Streambank Erosion Study
Final Report

July 3, 2012

Honeoye Lake Watershed
Honeoye Lake Restoration Implementation Project

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For:
Honeoye Lake Watershed Task Force

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EXECUTIVE SUMMARY

Honeoye Lake represents an important asset to the Finger Lakes Region, Ontario County and the residents of the Honeoye Lake Watershed. The year round resident numbers of more than 2500 blossom to over 4500 in the summer with the recreational opportunities provided by this rural finger lakes watershed. Honeoye Lake being the shallowest and one of the smaller Finger Lakes is not without its challenges. Honeoye Lake has been included on New York States 303 (d) list of impaired waterbodies, which is an inventory of lakes, streams and coastal areas where water quality conditions are not adequate to support an appropriate use and may require the development of a Total Maximum Daily Load (TMDL).

In recognition of the importance of Honeoye Lake and water quality issues residents, academics, local government and civic groups formed the Honeoye Lake Watershed Task Force (HLWTF) to write and implement the Honeoye Lake Watershed Management Plan, which was approved in 2007. As a recommendation of the watershed management plan the Town of Canadice in conjunction with the HLWTF and Ontario County Soil and Water Conservation District (OCSWCD) applied for a Local Waterfront Revitalization Grant through the New York State Department of State in 2007. The purpose of this grant was to inventory and assess streambank erosion in the watershed, develop recommendations, and prioritize remediation efforts. Another portion of the grant was to inventory the local laws and land use regulations associated with streambank erosion in the watershed. This report is limited to the finding of the inventory and assessment related to stream bank erosion.

A group of local volunteers were trained in stream assessment and along with staff from the OCSWCD the majority of streams in the Honeoye Lake watershed were visually observed and assessed over a two-year period. Erosion events were documented using standardized information sheets, GPS, and digital photography. This data was tabulated by OCSWCD staff and used by an advisory committee for prioritization. The committee was made up of Finger Lakes Community College (FLCC) Conservation Department staff, HLWTF members, OCSWCD staff and representatives from the NYS DEC Department of permits.

Projects were explored that would reduce sediment and nutrient loading on Honeoye Lake. Some of the main criteria for these projects were that they be permitted by the DEC, be achievable with regard to land ownership, be constructed in accessible areas and provide maximum sediment and nutrient loading benefit to the lake as well as protect resources and current infrastructure.

The Advisory Committee reviewed the data of the inventoried streams and established the following recommendations:

- Construct a 100-acre impound/ sediment control basin across the Honeoye Inlet before the wetland complex.
- Construct ¼ acre sediment control basins on chosen intermittent tributaries above the large impound basin and on the Finger Lakes Community College property.
- Construct debris catch basins ahead of road culverts on chosen intermittent tributaries.
- Promote Vernal Pool preservation and creation in upland reaches.
- Promote infrastructure and BMP maintenance on upland properties to prevent erosion and debris
- Streamline permitting and design process for stream bank stabilization projects in intense residential areas
- Utilize constructed sediment control basin projects to educate residents and highway departments of benefits.

The HLWTF and its partners are exploring implementation funding to implement these recommendations. Funding would continue the efforts toward engineering design; permit approval and construction of these projects to reduce sediment and nutrient loading on Honeoye Lake.

A. Introduction

The Honeoye Lake watershed encompasses nearly 40 square miles within Ontario and Livingston Counties in the Finger Lakes region of western New York. The watershed includes parts of six towns; Bristol, Canadice, Naples, Richmond and South Bristol in Ontario County and Springwater in Livingston County (Map 1). Honeoye Lake is one of the smallest of the Finger Lakes and is the shallowest. This attribute allows for relatively quick reactions to water quality changes.

The Honeoye Lake Watershed Task Force (HLWTF) was formed in 1998 to write and implement the Honeoye Lake Watershed Management Plan (HLWMP). The HLWMP guides the long-term management of a watershed's land and water resources with the ultimate goal of protecting and improving both water quality and living resources. The HLWMP identified sediments and nutrients, including phosphorus as major causes of water quality problems.

Erosion from all stream reaches contributes large amounts of sediment each year to Honeoye Lake. These sediments degrade water quality, inhibit recreation and reduce aesthetic quality. Excess sediments can also severely diminish habitat for plants and animals in the lake ecosystem.

Users of the lake have consistently expressed their concern regarding the negative effects of excessive aquatic macrophytes and algae blooms on water use needs and recreational opportunities. Consistent with this observation, Honeoye Lake is listed on the New York State Department of Environmental Conservation's (NYSDEC) Priority Waterbody List as an impaired waterbody. Several uses are impacted by water quality problems including water supply, public bathing, recreation, and aesthetics. Nutrient, algal growth, and invasive species are known pollutants within Honeoye Lake.

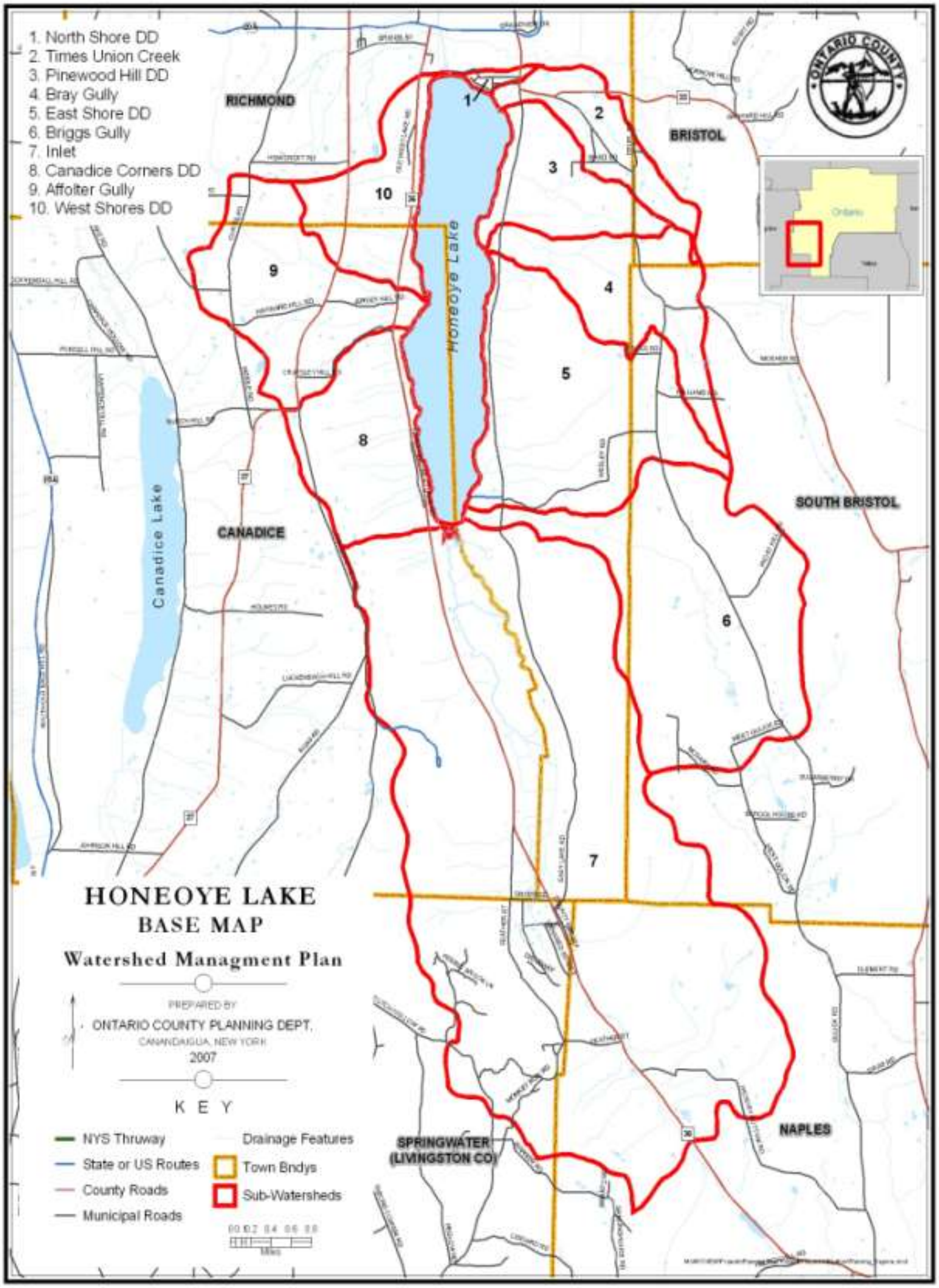
The overall goal of this HLWMP is the protection, restoration, and enhancement of water quality and living resources in the Honeoye Lake Watershed. The specific objectives are:

- To improve the water quality of Honeoye Lake
- To improve the quality of water resources in the Honeoye Lake Watershed
- To protect the Honeoye Lake Watershed's natural resources
- To identify challenges and barriers to water quality protection and to suggest means to overcome them
- To protect the high quality of life enjoyed by residents of the Honeoye Lake Watershed
- To improve water-dependent recreational opportunities
- To retain and attract business and improve local economic development opportunities
- To consider economic, social, and other incentives for water quality protection

One of the major action items in the HLWMP was to inventory, characterize and explore solutions to reduce sources of sediment and nutrients to the lake. In 2007, the HLWTF in conjunction with the Town of Canadice, and Ontario County Soil and Water Conservation District (OCSWCD) applied for and was awarded a grant to do this work, which began in 2008. OCSWCD developed inventory and characterization criteria and conducted training sessions with community volunteers who along with district staff walked and observed stream conditions.

GIS mapping was used to obtain ownership information for access permission, to assess terrain restrictions for volunteers and to assess potential solutions. Problem areas were assessed and the locations of each area were recorded with a GPS unit. Typical examples of problem areas on each reach were photographed.

Map 1: Honeoye Lake Sub-watersheds



1a. Technical Background

Sediment Pollution

Sediment is mineral and/or organic solid matter that is transported by wind or water into surface water. It is estimated that over one billion tons of sediment pollute America's lakes, streams, vernal pools, ponds and wetlands each year. Sediment is a leading cause of problems in many of New York's streams, rivers and lakes. Sediment is a result of natural erosion processes, however, increased sediment can occur as a result of human activity, which causes unnatural or excess sedimentation and pollution.

