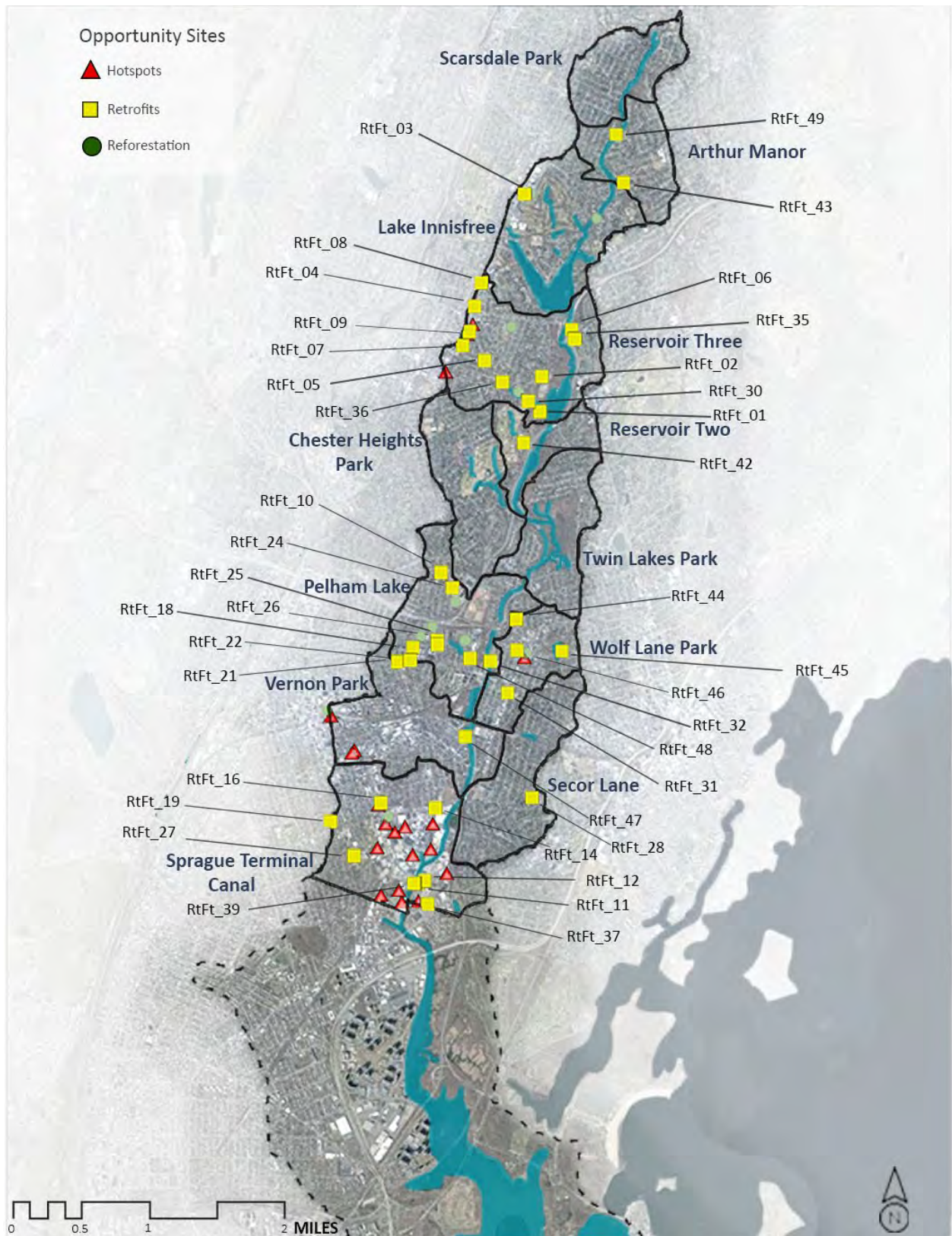


Figure 8. Stormwater Retrofit Locations in the Hutchinson River Watershed

Table 4. Summary of Stormwater Retrofit Sites

Retrofit ID	Site Name	Subwatershed	Proposed Stormwater Intervention
RtFt_01	Reservoir Three Shoreline	Reservoir Three	Wetland
RtFt_02	Twin Lakes County Park	Reservoir Three	Wetland
RtFt_03	Vernon Hill Shopping Center	Lake Innisfree	Bioretention
RtFt_04	Eastchester Public Library	Reservoir Three	Bioretention
RtFt_05	Joyce Park	Reservoir Three	Wetland
RtFt_06	Holy Trinity Greek Orthodox Church Side Lawn	Reservoir Three	Wetland
RtFt_07	Chase Bank	Reservoir Three	Bioretention
RtFt_08	Garden Coop Apartments	Reservoir Three	Bioretention
RtFt_09	Wells Fargo Lot	Reservoir Three	Bioretention
RtFt_10	Muslim Center	Pelham Lake	Bioretention
RtFt_11	Dave and Busters Parking Lot	Sprague Terminal Canal	Bioretention
RtFt_12	Pelham Plaza Parking Lot	Sprague Terminal Canal	Bioretention
RtFt_14	Sanford Blvd East Dunkin	Sprague Terminal Canal	Bioretention
RtFt_16	Mt Vernon Fire Department	Sprague Terminal Canal	Wetland
RtFt_18	Vernon Manor Coop Apts	Pelham Lake	Bioretention
RtFt_19	Cecil E Parker Elem School	Sprague Terminal Canal	Bioretention
RtFt_21	Presbyterian Church and Holmes School Shared Lot	Pelham Lake	Bioretention
RtFt_22	Mt Vernon Fire Department	Pelham Lake	Bioretention
RtFt_24	Mt Vernon High School	Pelham Lake	Wetland
RtFt_25	Sheridan Ave Park	Pelham Lake	Bioretention
RtFt_26	Sheridan Ave Street Median	Pelham Lake	Bioretention
RtFt_27	Rebecca Turner Elementary School	Sprague Terminal Canal	Bioretention
RtFt_28	Colonial Ave Shoulder	Secor Lane	Bioretention
RtFt_30	Path Alongside Reservoir Three	Reservoir Three	Wetland
RtFt_31	Pelham Art Center Parking Lot	Wolfs Lane Park	Bioretention
RtFt_32	Hutchinson River Tributary from River Ave	Wolfs Lane Park	Regenerative Stormwater Conveyance
RtFt_35	Holy Trinity Greek Orthodox Church Parking Lot	Reservoir Three	Bioretention
RtFt_36	Eastchester Park	Reservoir Three	Regenerative Stormwater Conveyance
RtFt_37	HomeGoods Parking Lot	Sprague Terminal Canal	Bioretention

Retrofit ID	Site Name	Subwatershed	Proposed Stormwater Intervention
RtFt_42	Twin Lakes Farm	Reservoir Three	Wetland
RtFt_43	Wilmot Ave Daisy Farm	Reservoir Three	Bioretention
RtFt_44	Chester Park	Wolfs Lane Park	Bioretention
RtFt_45	Glenwood Lake	Wolfs Lane Park	Bioretention
RtFt_46	Juliannes Playground	Wolfs Lane Park	Bioretention
RtFt_47	Beechwood Ave	Vernon Park	Bioretention
RtFt_48	Stream below Wartburg Home	Pelham Lake	Wetland
RtFt_49	Sprague Rd	Arthur Manor	Bioretention

The majority of stormwater management opportunities are on large, paved parcels in public, highly visible locations. Specific types of stormwater management facilities prescribed for retrofit locations vary, but include bioretention practices, regenerative stormwater conveyance, sand filters, and wetlands.

General findings from the retrofit assessment include:

- Swales and reforestation projects were recently completed along the Hutchinson River parkway at the Lincoln Ave exit in conjunction with highway improvement opportunities.
- Large flood protection projects have been implemented in the Pelham Lake portion of the Hutchinson River watershed, reducing flooding problems that were previously reported.
 - While there are some existing stormwater management projects, there are abundant opportunities for onsite practices that could provide aesthetic improvement and educational opportunities to sites.
 - These sites would benefit from signage to share benefits of the project to the community.
- There are numerous opportunities for stormwater management techniques throughout the watershed, particularly in parking lots and at publicly owned facilities.
 - Many of these sites appear to have underused parking lots and could potentially decrease their parking areas for retrofits and reforestation opportunities. Investigating the zoning laws for the size of parking lots will be required.
 - Additionally, redesigning parking lots, by, for example, making them one way, to maintain the number of parking spots while increasing open space for retrofits should be considered.
- Wetland areas were viable in multiple locations, which have the dual benefit of providing water quality treatment and creating wildlife habitat within a very urban watershed.

Figures 9 - 14 illustrate some of the findings described above.



Figure 9. Good Opportunities for Planter Boxes or Rain Gardens

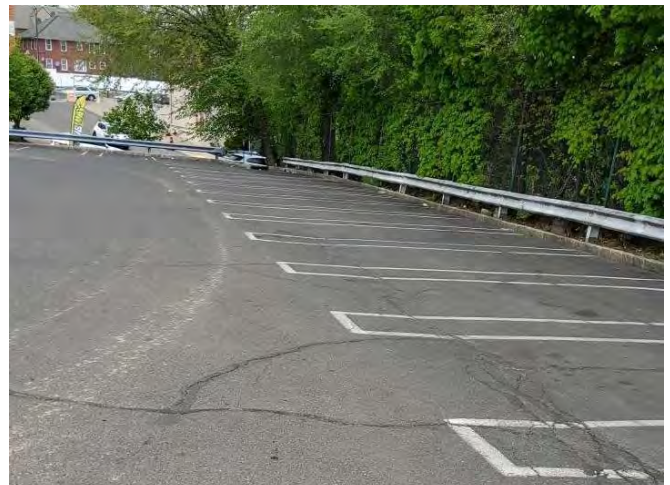


Figure 10. Large, Underutilized Parking Lots are a Stormwater Retrofit Opportunity



Figure 11. Wide Streets with Unmaintained Islands are a Green Streets Opportunity



Figure 12. Locations with Evidence of Ponding Pose Good Opportunities for Bioretention



Figure 13. Opportunities for Regenerative Stormwater Conveyance (RSC)

Reforestation Assessment

The Reforestation Assessment was modified from the Center for Watershed Protection's Urban Reforestation Site Assessment². The purpose of the Reforestation Assessment is to identify areas where:

- Forest fragments can be enhanced to improve health, condition, and function of the urban forest.
- Open land can be reforested through active replanting or natural regeneration to regain some of the functions and benefits of a forest and to increase overall watershed forest cover and increase forest canopy.

Prior to going out into the field, publicly owned sites, and sites with large areas of turf grass were identified using aerial photos and land use mapping information.

Reforestation practices in an urban watershed such as the Hutchinson River range in size; smaller scale efforts such as street tree planting improve canopy cover and provide water quality treatment in areas with less available space. Conservation landscaping focuses on the introduction of native grasses and flowers to areas covered in turf grass to decrease runoff, and improve soil quality, carbon capture, and water quality. Reforestation focuses on large areas that can be restored as “urban forests” or are areas concentrated with trees or urban forests.

Summary of Sites Assessed

A total of 25 sites were evaluated by field crews for the potential to replace impervious cover with pervious areas, restore turf grass to meadow landscapes, increase tree canopy, and enhance the existing urban forest. Sites were deemed as stronger reforestation candidates if they were on larger parcels with minimal site preparation requirements, were under public ownership, or had potential linkage with other upland restoration opportunities such as stormwater retrofit.

Figure 15 and Table 5 identifies reforestation assessment areas. A geodatabase of the field assessment data was delivered to the County and Save The Sound in July 2023.

² Capiella, K., Schueler, T.R., Tomlinson, J. L., and T. Wright. 2006. *Urban Watershed Forestry Manual. Part 3: Urban Tree Planting Guide*. Center for Watershed Protection. Ellicott City, MD.



Figure 14. Reforestation Locations in the Hutchinson River Watershed

Table 5. Summary of Reforestation Opportunities

Reforestation ID	Site Name	Subwatershed	Proposed Reforestation Project Type
ReFrst_03	Vernon Hills Shopping Center	Lake Innisfree	Reforestation
ReFrst_04	Wells Fargo Lot	Reservoir Three	Reforestation
ReFrst_05	Chase Bank Lot	Reservoir Three	Reforestation
ReFrst_06	Anne Hutchinson Elementary School	Reservoir Three	Conservation Landscaping
ReFrst_07	Greek Orthodox Holy Trinity Church	Reservoir Three	Reforestation
ReFrst_08	Eastchester Park	Reservoir Three	Conservation Landscaping
ReFrst_09	Mt Vernon High School	Pelham Lake	Conservation Landscaping
ReFrst_10	Stop and Shop Parking Lot	Sprague Terminal Canal	Reforestation
ReFrst_11	Muslim Center	Pelham Lake	Conservation Landscaping
ReFrst_12	Hutchinson River Shoreside	Sprague Terminal Canal	Conservation Landscaping
ReFrst_13	Wartburg Retirement Home II	Pelham Lake	Conservation Landscaping
ReFrst_15	Open, Unused Lot	Sprague Terminal Canal	Conservation Landscaping
ReFrst_16	Mt Vernon East Train Station	Vernon Park	Conservation Landscaping
ReFrst_17	Holmes Elementary School	Vernon Park	Conservation Landscaping
ReFrst_18	Mt Vernon Fire Department	Pelham Lake	Conservation Landscaping
ReFrst_19	Traphagen School II	Pelham Lake	Reforestation
ReFrst_20	Traphagen School I	Pelham Lake	Conservation Landscaping
ReFrst_21	Sheridan Ave Park I	Pelham Lake	Conservation Landscaping
ReFrst_22	Sheridan Ave Park II	Pelham Lake	Conservation Landscaping
ReFrst_23	5th Ave Businesses	Wolfs Lane Park	Street Trees
ReFrst_24	Wartburg Retirement Home I	Pelham Lake	Street Trees
ReFrst_25	Dave and Busters Parking Lot	Sprague Terminal Canal	Street Trees
ReFrst_26	Wilmot Rd @ Old Wilmot	Lake Innisfree	Reforestation
ReFrst_28	Beechwood Ave Grassy Curb	Vernon Park	Conservation Landscaping
ReFrst_30	Chester Park	Wolfs Lane Park	Conservation Landscaping

General findings from the reforestation assessment include:

- Additional opportunities for reforestation, street trees, and conservation landscaping exist throughout the watershed. Within the priority subwatersheds, these were the most viable reforestation opportunities.
- The parcel areas for reforestation are relatively small but in the context of such an urban watershed can have large impact.
 - Many reforestation opportunities are within parking lots that appear to be underutilized, which may warrant thinking about how zoning codes and ordinances influence the design and size of parking lots.
- Conservation landscaping is largely recommended on school grounds where underutilized turf exists. Recommendations took into consideration active play and sports areas; opportunities identified areas for outreach and education and more discovery-oriented play spaces.
- Street trees are identified in areas where they can provide additional benefits such as cooling capacity, pavement maintenance, and improved aesthetics.
 - There is high potential for green street programs as well.

