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Monroe County, New York

Green Infrastructure Rapid Assessment Plan

Northrup Creek – Long Pond

July 25, 2014

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Green Infrastructure Rapid Assessment Plan

Northrup Creek – Long Pond

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Tables

Figures

Acronyms and Abbreviations

CWP	Center for Watershed Protection
GIS	geographic information system
HSG	Hydrologic Soil Group
HUC	Hydrologic Unit Code
ICM	Impervious Cover Model
NYSDEC	New York State Department of Environmental Conservation
plan	Green Infrastructure Rapid Assessment Plan: Northrup Creek – Long Pond
PWL	Priority Waterbodies List
SWAPP	stormwater assessment and action plan
TMDL	total maximum daily load
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
WWTP	wastewater treatment plant

Executive Summary

This "Green Infrastructure Retrofit Plan: Northrup Creek – Long Pond" identifies and prioritizes potential stormwater retrofit projects to address existing water quality issues including nutrients (phosphorus), weed/algal growth, and streambank erosion. Long Pond has been listed as an impaired waterbody in the New York State SPDES General Permit for Stormwater Discharges from Municipal Separate Storm Sewer Systems (MS4s). This designation requires that MS4s insure no net increase in the discharge of pollutants of concern (phosphorus). The Towns of Greece, Ogden, and Parma, as well as the Village of Spencerport, are MS4s and located within the Long Pond watershed. In addition, the United States Environmental Protection Agency (USEPA) has prepared a draft Total Maximum Daily Load for Long Pond. Monroe County and the Stormwater Coalition have prepared this plan as a first step in complying with the "no net increase" requirement and to demonstrate to USEPA that the communities can address these water quality issues without the imposition of an additional regulatory framework.

The approximately 15,500-acre watershed discharges into Lake Ontario, just west of the City of Rochester, New York. The main water quality concern in the watershed is phosphorus in Long Pond and Cranberry Pond, which are both eutrophic. In addition, stormwater runoff volumes and rates, flooding, and hydro-modification are additional concerns because these influence nonpoint source pollutant loads as well stream channel geomorphology and biological habitat. Potential retrofit projects are recommended structural practices aimed at reducing nonpoint source loads of stormwater pollutants such as phosphorus, reducing runoff volumes and rates, and attenuating peak flows.

The expedited approach used to develop this Plan included a baseline assessment of current watershed conditions through the collection, review, and analyses of geographic information system data such as land cover, land use, land ownership, topography, stormwater infrastructure, roadways, surface water, hydrology, wetlands, and soil. In addition, background literature and reports were reviewed to understand the historical and current watershed conditions. Monroe County has employed this methodology for other Green Infrastructure Rapid Assessment Plans completed for other watersheds in the county, including Allen Creek Main Branch and Allen Creek East Branch.

A total of 58 potential retrofit projects are identified and ranked for the watershed. Projects identified are located on public and private lands in areas of the watershed where they can provide improvements to the water quality and help control runoff volumes during flood events. The types of potential retrofits include stormwater wet ponds, bioretention areas, green infrastructure, and forested riparian buffers. Potential projects are ranked by applying a scoring system adopted by Monroe County that awards project points for feasibility, watershed benefits, and cost-effectiveness criteria. Monroe County developed this approach using guidance from the Center for Watershed Protection's (CWP's) Urban Stormwater Retrofit Practices, Manual 3 in their Urban Subwatershed Restoration Series (CWP 2007). A school green infrastructure potential project ranked highest, followed by bioretention, constructed wetland and wet pond retrofit projects. In general, wet pond retrofit projects ranked lowest. While a couple of forested riparian buffer projects ranked in the top 10%, most of these project types ranked in middle.

1. Assessment Overview

1.1 Problem Statement

Like many other communities characterized by development and associated land uses and land covers, Monroe County, New York, faces water resources management challenges as a result of these practices. Land practices such as increasing land clearing, increases in impervious cover, and residential, commercial, industrial, and agricultural uses often lead to an increase in stormwater pollutants from nonpoint source and point sources. In addition, atmospheric deposition can contribute to surface-water pollutant loading by supplying sources of nutrients to waterbody surfaces (in contact with air), although this is difficult to quantify with a high degree of certainty due to factors such as the interaction of phosphorus with soil.

Land uses (e.g., municipal and agricultural), typically introduce a range of pollutants (e.g., sediment, nutrients, metals, hydrocarbons, pathogens, pesticides, organics) that have the potential to come into contact with stormwater runoff. For instance, in urban areas the construction of roadways typically results in increases of impervious cover and fewer opportunities for stormwater to infiltrate into the ground. Residential land uses may introduce the potential for nonpoint sources of nutrients from on-site wastewater treatment systems or sanitary sewer infrastructure. Agricultural land uses often introduce potential stormwater pollutants such as nutrients (nitrogen and phosphorus) and sediment from land-disturbing activities.

As a result of these practices, hydrologic, geomorphic, water quality, and biological alteration often occur within a watershed. For instance, stormwater runoff volumes and rates typically increase as a result of increases in impervious cover. Infiltration and groundwater recharge rates may decrease as a result of more impervious cover, thus causing lower baseflows and higher peak flows. As a result, stream channels may become more susceptible to erosion and sediment loads in receiving waters can increase and lead to degraded biological habitats. Increases in impervious cover can also contribute to habitat degradation by influencing increases in temperature and decreases in dissolved oxygen of the receiving surface.

In the Northrup Creek – Long Pond watershed, reported sources of water quality pollutants include urban/stormwater runoff, and municipal and agricultural sources (New York State Department of Environmental Conservation [NYSDEC] 2007). Residential land use accounts for the largest percentage (38%) in the Northrup Creek – Long Pond watershed, followed by vacant land (19%) and agricultural land use (17%).

1.2 Purpose

This Green Infrastructure Rapid Assessment Plan: Northrup Creek – Long Pond (Plan) provides Monroe County with a prioritized list of stormwater retrofit projects for the Northrup Creek-Long Pond watershed, which, if implemented, are expected to improve water quality and reduce stormwater runoff volumes in the watershed through time. The assessment methodology used to develop this Plan is a simplified approach of the methodology used to develop stormwater assessment and action plans (SWAPPs) for other watersheds in Monroe County. Unlike the rapid assessment approach, the SWAPP approach typically includes the development of a watershed model to evaluate baseline watershed conditions and to estimate the potential effects of proposed stormwater retrofit projects on water quality and hydrology. However, instead of watershed modeling, this rapid assessment employed a planning-level geographic information system (GIS) desktop analysis and ranking methodology that factored in estimates for project benefits, feasibility, and cost effectiveness. The results of this rapid assessment provide the groundwork for additional detailed investigations of stormwater management strategies such as those described in SWAPPs completed for other watersheds in Monroe County (e.g., Shipbuilders and Buckland creeks).