In Honeoye Lake sediment pollution reduces the recreational value of swimming, boating and fishing as well as the overall water quality. A high suspended sediment concentration causes turbid or cloudy water. Suspended sediment, as measured by turbidity and total suspended solids (TSS), can reduce photosynthesis in a stream or lake by lowering the amount of sunlight, and alter the water-bodies ecology. Sediments cause the water to absorb more heat from sunlight, which raises overall water temperature. Heated water has less capacity to hold dissolved oxygen. A decrease in dissolved oxygen alters the makeup of aquatic species able to occupy a particular habitat and can result in large-scale fish kills. These suspended sediments can create visual impairments for visual feeders, create fatal impacts for small animals and invertebrates that fish feed on, and also clog fish gills.

Sedimentation occurs when flowing water slows down enough to allow suspended soil particles to settle. Heavier sands and silts settle out sooner than finer clay particles. Accelerated sedimentation, one form of sediment pollution, which deposits sediments beyond the natural sediment load can destroy fish-spawning beds, reduces the useful storage volume of vernal pools, ponds and wetlands. It also clogs streams and reduces the usefulness of water for human uses.

Soil particles also carry other pollutants into waterways. Nutrients, such as phosphorus, can bind to soil particles and cause an increase in algae and aquatic macrophyte growth in lakes. As the algae die off and decompose, it increases the demand for dissolved oxygen. This increased demand for oxygen and continual nutrient loading severely reduce water quality and usefulness to people and nature alike.

Sources of Erosion

Erosion is the controlling process that dictates sediment pollution. Erosion begins when water or wind detaches soil or rock particles from the earth's surface. After detachment, air or water movement transports soil particles. Factors affecting erosion rates include climate, soil or rock type, slope length, topography, vegetative cover and soil disturbance. Anytime land is disturbed the potential for soil erosion increases. Eroded soil particles carried by water often move into streams where sedimentation and suspended solids can lead to a number of problems.

The two major sources of erosion sediment are classified as streambank (gully) and upland (sheet and rill) erosion. Streambank erosion is caused by an imbalance in geomorphic parameters in the stream system related to the watershed. As streams express their energy on the landscape erosion occurs either creating new suspended solids or re-suspending formerly deposited sediments. Upland erosion is a natural process that can be accelerated by human activities and land use practices within the watershed. Factors that affect upland soil erosion include vegetative cover, rooting depth, strength of soil, topography or slope and surface protection.

Agriculture and construction activities are the two biggest sources of upland erosion in the state of New York. These activities have historically been the source of upland sediment erosion and sediment input into Honeoye Lake. Over the past century and a half the hillsides that make up the Honeoye Lake watershed have gone from being completed forested to denuded by agricultural practices. Changes in agriculture in the later half of the 1900's have allowed for reforestation largely through natural succession from former farm field to forest. Currently sediment sources from both agriculture and construction impacts are minimized due to soil conservation practices and reduction in both activities. The majority of streams evaluated are in a state of recovery from the agricultural and construction practices of the past. Most of the sediment that eroded during the intense agricultural and development periods are still trapped in the stream systems and are having important geomorphic impact on the amount of streambank erosion and channel migration. These trapped historical sediments are considered “legacy sediments”.

Legacy Sediments

Stable valleys and intermittent streams received an increase in sediment load due to past agricultural and forestry practices. The stream valley system did not have the capacity to transport the additional sediments. Sediments clogged up the valleys forming sediment debris jams that evolved into sediment and debris dams after downed trees and large substrate were transported during bank erosion. These debris dams flatten local slopes causing additional sediments flowing from upstream to become trapped. As the sediment dams increase in size they reach a critical height. At this critical height the dams fail, releasing the sediment downstream. Once these sediments are released they are considered legacy sediments. These upland source sediments are slowly working toward the lake. Phosphorous and other pollutants are still attached to these legacy sediments. The steep slopes downstream of the debris dams and the failure of the dams cause channel instability downstream which leads to streambank erosion and occasional catastrophic releases of sediment and debris.

Many of the current sediment issues within the Honeoye Lake watershed are related to the temporary storage of legacy sediments and the geomorphic response and recovery of the historical impacted streams. However, current soil conservation practices in the areas investigated in the Honeoye Lake watershed appear to be appropriate for the land use. On-going efforts in upland areas to improve practices by what little agriculture remains and by highway departments continue to reduce potential for upland erosion.

Geomorphic Response and Channel Evolution

Stable streams are able to transport both the water and sediment supplied by the watershed. If the water or sediment budget changes, the stream reach will reach a state of disequilibria or instability. There are adverse consequences of accelerated sediment supply such as accelerated bank erosion rates, degradation, aggradation from channel disturbance, streamflow changes, sediment budget changes, and other factors that can lead to channel instability and evolution. These changes result in stream channel morphological changes, causing changes in the dimension, pattern, and profile of the stream channel. The disturbed stream reach adjusts to a quasi-equilibrium state with current sediment and flow regimes. All disturbed streams will approach a stable form if there are no constraints on time and space. Depending on stage in channel evolution, some reaches require large sediment supplies for recovery.

The geomorphic assessment and evaluation of channel evolution/departure is critical to understand before any remedial action should be suggested. Sediment and flow regimes should be considered and utilized if at all possible. Remedial action has a number of priority levels. There is always an option to do nothing and let the stream attain a stable form through its own devices. This option can be used when there is low risk related to the impacts of the channel evolution model. The second option is to address problem areas only where the departure of the stream would produce a significant risk. This option includes brush shelters, branch packing, brush mattresses, crib walls,, vegetated gabions, etc. However, in many cases, hard armoring is the only option. It is more of a last resort that would include armoring banks with, rip rap, concrete armoring, deflection structures (vanes), and other bank stabilization methods. With the proper understanding of the physics and morphology of the stream this option can be a viable streambank protection technique. The final option is a complete adjustment in the channel morphology by channel relocation, which is also called stream restoration. While this option is the most dramatic, in many cases the stream constraints and departure analysis are so far conflicting that there is no other sustainable option.

The geomorphic response to anthropogenic impacts can continue for decades and centuries after the stressor has been removed from the watershed. Channel evolution is based on the amount of flow, the force of flow, vegetation, soils, geology, and degree of channel incision. Channel incision is the degree at which the channel is disconnected from the historical floodplain terrace.

Anthropogenic Impacts

Agricultural activity in the region has reduced significantly as mentioned earlier. The benefits of this are being realized by reduced sediment loading. However, the topography of the watershed allows legacy sediments to continue to choke both intermittent and perennial stream and continue excessive loading of nutrients. Furthermore fields that are not actively in farming are less likely to have infrastructure maintained. Conservation practices that were installed may have been neglected reducing their effectiveness. This is also true in the forest industry. Forestry practices that were installed to reduce erosion during harvesting have been neglected due to changes in land ownership or land use.

Unrelated to agriculture, there are a variety of practices that have been used to try to manage the sediment supply. These include but are not limited to undersized culverts, stone lined road ditches and ditch dredging. Undersized culverts reduce the forces available to transport sediment, which in turn can result in clogging of the culvert and a loss of conveyance capacity, leading to gradation. When a culvert loses its conveyance capacity, the risk of failure from over-topping increases. Stone lined road ditches reduce velocity and sediment transport, which in turn increases maintenance requirements due to deposition. Ditch dredging is costly to highway departments but removes sediment from the system.

Honeoye Lake Stream System Characteristics

Thirty-five streams, perennial and intermittent, are indicated on USGS Topographic Maps as tributaries to Honeoye Lake. Several other intermittent waterways are present in the landscape and not documented by the USGS. The watershed of Honeoye Lake is divided into ten sub-watersheds (Map 1). This subdivision of the watershed area is used to study the runoff into the lake in order to identify specific areas needing management. The

Honeoye Inlet is the largest of these tributaries, draining 43% of the total Honeoye Lake Watershed. It is also more complex than the other streams, in that a number of branched streams pass through an 837acre wetland (Appendix H) before entering the lake at multiple locations.

Watershed Statistics;

Watershed Width	4.25 mi.	6.8 km.		
Watershed Length	10.9 mi.	17.4 km.		
Watershed Area	38.3 sq. mi.	99.1 sq. km.	24497 acres	

Sub-watersheds			Area (acres)		
	1	North Shore DD	64		DD- Direct Drainage
	2	Times Union Creek	651		
	3	Quail Hill DD	832		
	4	Bray Gully	1,165		
	5	East Shore DD	2,387		
	6	Briggs Gully	3,140		
	7	Inlet	10,676		
	8	Canadice Corners DD	1,273		
	9	Affolter Gully	1,585		
	10	West Shore DD	919		
Total Land Area				22,692	
Lake Area				1,805	
Total Watershed Area				24,497	

Annual Precipitation	30-35 in.	76-89 cm.	1/3 as snow
Mean annual temperature	47.5 F		
Coldest Month (January)	23.7 F		
Warmest Month (July)	69.6 F		
Growing Season	140-170 dependent on elevation		
Population	1930	823	
	1970	1276	
	1980	1837	
	2005	2772	

Major Public Lands (acres) (Appendix G)

▪ Cumming Nature Center (Rochester Museum and Science Center)	914
▪ NYS Parks' Harriet Hollister Spencer State Recreation Area	696
▪ NYSDEC Honeoye Inlet Wildlife Management Area	2454
▪ Finger Lakes Community College's Muller Conservation Field Station	50
▪ The Nature Conservancy's Muller Boy Scout Reservation	164
▪ Finger Lakes Land Trust's Wesley Hill Preserve	360
Total Public Lands	4638

B. Methods

Upon receiving the grant contract Ontario County Soil and Water Conservation District, with the assistance of Dr. Bruce Gilman from Finger Lakes Community College and volunteers, formulated the inventory and assessment protocol. A worksheet and guideline was established using examples from national and local efforts regarding stream characterization (Appendix J). OCSWCD staff held a walk through training session to train local volunteers in established protocol. 16 volunteers and OCSWCD staff walked 75 different stream reaches. Approximately 50,000 linear feet of total stream length was inventoried by walking the streams and conducting an evaluation. Data including flow regime, stream gradient, pattern, material composition and surrounding features were recorded on the data sheets and locations of severe erosion were documented using digital photography and GPS coordinates.

