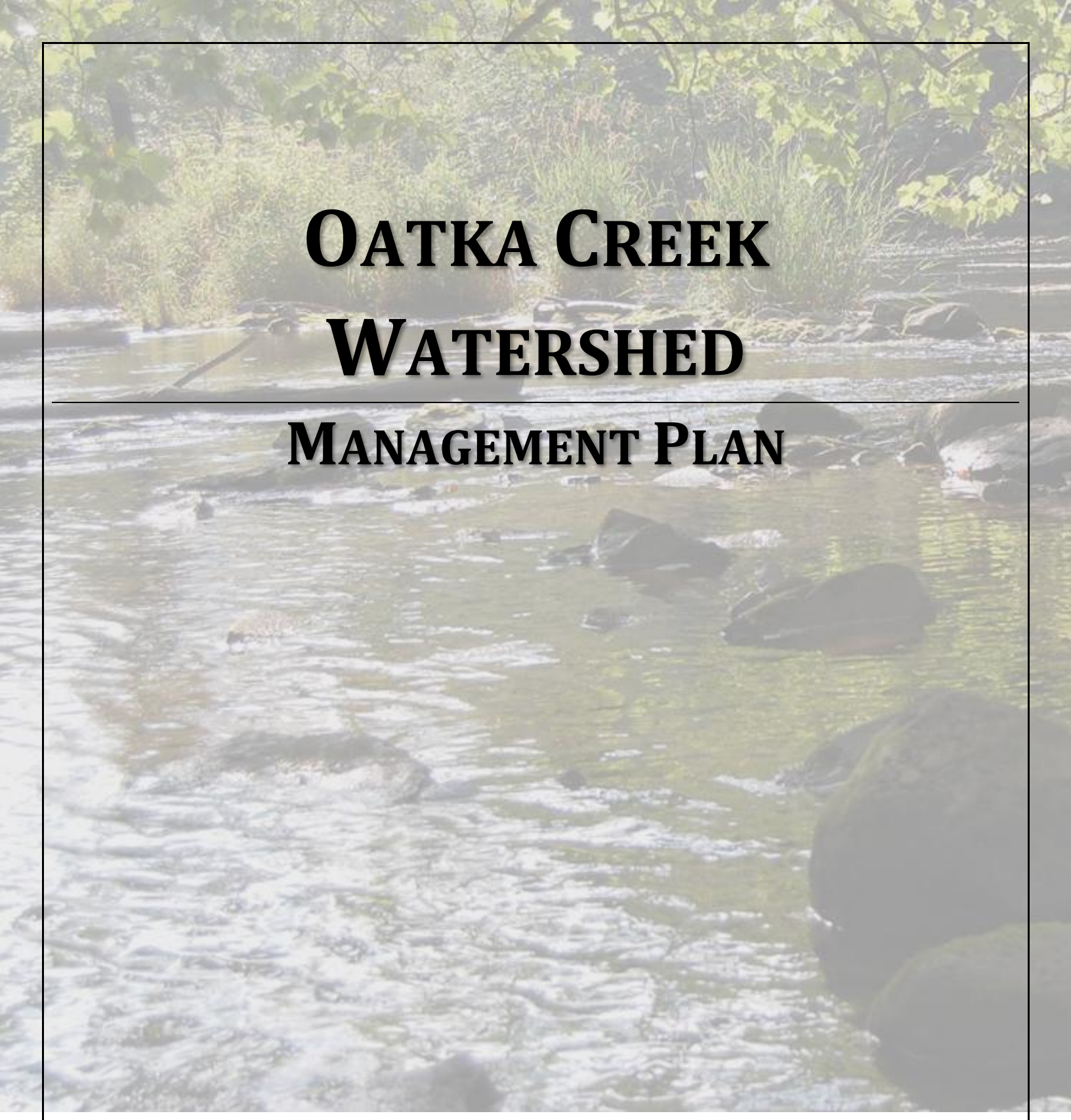

OATKA CREEK WATERSHED

MANAGEMENT PLAN

GENESEE/FINGER LAKES
Regional Planning Council

LOCAL WATERFRONT REVITALIZATION GRANT AWARDED TO:

TOWN OF WHEATLAND, NEW YORK
22 MAIN STREET
SCOTTSVILLE, NY 14546
HTTP://WWW.TOWNOFWHEATLAND.ORG

PROJECT MANAGER

GENESEE/FINGER LAKES REGIONAL PLANNING COUNCIL
50 WEST MAIN STREET, SUITE 8107
ROCHESTER, NY 14614
HTTP://WWW.GFLRPC.ORG

HTTP://WWW.GFLRPC.ORG/BLACKOATKA.HTM

OATKA CREEK WATERSHED

MANAGEMENT PLAN

This project is being developed for the New York State Department of State with funds provided under Title 11 of the Environmental Protection Fund.