1.3 Setting

The Northrup Creek-Long Pond watershed is located in the Town of Greece along the Lake Ontario shoreline, northwest of the City of Rochester in Monroe County, New York (Figure 1). The approximately 15,500-acre (24-square-mile) watershed is part of the greater Black Creek-Frontal Lake Ontario watershed, Hydrologic Unit Code (HUC) 041502000. Northrup Creek is the main perennial stream within the watershed and flows from south to north through the Town of Ogden/Village of Spencerport (approximately 25% of the watershed), Town of Parma (approximately 48%), and Town of Greece (approximately 27%). In the Town of Ogden, Northrup Creek is intersected by the New York State Barge Canal, otherwise known as the Erie Canal. At this location, Northrup Creek receives discharge from the canal via the waste gate. Downstream of the Village of Spencerport, Northrup Creek continues to flow northward through the Towns of Parma and Greece. In the Town of Greece, Northrup Creek is joined by Black Creek, a tributary to its west, and then flows northeasterly into Long Pond, a shallow embayment located on the shoreline of Lake Ontario. Long Pond also receives flow from its neighboring embayment to the west, Cranberry Pond, before ultimately discharging into Lake Ontario through a short and narrow unregulated channel.

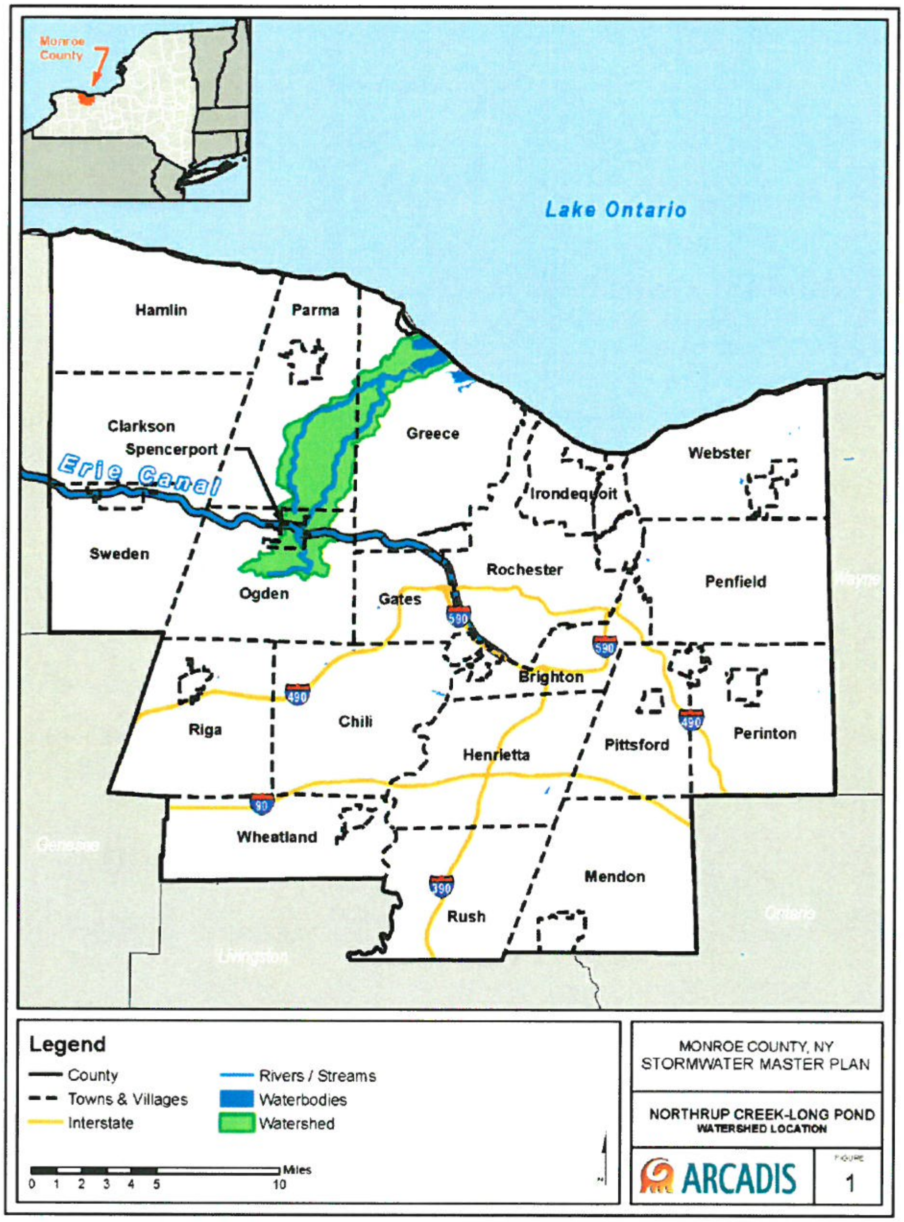

Figure 1 **Location of Northrup Creek-Long Pond Watershed, Monroe County, New York**

The Northrup Creek-Long Pond watershed comprises residential land (approximately 5,870 acres or 38%), vacant land (approximately 3,000 acres or 19%), and agricultural land (approximately 2,600 acres or 17%) (Table 1). Residential land uses are found throughout the watershed, including the southern and upstream portions surrounding the Village of Spencerport and within the Towns of Parma and Greece (Figure 2). Commercial land uses are mostly concentrated within the Village of Spencerport and just to the north of the Village of Spencerport along the intersection of the Erie Canal. Agricultural land use is most prominent in the central portion of the watershed within the Town of Parma, surrounding Black Creek and portions of Northrup Creek. Agricultural production in the watershed includes dairy cattle, beef cattle, nursery stock, vegetable and fruit production (Monroe County 2001).