All data sheets and photographs were sent to DOS and discussed by a committee consisting of OCSWCD staff, FLCC Conservation Department Staff, Members of HLWTF and DEC Permitting staff. Opportunities for bank stabilization projects, sediment and nutrient reduction projects and stream corridor access were explored.

OCSWCD used GIS to provide mapping of streams. More complex data sets utilizing slope percentage for steep slopes (Appendix A), topography using 2 foot LIDAR and the latest digital imagery were used to better describe areas for assessment.

C. Stream Assessment

The tabulated data was sent to NYS DOS and presented to a committee consisting of OCSWCD staff, FLCC Conservation Department staff, HLWTF members and DEC Permitting staff. Opportunities for bank stabilization projects, sediment and nutrient reduction projects and stream corridor access were explored. Criteria for opportunities were established and priorities set. The criteria for opportunities were; whether a site is accessible by the equipment necessary for remediation, if permitting could be obtained, is the remediation economical (cost/benefit analysis), Would remediation have a long term benefit, how much sediment and nutrient would likely be kept from entering the lake. The priorities were set as such;

-Most sediment and nutrient retained for money spent.

-Most accessible sites with mechanical, legal and political access

-Likely permit-ability

These priorities would have the greatest value to the community by protecting the lake and infrastructure.

As mentioned, 75 streams were assessed and 95% of those streams had unstable banks in areas. The most prevalent areas of instability were in the lake plain areas, those areas where legacy sediments have been deposited in the past. The common problem is the tendency of the stream to want to meander with the lower slope and in doing so cut into the previously deposited sediments. Although this is a natural occurrence the residential development in the area make it problematic. Unfortunately, these areas, because of there close proximity to the lake and lower slope percentages are heavily populated and opportunities for remediation are limited due to cost and accessibility. These sites will be monitored by the OCSWCD and when landowner cooperation and funding are available suitable remediation will be designed. These sites typically will require heavily engineered, “hard armored” remediation techniques due to the heavily developed area.

Legal access and permission to the private properties along stream-banks were obtained before a stream was assessed. The process also brought to light the question of obtaining cooperation for any future actions in the stream corridor. In stream corridors where legal access was not obtained OCSWCD will monitor for potential future assistance to land owners. The Honeoye Lake watershed has very diverse land uses ranging from intense residential in the highly populated cottage areas of the lakeshore and near lake hillside, to the large expanses of conservation land in the southern valley and hills. Ownership of land in the northern areas of the watershed is much more complex (Appendix E). Lots have been broken into many smallholdings and in many cases the intermittent streams were used as initial property boundaries. Larger holdings to the south of the lake allow more continuous access for possible projects.

Steep slopes or slopes of greater than 15 % occupy much of the watershed and in many cases make access to stream reaches difficult or impossible on foot (Appendix A). These reaches are also inaccessible by machinery and stabilization efforts would not be cost effective if even possible. However, maintenance practices for the adjacent hillside areas should be established and an effort to educate landowners of the benefits of maintenance should be made. OCSWCD will educate when plausible using BMP designed by the NYS DEC and the NRCS for forestry.

The majority of the bank stabilization projects assessed are in the northern intensive residential areas of the watershed. In many cases flows are collected on the hilltops concentrated through intermittent streams that grow into gullies in the steep slope reaches of the drainage. These streams are then forced through the legacy sediments and cottages on the lake plain or delta areas. Coordination of these projects would often involve more than one landowner, proper engineering and permitting through the NYS DEC. Efforts are underway by the OCSWCD to streamline the permitting process to better serve landowners. Promoting cooperation by neighbors and educating landowners on benefits of stabilization both for the lake and for the protection of their assets is important.

The Honeoye Inlet drains nearly half of the watershed and carries it into a large wetland complex on the southern end of the lake. Several intermittent streams collect drainage in the southern most reaches of the watershed. This area is a U shaped valley in a rural setting with mainly forested hillsides. Although many of these streams are high gradient streams they are generally in equilibrium. Reductions in farming intensity over the past few decades have reduced silt and sediment loading in this area. After reaching the main channel of the Honeoye Inlet these flows travel north through the legacy sediments deposited in the more agriculturally intense past. Heavier storm events tend to resuspend these legacy sediments and carry them toward the lake. The intermittent streams in the south central portion of the watershed that flow into the Honeoye Inlet also have increased sediment loads due to a recent trend toward heavier rain events in the area.

This sediment and nutrient rich water reaches the NYS DEC wildlife management area south of the wetland complex and travels approximately two miles through abandoned farm fields owned by the DEC (Appendix P). Slope in this area is less than one percent in most cases and deposition of these sediments begins. Sediment beds are formed in the stream and drainage channels until storm events resuspend them moving them on toward the lake.

D. Implementation Plan

The Advisory Committee reviewed the data of the inventoried streams and established the following recommendations:

- Construct a 100-acre impound/ sediment control basin across the Honeoye Inlet before the wetland complex.
- Construct ¼ acre sediment control basins on chosen intermittent tributaries above the large impound basin and on the Finger Lakes Community College property.
- Construct debris catch basins ahead of road culverts on chosen intermittent tributaries.
- Promote Vernal Pool preservation and creation in upland reaches.
- Promote infrastructure and BMP maintenance on upland properties to prevent erosion and debris
- Streamline permitting and design process for stream bank stabilization projects in intense residential areas
- Utilize constructed sediment control basin projects to educate residents and highway departments of benefits.

Waterfowl Impound

The advisory committee proposes the construction of an approximately 100 acre two stage waterfowl impound/ sediment control basin (Appendix K). This basin would be located on the NYS DEC Wildlife Management Area south of the large wetland complex (Appendix M). It would involve the retention of the entire flow of the Honeoye Inlet with two earthen dike structures. The two bays of the Impound would have the ability to capture roughly 10,000 tons of sediment per year while providing habitat for many species of waterfowl and amphibians. Using a two bay structure would allow proper retention time for sediment deposition, desired water depths for waterfowl and eventual removal of sediment to extend the life of the impound.

Sediment Basins and Debris Basins

The committee also recommends the construction of debris catch basins on the upland side of County Road 36 and West Lake Road (Appendix L). These basins would be constructed largely in the road right of way before the culvert inlet to collect woody debris and course sediment (rock) before clogging road culverts. The debris basins would be approximately 100 to 200 square foot basins excavated out below the culvert inlet elevation to allow for large rock fragments and woody debris to collect. The debris basins would also be constructed in a way to facilitate easy cleaning by the responsible highway departments.

Subsequently an approximately ¼ acre sediment control basin would be constructed on the downstream side of the road culvert, upland of the waterfowl impound to reduce fine sediment loading of the Impound from adjacent tributaries. The sediment basins would be shallow earthen dike structures across the intermittent waterway with a water-control structure to attenuate flows long enough after storm events to allow for the fine sediments to settle. These structures would be constructed with emphasis being placed on ease of cleaning by the local highway departments to ensure proper maintenance. The sediment basins would also be constructed on either highway right of way or DEC WMA properties. A second set of debris basins would be constructed on the upland side of County Road 36 across from the Finger Lakes Community College Muller Field Station with a sediment control basin on the down slope side of the road (Appendix N,O) . These features would reduce sediment to the lake and protect existing infrastructure at the field station.

Vernal Pool Preservation

Efforts have already begun to promote the preservation and construction of Vernal Pools in the upland headwaters of the watershed. Vernal Pools attenuate runoff and reduce peak flow volumes that intensify erosion. Preservation of these pools and creation of more pools in the landscape will help to reduce destructive erosive events while providing valuable habitat and groundwater recharge. The committee recommends a continued effort to educate the public on the values of vernal pools and their role in attenuating runoff. The HLWTF, OCSWCD and FLCC will continue to conduct workshops on vernal pools and produce handouts to further their preservation and promote potential creation of new pools.

Infrastructure and BMP Maintenance

In several instances old logging roads and former hillside BMP's from logging and agriculture have become preferential pathways for the conveyance and concentration of runoff. These were effective practices when installed, efforts to educate landowners about the consequences of this failing infrastructure need to be made to reduce runoff volumes and protect downstream assets. The committee recommends that OCSWCD, using county appropriations, increase efforts to promote the proper stewardship of these practices and educate landowners on their value in attenuating runoff.

Streamline Permit Process

The Ontario County Soil and Water Conservation District has begun a process with the United States Army Corps of Engineers (AcoE) and the DEC department of permits to obtain a general permit for all of the area involved in this inventory. Upon receipt of this general permit the OCSWCD will be able to better serve the residents of the Honeoye Lake Watershed with their stream projects with regard to permitting. The education of the OCSWCD staff received in preparation for this study along with their lengthy experience with agricultural and storm water runoff control measures will help them to plan and streamline individual streambank stabilization projects. Efforts will be made by the OCSWCD to make their services known to residents.

NYS DEC was consulted throughout the process and is enthusiastic and cooperating in the planning process. Letters of commitment are being obtained from the NYS DEC, FLCC Foundation, Richmond Town Highway Department and Ontario County Highway Department.

The committee has decided to focus construction efforts on projects located on public lands within the watershed. The waterfowl impounds would be constructed completely on NYS DEC lands. Three of the four sediment basins would be constructed on NYS DEC property and the fourth would be on Finger Lakes Community College Foundation property. The debris basins would be on the Ontario County Highway Departments right of way with portions on NYS DEC lands. There are no buildings or facilities in the direct vicinity of any of these projects. In the case of the Muller sediment basin the constructed basin would help protect the man made aquaculture ponds downstream from the basin.

Furthermore, due to the remote nature of these projects there is no below ground infrastructure in the project area. However, Dig Safely New York will be consulted before the start of construction on all projects. The projects will change water flow patterns but attention was given to assure that none of the planned projects will affect groundwater volume or flow pattern and no permanent flow will be directed from wetlands or other surface water resources.

New York State Department of Parks, Recreation and Historic Preservation (SHPO) have been contacted and a determination of the effects of the projects on cultural resources is forth coming. The projects in the southern portion of the valley are in a mapped archeologically sensitive area and a determination would be required. (Appendix I)

The planned projects will not be near any old growth forests (Appendix E). Trees that may be lost in the construction of the sediment basins and the debris basins are successional trees. Trees that may be inundated with the flooding of the waterfowl impounds are wetland species and will at the approval of the DEC biologists, add to the habitat of the Impound or be removed before inundation. All species currently in the impound area are successional due to the areas reversion from farm field.