Figures 15 and 16 below illustrate some of the findings described above.



Figure 15. Reforestation Opportunities Located in Pervious Areas Adjacent to Existing Tree Canopy



Figure 16. Reforestation Enhance Opportunities including Areas Identified for Invasives Species Removal

RESTORATION OPPORTUNITIES PRIORITIZATION METHODOLOGY

Based on data collected through the field assessments, an inventory of restoration opportunities was developed. Biohabitats worked with Save the Sound, Westchester County, and the Watershed Steering Committee to develop a schema to prioritize and rank restoration opportunities using the desktop and field assessment data. While the individual metrics vary by type of opportunity, the overall prioritization framework for all three (Hotspots, Retrofits, and Reforestation) organized into the following categories:

- **Environmental Impact:** covers metrics that are focused on the project’s environmental impact. Water quality is a large focus of this category. Additional metrics are included depending on the project type.
- **Ability to Address:** considers the feasibility or ease of implementing the proposed opportunity, including ownership and physical parameters such as available space, slope, and soil type.
- **Ancillary Benefits:** considers additional benefits that may result from the project’s implementation.

Restoration opportunities were scored within each of the categories to determine a total score that assigns each opportunity as either high, medium, or low priority within each restoration opportunity type. The following section provides additional detail on the scoring metrics utilized for each type of opportunity.

Hotspot Prioritization Metrics

Metrics considered in the prioritization of hotspot sites are described below.

Hotspots: Environmental Impacts

Environmental impacts scoring was largely based on field observations of hotspot sites in the field and included Contributing Pollutants of Concern (POC) and Severity.

- **Contributing POCs:** scores a site’s potential to contribute to the pollutants on Hutchinson River watershed’s 303d list of impaired waters (low dissolved oxygen, fecal coliform, and oil and grease).
- **Severity:** based on the site’s size and amount and type of exposed materials. The scoring breakdown for each of the factors is summarized in Table 6.

Table 6. Hotspot Environmental Impacts Scoring Criteria

Criteria	Points (Total Possible Pts: 30)
Contributing POCs	
Multiple POCs Observed	10
One POC Observed	5
No POCs Observed	0
Severity	
High	20
Medium	10
Low	0

Hotspots: Ability to Address

Metrics under the ability to address category included the following:

- **National Pollutant Discharge Elimination System (NPDES) Permit Coverage:** Facilities with coverage under the Stormwater Multi-Sector General Permit already have requirements to prevent and reduce stormwater pollution from onsite activities. Facilities with coverage under this permit may be more amenable to assistance and outreach regarding improvement of onsite practices to reduce stormwater pollution.
- **Ease of Implementation:** Based on field observations of the feasibility of implementation including physical parameters such as space and onsite activities.

- **Ownership:** Tax parcel data was analyzed to determine the ownership of the potential sites. This metric is important because some owners (for example, Westchester County), will provide fewer logistics barriers than a private owner. Other Public land is defined as land owned by towns, NY state, and federal land. Institutional land is defined as a privately owned parcel that does not include living quarters but offers services to the community (religious centers, private schools, etc.).
- **Cost:** The field assessment identified recommendations for each site with most sites having multiple recommendations. For the purposes of prioritization, a general cost estimate was assigned to each type of recommendation. Cost will vary depending on the site and extent of activities at each site. A summary of the costs assigned to each recommendation type is provided in Table 8. Projects with costs over \$190,000 were deemed to be High; projects with costs between \$190,000 and \$130,000 were deemed to be Medium; and projects with costs less than \$130,000 were Low Cost.

The scoring breakdown for each of the factors is summarized in Table 7.

Table 7. Hotspot Ability to Address Scoring

Criteria	Points (Total Possible Pts: 25)
NPDES Permit Coverage	
Yes	5
No	0
Ease of Implementation	
High	7
Medium	5
Low	0
Ownership	
Westchester County	8
Other Public	7
Institutional	3
Private	0
Cost	
Low	5
Medium	3
High	0

Table 8. Hotspot Recommendations High Level Cost Estimates

Recommendation Type	Unit Cost Estimate	Additional Notes
Outreach	\$2,500	Staff time for two full day visits per year.
Dumpster replacement	\$1,200	
Bulk material perimeter control	\$20,000	
Resurfacing parking lot	\$45,000	Assuming the cost is \$3/square foot and 1 acres of parking lot will be resurfaced.
Weekly street sweeping	\$5,200	Two sweepings per week per year costing \$50 per visit.
Oil and Grease Separator	\$60,000	Cost varies greatly depending on the drainage area and size of the oil and grease separator. Costs also assume that one oil and grease separator is installed at a site. Costs are based on King and Hagan (2011) and adjusted for inflation. ³

³ King, D. and P. Hagan. 2011. *Cost of Stormwater Management Practices in Maryland Counties*. Prepared for Maryland Department of the Environment. University of Maryland Center for Environmental Science. Solomons, MD.

Hotspots: Ancillary Benefits

Additional benefits considered as a result of implementing hotspot recommendations included:

- **Ability to Combine with Other Opportunities:** This metric considered the presence of other opportunity types located on the same parcel. For example, if one parcel with a reforestation opportunity was also identified as a retrofit opportunity. A summary of hotspot opportunities co-located within another opportunity type is provided in Table 10.
- **Visibility:** This metric considered how visible a potential project might be to the public. Considerations included proximity to the street, whether volunteer efforts are possible during the implementation effort, and how often the site will be engaged with by the community.

The scoring breakdown for each of the factors is summarized in Table 9.

Table 9. Hotspot Ancillary Benefits Scoring

Criteria	Points (Total Possible Pts: 12)
Ability to Combine	
Yes	5
No	0
Visibility	
High	7
Medium	5
Low	0

Hotspot opportunities that are on the same parcel as other restoration opportunities are shown in Table 10.

Table 10. Hotspot Opportunities Co-Located with Other Opportunity Types

Hotspot Opportunity	Co-Located Opportunity(ies)
HtSpt_02: Train Yard	ReFrst_16: Mt Vernon East Train Station
HtSpt_11: Shopping Center Dumpster Area 3	RtFt_09: Wells Fargo Lot ReFrst_04: Wells Fargo Lot
HtSpt_20: Auto Service Shop	ReFrst_20: 5 th Ave Businesses

Stormwater Retrofits

Metrics considered in the prioritization of retrofit sites are described below.

Stormwater Retrofits: Environmental Impacts

The environmental impacts of the retrofit opportunities were scored on the following metrics:

- **Proposed Stormwater Management Opportunity Type:** As part of the field assessment, a proposed type of stormwater management opportunity was identified based on-site conditions. Scoring is based on the proposed stormwater management opportunity's ability to provide both water quality treatment and/or habitat enhancement.
- **Observed Flooding:** The observed flooding metric was based on field observations of evidence of nuisance (e.g., staining near storm drain) or major flooding (e.g., sandbags) events at the location of the proposed stormwater management opportunity.
- **Water Treatment Ratio:** approximated the potential water quality treatment provided by the proposed stormwater management opportunity. Field and desktop data were utilized to approximate a footprint and drainage area for each proposed stormwater management opportunity. The stormwater management opportunity footprint and drainage area were compared to create a water

treatment ratio to identify the level of potential water quality treatment provided at a site. This ratio was used to place potential retrofits into one of three bins:

- Potential for Extra Treatment: the stormwater management opportunity footprint was more than 10% of the drainage area.
- Full Treatment Likely: the stormwater management opportunity footprint was between 5 and 10% of the drainage area.
- Partial Treatment Likely: the stormwater management opportunity footprint was less than 5% of the drainage area.

The scoring breakdown for each of the factors is summarized in Table 11.

Table 11. Stormwater Retrofit Environmental Impacts Scoring Criteria

Criteria	Points (Total Possible Pts: 40)
Proposed Stormwater Management Opportunity Type	
Wetlands	10
Bioretention, Stream Restoration, Regenerative Stormwater Conveyance	5
None	0
Observed Flooding	
Major Flooding	20
Nuisance Flooding	10
None	0
Water Treatment Ratio	
Potential for Extra Treatment Likely	10
Full Treatment Likely	7
Partial Treatment Likely	0

Stormwater Retrofits: Ability to Address

Metrics under the ability to address category included the following:

- **Ease of Implementation:** This metric utilized data compiled during field work to determine how difficult it would be to implement the retrofit effort at that site. Considerations included proximity to roads, natural resources, property boundaries, presence of steep slopes and utilities, and access.
- **Ownership:** Tax parcel data was analyzed to determine the ownership of the potential sites. This metric is important because some owners (for example, Westchester County, a key stakeholder and Plan partner), may provide fewer logistics barriers than a private owner. Other Public land is defined as land owned by towns, NY state, and federal land. Institutional land is defined as a private owner that is not a single-family home (religious centers, private schools, etc.).
- **Cost:** Planning level construction costs were estimated for the various project types depending on their estimated footprint or length. To provide conservative estimates, costs were increased by 20% to account for inflation. Cost assumptions were taken from previous similar projects. Table 13 provides the assumptions used for each stormwater management opportunity type. Projects with costs over \$310,000 were deemed to be High costs; projects with costs between \$310,000 and \$190,000 were deemed to be Medium Cost; and projects with costs less than \$190,000 were Low Cost.

The scoring breakdown for each of the factors is summarized in Table 12.

Table 12. Stormwater Retrofit Ability to Address Scoring

Criteria	Points (Total Possible Pts: 20)
Ease of Implementation	
High	7
Medium	5
Low	0
Ownership	
Westchester County	8
Other Public	7
Institutional	3
Private	0
Cost	
Low	5
Medium	3
High	0

Table 13. Stormwater Retrofit Planning Level Cost Estimate Assumptions

Stormwater Management Opportunity Type	Cost Assumptions
Bioretention	Soil: \$20/cubic foot Plants: \$13/square foot Overflow Structure: \$10,000 Erosion and Sediment Control: 20% of costs or \$12,000 minimum
Regenerative Stormwater Conveyance	\$700/linear foot
Stream Restoration	\$1400/linear foot
Wetland	Soil: \$10/cubic foot Plants: \$18/square foot Overflow Structure: \$10,000 Erosion and Sediment Control: 20% of costs or \$12,000 minimum

Stormwater Retrofits: Ancillary Benefits

Metrics under the ancillary benefits category included the following:

- **Ability to Combine with Other Opportunities:** This metric considered the presence of other intervention types located on the same parcel. For example, if one parcel with a reforestation opportunity was also deemed fit to have a retrofit located there. A summary of hotspot opportunities co-located within another opportunity type is provided in Table 15.
- **Visibility:** This metric considered how visible a potential project might be to the public. The team considered proximity to the street, whether volunteer efforts are possible during the implementation effort, and how often the site will be engaged with by the community.

The scoring breakdown for each of the factors is summarized in Table 14.

Table 14. Stormwater Retrofit Ancillary Benefits Scoring

Criteria	Points (Total Possible Pts: 12)
Ability to Combine	
Yes	5
No	0

Criteria	Points (Total Possible Pts: 12)
Visibility	
High	7
Medium	5
Low	0

Retrofit opportunities that are on the same parcel as other restoration opportunities are shown in Table 15.

Table 15. Stormwater Retrofit Opportunities Co-Located with Other Opportunity Types

Stormwater Retrofit Opportunity	Co-Located Opportunity(ies)
RtFt_01: Reservoir Three Shoreline	RtFt_02: Twin Lakes County Park RtFt_30: Path Alongside Reservoir Three RtFt_42: Twin Lakes Farm
RtFt_02: Twin Lakes County Park	RtFt_01: Reservoir Three Shoreline RtFt_30: Path Alongside Reservoir Three RtFt_42: Twin Lakes Farm
RtFt_03: Vernon Hill Shopping Center	ReFrst: Vernon Hills Shopping Center
RtFt_05 : Joyce Park	Stream Restoration and Wetland Opportunities at this Site.
RtFt_06 : Holy Trinity Greek Orthodox Church Side Lawn	ReFrst_07: Holy Trinity Greek Orthodox Church RtFt_35: Holy Trinity Greek Orthodox Church Parking Lot
RtFt_07: Chase Bank	ReFrst: Chase Bank
RtFt_09: Wells Fargo Lot	HtSpt_11: CVS & Wells Fargo Dumpster ReFrst04: Wells Fargo Lot
RtFt_10: Muslim Center	ReFrst_11: Muslim Center
RtFt_11: Dave and Busters Parking Lot	ReFrst_12: Hutchinson River Shoreside ReFrst_25: Dave and Busters Parking Lot
RtFt_21: Presbyterian Church and Holmes School Shared Lot	ReFrst_17: Holmes Elementary School
RtFt_22: Mt Vernon Fire Department	ReFrst_18: Mt Vernon Fire Department
RtFt_24: Mt Vernon High School	ReFrst_09: Mt Vernon High School
RtFt_25: Sheridan Ave Park	ReFrst_21: Sheridan Ave Park I ReFrst_22: Sheridan Ave Park II
RtFt_30: Path Alongside Reservoir Three	RtFt_01: Reservoir Three Shoreline RtFt_02: Twin Lakes County Park RtFt_42: Twin Lakes Farm
RtFt_35: Holy Trinity Greek Orthodox Church Parking Lot	ReFrst_07: Holy Trinity Greek Orthodox Church RtFt_06: Holy Trinity Greek Orthodox Church Side Lawn
RtFt_37: HomeGoods Parking Lot	Multiple locations on the Site for Retrofit Opportunities
RtFt_42: Twin Lakes Farm	RtFt_01: Reservoir Three Shoreline RtFt_02: Twin Lakes County Park RtFt_30: Path Alongside Reservoir Three
RtFt_44: Chester Park	ReFrst_30: Chester Park
RtFt_47: Beechwood Ave	ReFrst_28: Beechwood Ave Grassy Curb

Reforestation

Metrics considered in the prioritization of reforestation sites are described below.