Table 1 Watershed Data

Metric	Value
Area	15,534 acres
Mapped Stream Length	59 miles
Percent of Stream Channelized	Unknown
Primary/Secondary Land Use	Residential/vacant
Agricultural land use	17%
Residential land use	38%
Vacant land use	19%
Commercial land use	3%
Recreational and Entertainment land uses	2%
Community Service land use	12%
Industrial land use	1%
Public Services land use	6%
Wild, Forested, Conservation Lands, and Public Parks land uses	3%
Number of Stormwater Treatment Ponds	Unknown
Number of Stormwater Outfalls	232
Current Impervious Cover	21%
Estimated Future Impervious Cover	Unknown
Wetlands	2,574 acres or 17%

Table 1 Watershed Data

Metric	Value
Municipal Jurisdictions	
Village of Spencerport	4.1%
Town of Ogden	21.8%
Town of Parma	46.8%
Town of Greece	27.3%

Wetlands are prevalent throughout the watershed, most notably near the confluence of Northrup Creek with Long Pond. These wetlands play critical roles in hydrologic, water quality, and biological processes by filtering out pollutants (e.g., phosphorus) and sediment, infiltrating stormwater runoff, and providing important aquatic habitat for fish, macroinvertebrates, and amphibians.

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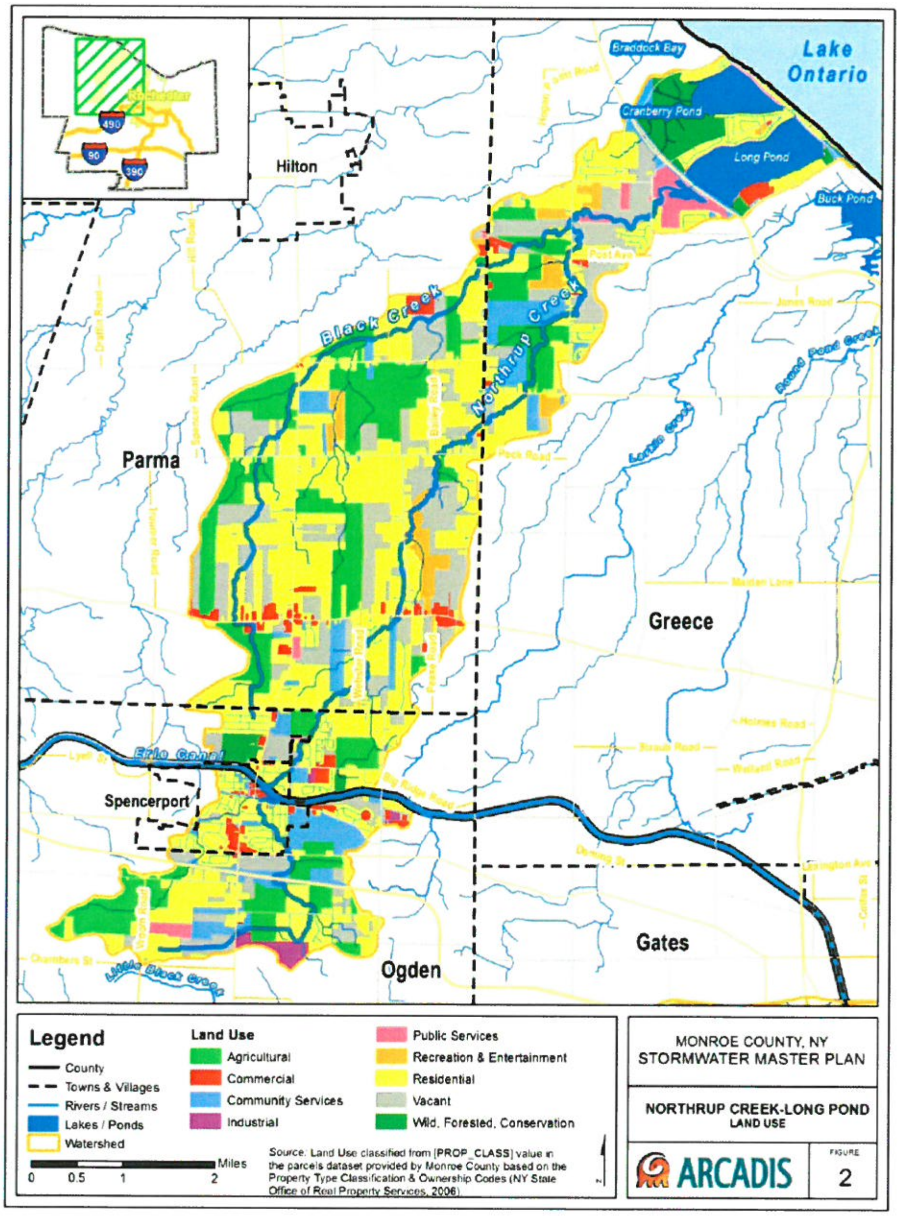

Figure 2 **Land Use within Northrup Creek-Long Pond Watershed (Source: Monroe County Parcels GIS Dataset)**

1.4 Watershed Characteristics

1.4.1 Water Quality Concerns

Water quality pollutants of concern in the Northrup Creek-Long Pond watershed include phosphorus, sediment, and hydro-modification from point and nonpoint sources. Nonpoint sources of these pollutants have been identified as stormwater runoff from residential/urban land uses and from agricultural practices, including the re-suspension of instream sources (known as the internal load). Point sources of pollutants are reported as the direct discharges of the Erie Canal waste gate (Figure 3).

In Monroe County, surface-water quality problems are reported for the entire 55-mile segment of Northrup Creek, the 474-acre Long Pond, and the 236-acre Cranberry Pond according to the Priority Waterbodies List (PWL) for Lake Ontario and Tribs River Basin published by the NYSDEC (2007) (Appendix B). Designated uses of these surface-waters bodies include aquatic life, public bathing, and recreation, which are impaired or threatened due to pollutants ranging from nutrients (phosphorus), algal growth/weeds, priority organics (polychlorinated biphenyls, dioxin), pesticides (mirex) stemming from agricultural nonpoint sources and municipal (non-point sources and point sources, such as the Erie Canal waste gate). However, previous U.S. Geological Survey (USGS) studies show that reduction in the amount of phosphorus in discharges from the Spencerport WWTP between August 1995 and the plants decommissioning in June 2008 resulted in a decrease in historical phosphorus loading levels to Northrup Creek, which have contributed to a slight improvement of water quality conditions in Long Pond.

The proposed projects identified in this study are not mandatory, but are being proposed proactively by Monroe County together with the members of the Monroe County Stormwater Coalition to improve water quality. Long and Cranberry Ponds are also listed in Appendix 2 of the NYS SPDES General Permit for Stormwater Discharges from Municipal Separate Storm Sewer Systems (MS4s) because urban stormwater has been identified as a source of pollutants causing the impairment. The General Permit requires that MS4s insure no net increase of pollutants of concern to Appendix 2 waterbodies. Monroe County, the towns of Greece, Ogden, and Parma, and the village of Spencerport are all MS4s and own or operate storm sewers within the Northrup Creek – Long Pond watershed. This plan will help the MS4s identify projects that could be implemented as part of a strategy for complying with the no net increase requirement.