All of the projects recommended are within lands that are zoned as conservation lands in the towns of Canadice and Richmond. The projects planned meet the criteria of the local zoning for projects on these lands and all Zoning Board approvals will be obtained.

The construction of these projects and the involvement of the OCSWCD will provide a valuable visual educational tool that can be used to demonstrate solutions to residents and highway departments in the future. Important design standards and costs will also be learned for future use in planning and design. This knowledge will assist OCSWCD in advising

The prioritized projects were discussed with representatives from the DEC. Planning for the projects has included input from the DEC regarding the ability of the project concepts to achieve the necessary permits for construction and meet the habitat goals of the DEC for wildlife. Consensus was reached on the direction of these projects but actual permit determinations would have to be made with formal design submittals.

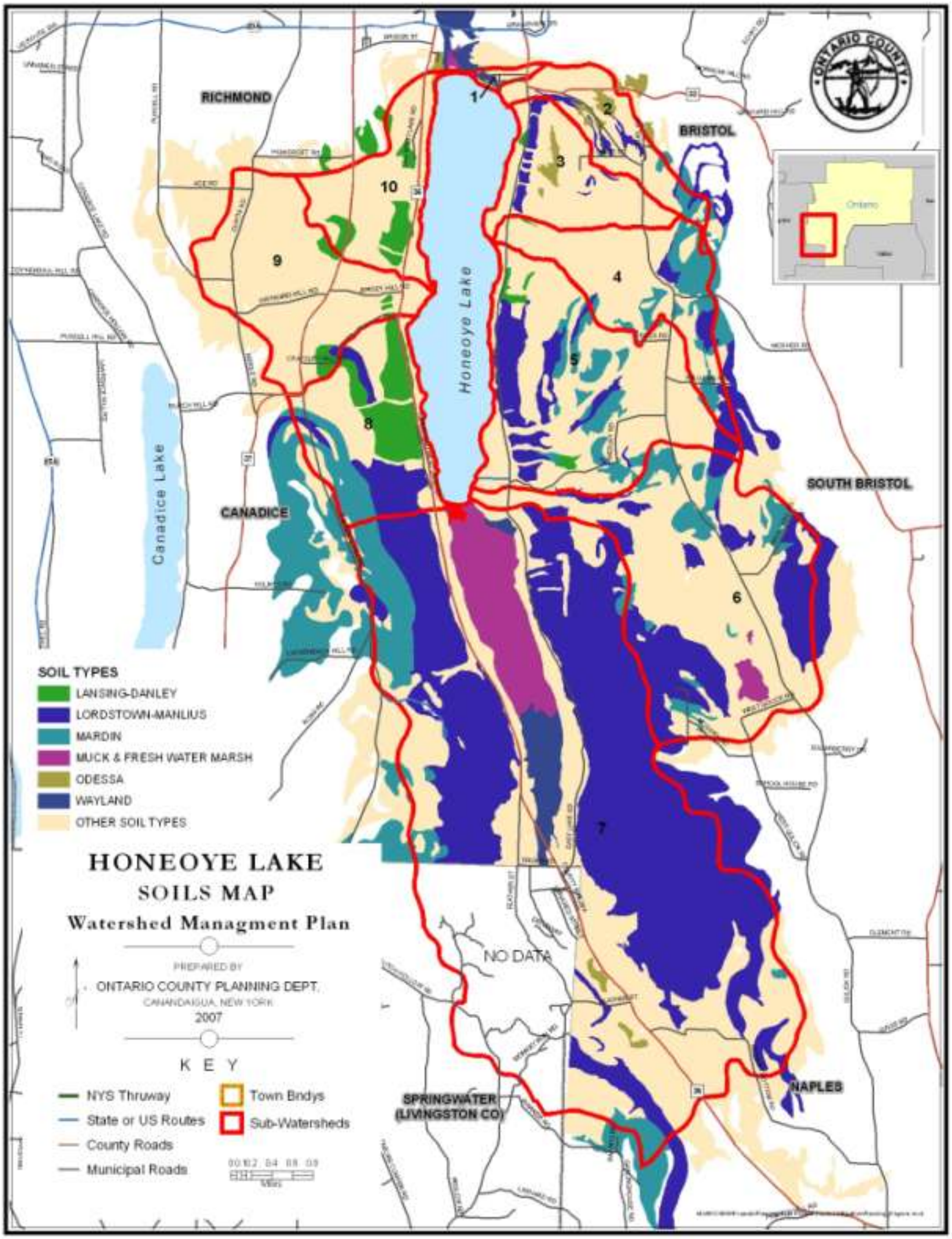
The member towns of HLWTF and OCSWCD are committed to implementing these sediment reduction projects. Funding for implementation will be sought through subsequent DOS Lake Restoration Grants, Great Lakes Restoration Initiative Grants and other grant opportunities as well as funding from other conservation organizations.

<u>Implementation Strategy-</u>

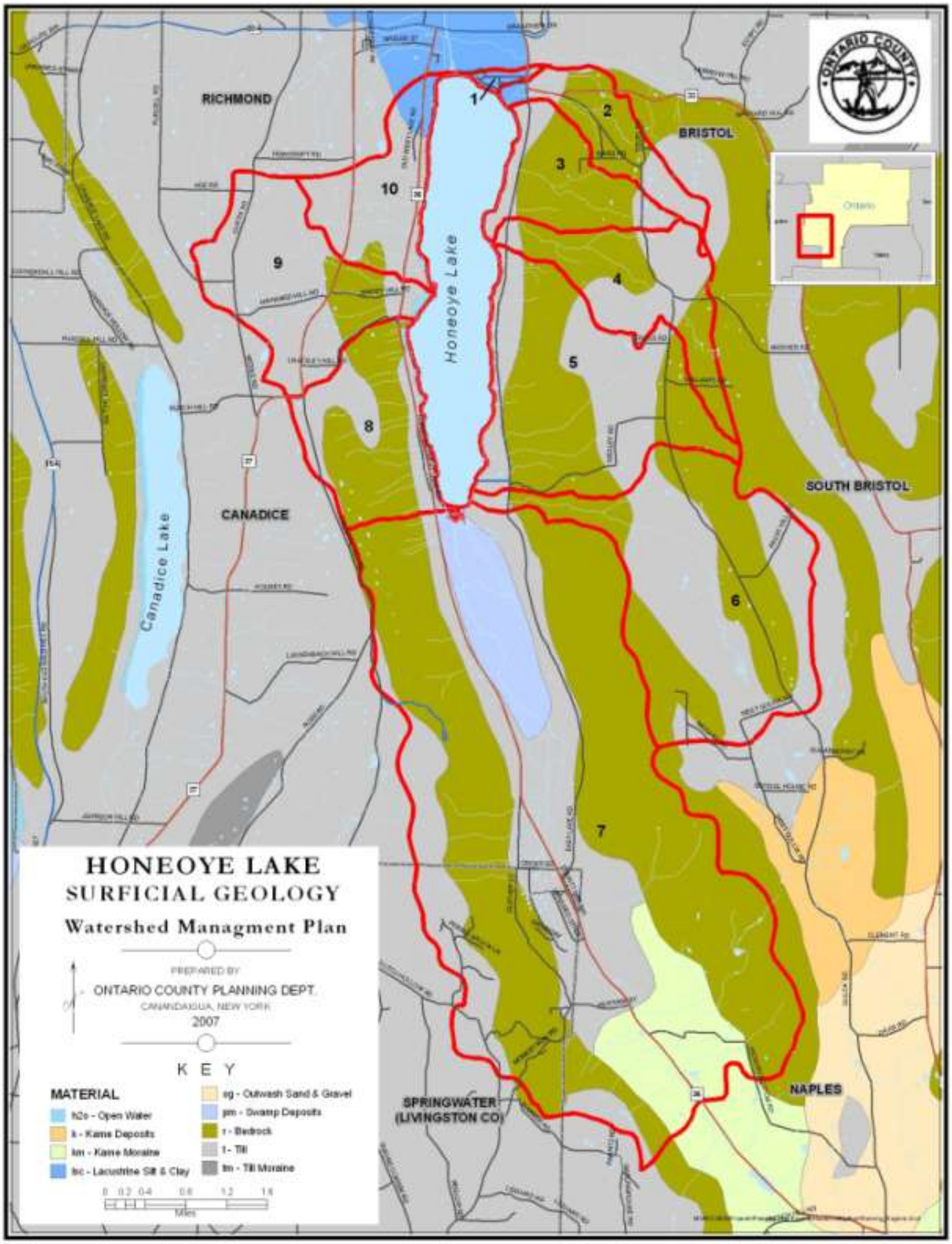
Recommendation	Priority	Brief Description	Estimated Cost ($)	Source of Funds	Partners
Waterfowl Impound	1	Create impounds across inlet	250,000	Grant and Waterfowl organizations	OCSWCD, NYS DEC, DU, TNC
Debris Catch Basins	2	Basins stop course sediment	20,000	Grant and Municipalities	OCSWCD, OC Highway, T. o Richmond
Sediment control Basins	3	Basins stop fine sediment	30,000	Grant and Municipalities	OCSWCD, NYS DEC
Streamline Permit Process	4	Obtain general permit to ease process time	5,000	OCSWCD	NYS DEC, US ACoE
Infrastructure and BMP Maintenance Education	5	Site visits and flyers	2,000	OCSWCD	NYS DEC Forestry
Sediment Control Education	6	Site visits and flyers	2,000	OCSWCD, OC planning	OC Planning
Vernal Pool preservation	7	Site visits and flyers	500	FLCC	OCSWCD