Reforestation: Environmental Impacts

The environmental impacts of proposed reforestation projects were based on the size of the project area, project type and the presence of invasive species.

- **Project Area:** the proposed project area metric approximated the amount of land that could be restored in a reforestation effort. The scale is done on a relative basis between the proposed projects. Sites were categorized as follows:
 - Large reforestation efforts covered over 0.35 acres (15,000 square feet)
 - Medium reforestation efforts covered over 0.08 acres (3,400 square feet)
 - Small reforestation efforts covered less than 0.08 acres (3,400 square feet)
- **Project Type:** the project type was based on field observations to determine the type of reforestation best suited for the site.
 - Reforestation efforts comprise of high-density tree and shrub planting in areas that are currently turf grass or impervious surfaces.
 - Conservation Landscaping efforts comprise of tall grass meadowlands and some trees.
 - Street Tree efforts comprise of single trees along roads and sidewalks to provide shade and water quality improvements.
- **Invasives Presence:** The invasive presence metric was based on field observations that determined the percentage of invasive coverage located at the site, which presents an opportunity to improve and enhance onsite habitat. Sites were categorized as follows:
 - High invasives presence: over 60 percent invasives coverage
 - Medium invasives presence: over 20 percent invasives coverage
 - Low invasives presence: less than 20 percent invasives coverage

The scoring breakdown for each of the factors is summarized in Table 16.

Table 16. Reforestation Environmental Impacts Scoring Criteria

Criteria	Points (Total Possible Pts: 30)
Project Area	
Large	15
Medium	7
Small	1
Project Type	
Reforestation	10
Conservation Landscaping	7
Street Trees	3
Presence of Invasive Species	
High	5
Medium	3
Low	0

Reforestation: Ability to Address

Metrics under the ability to address category included the following:

- **Ownership:** Tax parcel data was analyzed to determine the ownership of the potential sites. This metric is important because some owners (for example, Westchester County), will provide fewer logistics barriers than a private owner. Other Public land is defined as land owned by towns, NY state, and federal land. Institutional land is defined as a private owner that is not a single-family home (religious centers, private schools, etc.).
- **Ease of Implementation:** This metric utilized data compiled during field work to determine how difficult it would be to implement the reforestation effort at that site. Considerations included the ability to include volunteers in reforestation efforts, the proximity to a water source, and the presence

of any physical constraints (utilities, pavement, buildings, wires, lighting). If yes, the metric was given one point. The total scores were then divided into thirds as high, medium, and low.

- **Cost:** Costs were determined for the various project types depending on their estimated footprint. Cost assumptions were taken from previous similar projects. The following table provides the assumptions used for each Reforestation type. Costs are based off of the existing land use and apply to both conservation landscaping and reforestation. Projects with costs over \$150,000 were deemed to be High cost; projects with costs between \$50,000 and \$150,000 were deemed to be Medium Cost; and projects with costs less than \$50,000 were Low Cost.

Table 17. Reforestation Planning Level Cost Estimate Assumptions

Reforestation Type	Existing Land Use	Unit Cost
Reforestation and Conservation Landscaping	Open Space or Forest	\$300,000 per acre
Reforestation or Conservation Landscaping	Paved	\$469,440 per acre
Street Trees	All	\$5,300 per tree

The scoring breakdown for each of the factors is summarized in Table 17.

Table 18. Reforestation Ability to Address Scoring

Criteria	Points (Total Possible Pts: 20)
Ease of Implementation	
High	7
Medium	5
Low	0
Ownership	
Westchester County	8
Other Public	7
Institutional	3
Private	0
Cost	
Low	5
Medium	3
High	0

Reforestation: Ancillary Benefits

Metrics under the ancillary benefits category included the following:

- **Ability to Combine with Other Opportunities:** This metric considered the presence of other opportunity types located on the same parcel. For example, if one parcel with a reforestation opportunity was also identified as a retrofit opportunity. A summary of hotspot opportunities co-located within another opportunity type is provided in Table 20.
- **Visibility:** This metric considered how visible a potential project might be to the public. The team considered proximity to the street, whether volunteer efforts are possible during the implementation effort, and how often the site will be engaged with by the community.
- **Tree Canopy Cover:** This metric considered whether an increase in canopy cover would occur as a result of the reforestation effort.

The scoring breakdown for each of the factors is summarized in Table 19.

Table 19. Reforestation Ancillary Benefits Scoring

Criteria	Points (Total Possible Pts: 17)
Ability to Combine	
Yes	5
No	0
Visibility	
High	7
Medium	5
Low	0
Tree Canopy Cover	
Yes	5
No	0

Reforestation opportunities that are on the same parcel as other restoration opportunities are shown in Table 20.

Table 20. Reforestation Opportunities Co-Located with Other Opportunity Types

Reforestation Opportunity	Co-Located Opportunity(ies)
ReFrst_03: Vernon Hills Shopping Center	RtFt_03: Vernon Hills Shopping Center
ReFrst_04: Wells Fargo Lot	HtSpt_11: Shopping Center Dumpster Area 3 RtFt_09: Wells Fargo Lot
ReFrst_05: Chase Bank Lot	RtFt_07: Chase Bank
ReFrst_07: Greek Orthodox Holy Trinity Church	RtFt_07: Holy Trinity Greek Orthodox Church RtFt_35: Holy Trinity Greek Orthodox Church Parking Lot
ReFrst_09: Mt Vernon High School	RtFt_24: Mt Vernon High School
ReFrst_11: Muslim Center	RtFt_10: Muslim Center
ReFrst_12: Hutchinson River Shoreside	ReFrst_25: Dave and Busters Parking Lot RtFt_11: Dave and Busters Parking Lot
ReFrst_13: Wartburg Retirement Home II	ReFrst_24: Wartburg Retirement Home I
ReFrst_16: Mt Vernon East Train Station	HtSpt_02: Train Yard
ReFrst_17: Holmes Elementary School	RtFt_21: Presbyterian Church and Holmes School Shared Lot
ReFrst_18: Mt Vernon Fire Department	RtFt_22: Mt Vernon Fire Department
ReFrst_19: Traphagen School II	ReFrst_20: Traphagen School I
ReFrst_20: Traphagen School I	ReFrst_19: Traphagen School II
ReFrst_21: Sheridan Ave Park I	ReFrst_22: Sheridan Ave Park II RtFt_25: Sheridan Ave Park
ReFrst_22: Sheridan Ave Park II	ReFrst_21: Sheridan Ave Park I RtFt_25: Sheridan Ave Park
ReFrst_23: 5th Ave Businesses	HtSpt_20: Auto Service Shop
ReFrst_24: Wartburg Retirement Home I	ReFrst_13: Wartburg Retirement Home II
ReFrst_25: Dave and Busters Parking Lot	RtFt_11: Dave and Busters Parking Lot ReFrst_12: Hutchinson River Shoreside
ReFrst_28: Beechwood Ave Grassy Curb	RtFt_47: Beechwood Ave
ReFrst_30: Chester Park	RtFt_44: Chester Park

RESTORATION OPPORTUNITY PRIORITIZATION RESULTS

A summary of the prioritization results, by opportunity type, is provided in Tables 21 – 23 and are depicted in Figures 18 – 20. Detailed scoring results can be found in Attachment A.

Table 21. Hotspot Opportunities Prioritization Summary

ID	Site Name	Environmental Score	Ability to Address Score	Ancillary Benefits Score	Total Score (Total Possible Pts: 67)	Prioritization
HtSpt_07	Asphalt Production 2	25	10	7	42	High
HtSpt_13	Concrete Production	25	8	7	40	High
HtSpt_08	Recycling Center	15	20	0	35	High
HtSpt_06	Pavement Facility	15	15	5	35	High
HtSpt_20	Auto Service Shop	15	7	12	34	High
HtSpt_09	Asphalt Production 1	25	8	0	33	High
HtSpt_04	East Third Street	15	10	7	32	High
HtSpt_02	Train Yard	15	5	12	32	Medium
HtSpt_10	Shopping Center Dumpster Area	20	10	0	30	High
HtSpt_05	Scrap Metal Service	15	15	0	30	Medium
HtSpt_19	Parking Lot Storage	15	7	5	27	Medium
HtSpt_15	Pavement Facility 2	15	8	0	23	Medium
HtSpt_03	Laundromat	5	12	5	22	Medium
HtSpt_21	Shipping Terminal	15	5	0	20	Medium
HtSpt_16	Pavement Facility 3	5	7	7	19	Low
HtSpt_14	Parking Lot	5	8	5	18	Low
HtSpt_11	Shopping Center Dumpster Area 3	0	10	5	15	Low
HtSpt_01	Hardware Store	0	12	0	12	Low
HtSpt_17	Shopping Center Dumpster Area 2	0	7	0	7	Low
HtSpt_18	Materials Storage Area	0	5	0	5	Low



Figure 17. Hotspot Opportunities Based on Prioritization Ranking

Table 22. Stormwater Retrofit Opportunities Prioritization Summary

ID	Site Name	Environmental Score	Ability to Address Score	Ancillary Benefits Score	Total Score (Total Possible Pts: 72)	Prioritization
RtFt_24	Mt Vernon High School	40	14	12	66	High
RtFt_11	Dave and Busters Parking Lot	35	5	12	52	High
RtFt_21	Presbyterian Church and Holmes School Shared Lot	25	12	12	49	High
RtFt_27	Rebecca Turner Elementary School	25	15	7	47	High
RtFt_31	Pelham Art Center Parking Lot	25	17	5	47	High
RtFt_04	Eastchester Public Library	22	17	7	46	High
RtFt_19	Cecil E Parker Elementary School	22	17	7	46	High
RtFt_26	Sheridan Ave Street Median	22	17	7	46	High
RtFt_06	Holy Trinity Greek Orthodox Church Side Lawn	30	10	5	45	High
RtFt_25	Sheridan Ave Park	15	17	12	44	High
RtFt_47	Beechwood Ave	15	17	12	44	High
RtFt_28	Colonial Ave Shoulder	22	17	5	44	High
RtFt_02	Twin Lakes County Park	20	13	10	43	Medium
RtFt_16	Mt Vernon Fire Department	20	15	7	42	Medium
RtFt_30	Path Alongside Reservoir Three	20	11	10	41	Medium
RtFt_05	Joyce Park	20	10	10	40	Medium
RtFt_35	Holy Trinity Greek Orthodox Church Parking Lot	15	15	10	40	Medium
RtFt_22	Mt Vernon Fire Department	15	17	7	39	Medium
RtFt_09	Wells Fargo Lot	22	12	5	39	Medium
RtFt_03	Vernon Hill Shopping Center	15	13	10	38	Medium
RtFt_10	Muslim Center	15	13	10	38	Medium
RtFt_48	Stream below the Wartburg Home	30	3	5	38	Medium
RtFt_46	Juliannes Playground	12	19	7	38	Medium
RtFt_37	Homegoods Parking Lot	25	7	5	37	Medium
RtFt_07	Chase Bank	22	8	5	35	Low
RtFt_18	Vernon Manor Coop Apartments	25	5	5	35	Low
RtFt_42	Twin lakes Farm	20	8	5	33	Low
RtFt_49	Sprague Rd	15	12	5	32	Low
RtFt_44	Chester Park	15	10	5	30	Low
RtFt_12	Pelham Plaza parking lot	22	8	0	30	Low

ID	Site Name	Environmental Score	Ability to Address Score	Ancillary Benefits Score	Total Score (Total Possible Pts: 72)	Prioritization
RtFt_36	Eastchester Park	15	10	5	30	Low
RtFt_08	Garden Coop Apartments	12	10	5	27	Low
RtFt_14	Sanford Blvd East Dunkin	22	5	0	27	Low
RtFt_01	Reservoir Three Shoreline	10	8	5	23	Low
RtFt_45	Glenwood Lake	15	7	0	22	Low
RtFt_43	Wilmot Ave Daisy Farm	5	10	5	20	Low
RtFt_32	Hutchinson River Tributary from River Ave	5	12	0	17	Low