Studies have concluded that Long Pond is hyper-eutrophic as a result of an elevated nutrient (phosphorus) (Makarewicz 1995, Monroe County Environmental Health Laboratory and USGS 1999, NYSDEC 2007, The Cadmus Group 2010). Northrup Creek is the largest contributor to Long Pond and a long-term/historical and ongoing source of elevated nutrient concentrations in Long Pond. Through time, this source has contributed significant nutrient-rich sediment accumulations in Long Pond. Recent total maximum daily load (TMDL) studies suggest that a large proportion of the high nutrient levels currently detected in Long Pond are associated with internal loading due to the re-suspension of sediment deposits in Long Pond into the water column during periods of turbulence associated with boat traffic, windy periods, periods of higher flows, and associated with water-temperature gradients. As a result, the recreational value of the pond has declined due to excessive accelerated growth of aquatic vegetation and algal blooms spurred by the high nutrient concentrations (particularly phosphorus, the limiting nutrient in freshwater aquatic systems).

The Cadmus Group (2010) prepared a draft TMDL for Long and Cranberry ponds for the United States Environmental Protection Agency and the NYSDEC. The TMDL (The Cadmus Group 2010) estimates that approximately 29,000 pounds of phosphorus are delivered to Long Pond annually, of which approximately 70% are from internal sources. The second largest source of phosphorus loads is point source discharges (The Cadmus Group 2010).

One USGS gage is located within the watershed on Northrup Creek in the Town of Greece (USGS 0422026250 Northrup Creek at North Greece, NY) (Figure 3). The gage receives drainage from approximately 10 square miles of the Northrup Creek subwatershed. According to the 2012 Water Data Report for this gage published by the USGS, annual mean discharge for water years 1990 through 2012 is 15.0 cubic feet per second (cfs). Annual mean discharge ranged from a low of 7.33 cfs (Water Year 1995) to a high of 21.7 cfs (Water Year 2007). Monthly mean discharge ranges from 8.44 cfs (August) to 26.2 cfs (March).

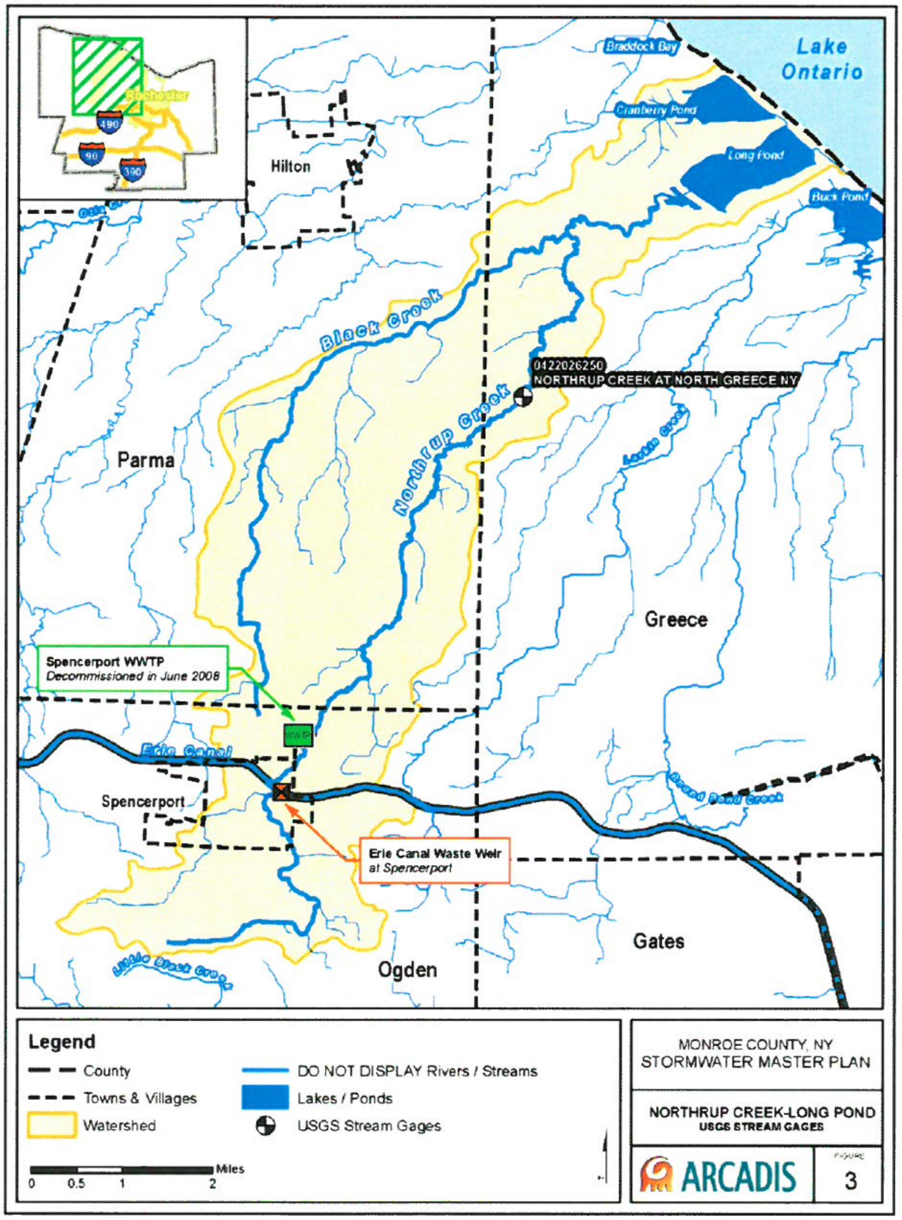

Figure 3 USGS Gaging Stations within Northrup Creek-Long Pong Watershed

1.4.2 Impervious Cover Analysis

Impervious cover is concentrated in the upper (southern) portion of Northrup Creek in the Village of Spencerport and the Town of Ogden. Potential retrofit projects are located, to the extent possible, downstream of or within concentrated areas of impervious cover to improve stormwater infiltration and reduce surface runoff (Figure 4).

The CWP developed an Impervious Cover Model (ICM) to predict the degree of impairment associated with varying proportions of watershed impervious cover (Figure 5). Applying the total percent impervious surface for Northrup Creek-Long Pond, 21%, to the ICM yields a prediction of "Impacted."