Appendix A: Map 2: Honeoye Lake Watershed Steep Slopes

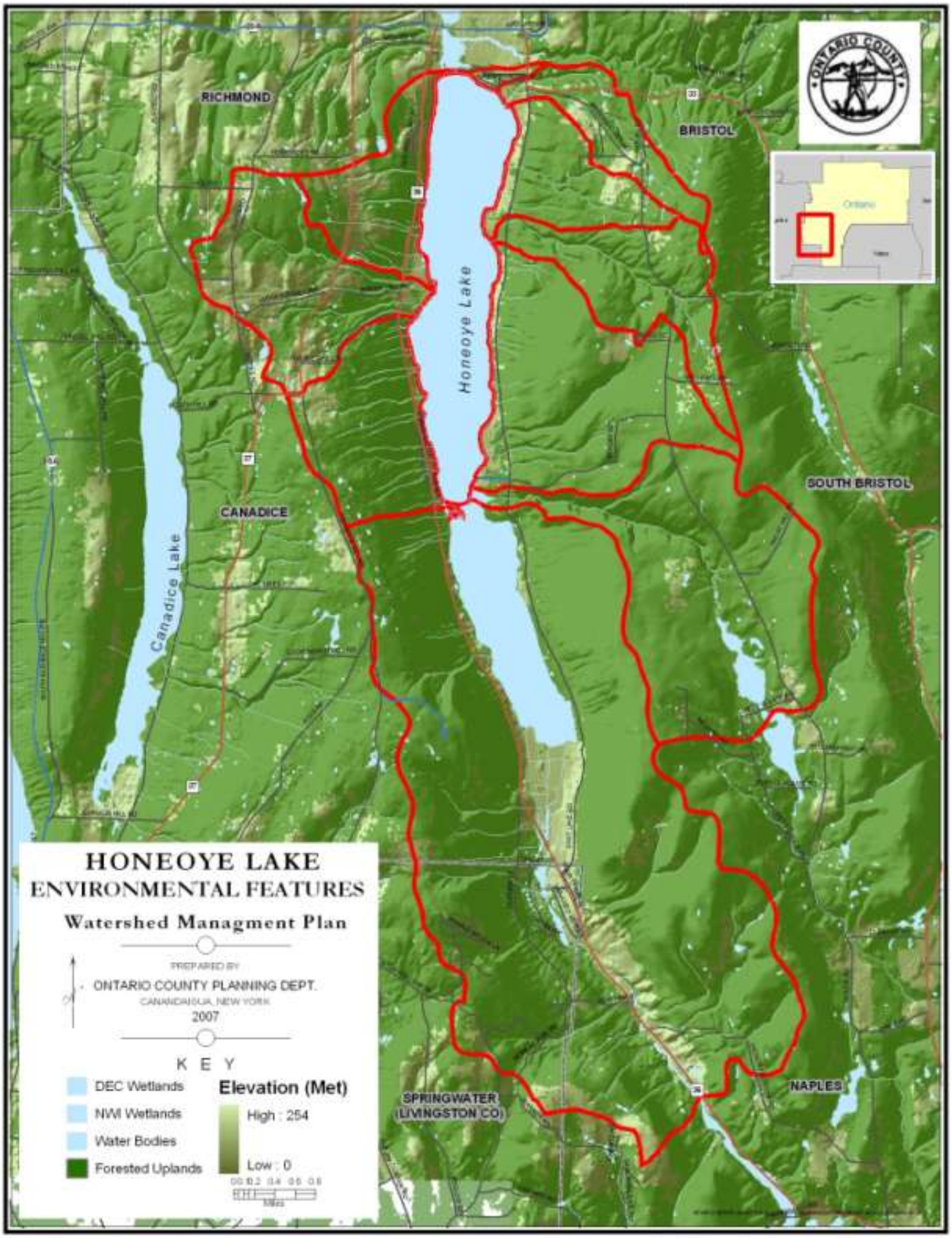
Appendix B: Map 3: Honeoye Lake Watershed Soils



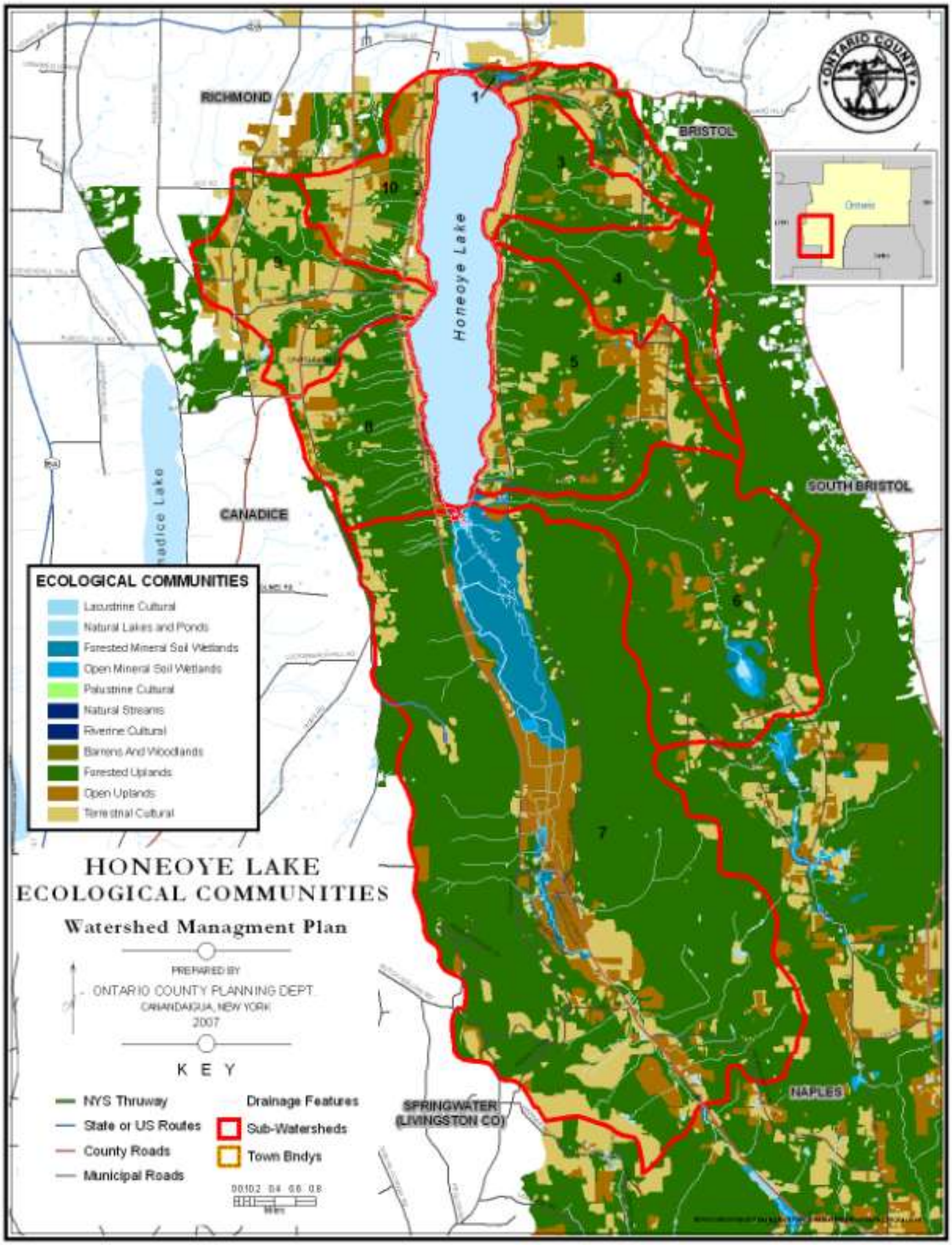
Appendix C: Map 4: Honeoye Lake Watershed Surficial Geology



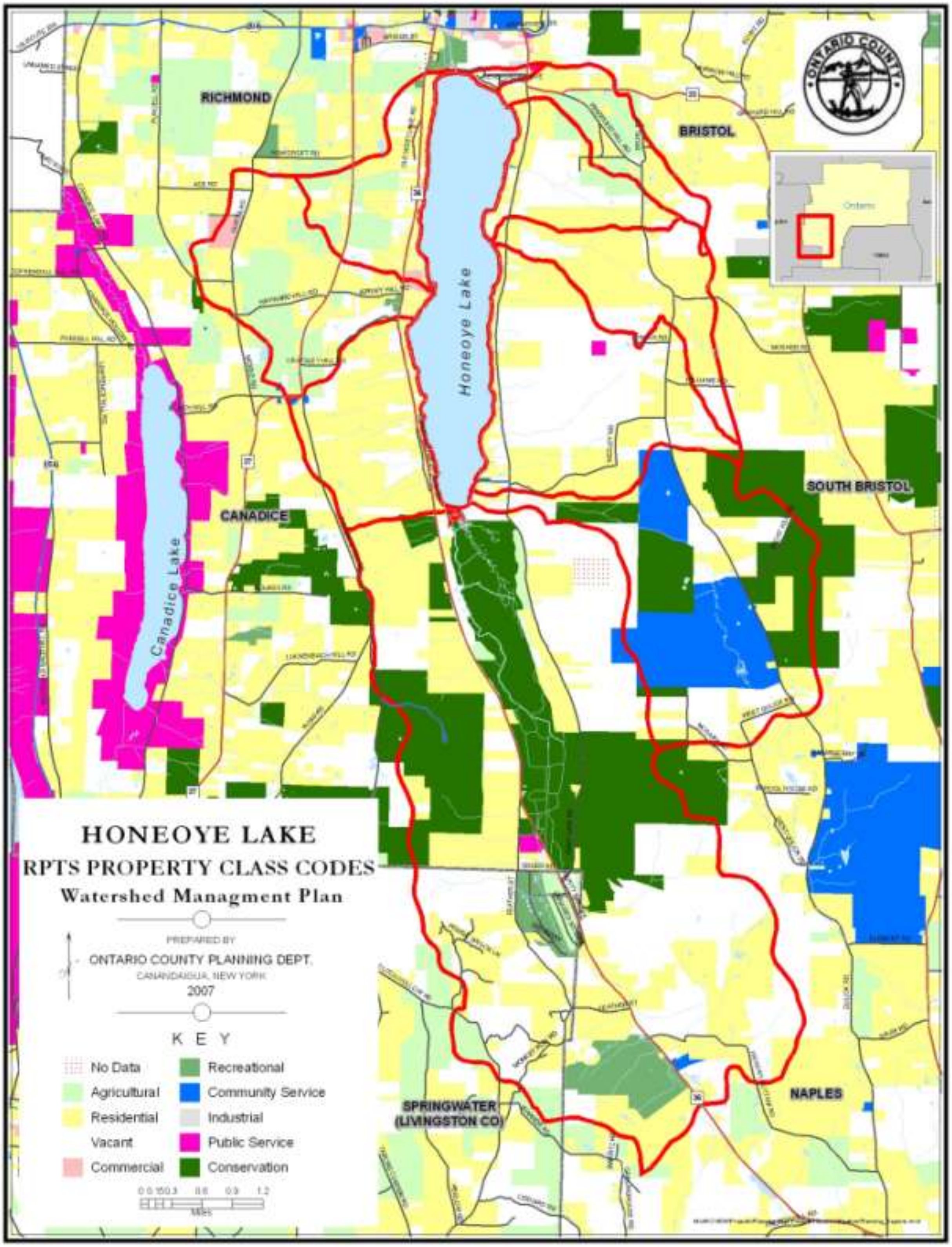
Appendix D: Map 5: Honeoye Lake Watershed Environmental Features