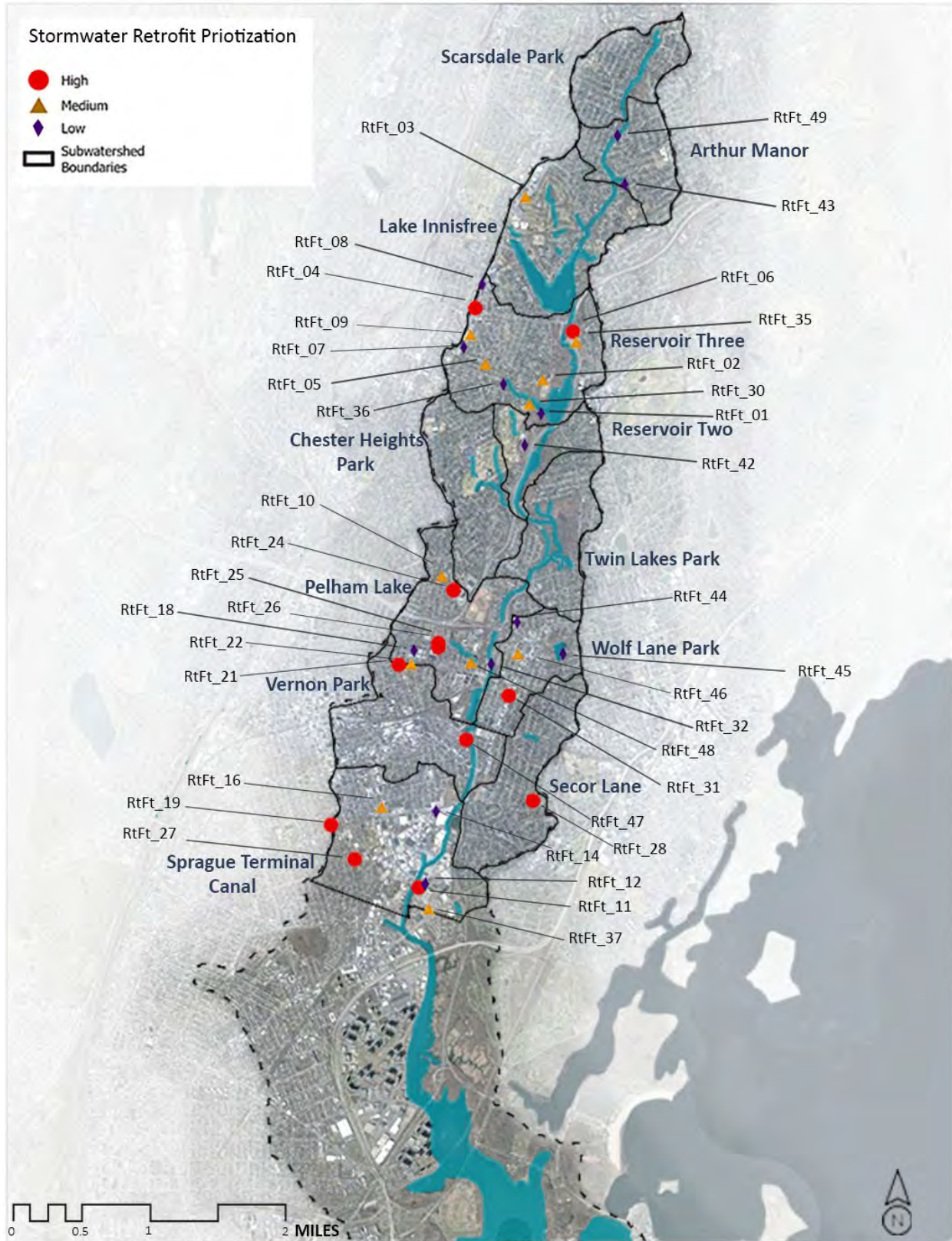


Figure 18. Stormwater Retrofit Opportunities Based on Prioritization Ranking

Table 23. Reforestation Opportunities Prioritization Summary

ID	Site Name	Environmental Score	Ability to Address Score	Ancillary Benefits Score	Total Score (Total Possible Score: 67)	Prioritization
ReFrst_28	Beechwood Ave Grassy Curb	25	19	17	61	High
ReFrst_03	Vernon Hills Shopping Center	25	13	15	53	High
ReFrst_06	Anne Hutchinson Elementary School	22	14	15	51	High
ReFrst_17	Holmes Elementary School	22	17	10	49	High
ReFrst_09	Mt Vernon High School	22	14	10	46	High
ReFrst_30	Chester Park	14	15	17	46	High
ReFrst_16	Mt Vernon East Train Station	22	5	17	44	High
ReFrst_08	Eastchester Park	27	7	10	44	High
ReFrst_15	Open, Unused Lot	22	3	17	42	Medium
ReFrst_11	Muslim Center	17	10	15	42	Medium
ReFrst_21	Sheridan Ave Park I	8	17	17	42	Medium
ReFrst_13	Wartburg Retirement Home II	22	7	10	39	Medium
ReFrst_18	Mt Vernon Fire Department	14	19	5	38	Medium
ReFrst_07	Greek Orthodox Holy Trinity Church	17	10	10	37	Medium
ReFrst_20	Traphagen School I	14	17	5	36	Medium
ReFrst_23	5th Ave Businesses	10	8	17	35	Low
ReFrst_12	Hutchinson River Shoreside	8	12	15	35	Low
ReFrst_26	Wilmot Rd @ old Wilmot	14	5	15	34	Low
ReFrst_19	Traphagen School II	11	12	10	33	Low
ReFrst_22	Sheridan Ave Park II	8	17	5	30	Low
ReFrst_25	Dave and Busters Parking Lot	4	10	15	29	Low
ReFrst_04	Wells Fargo Lot	11	5	10	26	Low
ReFrst_05	Chase Bank Lot	11	5	10	26	Low
ReFrst_10	Stop and Shop Parking Lot	17	3	5	25	Low
ReFrst_24	Wartburg Retirement Home I	4	10	10	24	Low



Figure 19. Reforestation Opportunities Based on Prioritization Ranking

TREATMENT POTENTIAL OF IMPROVEMENT OPPORTUNITIES

Using the Watershed Treatment Model (WTM) developed in Phase 1, Biohabitats conducted a treatment analysis to evaluate the pollutant load reduction potential associated with the suite of proposed restoration opportunities. When compared with the results from Phase 1, the results from this task meet the requirements of Element 2 of the US EPA’s 9E planning process (Expected Load Reductions for Solutions Identified). The methodology for the analysis is described below.

Watershed Treatment Model

For this WTM rerun, “Future Management Practices” were considered to determine the load reduction from proposed restoration opportunities. Retrofit and reforestation opportunities were quantified in this model. The WTM is not set up to account for water quality improvements associated with hotspot opportunities which are largely dependent on outreach and education; however, the WTM rerun does account for recommended street sweeping. These practice types’ efficiencies in removal of pollutants were quantified according to the methodologies as described below.

Reforestation / Land Reclamation

Reforestation opportunities were classified as land reclamation in the WTM. To calculate the pollutant reduction, the reforestation opportunities’ current land uses and pollutant loading amounts were identified. Then, these spaces were converted to park space. The difference between the current land use and the future “park” land use was calculated to determine the future load reduction. Table 24 provides the acreage of reforestation (accounted for as land reclamation within the WTM) by subwatershed.

Table 24. Acreage of Proposed Reforestation Opportunities by Subwatershed

Subwatershed	Converted Acreage
Lake Innisfree	0.44
Pelham Lake	2.17
Reservoir Three	3.45
Sprague Terminal Canal	0.70
Vernon Park	0.84
Wolfs Lane Park	0.44

No discount rates were applied to land reclamation sites. WTM assumptions include the full implementation of all reforestation opportunities.

Stormwater Retrofits

Drainage areas were delineated for all retrofit opportunities to determine the total area of treatment. The impervious cover within the drainage area was used to determine the Treatable Area.

This analysis utilized New York State Department of Environmental Conservation (NYS DEC) established pollutant removal rates by stormwater facility type⁴. These values determined the new loading rates for the retrofit drainage areas. Table 25 provides the NYS DEC established efficiencies used for the proposed stormwater retrofit opportunities.

⁴ Center for Watershed Protection. 2022. *Stormwater Management Design Manual*. New York State Department of Environmental Conservation.

Table 25. Pollutant Removal Rates for Proposed Retrofit Opportunity Types

Retrofit Design	Nitrogen (TN)	Phosphorus (TP)	Solids (TSS)	Pathogens (Bacteria)
Pond/Wetland System	30%	40%	80%	35%
Filtration Bioretention	30%	40%	80%	70%
Regenerative Stormwater Conveyance	30%	40%	80%	70%

The WTM allows users to incorporate three Discount Factors for Stormwater Retrofits: Capture Factor (D₁), Design Factor (D₂), and Maintenance Factor (D₃). The factors used in this assessment were as follows:

D₁: The Capture Factor is the fraction of annual rainfall captured by the structure. The NYS DEC uses the 90% rule for water quality volume, so a discount factor of 90% is used assuming that all practices will be sized to meet this rule.

D₂: The Design Factor is based on the adequacy of the existing design standards. No discount was applied since NYS DEC has a design manual that meets all minimum criteria.

D₃: The Maintenance Factor considers the level of maintenance likely to be performed on treatment practices. For the purposes of this effort, a Maintenance Factor of 60% which the WTM defines as a retrofit having “regular maintenance specified in design guidance, but the community has a poor tracking system or limited staff to ensure that maintenance occurs.”

Table 26 provides the acreage of retrofit opportunities identified in each subwatershed.

Table 26. Retrofit Opportunity Acreage by Subwatershed

Subwatershed	Bioretention (Acres)	Regenerative Stormwater Conveyance (Acres)	Pond/Wetland System (Acres)
Arthur Manor	1.17	-	-
Lake Innisfree	3.05	-	-
Pelham Lake	2.38	2.65	2.23
Reservoir Three	2.56	3.89	8.12
Reservoir Two	-	-	0.23
Secor Lane	0.40	-	-
Sprague Terminal Canal	4.44	-	2.95
Vernon Park	2.07	-	-
Wolfs Lane Park	1.45	0.10	-

Street Sweeping

Recommendations from the hotspot assessment included increased street sweeping for a number of the sites, but in particular for industries located within the Sprague Terminal Canal subwatershed. No discount rates were applied to street sweeping. For the purposes of the WTM re-run, it was assumed that the street sweeping would be conducted to optimize water quality benefits (weekly sweeping using a vacuum assisted street sweeper conducted by trained operators).

Results

The following tables provide the results from the WTM showing the impact of the addition of the treatment opportunities within the watershed. Attachment B provides the results from the entire WTM re-run.

Table 27. Estimated Load Reduction from Restoration Opportunities

Treatment Opportunity	TN (lbs/year)	TP (lbs/year)	TSS (lbs/year)	Bacteria (billion/year)
Street Sweeping	24	6	2290	-
Structural Stormwater Management Practices	148	34	18,673	4,889,197
Land Reclamation	26,051	4,379	1,229,652	303,537,265
Total Reduction	26,199	4,413	1,248,326	308,426,462

Table 28. Comparison of Existing and Estimated Future Loads

WTM Scenario	Load Type	TN	TP	TSS	Bacteria
		lbs/year	lbs/year	lbs/year	billion/year
Existing	Total	49,255	8,127	2,277,395	797,792,694
	Storm	47,042	8,025	2,252,105	797,792,694
	Non-Storm	2,213	101	25,290	-
With Future Practices	Total	23,033	3,707	1,026,800	489,366,233
	Storm	21,536	3,649	1,008,672	489,366,233
	Non-Storm	1,497	59	18,127	-

KEY TAKEAWAYS

The results from the WTM re-run shows a small reduction in pollutant potential from the restoration opportunities, with significantly more impact from land reclamation. In the majority of situations, land reclamation will have a greater impact on pollutant removal because it works to restore the watershed's natural ecosystem functions such as evapotranspiration and infiltration.

The WTM re-run shows a small impact from the restoration opportunities due to the limited field assessment which identified restoration projects in a subset of the subwatersheds. The sites considered were focused on large, public properties primarily in four specific subwatersheds. There are many more opportunities throughout the Hutchinson River watershed that were not considered, including:

- Private properties or institutional properties with access restrictions for safety and private property permission purposes
- Subwatersheds outside of the scope of the prioritization from Phase I

The sites that were identified in this study can be used as templates that can be applied across similar property types and scenarios throughout the watershed. For example, the application of green streets and the removal of concrete from under-utilized parking lots are opportunities that have applicability across the watershed. These opportunities provide practitioners with ideas for larger scale implementation throughout the watershed that will create larger change and improve the ecological condition of the watershed.

Hotspot Prioritization Summary Sheet					
ID	Site Name	ENVIRONMENTAL SCORE	ABILITY TO ADDRESS SCORE	ANCILLARY BENEFITS SCORE	TOTAL SCORE ¹
HtSpt_07	Asphalt Production 2	25	8	7	40
HtSpt_13	Concrete Production	25	5	7	37
HtSpt_20	Auto Service Shop	15	10	12	37
HtSpt_06	Pavement Facility	15	13	5	33
HtSpt_08	Recycling Center	15	17	0	32
HtSpt_10	Shopping Center Dumpster Area	20	12	0	32
HtSpt_09	Asphalt Production 1	25	5	0	30
HtSpt_04	East Third Street	15	8	7	30
HtSpt_05	Scrap Metal Service	15	15	0	30
HtSpt_02	Train Yard	15	0	12	27
HtSpt_19	Parking Lot Storage	15	7	5	27
HtSpt_15	Pavement Facility 2	15	10	0	25
HtSpt_21	Shipping Terminal	15	8	0	23
HtSpt_16	Pavement Facility 3	5	10	7	22
HtSpt_14	Parking Lot	5	8	5	18
HtSpt_03	Laundromat	5	7	5	17
HtSpt_11	Shopping Center Dumpster Area 3	0	12	5	17
HtSpt_01	Hardware Store	0	12	0	12
HtSpt_17	Shopping Center Dumpster Area 2	0	12	0	12
HtSpt_18	Materials Storage Area	0	10	0	10

1: Sum of the Environmental, Ability to Address, and Ancillary Benefits scores

Hotspot Prioritization Environmental Scoring Summary						
ID	Site Name	Pollutants of Concern*	Pollutants of Concern Score	Severity	Severity Score	Environmental Score
HtSpt_01	Hardware Store	n/a	0	low - one dumpster	0	0
HtSpt_02	Train Yard	Oil&Grease	5	medium - large stockpile	10	15
HtSpt_03	Laundromat	Oil&Grease	5	low - one dumpster	0	5
HtSpt_04	East Third Street	Oil&Grease	5	medium - multiple empty lots	10	15
HtSpt_05	Scrap Metal Service	Oil&Grease	5	medium - larger construction site	10	15
HtSpt_06	Pavement Facility	Oil&Grease	5	medium - heavy staining	10	15
HtSpt_07	Asphalt Production 2	Oil&Grease	5	high - huge amount of material	20	25
HtSpt_08	Recycling Center	Oil&Grease	5	medium - lots of bulk and poor pavement on medium sized parcel	10	15
HtSpt_09	Asphalt Production 1	Oil&Grease	5	high - huge asphalt pile	20	25
HtSpt_10	Shopping Center Dumpster Area	Oil&Grease, oxygen demand	10	medium - unmaintained oil disposal container	10	20
HtSpt_11	Shopping Center Dumpster Area 3	n/a	0	low - one dumpster	0	0
HtSpt_13	Concrete Production	Oil&Grease	5	high - huge area with large piles of bulk materials	20	25
HtSpt_14	Parking Lot	Oil&Grease	5	low - large poorly paved area	0	5
HtSpt_15	Pavement Facility 2	Oil&Grease	5	medium - staining and exposed materials	10	15
HtSpt_16	Pavement Facility 3	Oil&Grease	5	low - just pavement	0	5
HtSpt_17	Shopping Center Dumpster Area 2	n/a	0	low - just dumpster	0	0
HtSpt_18	Materials Storage Area	n/a	0	low - smaller parcel	0	0
HtSpt_19	Parking Lot Storage	Oil&Grease	5	medium - multiple types of materials and what not	10	15
HtSpt_20	Auto Service Shop	Oil&Grease	5	medium - multiple types of pollutants (o&g, pavement)	10	15
HtSpt_21	Shipping Terminal	Oil&Grease	5	medium - multiple pollutant types	10	15

* Limited to 303d listing pollutants (oil and grease, los dissolved oxygen, fecal coliform)