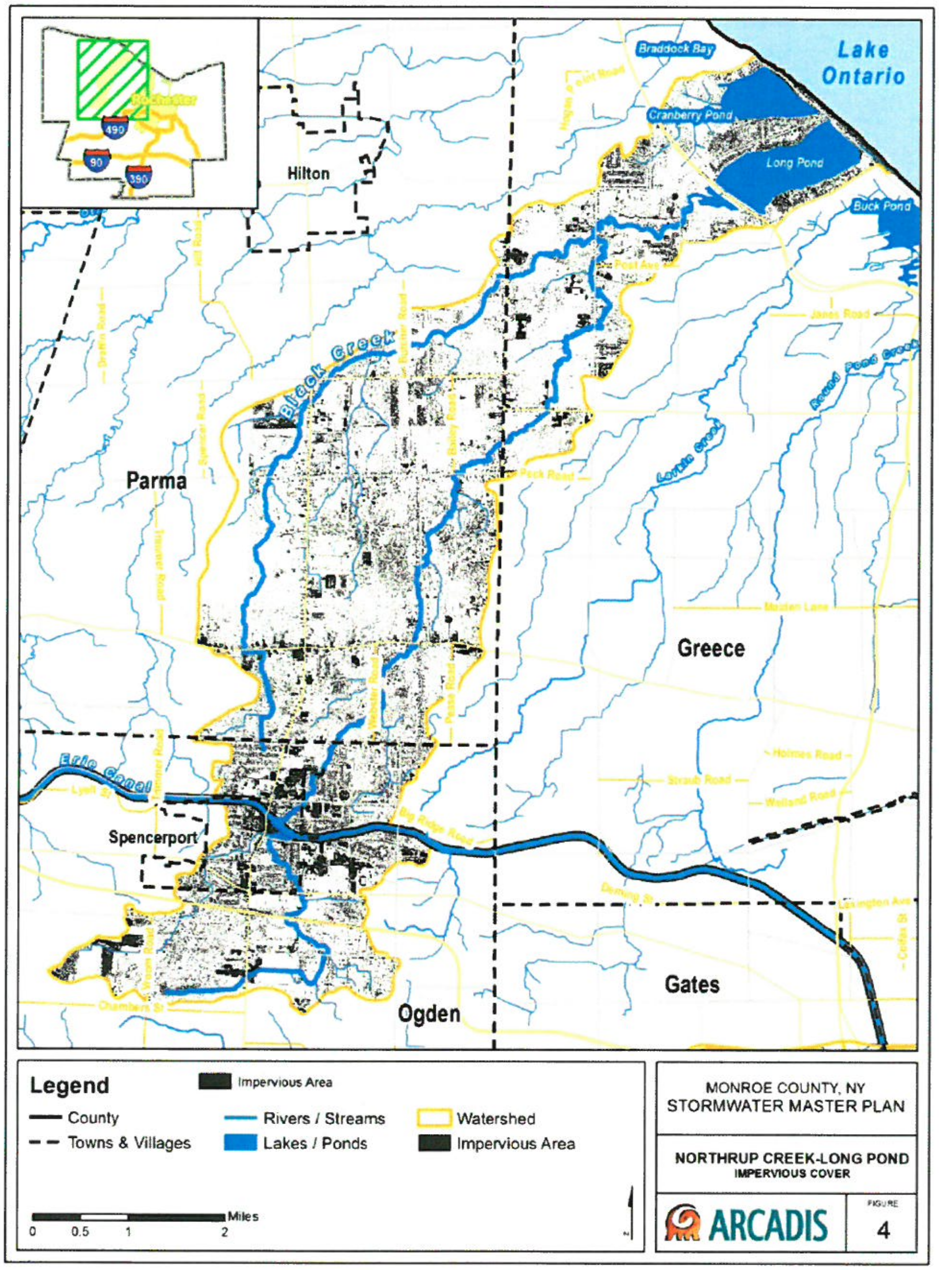

Figure 4 Impervious Cover in Northrup Creek-Long Pond Watershed

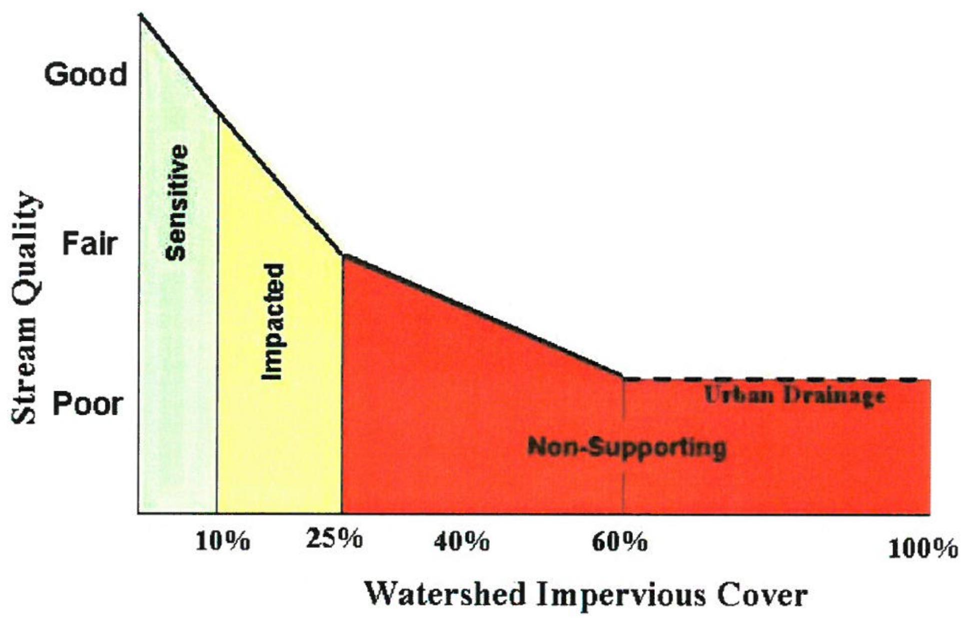

Figure 5 Impervious Cover Model (Center for Watershed Protection)

1.4.3 Drainage Concerns

The effective floodplain maps for the Northrup Creek watershed were reviewed to identify existing flood-prone areas that could be protected from flooding by proposed retrofit projects. However, upon review of current digital flood insurance rate maps, no significant structural or street flooding was apparent along the streams that were mapped. It may be possible to reduce the risk of flooding in areas of localized/nuisance flooding in the watershed through a detailed analysis during the design of the proposed wet ponds and other stormwater retrofit projects.