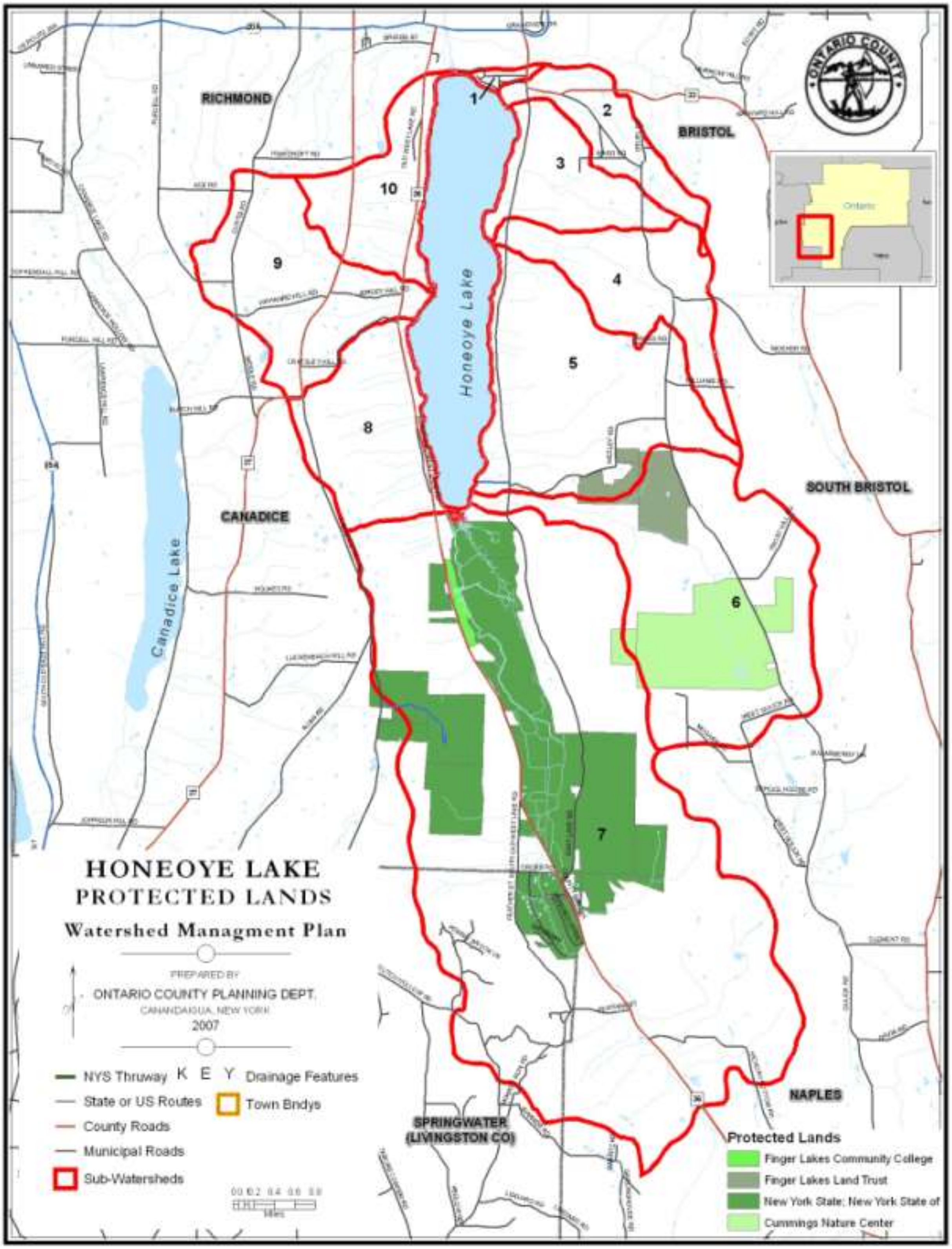
Appendix E: Map 6: Honeoye Lake Watershed Ecological Communities



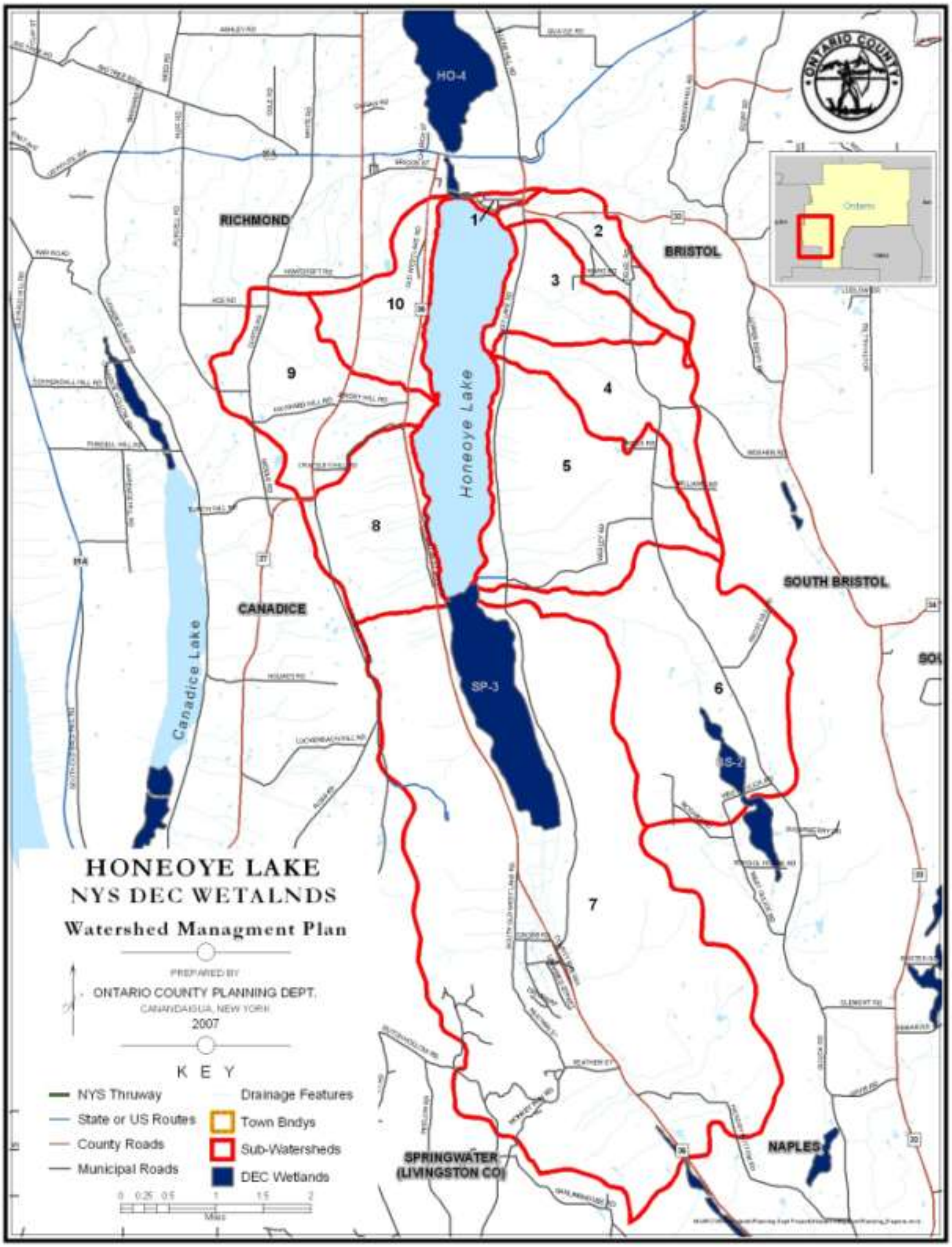
Appendix F: Map 7: Honeoye Lake Watershed Property Classes