Hotspot Ability to Address Scoring Summary											
ID	Site Name	Ownership	Ownership Score	NPDES Status	NPDES Status Score	Ease of Implementation	Ease of Implementation Score	Recommended Interventions*	Costs	Cost Score	Ability to Address Score
HtSpt_01	Hardware Store	Private	0	No	0	High	7	OR; DR; BM	\$ 23,700	5	12
HtSpt_02	Train Yard	Private	0	No	0	Low	0	OR; DR; BM; PL; OG	\$ 218,900	0	0
HtSpt_03	Laundromat	Private	0	No	0	High	7	OR; DR; PL; OG	\$ 193,700	0	7
HtSpt_04	East Third Street	Private	0	No	0	Medium	5	OR; DR; BM; PL	\$ 153,700	3	8
HtSpt_05	Scrap Metal Service	Private	0	Yes	5	Medium	5	OR; BM; OG	\$ 82,500	5	15
HtSpt_06	Pavement Facility	Private	0	Yes	5	Medium	5	OR; PL; OG	\$ 192,500	3	13
HtSpt_07	Asphalt Production 2	Private	0	Yes	5	Low	0	PL; OG	\$ 190,000	3	8
HtSpt_08	Recycling Center	Other Public - Engagement from FCWC	7	Yes	5	Medium	5	OR; DR; PL; SS; OG	\$ 198,900	0	17
HtSpt_09	Asphalt Production 1	Private	0	Yes	5	Low	0	OR; PL; SS; OG	\$ 197,700	0	5
HtSpt_10	Shopping Center Dumpster Area	Private	0	No	0	High	7	OR; DR; OG	\$ 63,700	5	12
HtSpt_11	Shopping Center Dumpster Area 3	Private	0	No	0	High	7	OR	\$ 2,500	5	12
HtSpt_13	Concrete Production	Private	0	Yes	5	Low	0	OR; BM; PL; SS; OG	\$ 217,700	0	5
HtSpt_14	Parking Lot	Private	0	No	0	Medium	5	OR; PL	\$ 132,500	3	8
HtSpt_15	Pavement Facility 2	Private	0	No	0	Medium	5	OR; OG	\$ 62,500	5	10
HtSpt_16	Pavement Facility 3	Private	0	No	0	High	7	PL	\$ 130,000	3	10
HtSpt_17	Shopping Center Dumpster Area 2	Private	0	No	0	High	7	OR; DR	\$ 3,700	5	12
HtSpt_18	Materials Storage Area	Private	0	No	0	Medium	5	OR; DR; BM	\$ 23,700	5	10
HtSpt_19	Parking Lot Storage	Private	0	No	0	High	7	OR; DR; PL; OG	\$ 193,700	0	7
HtSpt_20	Auto Service Shop	Private	0	No	0	High	7	OR; PL; OG	\$ 192,500	3	10
HtSpt_21	Shipping Terminal	Private	0	No	0	Medium	5	PL; OG	\$ 190,000	3	8

* OR = Outreach; DR = Dumpster Replacement; BM = Bulk Material Perimeter Contorl; PL = Resurfacing Parking Lot; SS = Weekly Street Sweeping; OG = Oil and Grease Separator

Hotspot Ancillary Benefits Scoring Summary						
ID	Site Name	Can Combine	Can Combine Score	Visibility	Visibility Score	Ancillary Benefits Score
HtSpt_01	Hardware Store	No	0	low - behind building	0	0
HtSpt_02	Train Yard	Yes	5	high - at train station	7	12
HtSpt_03	Laundromat	No	0	medium - closer to road	5	5
HtSpt_04	East Third Street	No	0	high - unused lots in community	7	7
HtSpt_05	Scrap Metal Service	No	0	low - back street in industrial area	0	0
HtSpt_06	Pavement Facility	No	0	medium - more busy street but fenced	5	5
HtSpt_07	Asphalt Production 2	No	0	high - material stockpile is large	7	7
HtSpt_08	Recycling Center	No	0	low - dead end in industrial area	0	0
HtSpt_09	Asphalt Production 1	No	0	low - back street in industrial area	0	0
HtSpt_10	Shopping Center Dumpster Area	No	0	low - dumpsters behind building	0	0
HtSpt_11	Shopping Center Dumpster Area 3	Yes	5	low - behind businesses	0	5
HtSpt_13	Concrete Production	No	0	medium - not highly frequented area but really large amount of materials	7	7
HtSpt_14	Parking Lot	No	0	medium - largely used parking area	5	5
HtSpt_15	Pavement Facility 2	No	0	low - in industrial area behind fence	0	0
HtSpt_16	Pavement Facility 3	No	0	low - not very highly frequented area	7	7
HtSpt_17	Shopping Center Dumpster Area 2	No	0	low - behind building	0	0
HtSpt_18	Materials Storage Area	No	0	low - fenced area	0	0
HtSpt_19	Parking Lot Storage	No	0	medium - on busier street more within community	5	5
HtSpt_20	Auto Service Shop	Yes	5	high - on busy street in community	7	12
HtSpt_21	Shipping Terminal	No	0	low - behind businesses	0	0

Retrofit Prioritization Summary Sheet														
ID	Site Name	Subwatershed	Proposed BMP Score	Observed Flooding Score	Water Treatment Ratio Score	ENVIRONMENTAL SCORE	Ownership Score	Ease of Implementation Score	Cost Score	ABILITY TO ADDRESS SCORE	Can Combine Score	Visibility Score	ANCILLARY BENEFITS SCORE	Total Score
RtFt_24	Mt Vernon high school	Pelham Lake	10	20	10	40	7	7	0	14	5	7	12	66
RtFt_11	Dave and busters Parking Lot	Sprague Terminal Canal	5	20	10	35	0	5	0	5	5	7	12	52
RtFt_21	Presbyterian Church and Holmes School Shared Lot	Pelham Lake	5	10	10	25	7	5	0	12	5	7	12	49
RtFt_27	Rebecca Turner Elementary School	Sprague Terminal Canal	5	10	10	25	7	5	3	15	0	7	7	47
RtFt_31	Pelham Art Center Parking Lot	Wolfs Lane Park	5	10	10	25	7	7	3	17	0	5	5	47
RtFt_04	Eastchester Public Library	Reservoir Three	5	10	7	22	7	5	5	17	0	7	7	46
RtFt_19	Cecil E Parker Elementary School	Sprague Terminal Canal	5	10	7	22	7	7	3	17	0	7	7	46
RtFt_26	Sheridan Ave Street Median	Pelham Lake	5	10	7	22	7	5	5	17	0	7	7	46
RtFt_06	Holy Trinity Greek Orthodox Church Side Lawn	Reservoir Three	10	10	10	30	3	7	0	10	5	0	5	45
RtFt_25	Sheridan Ave Park	Pelham Lake	5	10	0	15	7	5	5	17	5	7	12	44
RtFt_47	Beechwood Ave	Vernon Park	5	10	0	15	7	7	3	17	5	7	12	44
RtFt_28	Colonial Ave Shoulder	Secor Lane	5	10	7	22	7	5	5	17	0	5	5	44
RtFt_02	Twin Lakes County Park	Reservoir Three	10	10	0	20	8	0	5	13	5	5	10	43
RtFt_16	Mt vernon fire department	Sprague Terminal Canal	10	10	0	20	7	5	3	15	0	7	7	42
RtFt_30	Path Alongside Reservoir Three	Reservoir Three	10	0	10	20	8	0	3	11	5	5	10	41
RtFt_05	Joyce park	Reservoir Three	10	10	0	20	7	0	3	10	5	5	10	40
RtFt_35	Holy Trinity Greek Orthodox Church Parking Lot	Reservoir Three	5	10	0	15	3	7	5	15	5	5	10	40
RtFt_22	Mt Vernon Fire Department	Pelham Lake	5	10	0	15	7	5	5	17	0	7	7	39
RtFt_09	Wells Fargo Lot	Reservoir Three	5	10	7	22	0	7	5	12	5	0	5	39
RtFt_03	Vernon Hill Shopping Center	Lake Innisfree	5	10	0	15	8	5	0	13	5	5	10	38
RtFt_10	Muslim center	Pelham Lake	5	10	0	15	3	5	5	13	5	5	10	38
RtFt_48	Stream below the Wartburg Home	Pelham Lake	10	10	10	30	3	0	0	3	0	5	5	38
RtFt_46	Juliannes Playground	Wolfs Lane Park	5	0	7	12	7	7	5	19	0	7	7	38
RtFt_37	Homegoods Parking Lot	Sprague Terminal Canal	5	10	10	25	0	7	0	7	5	0	5	37
RtFt_07	Chase Bank	Reservoir Three	5	10	7	22	0	5	3	8	5	0	5	35
RtFt_18	Vernon manor coop Apartments	Pelham Lake	5	10	10	25	0	5	0	5	0	5	5	35
RtFt_42	Twin lakes Farm	Reservoir Three	10	0	10	20	8	0	0	8	5	0	5	33
RtFt_49	Sprague Rd	Arthur Manor	5	10	0	15	7	0	5	12	0	5	5	32
RtFt_44	Chester Park	Wolfs Lane Park	5	0	10	15	7	0	3	10	5	0	5	30
RtFt_12	Pelham plaza parking lot	Sprague Terminal Canal	5	10	7	22	0	5	3	8	0	0	0	30
RtFt_36	Eastchester park	Reservoir Three	5	10	0	15	7	0	3	10	0	5	5	30
RtFt_08	Garden coop apartments	Reservoir Three	5	0	7	12	0	5	5	10	0	5	5	27
RtFt_14	Sanford Blvd East Dunkin	Sprague Terminal Canal	5	10	7	22	0	5	0	5	0	0	0	27
RtFt_01	Reservoir Three Shoreline	Reservoir Three	10	0	0	10	8	0	0	8	5	0	5	23
RtFt_45	Glenwood lake	Wolfs Lane Park	5	10	0	15	7	0	0	7	0	0	0	22
RtFt_43	Wilmot Ave Daisy Farm	Reservoir Three	5	0	0	5	7	0	3	10	0	5	5	20
RtFt_32	Hutchinson River Tributary from River Ave	Wolfs Lane Park	5	0	0	5	7	0	5	12	0	0	0	17

1: Sum of the Environmental, Ability to Address, and Ancillary Benefits scores

Retrofit Prioritization Environmental Scoring Summary								
ID	Site Name	Proposed BMP	Proposed BMP Score	Observed Flooding	Observed Flooding Score	Water Treatment Ratio	Water Treatment Ratio Score	Environmental Score
RtFt_01	Reservoir Three Shoreline	WETLAND	10	None	0	Partial Treatment Likely	0	10
RtFt_02	Twin Lakes County Park	WETLAND	10	Nuisance Flooding	10	Partial Treatment Likely	0	20
RtFt_03	Vernon Hill Shopping Center	BIORETENTION	5	Nuisance Flooding	10	Partial Treatment Likely	0	15
RtFt_04	Eastchester Public Library	BIORETENTION	5	Nuisance Flooding	10	Full Treatment Likely	7	22
RtFt_05	Joyce park	WETLAND & STREAM RESTORATION	10	Nuisance Flooding	10	Partial Treatment Likely	0	20
RtFt_06	Holy Trinity Greek Orthodox Church Side Lawn	WETLAND	10	Nuisance Flooding	10	Potential for Extra Treatment	10	30
RtFt_07	Chase Bank	BIORETENTION	5	Nuisance Flooding	10	Full Treatment Likely	7	22
RtFt_08	Garden coop apartments	BIORETENTION	5	None	0	Full Treatment Likely	7	12
RtFt_09	Wells Fargo Lot	BIORETENTION	5	Nuisance Flooding	10	Full Treatment Likely	7	22
RtFt_10	Muslim center	BIORETENTION	5	Nuisance Flooding	10	Partial Treatment Likely	0	15
RtFt_11	Dave and busters Parking Lot	BIORETENTION	5	Major Flooding	20	Potential for Extra Treatment	10	35
RtFt_12	Pelham plaza parking lot	BIORETENTION	5	Nuisance Flooding	10	Full Treatment Likely	7	22
RtFt_14	Sanford Blvd East Dunkin	BIORETENTION	5	Nuisance Flooding	10	Full Treatment Likely	7	22
RtFt_16	Mt vernon fire department	WETLAND	10	Nuisance Flooding	10	Partial Treatment Likely	0	20
RtFt_18	Vernon manor coop Apartments	BIORETENTION	5	Nuisance Flooding	10	Potential for Extra Treatment	10	25
RtFt_19	Cecil E Parker Elementary School	BIORETENTION	5	Nuisance Flooding	10	Full Treatment Likely	7	22
RtFt_21	Presbyterian Church and Holmes School Shared Lot	BIORETENTION	5	Nuisance Flooding	10	Potential for Extra Treatment	10	25
RtFt_22	Mt Vernon Fire Department	BIORETENTION	5	Nuisance Flooding	10	Partial Treatment Likely	0	15
RtFt_24	Mt Vernon high school	WETLAND	10	Major Flooding	20	Potential for Extra Treatment	10	40
RtFt_25	Sheridan Ave Park	BIORETENTION	5	Nuisance Flooding	10	Partial Treatment Likely	0	15
RtFt_26	Sheridan Ave Street Median	BIORETENTION	5	Nuisance Flooding	10	Full Treatment Likely	7	22
RtFt_27	Rebecca Turner Elementary School	BIORETENTION	5	Nuisance Flooding	10	Potential for Extra Treatment	10	25
RtFt_28	Colonial Ave Shoulder	BIORETENTION	5	Nuisance Flooding	10	Full Treatment Likely	7	22
RtFt_30	Path Alongside Reservoir Three	WETLAND	10	None	0	Potential for Extra Treatment	10	20
RtFt_31	Pelham Art Center Parking Lot	BIORETENTION	5	Nuisance Flooding	10	Potential for Extra Treatment	10	25
RtFt_32	Hutchinson River Tributary from River Ave	REGENERATIVE STORMWATER CONVEYANCE	5	None	0	Partial Treatment Likely	0	5
RtFt_35	Holy Trinity Greek Orthodox Church Parking Lot	BIORETENTION	5	Nuisance Flooding	10	Partial Treatment Likely	0	15
RtFt_36	Eastchester park	REGENERATIVE STORMWATER CONVEYANCE	5	Nuisance Flooding	10	Partial Treatment Likely	0	15
RtFt_37	Homegoods Parking Lot	BIORETENTION	5	Nuisance Flooding	10	Potential for Extra Treatment	10	25
RtFt_42	Twin lakes Farm	WETLAND	10	None	0	Potential for Extra Treatment	10	20
RtFt_43	Wilmot Ave Daisy Farm	BIORETENTION	5	None	0	Partial Treatment Likely	0	5
RtFt_44	Chester Park	BIORETENTION	5	None	0	Potential for Extra Treatment	10	15
RtFt_45	Glenwood lake	BIORETENTION	5	Nuisance Flooding	10	Partial Treatment Likely	0	15
RtFt_46	Juliannes Playground	BIORETENTION	5	None	0	Full Treatment Likely	7	12
RtFt_47	Beechwood Ave	BIORETENTION	5	Nuisance Flooding	10	Partial Treatment Likely	0	15
RtFt_48	Stream below the Wartburg Home	WETLAND	10	Nuisance Flooding	10	Potential for Extra Treatment	10	30
RtFt_49	Sprague Rd	BIORETENTION	5	Nuisance Flooding	10	Partial Treatment Likely	0	15