1.4.4 Streambank Erosion

Streambank erosion occurs throughout the watershed in areas with disturbed soil and where forested or vegetated riparian buffers are scarce, such as the area adjacent to the Flynn Road landfill along Black Creek in the Town of Greece. In addition, streambank erosion has been noted in areas of the Towns of Parma and Greece, typically downstream of major roadways and stormwater outfalls (Figure D-1, Appendix D). The potential streambank erosion areas shown in Figure D-1 were provided by Monroe County and originate from the Monroe County Soil and Water

Conservation District and are suspected to be at least 10-years old. These sites have not been verified in the field as part of this Plan.

1.4.5 Soil

According to a custom Web Soil Survey Report generated for the Northrup Creek-Long Pond watershed (HUC 041502000) (included in Appendix E), the most common soil types are Collamer silt loams on 0 to 2% slopes (about 7.3% of the watershed) and on 2 to 6% slopes(about 7.4% of the watershed). In general, the Collamer soils are moderately well drained and have high available water storage in the profile. Niagara silt loams are found in about 7.3% of the watershed, are somewhat poorly drained and have available water storage in profile. Madrid fine sandy loams on 3 to 8% slopes are found in about 5.9% of the watershed. These soils are well drained and have moderate water storage in profile.

The predominant Hydrologic Soil Groups (HSGs) in the Northrup Creek-Long Pond watershed are Type C/D (approximately 45%), Type B/D (approximately 13%), Type B (approximately 9%), and Type A (approximately 8%) (U.S. Department of Agriculture [USDA] 2013) (Figure 6).

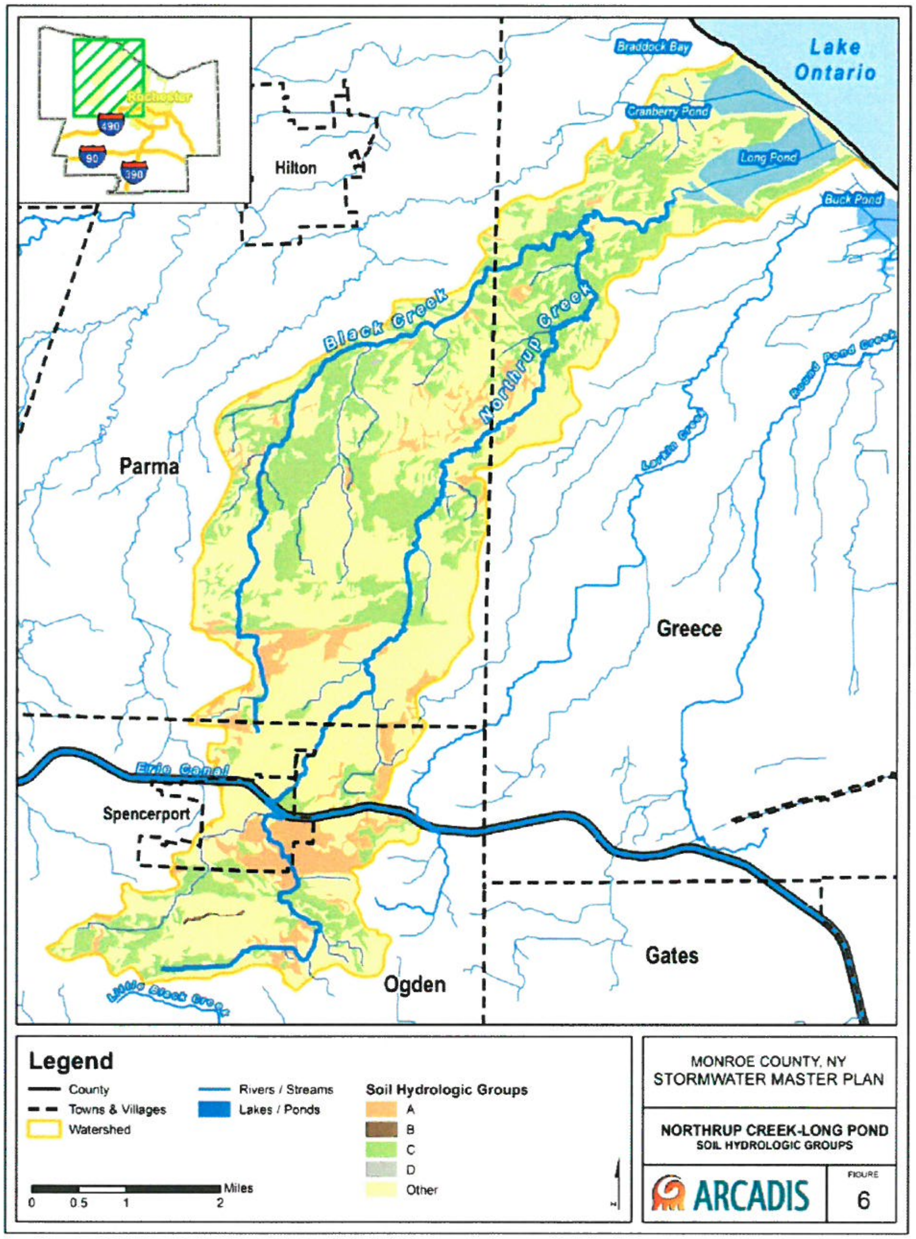

Figure 6 Hydrologic Soil Groups within Northrup Creek-Long Pond Watershed

2. Retrofit Ranking Inventory

2.1 Approach

Potential retrofit project types identified and selected for the assessment of Northrup Creek-Long Pond watershed include bioretention areas (within public highway right of ways and parking lot areas of impervious cover), constructed/enhanced wetlands, forested riparian buffers, and stormwater wet pond retrofits. Design sheets for these stormwater retrofit projects from the CWP Urban Subwatershed Restoration Manual No. 3 (CWP 2007) are included in Appendix F. Potential retrofit projects identified during the GIS reconnaissance are prioritized according to scores calculated for each individual project based on metrics for feasibility, watershed benefits, and cost-effectiveness criteria as explained in the Retrofit Assessment Methodology, Project Type Descriptions, and Retrofit Ranking Criteria (Monroe County, NY 2013), which serves as a reference document for the Monroe County Stormwater Master Plan (Monroe County 2013). These ranking criteria and their associated metrics are summarized below and in Table 2:

- *Feasibility*. The maximum number of points awarded to potential projects for feasibility is five. Points were awarded to projects based on whether the potential project is located mostly on publicly owned land, commercial land, or residential land with Homeowners Associations, and whether the land is undeveloped, zoned for commercial land use, and easily accessed (i.e., easement or within a public right of way).