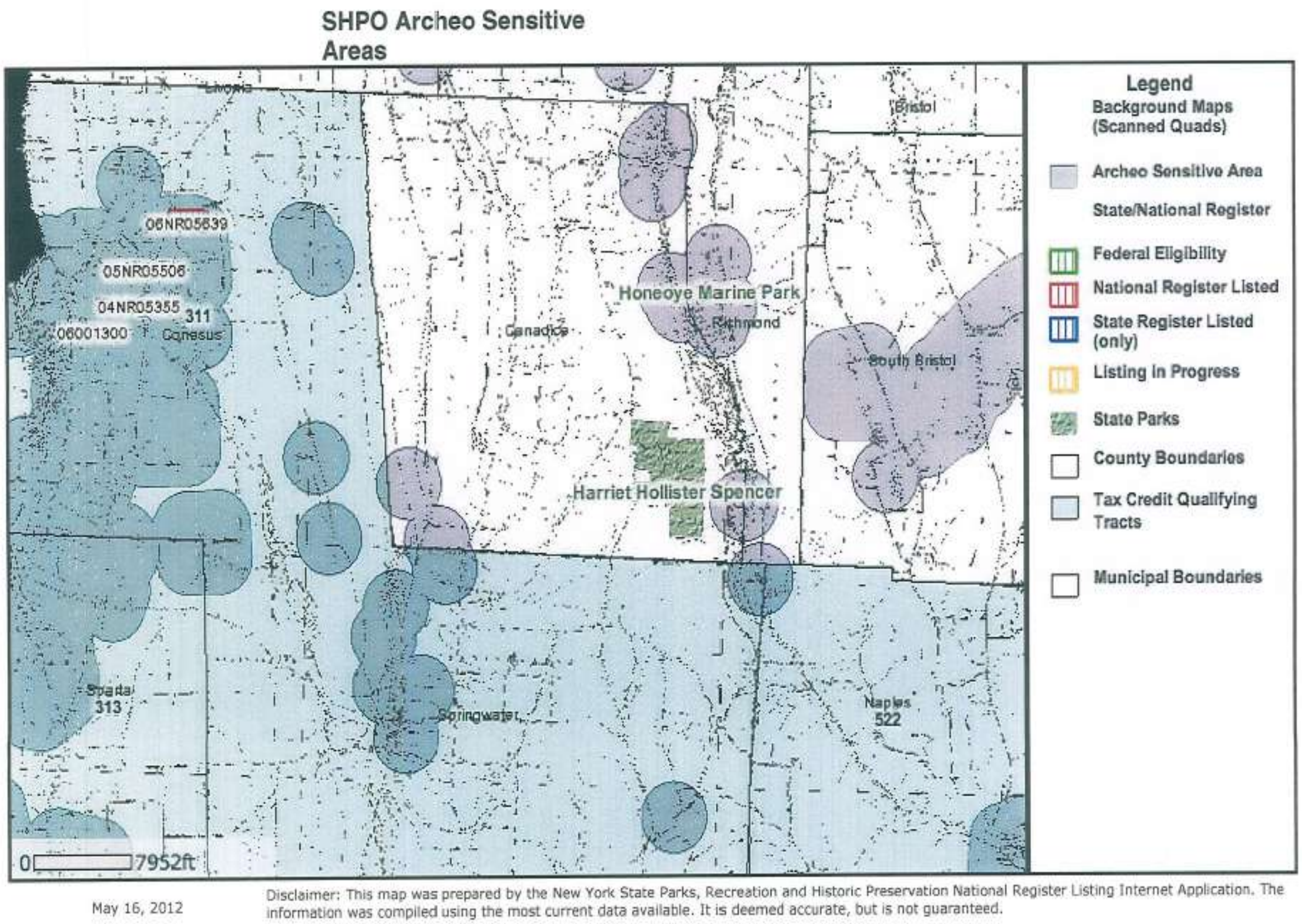
Appendix G: Map 8: Honeoye Lake Watershed Protected Lands



Appendix H: **Map 9: Honeoye Lake Watershed DEC Wetlands**



Appendix I: Map 10: NYS SHPO Archeologically Sensitive Areas



Appendix J: Assessment Worksheet Example:

STREAM INVENTORY AND EROSION ASSESSMENT
HONEOYE LAKE WATERSHED

General Information

Stream name ______________________ USGS Stream code # ____________

Date _________________________ ☐ Ontario County ☐ Livingston County

☐ Bristol ☐ Canadice ☐ Naples ☐ Richmond ☐ South Bristol ☐ Springwater

Inventory team ____

Start Point GPS latitude ______________ GPS longitude ____________

End Point GPS latitude ______________ GPS longitude ____________

Additional information ____

____

____

____

STREAM INVENTORY AND EROSION ASSESSMENT
HONEOYE LAKE WATERSHED

Site Specific Information

USGS Stream Code # (same as from General Information Form)______________

Site # ___ Waypoint start: latitude___________ GPS longitude___________

Waypoint end: latitude___________ GPS longitude___________

☐ Left bank ☐ Right bank Stream width ___________

Digital image filename ____

Flow regime: ☐ subterranean ☐ ephemeral ☐ intermittent ☐ perennial

Stream gradient: ☐ slight (no or a few riffles) ☐ moderate ☐ high

Stream pattern: ☐ slightly curved ☐ moderately curved ☐ sharply curved

Length of eroding bank _________ Average height of eroding bank ________

Slope of eroding bank: ☐ slight (≤ 3:1) ☐ moderate ☐ steep (≥ 1:1)