Retrofit Prioritization Ability to Address Scoring Summary															
ID	Site Name	Ownership	Ownership Score	Site Constraints - Proximity to Roads	Site Constraints - Utility	Site Constraints - Natural Resources	Site Constraints - Property Boundary	Site Constraints - Steep Slopes	Site Constraints - Vertical Storage	Site Constraints - Access	Ease of Implementation	Ease of Implementation Score	Cost	Cost Score	Ability to Address Score
RtFt_01	Reservoir Three Shoreline	Westchester County Owned	8	No	Yes	Yes	No	Yes	Yes	No	4	0	High	0	8
RtFt_02	Twin Lakes County Park	Westchester County Owned	8	Yes	Yes	Yes	Yes	No	Yes	No	5	0	Low	5	13
RtFt_03	Vernon Hill Shopping Center	Westchester County Owned	8	No	Yes	No	Yes	No	No	No	2	5	High	0	13
RtFt_04	Eastchester Public Library	Public	7	No	Yes	Yes	No	No	No	No	2	5	Low	5	17
RtFt_05	Joyce park	Public	7	No	Yes	Yes	Yes	No	Yes	No	4	0	Medium	3	10
RtFt_06	Holy Trinity Greek Orthodox Church Side Lawn	Institutional	3	No	No	No	No	Yes	No	No	1	7	High	0	10
RtFt_07	Chase Bank	Private	0	No	Yes	No	Yes	No	No	No	2	5	Medium	3	8
RtFt_08	Garden coop apartments	Private	0	No	Yes	No	Yes	No	No	No	2	5	Low	5	10
RtFt_09	Wells Fargo Lot	Private	0	No	Yes	No	No	No	No	No	1	7	Low	5	12
RtFt_10	Muslim center	Institutional	3	No	Yes	Yes	Yes	No	No	No	3	5	Low	5	13
RtFt_11	Dave and busters Parking Lot	Private	0	No	Yes	Yes	No	No	Yes	No	3	5	High	0	5
RtFt_12	Pelham plaza parking lot	Private	0	No	Yes	No	No	No	Yes	No	2	5	Medium	3	8
RtFt_14	Sanford Blvd East Dunkin	Private	0	No	No	No	Yes	No	Yes	No	2	5	High	0	5
RtFt_16	Mt vernon fire department	Public	7	No	Yes	No	No	No	Yes	No	2	5	Medium	3	15
RtFt_18	Vernon manor coop Apartments	Private	0	No	No	No	Yes	No	No	Yes	2	5	High	0	5
RtFt_19	Cecil E Parker Elementary School	Public	7	No	No	No	Yes	No	No	No	1	7	Medium	3	17
RtFt_21	Presbyterian Church and Holmes School Shared Lot	Public	7	No	No	No	Yes	No	Yes	No	2	5	High	0	12
RtFt_22	Mt Vernon Fire Department	Public	7	No	Yes	No	No	No	Yes	No	2	5	Low	5	17
RtFt_24	Mt Vernon high school	Public	7	No	Yes	No	No	No	No	No	1	7	High	0	14
RtFt_25	Sheridan Ave Park	Public	7	No	Yes	No	Yes	No	No	No	2	5	Low	5	17
RtFt_26	Sheridan Ave Street Median	Public	7	Yes	Yes	No	No	No	No	No	2	5	Low	5	17
RtFt_27	Rebecca Turner Elementary School	Public	7	No	No	Yes	Yes	No	No	No	2	5	Medium	3	15
RtFt_28	Colonial Ave Shoulder	Public	7	Yes	Yes	No	Yes	No	No	No	3	5	Low	5	17

Retrofit Prioritization Ability to Address Scoring Summary															
ID	Site Name	Ownership	Ownership Score	Site Constraints - Proximity to Roads	Site Constraints - Utility	Site Constraints - Natural Resources	Site Constraints - Property Boundary	Site Constraints - Steep Slopes	Site Constraints - Vertical Storage	Site Constraints - Access	Ease of Implementation	Ease of Implementation Score	Cost	Cost Score	Ability to Address Score
RtFt_30	Path Alongside Reservoir Three	Westchester County Owned	8	Yes	Yes	Yes	No	Yes	Yes	No	5	0	Medium	3	11
RtFt_31	Pelham Art Center Parking Lot	Public	7	No	Yes	No	No	No	No	No	1	7	Medium	3	17
RtFt_32	Hutchinson River Tributary from River Ave	Public	7	Yes	No	Yes	Yes	No	Yes	No	4	0	Low	5	12
RtFt_35	Holy Trinity Greek Orthodox Church Parking Lot	Institutional	3	No	No	No	No	No	No	No	0	7	Low	5	15
RtFt_36	Eastchester park	Public	7	Yes	No	Yes	Yes	Yes	No	No	4	0	Medium	3	10
RtFt_37	Homegoods Parking Lot	Private	0	No	No	No	No	No	No	No	0	7	High	0	7
RtFt_42	Twin lakes Farm	Westchester County Owned	8	No	No	Yes	Yes	Yes	No	Yes	4	0	High	0	8
RtFt_43	Wilmot Ave Daisy Farm	Public	7	Yes	Yes	Yes	Yes	No	Yes	No	5	0	Medium	3	10
RtFt_44	Chester Park	Public	7	Yes	No	Yes	Yes	Yes	No	No	4	0	Medium	3	10
RtFt_45	Glenwood lake	Public	7	Yes	Yes	Yes	No	Yes	No	No	4	0	High	0	7
RtFt_46	Juliannes Playground	Public	7	No	No	No	Yes	No	No	No	1	7	Low	5	19
RtFt_47	Beechwood Ave	Public	7	No	Yes	No	No	No	No	No	1	7	Medium	3	17
RtFt_48	Stream below the Wartburg Home	Institutional	3	Yes	Yes	Yes	Yes	Yes	No	No	5	0	High	0	3
RtFt_49	Sprague Rd	Public	7	Yes	Yes	Yes	Yes	No	No	No	4	0	Low	5	12

Retrofit Prioritization Ancillary Benefits Scoring Summary						
ID	Site Name	Can Combine	Can Combine Score	Visibility	Visibility Score	Ancillary Benefits Score
RtFt_01	Reservoir Three Shoreline	Yes	5	low - along lakeshore	0	5
RtFt_02	Twin Lakes County Park	Yes	5	medium - along road and walking path	5	10
RtFt_03	Vernon Hill Shopping Center	Yes	5	medium - back of unused parking lot but lot is so big so it's quite used	5	10
RtFt_04	Eastchester Public Library	No	0	high - library	7	7
RtFt_05	Joyce park	Yes	5	medium - park but small	5	10
RtFt_06	Holy Trinity Greek Orthodox Church Side Lawn	Yes	5	low - corner of church parking lot but more a roadway	0	5
RtFt_07	Chase Bank	Yes	5	low - behind private building	0	5
RtFt_08	Garden coop apartments	No	0	medium - on busy road but private property	5	5
RtFt_09	Wells Fargo Lot	Yes	5	low - back of a parking lot	0	5
RtFt_10	Muslim center	Yes	5	medium - muslim center but inside	5	10
RtFt_11	Dave and busters Parking Lot	Yes	5	high - former brownfield site, high visibility in large parking lot	7	12
RtFt_12	Pelham plaza parking lot	No	0	low - unused parking lot	0	0
RtFt_14	Sanford Blvd East Dunkin	No	0	low - not very used parking lot	0	0
RtFt_16	Mt vernon fire department	No	0	high - front of fire station	7	7
RtFt_18	Vernon manor coop Apartments	No	0	medium - playground for apartment complex	5	5
RtFt_19	Cecil E Parker Elementary School	No	0	high - front of elementary school	7	7
RtFt_21	Presbyterian Church and Holmes School Shared Lot	Yes	5	high - between church and school	7	12
RtFt_22	Mt Vernon Fire Department	Yes	5	medium - within fire station property	5	10
RtFt_24	Mt Vernon high school	Yes	5	high - large high school	7	12
RtFt_25	Sheridan Ave Park	Yes	5	high - park and playground	7	12
RtFt_26	Sheridan Ave Street Median	No	0	high - public street	7	7
RtFt_27	Rebecca Turner Elementary School	No	0	high - in front of school	7	7
RtFt_28	Colonial Ave Shoulder	No	0	medium - road but no sidewalk	5	5
RtFt_30	Path Alongside Reservoir Three	Yes	5	medium - bridge crossing stream	5	10
RtFt_31	Pelham Art Center Parking Lot	No	0	medium - in town but in parking lot	5	5
RtFt_32	Hutchinson River Tributary from River Ave	No	0	low - quiet road	0	0
RtFt_35	Holy Trinity Greek Orthodox Church Parking Lot	Yes	5	medium - church parking lot	5	10
RtFt_36	Eastchester park	No	0	medium - park	5	5
RtFt_37	Homegoods Parking Lot	Yes	5	low - unused parking	0	5
RtFt_42	Twin lakes Farm	Yes	5	low - behind horse stable	0	5
RtFt_43	Wilmot Ave Daisy Farm	No	0	medium - along roadway but not heavily trafficked	5	5
RtFt_44	Chester Park	Yes	5	low - in an out of the way park	0	5
RtFt_45	Glenwood lake	No	0	low - in a nature preserve out of the way	0	0
RtFt_46	Juliannes Playground	No	0	high - in a heavily used public park	7	7
RtFt_47	Beechwood Ave	Yes	5	high - Westchester Land Trust Interested in this project - includes opportunities to access the river, potential connection to trail/park to the north and significant opportunities for education	7	12
RtFt_48	Stream below the Wartburg Home	No	0	medium - not heavily used road	5	5
RtFt_49	Sprague Rd	No	0	medium - not a heavily used road	5	5

Reforestation Prioritization Summary Sheet															
ID	Site Name	Subwatershed	Proposed Project Area Score	Forestation Type Score	Invasive Presence Score	ENVIRONMENTAL SCORE	Ownership Score	Ease of Implementation Score	Cost Score	ABILITY TO ADDRESS SCORE	Canopy Cover Score	Can Combine Score	Visibility Score	ANCILLARY BENEFITS SCORE	TOTAL SCORE ¹
ReFst_28	Beechwood Ave Grassy Curb	Vernon Park	15	7	3	25	7	7	5	19	5	5	7	17	61
ReFst_03	Vernon Hills Shopping Center	Lake Innisfree	15	10	0	25	8	5	0	13	5	5	5	15	53
ReFst_06	Anne hutchinson Elementary school	Reservoir Three	15	7	0	22	7	7	0	14	5	5	5	15	51
ReFst_17	Holmes Elementary School	Vernon Park	15	7	0	22	7	7	3	17	5	5	0	10	49
ReFst_09	Mt Vernon High School	Pelham Lake	15	7	0	22	7	7	0	14	5	5	0	10	46
ReFst_30	Chester Park	Wolfs Lane Park	7	7	0	14	7	5	3	15	5	5	7	17	46
ReFst_16	Mt Vernon East Train Station	Vernon Park	15	7	0	22	0	5	0	5	5	5	7	17	44
ReFst_08	Eastchester park	Reservoir Three	15	7	5	27	7	0	0	7	5	0	5	10	44
ReFst_11	Muslim Center	Pelham Lake	7	7	3	17	0	5	5	10	5	5	5	15	42
ReFst_15	Open, Unused Lot	Sprague Terminal Canal	15	7	0	22	0	0	3	3	5	5	7	17	42
ReFst_21	Sheridan Ave Park I	Pelham Lake	1	7	0	8	7	5	5	17	5	5	7	17	42
ReFst_13	Wartburg Retirement Home II	Pelham Lake	15	7	0	22	0	7	0	7	0	5	5	10	39
ReFst_18	Mt Vernon Fire Department	Pelham Lake	7	7	0	14	7	7	5	19	0	5	0	5	38
ReFst_07	Greek Orthodox Holy Trinity Church	Reservoir Three	7	10	0	17	0	7	3	10	5	5	0	10	37
ReFst_20	Traphagen School I	Pelham Lake	7	7	0	14	7	7	3	17	0	5	0	5	36
ReFst_23	5th ave Businesses	Wolfs Lane Park	7	3	0	10	0	5	3	8	5	5	7	17	35
ReFst_12	Hutchinson River Shoreside	Sprague Terminal Canal	1	7	0	8	0	7	5	12	5	5	5	15	35
ReFst_26	Wilmot rd @ old wilmot	Lake Innisfree	1	10	3	14	0	0	5	5	5	5	5	15	34
ReFst_19	Traphagen School II	Pelham Lake	1	10	0	11	7	5	0	12	5	5	0	10	33
ReFst_22	Sheridan Ave Park II	Pelham Lake	1	7	0	8	7	5	5	17	0	5	0	5	30
ReFst_25	Dave and Busters Parking Lot	Sprague Terminal Canal	1	3	0	4	0	5	3	8	5	5	5	15	27
ReFst_04	Wells Fargo Lot	Reservoir Three	1	10	0	11	0	0	5	5	5	5	0	10	26
ReFst_05	Chase Bank Lot	Reservoir Three	1	10	0	11	0	0	5	5	5	5	0	10	26
ReFst_10	Stop and Shop Parking Lot	Sprague Terminal Canal	7	10	0	17	0	0	3	3	0	5	0	5	25
ReFst_24	Wartburg Retirement Home I	Pelham Lake	1	3	0	4	0	5	5	10	5	5	0	10	24