- *Watershed Benefits*. Projects are assigned points for watershed benefits based on calculations of the projects' available flood storage capacity, channel protection volume, and water quality volume targets. If the available flood storage of a project was greater than the computed water quality volume, the channel protection volume or the sum of the computed channel protection and water quality volumes, then the project received a point for flood storage. The target storage for channel protection is about 60% of the 1-year, 24-hour storm runoff volume. The normal target for water quality is to capture and treat the 90% storm (CWP 2007). In addition, points were awarded to projects located in areas of expected infiltration (HSG Classes A and/or B) and whether the projects are considered a potential opportunity for public education and/or community revitalization.

- *Cost Effectiveness*. Projects are assigned points for cost effectiveness based on planning-level cost estimates that consider retrofit project type and drainage area to the project. Unit costs described the CWP Manual for all project types except forested riparian buffers were applied to estimate planning-level construction cost. Forested riparian buffer planning-level construction costs were estimated using unit costs developed from recent analysis conducted by Virginia Polytechnic Institute and State University, Forest Resources and Environmental Conservation Department and presented in the current version of the peer reviewed journal of Ecological Restoration (Guillozet, P. et al. 2014)

Cost estimates did not consider the cost of land acquisition or ongoing maintenance. Projects with an estimated low cost and high degree of watershed or community benefits (see Table 3) received the highest number of points, while projects estimated to be a high cost with a low benefit were assigned the lowest points.

Table 2 Ranking Protocol (Monroe County 2013)

Project Type	Feasibility	Watershed Benefits	Cost Effectiveness	Score
New or Retrofit Stormwater Management Ponds	**New Projects** Vacant Public Lands = 4 points; Other Public Lands = 3 points; Projects on commercial property or HOA = 2 points; Ease of access = 1 additional point ***5 possible pts.***	Infiltration = 2 points; Flood storage = 1 point; Water quality = 1 point; Channel projector = 1 point; Education = 1 point ***6 possible points***	3 points = $1-11, 2 points = $12-25 1 point = >$26 Note: new ponds = New Storage ***3 possible points***	14
	Upgrades to Existing SW Facilities On public land = 4 points; On private land with easement = 2 points; Ease of access = 1 additional point ***5 possible points***			
GI on Public Highways	1. Planned Road Reconstruction = 5 points 2. Area within ROW is: • vacant/unused paved = 3 points • lawn = 2 points • In use by adjacent business = 1 point 3. Average number of Property Owners – • 1 property owner per 125 or more linear feet = 2 points • Greater than 1 property owner per 125 feet = 1 point ***5 possible points***	Infiltration = 2 points A or B soil types = 1 point; Water quality = 1 point; Channel protection = 1 point; Education = 1 point; Source control = 1 point ***8 possible points***	3 points = $1-11, 2 points = $12-25 1 point = >$26 based on table ***3 possible points***	16

Table 2 Ranking Protocol (Monroe County 2013)

Project Type	Feasibility	Watershed Benefits	Cost Effectiveness	Score
Neighborhood GI	Neighborhoods considered meet these criteria and receive 1 point each: • Neighborhood was built in 1975 or before whose stormwater is not being treated with any management practice. • Average property size is 10,000 SF or larger but is less than 1 acre. • A, B, or C soil type ***2 points***	Community revitalization = 1 point; Water quality = 1 point; Education = 1 point; Source control = 1 point ***4 points***	Neighborhood GI practices vary in cost effectiveness from a score of 3 to 1; therefore, average with 2 points each ***2 points***	8
Other GI Retrofits	Vacant Public lands = 4 points; Other Public Lands = 3 points; Projects on commercial property or HOA = 2 points; Ease of access = 1 additional point ***5 possible points***	Same as GI on public highways ***8 possible points***	Same as above ***3 possible points***	16

Once scores for each of the above metrics were computed, the metric scores were summed for each project to give an overall score for each project. Projects were then ranked based on their total overall score, where the project with the highest number of points was ranked highest and the project with the lowest number of total points was ranked lowest.

2.2 Results

Potential retrofit projects received total scores ranging from five to 15. The project which ranked the highest is the school green infrastructure project (OGI-1), which received a total of 15 points. After the school GI project, a bioretention (bio 40-46), a constructed/enhanced wetland (Wtlnd 5) and a wet pond retrofit project (, had the next highest ranks; each had a total of 14 points. The projects which had 13 total points included one forested riparian buffer and two bioretention (impervious cover reduction) projects.

Projects that ranked the lowest (each received a total of five points) included five wet pond retrofits (Wet-5, Wet 49, Wet-75, Wet-77 and Wet-78) and one forested riparian buffer (Rip-35). The aforementioned projects ranked low because no points were awarded for feasibility. In addition each of these wet ponds received only two points for watershed benefits (from infiltration) and the forested riparian buffer project only received one point for cost effectiveness.

One noteworthy project that is presented in the results is the enhanced wetland in Long Pond located just upstream of the outlet of the pond to Lake Ontario. This project is unique from the other projects in that it could treat flow from the pond before it is discharged into the Lake and thereby help reduce pollutants from reaching Lake Ontario. This project received a total score of 10 and ranked close to the top third of all projects.