Composition of eroding bank: ☐ silt ☐ sand ☐ gravel ☐ large rocks ☐ shale

Debris and Blockage: ☐ none ☐ infrequent ☐ moderate ☐ extensive

Blockage material: ☐ rock ☐ log ☐ other: ___________________________

Depositional features: ☐ side bars ☐ mid-channel bars ☐ delta bars

Vegetation at top of bank: ☐ forest ☐ shrub ☐ field ☐ lawn ☐ farmland

If pasture, ☐ Fenced ☐ Unfenced Site accessible by machine ☐ Yes ☐ No

Surrounding land uses: ____

____

____

Suspected cause of bank instability: _____________________________

____

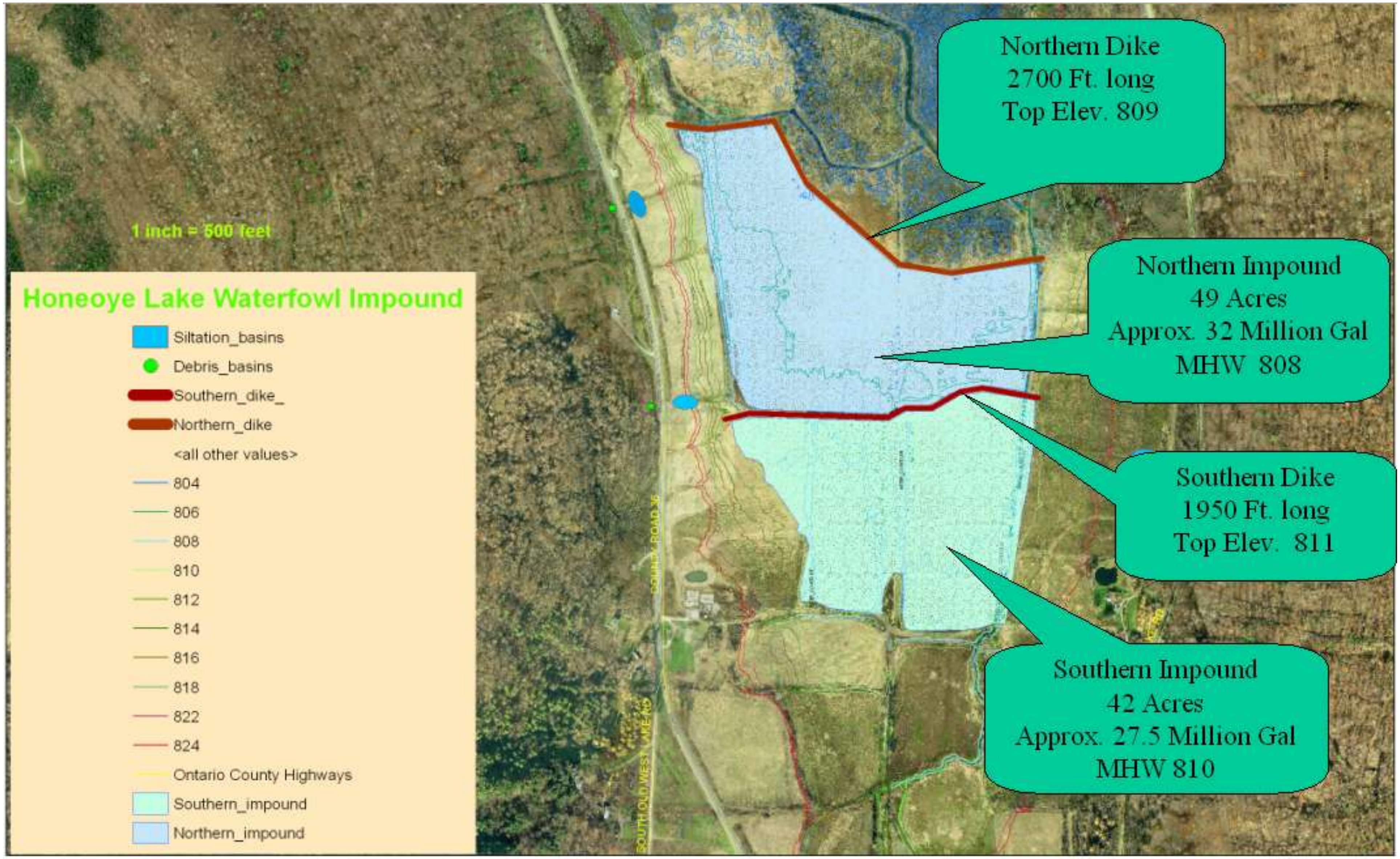
____

Additional comments: ____

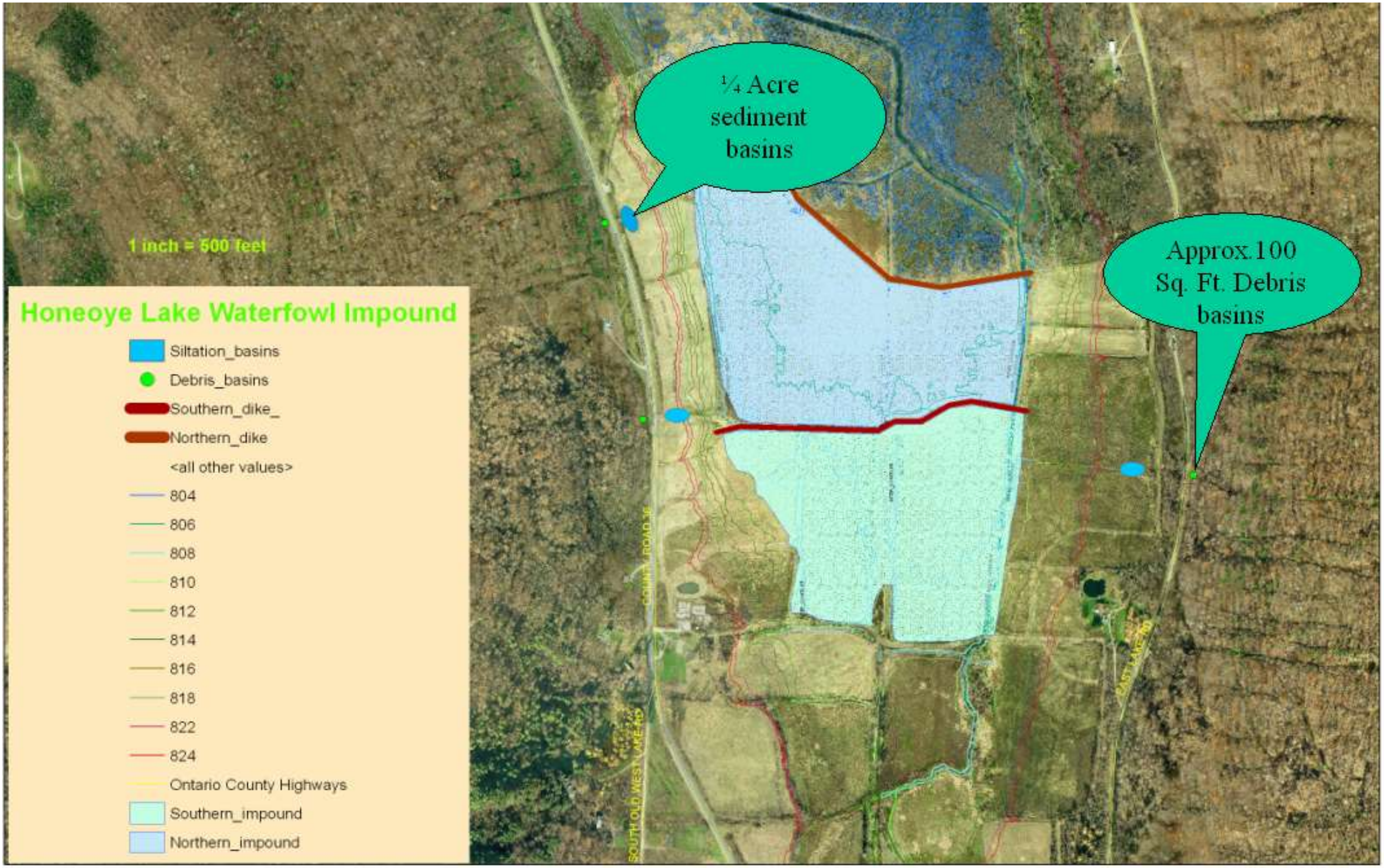
____

____

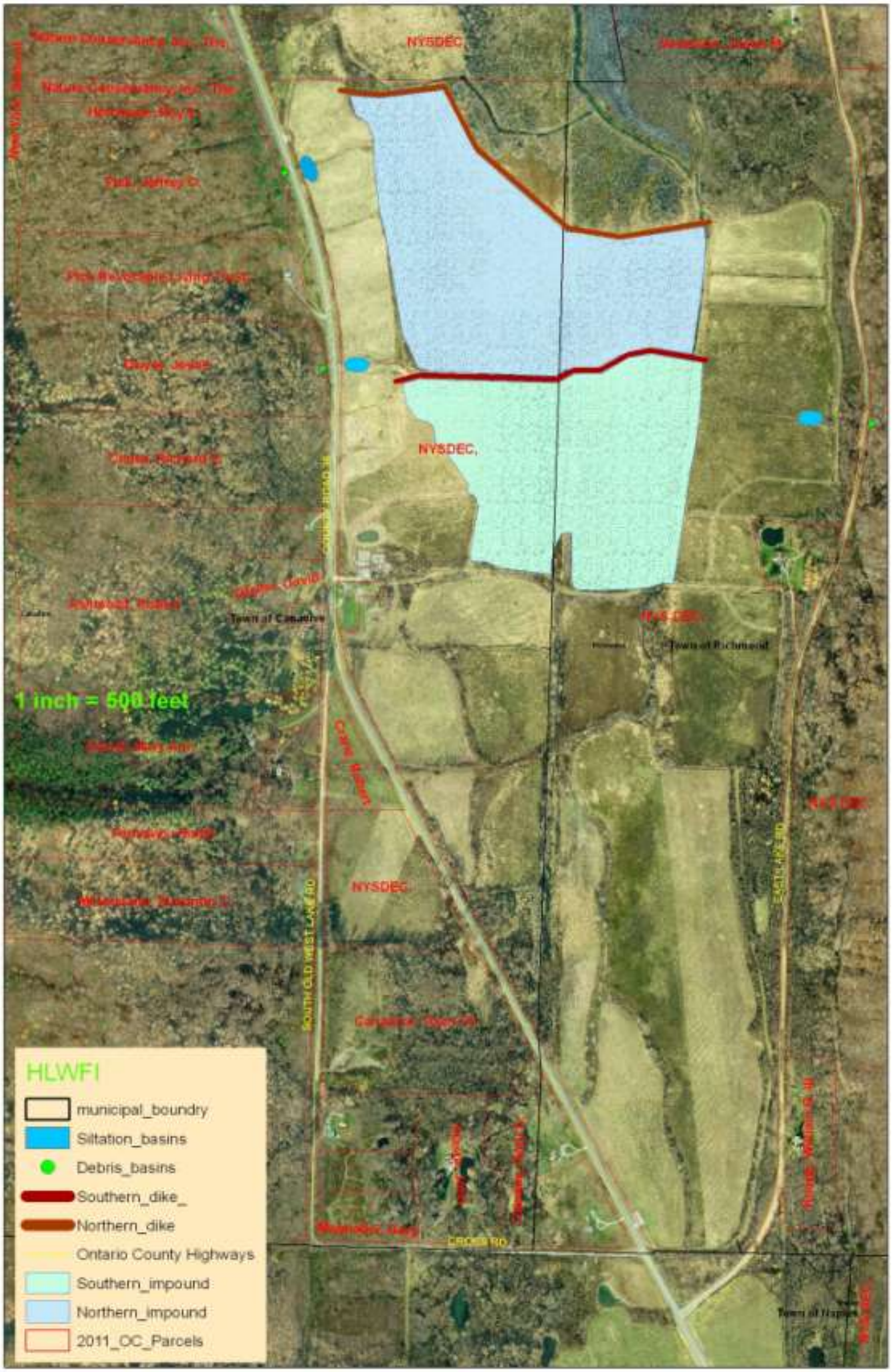
Appendix K: **Map 11: Schematic of Honeoye Lake Waterfowl Impound**



Appendix L: Map 12: Schematic of Honeoye Lake Watershed Sediment Basins and Debris Basins

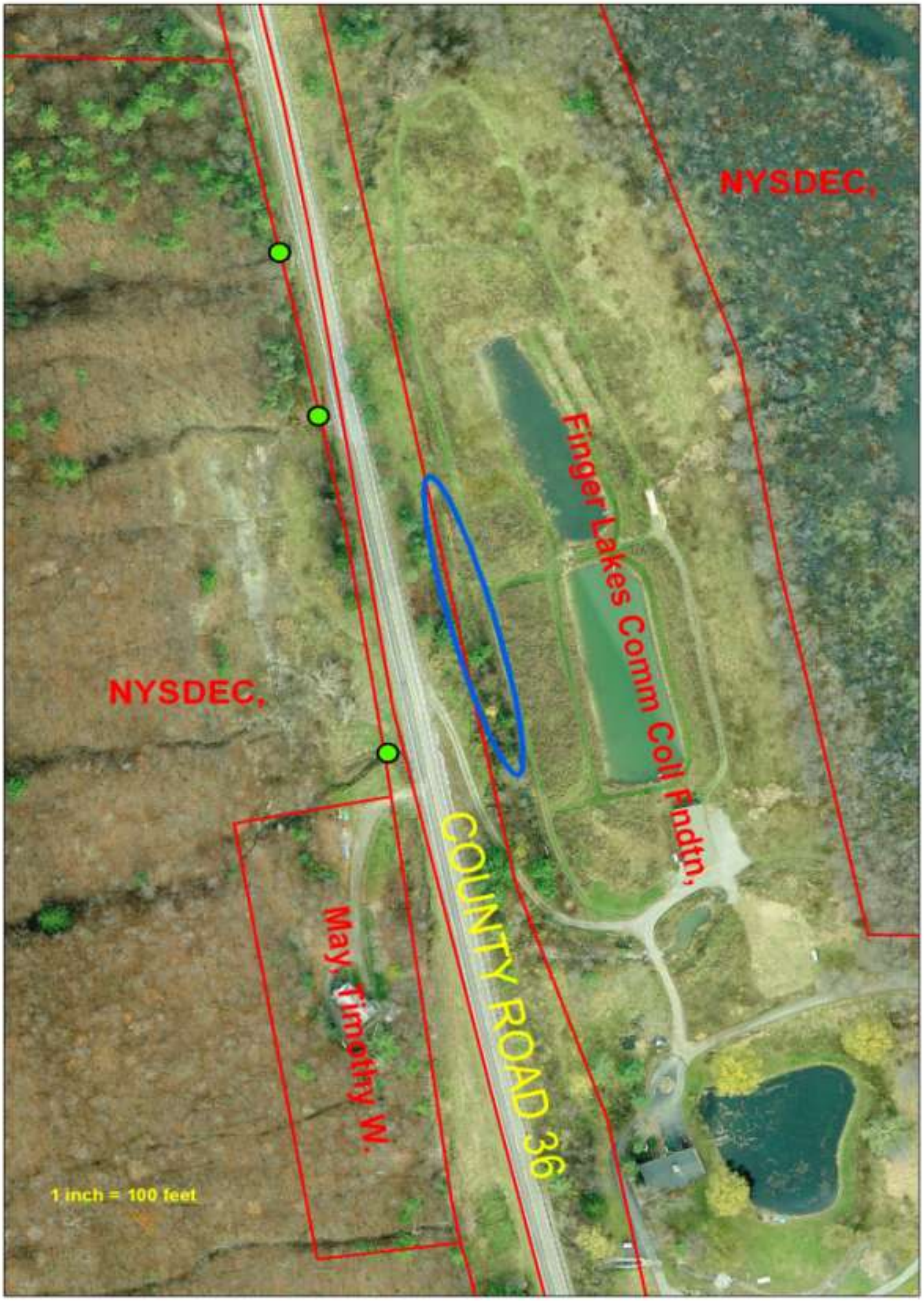


Appendix M: Map 13: Impound area ownership and parcels



Appendix N: Map 14: Location of Muller Field Station Sediment Basin and Debris Basin

Appendix O: Map 15: Parcel ownership for Muller Sediment and Debris Basins



Appendix P: Map 16: DEC Honeoye Inlet Wildlife Management Area