1: Sum of the Environmental, Ability to Address, and Ancillary Benefits scores

Reforestation Prioritization Environmental Scoring Summary								
ID	Site Name	Proposed Project Area	Proposed Project Area Score	Forestation Type	Forestation Type Score	Invasive Presence	Invasive Presence Score	Environmental Score
ReFst_03	Vernon Hills Shopping Center	Large	15	Reforestation	10	Low	0	25
ReFst_04	Wells Fargo Lot	Medium	7	Reforestation	10	Low	0	17
ReFst_05	Chase Bank Lot	Small	1	Reforestation	10	Low	0	11
ReFst_06	Anne hutchinson Elementary school	Large	15	Conservation Landscaping	7	Low	0	22
ReFst_07	Greek Orthodox Holy Trinity Church	Medium	7	Reforestation	10	Low	0	17
ReFst_08	Eastchester park	Large	15	Conservation Landscaping	7	High	5	27
ReFst_09	Mt Vernon High School	Large	15	Conservation Landscaping	7	Low	0	22
ReFst_10	Stop and Shop Parking Lot	Medium	7	Reforestation	10	Low	0	17
ReFst_11	Muslim Center	Medium	7	Conservation Landscaping	7	Medium	3	17
ReFst_12	Hutchinson River Shoreside	Medium	7	Conservation Landscaping	7	Low	0	14
ReFst_13	Wartburg Retirement Home II	Large	15	Conservation Landscaping	7	Low	0	22
ReFst_15	Open, Unused Lot	Medium	7	Conservation Landscaping	7	Low	0	14
ReFst_16	Mt Vernon East Train Station	Large	15	Conservation Landscaping	7	Low	0	22
ReFst_17	Holmes Elementary School	Large	15	Conservation Landscaping	7	Low	0	22
ReFst_18	Mt Vernon Fire Department	Medium	7	Conservation Landscaping	7	Low	0	14
ReFst_19	Traphagen School II	Medium	7	Reforestation	10	Low	0	17
ReFst_20	Traphagen School I	Large	15	Conservation Landscaping	7	Low	0	22
ReFst_21	Sheridan Ave Park I	Small	1	Conservation Landscaping	7	Low	0	8
ReFst_22	Sheridan Ave Park II	Small	1	Conservation Landscaping	7	Low	0	8
ReFst_23	5th ave Businesses	Small	1	Street Trees	3	Low	0	4
ReFst_24	Wartburg Retirement Home I	Small	1	Street Trees	3	Low	0	4
ReFst_25	Dave and Busters Parking Lot	Small	1	Street Trees	3	Low	0	4
ReFst_26	Wilmot rd @ old wilmot	Small	1	Reforestation	10	Medium	3	14
ReFst_28	Beechwood Ave Grassy Curb	Medium	7	Conservation Landscaping	7	Medium	3	17
ReFst_30	Chester Park	Medium	7	Conservation Landscaping	7	Low	0	14

Reforestation Prioritization Ability to Address Scoring Summary														
ID	Site Name	Ownership	Ownership Score	Land Use	Site Access Score	Volunteer Effort Ability	Access to Water Source	Constraints and Challenges	Constraints and Challenges Score	Implementation Total Score	Ease of Implementation Adjusted Score	Cost	Cost Score	Ability to Address Score
ReFst_03	Vernon Hills Shopping Center	Westchester County Owned	8	3	5	1	1	Pavement, Structures, Utility,Lighting	1	11	5	\$ 192,706	0	13
ReFst_04	Wells Fargo Lot	Private	0	3	4	1	0	Pavement, Structures,Utility	2	10	0	\$ 39,005	5	5
ReFst_05	Chase Bank Lot	Private	0	3	4	1	0	Pavement, Structures,Utility	2	10	0	\$ 18,831	5	5
ReFst_06	Anne hutchinson Elementary school	Public	7	5	3	1	1	Utility	4	14	7	\$ 209,493	0	14
ReFst_07	Greek Orthodox Holy Trinity Church	Private	0	3	5	1	1	Lighting	4	14	7	\$ 54,777	3	10
ReFst_08	Eastchester park	Public	7	1	3	1	0	Pavement, Structures,Utility	2	7	0	\$ 754,361	0	7
ReFst_09	Mt Vernon High School	Public	7	5	5	1	1	Wire,Pavement, Lighting	2	14	7	\$ 206,494	0	14
ReFst_10	Stop and Shop Parking Lot	Private	0	3	3	1	1	Pavement, Structures,Utility	2	10	0	\$ 58,823	3	3
ReFst_11	Muslim Center	Private	0	3	3	1	1	Pavement	4	12	5	\$ 40,368	5	10
ReFst_12	Hutchinson River Shoreside	Private	0	5	5	1	0	Pavement	4	15	7	\$ 50,451	5	12
ReFst_13	Wartburg Retirement Home II	Private	0	5	5	0	1	Pavement, Structures	3	14	7	\$ 153,018	0	7
ReFst_15	Open, Unused Lot	Private	0	3	4	0	0	Pavement,Utility, Function	2	9	0	\$ 103,897	3	3
ReFst_16	Mt Vernon East Train Station	Private	0	3	5	1	0	Pavement,Function	3	12	5	\$ 166,128	0	5
ReFst_17	Holmes Elementary School	Public	7	5	5	1	1	Function	4	16	7	\$ 107,633	3	17
ReFst_18	Mt Vernon Fire Department	Public	7	5	3	1	1	Utility	4	14	7	\$ 26,267	5	19
ReFst_19	Traphagen School II	Public	7	3	5	1	1	Pavement, Structure,Function	2	12	5	\$ 160,327	0	12
ReFst_20	Traphagen School I	Public	7	5	5	1	1	Function	4	16	7	\$ 107,694	3	17
ReFst_21	Sheridan Ave Park I	Public	7	3	5	1	0	Utilities	4	13	5	\$ 20,811	5	17
ReFst_22	Sheridan Ave Park II	Public	7	3	5	1	0	Pavement	4	13	5	\$ 23,783	5	17
ReFst_23	5th ave Businesses	Private	0	3	5	1	1	Pavement, Structure,Pedestrian	2	12	5	\$ 68,900	3	8
ReFst_24	Wartburg Retirement Home I	Private	0	5	3	1	1	Pavement, Structure, Pedestrian	2	12	5	\$ 37,100	5	10

Reforestation Prioritization Ability to Address Scoring Summary														
ID	Site Name	Ownership	Ownership Score	Land Use	Site Access Score	Volunteer Effort Ability	Access to Water Source	Constraints and Challenges	Constraints and Challenges Score	Implementation Total Score	Ease of Implementation Adjusted Score	Cost	Cost Score	Ability to Address Score
ReFst_25	Dave and Busters Parking Lot	Private	0	3	5	1	0	Pavement, Structure, Pedestrian	2	11	5	\$ 111,300	3	8
ReFst_26	Wilmot rd @ old wilmot	Private	0	5	1	1	1	Structures,Utility, Pavement	2	10	0	\$ 7,465	5	5
ReFst_28	Beechwood Ave Grassy Curb	Public	7	5	3	1	1	Pavement	4	14	7	\$ 38,941	5	19
ReFst_30	Chester Park	Public	7	5	3	1	1	Utility,Pavement	3	13	5	\$ 98,245	3	15

Reforestation Prioritization Ancillary Benefits Scoring Summary								
ID	Site Name	Canopy Cover	Canopy Cover Score	Can Combine	Can Combine Score	Visibility	Visibility Score	Ancillary Benefits
ReFst_03	Vernon Hills Shopping Center	Y	5	Yes	5	medium	5	15
ReFst_04	Wells Fargo Lot	Y	5	Yes	5	low	0	10
ReFst_05	Chase Bank Lot	Y	5	Yes	5	low	0	10
ReFst_06	Anne hutchinson Elementary school	Y	5	No	0	medium	5	10
ReFst_07	Greek Orthodox Holy Trinity Church	Y	5	Yes	5	low	0	10
ReFst_08	Eastchester park	Y	5	No	0	medium	5	10
ReFst_09	Mt Vernon High School	Y	5	Yes	5	low	0	10
ReFst_10	Stop and Shop Parking Lot	N	0	No	0	low	0	0
ReFst_11	Muslim Center	Y	5	Yes	5	medium	5	15
ReFst_12	Hutchinson River Shoreside	Y	5	Yes	5	medium	5	15
ReFst_13	Wartburg Retirement Home II	N	0	Yes	5	medium	5	10
ReFst_15	Open, Unused Lot	Y	5	No	0	high	7	12
ReFst_16	Mt Vernon East Train Station	Y	5	Yes	5	high	7	17
ReFst_17	Holmes Elementary School	Y	5	Yes	5	low	0	10
ReFst_18	Mt Vernon Fire Department	N	0	Yes	5	low	0	5
ReFst_19	Traphagen School II	Y	5	Yes	5	low	0	10
ReFst_20	Traphagen School I	N	0	Yes	5	low	0	5
ReFst_21	Sheridan Ave Park I	Y	5	Yes	5	high	7	17
ReFst_22	Sheridan Ave Park II	N	0	Yes	5	low	0	5
ReFst_23	5th ave Businesses	Y	5	Yes	5	high	7	17
ReFst_24	Wartburg Retirement Home I	Y	5	Yes	5	low	0	10
ReFst_25	Dave and Busters Parking Lot	Y	5	Yes	5	medium	5	15
ReFst_26	Wilmot rd @ old wilmot	Y	5	No	0	medium	5	10
ReFst_28	Beechwood Ave Grassy Curb	Y	5	Yes	5	high	7	17
ReFst_30	Chester Park	Y	5	Yes	5	high	7	17

PRIMARY SOURCES - Land Use		Area (Acres)	Impervious Cover %	Concentrations				Annual Loading Rates				Annual Load				
All	Watershed			TN mg/l	TP mg/l	TSS mg/l	FC MPN/100ml	TN lb/acre	TP lb/acre	TSS lb/acre	FC # billion/acre	TN lb/year	TP lb/year	TSS lb/year	FC # billion/year	
Residential	Arthur Manor	202.38	24.55	2.2	0.4	100	20000	4.9	0.9	223	251,194	994	181	45,176	50,836,680	
	Chester Heights Park	240.12	25.37	2.2	0.4	100	20000	5.0	0.9	229	258,000	1,211	220	55,051	61,949,927	
	Lake Innisfree	246.44	25.14	2.2	0.4	100	20000	5.0	0.9	228	256,099	1,234	224	56,085	63,113,284	
	Pelham Lake	263.75	33.07	2.2	0.4	100	20000	6.3	1.1	286	322,224	1,661	302	75,523	84,986,618	
	Reservoir Three	278.44	28.08	2.2	0.4	100	20000	5.5	1.0	249	280,592	1,527	278	69,428	78,127,931	
	Reservoir Two	54.54	27.50	2.2	0.4	100	20000	5.4	1.0	245	275,805	294	53	13,367	15,042,429	
	Scarsdale Park	217.32	25.16	2.2	0.4	100	20000	5.0	0.9	228	256,292	1,089	198	49,495	55,697,312	
	Secor Lane	300.42	28.73	2.2	0.4	100	20000	5.6	1.0	254	286,054	1,680	305	76,367	85,936,337	
	Sprague Terminal Canal	205.22	44.19	2.2	0.4	100	20000	8.1	1.5	369	415,045	1,665	303	75,690	85,175,448	
	Twin Lakes Park	196.31	29.99	2.2	0.4	100	20000	5.8	1.1	264	296,585	1,138	207	51,739	58,222,553	
	Vernon Park	262.39	41.54	2.2	0.4	100	20000	7.7	1.4	349	392,928	2,016	366	91,619	103,100,477	
	Wolfs Lane Park	161.13	35.05	2.2	0.4	100	20000	6.6	1.2	301	338,793	1,067	194	48,511	54,589,640	
	Commercial	Arthur Manor	15.5	30.39	2	0.32	75	20000	5.3	0.9	200	243	83	13	3,098	3,765
		Chester Heights Park	74	43.34	2	0.32	75	20000	7.2	1.2	272	330	536	86	20,118	24,451
Lake Innisfree		69.7	50.99	2	0.32	75	20000	8.4	1.3	314	382	584	94	21,915	26,634	
Pelham Lake		14.11	41.32	2	0.32	75	20000	7.0	1.1	261	317	98	16	3,678	4,470	
Reservoir Three		53.16	60.48	2	0.32	75	20000	9.8	1.6	367	446	521	83	19,519	23,722	
Reservoir Two		9	48.78	2	0.32	75	20000	8.1	1.3	302	367	73	12	2,719	3,305	
Scarsdale Park		7.9	30.00	2	0.32	75	20000	5.3	0.8	198	240	42	7	1,562	1,898	
Secor Lane		17.7	45.59	2	0.32	75	20000	7.6	1.2	284	346	134	21	5,034	6,118	
Sprague Terminal Canal		116.7	79.69	2	0.32	75	20000	12.6	2.0	474	576	1,475	236	55,317	67,229	
Twin Lakes Park		5.5	60.91	2	0.32	75	20000	9.9	1.6	370	449	54	9	2,033	2,470	
Vernon Park		55.8	71.33	2	0.32	75	20000	11.4	1.8	427	520	636	102	23,854	28,991	
Wolfs Lane Park		32.56	68.34	2	0.32	75	20000	11.0	1.8	411	499	357	57	13,378	16,259	
Arthur Manor		59.59	100	3	0.5	150	20000	23.5	3.9	1174	713	1,399	233	69,951	42,507	
Chester Heights Park		88.54	100	3	0.5	150	20000	23.5	3.9	1174	713	2,079	346	103,935	63,158	
Roadway	Lake Innisfree	82.03	100	3	0.5	150	20000	23.5	3.9	1174	713	1,926	321	96,293	58,514	
	Pelham Lake	114.5	100	3	0.5	150	20000	23.5	3.9	1174	713	2,688	448	134,408	81,676	
	Reservoir Three	116.38	100	3	0.5	150	20000	23.5	3.9	1174	713	2,732	455	136,615	83,017	
	Reservoir Two	34.38	100	3	0.5	150	20000	23.5	3.9	1174	713	807	135	40,358	24,524	
	Scarsdale Park	62.1	100	3	0.5	150	20000	23.5	3.9	1174	713	1,458	243	72,897	44,298	
	Secor Lane	110.41	100	3	0.5	150	20000	23.5	3.9	1174	713	2,592	432	129,607	78,758	
	Sprague Terminal Canal	151.85	100	3	0.5	150	20000	23.5	3.9	1174	713	3,565	594	178,253	108,319	
	Twin Lakes Park	67.16	100	3	0.5	150	20000	23.5	3.9	1174	713	1,577	263	78,837	47,907	
	Vernon Park	145.62	100	3	0.5	150	20000	23.5	3.9	1174	713	3,419	570	170,939	103,875	
	Wolfs Lane Park	71.59	100	3	0.5	150	20000	23.5	3.9	1174	713	1,681	280	84,038	51,067	
	Arthur Manor	0.86	3.24	2.5	0.4	120	20000	1.0	0.2	49	38	1	0	43	32	
	Chester Heights Park	0.00	0.00	2.5	0.4	120	20000	1.6	0.3	78	59	-	-	-	-	
	Lake Innisfree	1.56	27.72	2.5	0.4	120	20000	1.0	0.2	49	38	2	0	77	59	
	Pelham Lake	2.48	69.76	2.5	0.4	120	20000	6.2	1.0	296	225	15	2	734	558	
Reservoir Three	0	0.00	2.5	0.4	120	20000	14.0	2.2	670	509	-	-	-	-		
Reservoir Two	0	0.00	2.5	0.4	120	20000	1.0	0.2	49	38	-	-	-	-		
Scarsdale Park	0	0.00	2.5	0.4	120	20000	1.0	0.2	49	38	-	-	-	-		
Secor Lane	0	0.00	2.5	0.4	120	20000	1.0	0.2	49	38	-	-	-	-		
Sprague Terminal Canal	141.96	86.22	2.5	0.4	120	20000	1.0	0.2	49	38	146	23	7,017	5,330		
Twin Lakes Park	0	0.00	2.5	0.4	120	20000	17.0	2.7	817	620	-	-	-	-		
Vernon Park	30.71	87.46	2.5	0.4	120	20000	1.0	0.2	49	38	32	5	1,518	1,153		
Wolfs Lane Park	2.23	89.69	2.5	0.4	120	20000	17.2	2.8	828	629	38	6	1,845	1,402		
Park	Arthur Manor	5.14	0.58					2.0	0.2	100	12	10	1	514	62	
	Chester Heights Park	19.45	2.05					2.0	0.2	100	12	39	4	1,945	233	
	Lake Innisfree	117.34	5.68					2.0	0.2	100	12	235	23	11,734	1,408	
	Pelham Lake	58.10	5.34					2.0	0.2	100	12	116	12	5,810	697	
	Reservoir Three	113.64	3.23					2.0	0.2	100	12	227	23	11,364	1,364	
	Reservoir Two	168.42	1.15					2.0	0.2	100	12	337	34	16,842	2,021	
	Scarsdale Park	8.86	0.42					2.0	0.2	100	12	18	2	886	106	
	Secor Lane	13.43	7.29					2.0	0.2	100	12	27	3	1,343	161	
	Sprague Terminal Canal	61.69	24.80					2.0	0.2	100	12	123	12	6,169	740	
	Twin Lakes Park	109.51	0.20					2.0	0.2	100	12	219	22	10,951	1,314	
	Vernon Park	26.72	6.62					2.0	0.2	100	12	53	5	2,672	321	
	Wolfs Lane Park	13.97	1.42					2.0	0.2	100	12	28	3	1,397	168	
	Arthur Manor	0.053	0					12.8	0.5	155		1	0	8	-	
	Chester Heights Park	1.71	0					12.8	0.5	155		22	1	265	-	
Lake Innisfree	60.95	0					12.8	0.5	155		780	30	9,447	-		
Pelham Lake	4.80	0					12.8	0.5	155		61	2	743	-		
Reservoir Three	21.54	0					12.8	0.5	155		276	11	3,339	-		
Reservoir Two	9.713	0					12.8	0.5	155		124	5	1,506	-		
Scarsdale Park	0	0					12.8	0.5	155		-	-	-	-		
Secor Lane	0	0					12.8	0.5	155		-	-	-	-		
Sprague Terminal Canal	9.69	0					12.8	0.5	155		124	5	1,502	-		
Twin Lakes Park	1.26	0					12.8	0.5	155		16	1	195	-		
Vernon Park	1.42	0					12.8	0.5	155		18	1	220	-		
Wolfs Lane Park	5.82	0					12.8	0.5	155		74	3	902	-		
Total		5217.28	45.70					9.44	1.56	436.51	152913.55	49,256	8,127	2,277,396	797,792,694	