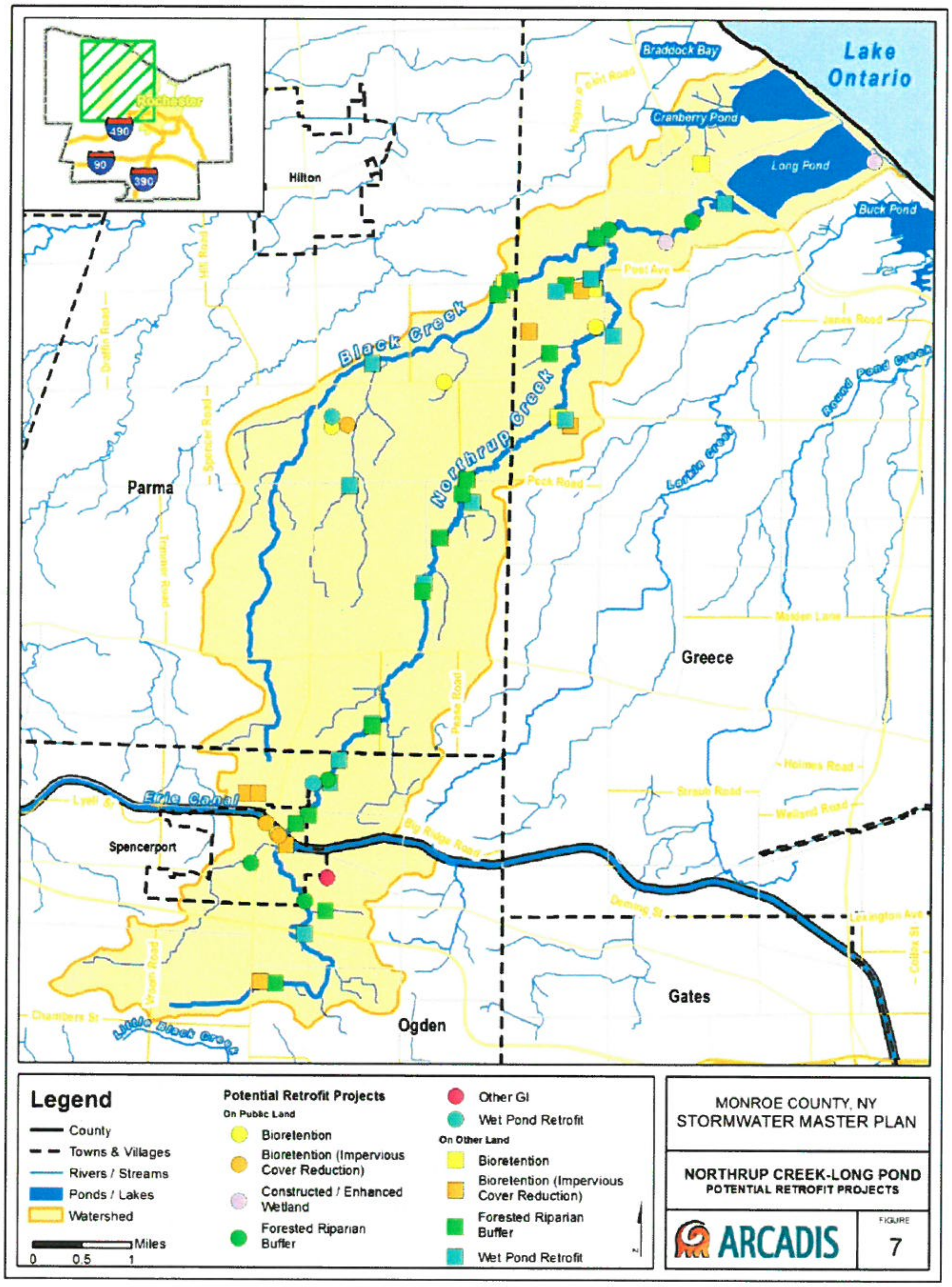

Figure 7 Potential Project Sites within Northrup Creek Long-Pond Watershed

Table 3 Ranked Potential Projects

Project ID	Category	Feasibility	Watershed Benefits (Parameters that received points)	Watershed Benefits	Cost Effectiveness	Total Score
	Wetland					
Wtlnd-7	Constructed/Enhanced Wetland	4	I,E	3	3	10
Rip-24	Forested Riparian Buffer	4	I,E	3	3	10
Rip-31	Forested Riparian Buffer	3	I,WQ,E	4	3	10
Rip-7-8	Forested Riparian Buffer	5	WQ,E	2	3	10
Imp-10	Impervious Cover Reduction	1	I,WQ,CP,E,FS	6	3	10
Rip-19-22	Forested Riparian Buffer	1	I,WQ,CP,FS	5	3	9
Rip-23	Forested Riparian Buffer	1	I,WQ,CP,FS	5	3	9
Rip-25-26	Forested Riparian Buffer	1	I,WQ,CP,FS	5	3	9
Rip-32-33	Forested Riparian Buffer	1	I,WQ,CP,FS	5	3	9
Rip-44-45	Forested Riparian Buffer	1	I,WQ,CP,FS	5	3	9
Imp-13	Impervious Cover Reduction	3	WQ,CP,FS	3	3	9
Wet-61-62	Wet Pond Retrofit	1	I,WQ,CP,FS	5	3	9
Bio-6-9	Bioretention	4	WQ,E	2	2	8
Rip-10-11	Forested Riparian Buffer	1	WQ,CP,E,FS	4	3	8
Rip-34	Forested Riparian Buffer	0	I,WQ,CP,FS	5	3	8
Rip-47	Forested Riparian Buffer	0	I,WQ,CP,FS	5	3	8
Imp-2-4	Impervious Cover Reduction	1	WQ,CP,E,FS	4	3	8
Imp-5-6	Impervious Cover Reduction	1	WQ,CP,E,FS	4	3	8
Wet-37-38	Wet Pond Retrofit	1	WQ,CP,E,FS	4	3	8

Table 3 Ranked Potential Projects

Project ID	Category	Feasibility	Watershed Benefits (Parameters that received points)	Watershed Benefits	Cost Effectiveness	Total Score
Wet-57	Wet Pond Retrofit	0	I,WQ,CP,FS	5	3	8
Wet-90	Wet Pond Retrofit	0	I,WQ,CP,FS	5	3	8
Bio-3-5	Bioretention	1	WQ,CP,E,FS	4	2	7
Rip-37-39	Forested Riparian Buffer	1	I,WQ	3	3	7
Wet-42	Wet Pond Retrofit	0	WQ,CP,E,FS	4	3	7
Wet-55	Wet Pond Retrofit	1	I,E	3	3	7
Wet-81	Wet Pond Retrofit	1	I,WQ	3	3	7
Rip-12	Forested Riparian Buffer	0	WQ,CP,FS	3	3	6
Rip-13-14	Forested Riparian Buffer	0	WQ,CP,FS	3	3	6
Rip-28-30	Forested Riparian Buffer	1	I	2	3	6
Rip-36	Forested Riparian Buffer	1	I	2	3	6
Wet-54	Wet Pond Retrofit	1	I	2	3	6
Wet-80	Wet Pond Retrofit	1	I	2	3	6
Rip-35	Forested Riparian Buffer	0	WQ,CP,E,FS	4	1	5
Wet-49	Wet Pond Retrofit	0	I	2	3	5
Wet-5	Wet Pond Retrofit	0	I	2	3	5
Wet-75	Wet Pond Retrofit	0	I	2	3	5
Wet-77	Wet Pond Retrofit	0	I	2	3	5
Wet-78	Wet Pond Retrofit	0	I	2	3	5

2.3 Top-Rated Retrofit Project Diagrams

Potential retrofit projects are shown individually on diagrams included in Appendix G. Each diagram includes the project name, project identification number, summary of the watershed benefits (per Monroe County Assessment Methodology), project footprint, parcel boundaries, hydrology, stormwater infrastructure, and surrounding roadways.

3. References

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