Partitioning Coefficients for Rural and Forest Land			
Pollutant	TN	TSS	FC
Fraction as Storm Load	50%	90%	100%

Watershed Data	
Annual Rainfall (inches)	40.5
Watershed Area (acres)	5217

Future Structural Stormwater Management Practices Loading Calculations

Watershed	Bioretention	Regenerative Stormwater Conveyance	Pond/Wetland System		
Arthur Manor	1.17				
Lake Innisfree	3.05				
Pelham Lake	2.38	2.65	2.23		
Reservoir Three	2.56	3.89	8.12		
Reservoir Two			0.23		
Secor Lane	0.40				
Sprague Terminal Canal	4.44		2.95		
Vernon Park	2.07				
Wolfs Lane Park	1.45	0.10			

Structural Stormwater Management Practices

Watershed	Impervious Area Captured		Efficiency		
All	(Acres)				
BMP Type		TN	TP	TSS	Bacteria
Pond/Wetland System	13.53	30%	40%	80%	35%
Filtration Bioretention	17.52	30%	40%	80%	70%
Regenerative Stormwater Conveyance	6.64	30%	40%	80%	70%
Total	37.69	30%	40%	80%	57%
Treatability	Capture Discount (D1)	Design Discount (D2)	Maintenance Discount (D3)		
0.016	0.9	1	0.75		

"Undiscounted" Load Reductions - Do Not Account for Discount Factors or Treatability

	N (lbs/year)	P (lbs/year)	TSS (lbs/year)	Bacteria(billion/year)
Street Sweeping	0	0	0	
Structural Stormwater Management Practices	13898	3170	1750112	458224354
Total Load Reduction	13898	3170	1750112	458,224,354

Load Reduction from Existing Practices - Including Discounts (lbs/year)

	N (lbs/year)	P (lbs/year)	TSS (lbs/year)	Bacteria(billion/year)
Structural Stormwater Management Practices	148	34	18,673	4,889,197
Total Reduction	148	34	18,673	4,889,197

Future Management Practices

Street Sweeping							
Sweeper Type	Streets Swept (Acres)		Parking Lots Swept (acres)	Efficiencies - Residential		Efficiencies - Other roads	
	Residential	Other Streets		Nutrients	TSS	Nutrients	TSS
Mechanical	0		0	24%	30%	4%	5%
Regenerative Air	0	0	0	51%	64%	18%	22%
Vacuum Assisted	0	2	0	62%	78%	63%	79%
Sweeping Frequency (M=monthly, W = Weekly)	0	W	M				
Total Street Area (acres)	0	151.85	0				
Technique Discount	1						

Land Reclamation							
Watershed	Land Use	Watershed Fraction Implemented		TN lb/acre/year	TP lb/acre/year	TSS lb/acre/year	FC # billion/acre/year
		Existing Subwatershed Acres	Reforestation Acres				
Lake Innisfree	Commercial	69.7	0.41	8.4	1.3	314	382
Pelham Lake		14.11	1.53	7.0	1.1	261	317
Reservoir Three		53.16	0.90	9.8	1.6	367	446
Sprague Terminal Canal		116.7	0.35	12.6	2.0	474	576
Vernon Park		55.8	0.36	11.4	1.8	427	520
Wolf Lake Park		32.56	0.01	11.0	1.8	411	499
Wolf Lake Park		2.23	0.00	17.2	2.8	828	629
Pelham Lake		58.103	0.10	2.0	0.2	100	12
Reservoir Three		113.644	2.44	2.0	0.2	100	12
Vernon Park		26.724	0.13	2.0	0.2	100	12
Wolf Lake Park	13.966	0.26	2.0	0.2	100	12	
Pelham Lake	Residential	263.75	0.52	6.3	1.1	286	322224
Reservoir Three		278.44	0.04	5.5	1.0	249	280592
Sprague Terminal Canal		205.22	0.34	8.1	1.5	369	415045
Wolf Lake Park		161.13	0.00	6.6	1.2	301	338793
Lake Innisfree		82.03	0.02	23.5	3.9	1174	713
Pelham Lake		114.5	0.03	23.5	3.9	1174	713
Reservoir Three		116.38	0.07	23.5	3.9	1174	713
Sprague Terminal Canal		151.85	0.01	23.5	3.9	1174	713
Vernon Park		145.62	0.36	23.5	3.9	1174	713
Wolf Lake Park		71.59	0.07	23.5	3.9	1174	713
Land Use			TN lb/acre/year	TP lb/acre/year	TSS lb/acre/year	FC # billion/acre/year	
Park		Acres Created	2	0.2	100	12	

"Undiscounted" Load Reductions - Do Not Account for Discount Factors or Treatability				
	N (lbs/year)	P (lbs/year)	TSS (lbs/year)	Bacteria(billion/year)
Street Sweeping	24	6	2,290	0
Structural Stormwater Management Practices	13,898	3,170	1,750,112	458,224,354
Land Reclamation	26050.62	4379.49	1229652.04	303537264.6

"Discounted" Load Reductions for Future Management Practices				
	N (lbs/year)	P (lbs/year)	TSS (lbs/year)	Bacteria(billion/year)
Street Sweeping	24	6	2,290	0
Structural Stormwater Management Practices	148	34	18,654	4,889,197
Land Reclamation	26,051	4,379	1,229,652	303,537,265
Total Reduction	26,223	4,419	1,250,596	308,426,462

Future Land Use		
Watershed All		Area (Acres)
Residential	Arthur Manor	202.4
	Chester Heights Park	240.1
	Lake Innisfree	246.4
	Pelham Lake	263.2
	Reservoir Three	278.4
	Reservoir Two	54.5
	Scarsdale Park	217.3
	Secor Lane	300.4
	Sprague Terminal Canal	204.9
	Twin Lakes Park	196.3
	Vernon Park	262.4
	Wolfs Lane Park	161.1
Commercial	Arthur Manor	15.5
	Chester Heights Park	74.0
	Lake Innisfree	69.3
	Pelham Lake	12.6
	Reservoir Three	52.3
	Reservoir Two	9.0
	Scarsdale Park	7.9
	Secor Lane	17.7
	Sprague Terminal Canal	116.3
	Twin Lakes Park	5.5
	Vernon Park	55.4
	Wolfs Lane Park	32.6
Roadway	Arthur Manor	59.6
	Chester Heights Park	88.5
	Lake Innisfree	82.0
	Pelham Lake	114.5
	Reservoir Three	116.3
	Reservoir Two	34.4
	Scarsdale Park	62.1
	Secor Lane	110.4
	Sprague Terminal Canal	151.8
	Twin Lakes Park	67.2
	Vernon Park	145.3
	Wolfs Lane Park	71.5
Industrial	Arthur Manor	0.9
	Chester Heights Park	0.0
	Lake Innisfree	1.6
	Pelham Lake	2.5
	Reservoir Three	0.0
	Reservoir Two	0.0
	Scarsdale Park	0.0
	Secor Lane	0.0
	Sprague Terminal Canal	142.0
	Twin Lakes Park	0.0
	Vernon Park	30.7
	Wolfs Lane Park	2.2
Park	Arthur Manor	5.1
	Chester Heights Park	19.5
	Lake Innisfree	117.8
	Pelham Lake	60.2
	Reservoir Three	114.7
	Reservoir Two	168.4
	Scarsdale Park	8.9
	Secor Lane	13.4
	Sprague Terminal Canal	62.4
	Twin Lakes Park	109.5
	Vernon Park	27.4
	Wolfs Lane Park	14.1
Open Water	Arthur Manor	0.1
	Chester Heights Park	1.7
	Lake Innisfree	61.0
	Pelham Lake	4.8
	Reservoir Three	21.5
	Reservoir Two	9.7
	Scarsdale Park	0.0
	Secor Lane	0.0
	Sprague Terminal Canal	9.7
	Twin Lakes Park	1.3
	Vernon Park	1.4
	Wolfs Lane Park	5.8
Total Watershed Area (Should be same as total)		5217

Discounts and Treatability - Future Practices				
	T	D1	D2	D3
Street Sweeping	1.00	1.00	1.00	1.00
Structural Stormwater Management Practices	0.02	1.00	0.90	0.75
Land Reclamation	1.00	1.00	1.00	1.00

"Discounted" Load Reductions for Future Management Practices				
	N (lbs/year)	P (lbs/year)	TSS (lbs/year)	Bacteria(billion/year)
Street Sweeping	24	6	2290	0
Structural Stormwater Management Practices	148	34	18,654	4,889,197
Land Reclamation	26,051	4,379	1,229,652	303,537,265
Total Reduction	26,223	4,419	1,250,596	308,426,462

Existing Loads					
	Area (acres)	TN lb/year	TP lb/year	TSS lb/year	Fecal Coliform billion/year
URBAN SOURCES					
Urban Land	4,384	46,326	7,925	2,187,640	797,784,099
RURAL SOURCES					
Parks	716	1,433	143	71,629	8,595
Open Water	117	1,497	58	18,127	-
TOTAL LOAD	5,217	49,256	8,127	2,277,396	797,792,694
Storm Load		47,043	8,025	2,252,105	797,792,694
Non-Storm Load		2,213	101	25,290	0

Loads with Future Practices					
	Area (acres)	TN lb/year	TP lb/year	TSS lb/year	Fecal Coliform billion/year
URBAN SOURCES					
Urban Land	4,379	20,104	3,506	937,044	489,357,637
RURAL SOURCES					
Parks	721	1,433	143	71,629	8,595
Open Water	117	1,497	58	18,127	-
TOTAL LOAD	5,217	23,033	3,707	1,026,800	489,366,233
Storm Load		21,536	3,649	1,008,672	489,366,233
Non-Storm Load		1,497	59	18,127	0

Summary of All Loads					
		TN lb/year	TP lb/year	TSS lb/year	Bacteria billion/year
Existing	Total	49,256	8,127	2,277,396	797,792,694
	Storm	47,043	8,025	2,252,105	797,792,694
	Non-Storm	2,213	101	25,290	-
With Future Practices	Total	23,033	3,707	1,026,800	489,366,233
	Storm	21,536	3,649	1,008,672	489,366,233
	Non-Storm	1,497	59	18,127	-