ACKNOWLEDGEMENTS

The authors of this report would like to personally thank each of the volunteer Project Advisory Committee members who devoted their time and effort to the completion of this phase of the project.

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COMPONENTS

I. Executive Summary
II. Watershed Characterization
III. Subwatershed Report
IV. Regulatory and Programmatic Environment Report
V. Identification and Description of Management Practices, Approaches, and Strategies for Watershed Protection and Restoration and Implementation Strategy and Schedule

EXECUTIVE SUMMARY

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Executive Summary

Introduction

The purpose of this planning effort, the Oatka Creek Watershed Management Plan, was the formation of a long-term strategy to ensure the protection and restoration of Oatka Creek water quality and compatible land use and development. The result is this watershed management plan for the protection and enhancement of Oatka Creek. This briefing describes the Plan's discrete components and the project's process to develop strategies to protect and restore water quality within the Oatka Creek Watershed.

The Oatka Creek watershed lies within the Lower Genesee River Basin – part of the larger Lake Ontario Drainage Basin – and occupies 138,092 acres (215.8 sq. mi.) across portions of Wyoming, Genesee, Livingston and Monroe Counties of New York State. The watershed overlaps portions of 26 municipalities. The Lower Genesee River Basin has an area of 2,500 square miles and drains the hills and valleys over a wide swath of western New York and part of northern Pennsylvania into the Genesee River, which flows north into Lake Ontario. Of the 17 watersheds that comprise the Genesee River Basin, the Oatka Creek watershed has the second largest drainage area, constituting approximately 9% of the entire Genesee River Basin.

The Oatka Creek Watershed Management Plan was developed through a grant by the New York State Department of State (DOS) with funds provided to the Town of Wheatland under Title 11 of the Environmental Protection Fund.

History of Watershed Protection

Intermunicipal watershed planning began in the Black and Oatka Creek Watershed counties with the Rochester Embayment Remedial Action Plan (RAP), an area identified as an Area of Concern (AOC) since the early 1980's. Since then significant progress has been made towards improving the water quality in the Oatka Creek watershed.

Following the Caring for Creeks conference in Rochester in 1998, the Oatka Creek Watershed Committee formed. With the help of Dr. Timothy Takis and other researchers at Monroe Community College, the non-profit Oatka Creek Watershed Committee developed a *State of the Basin* report in 2003. Subsequent work includes a completed a metals study throughout the watershed; initiation of a municipal outreach program; a stressed segment analysis of the Genesee and Wyoming County portions of the watershed funded through the Finger Lakes Lake Ontario Watershed Protection Alliance; completion of initial municipal outreach by the committee; an assessment of local ordinances and practices pertaining to erosion and sedimentation completed by Genesee/Finger Lakes Regional Planning Council (G/FLRPC) with funding from the Great Lakes Commission Great Lakes Basin Program for Soil Erosion and Sediment Control; and the *Oatka Creek Water Quality Assessment: Identifying Point and Nonpoint Sources of Pollution with Application of the SWAT Model*, Dale Matthew Pettenski (2012) in a thesis submitted to the Department of Environmental Science and Biology of the State University of New York College at Brockport.[1]

Intermunicipal Cooperation

The basis for intermunicipal cooperation is founded in a Memorandum of Understanding (MOU) between the four counties and 26 municipal governments that geographically fall within the Oatka Creek

Watershed. The MOU will link those municipalities with project partners, county and state officials, watershed groups, and local scientists in an intermunicipal watershed organization.

This "new" intermunicipal organization may replace the Oatka Creek Watershed Committee. This group can further the Plan's goals of preserving, restoring, and enhancing the health of Oatka Creek leading efforts to implement the *Oatka Creek Watershed Management Plan*.

SECTION ENDNOTE

[1] Pettenski, Dale Matthew , Oatka Creek Water Quality Assessment: Identifying Point and Nonpoint Sources of Pollution with Application of the SWAT Model", (2012) in a thesis submitted to the Department of Environmental Science and Biology of the State University of New York College at Brockport, Theses. Paper 38

Watershed Plan Components

Process of Preparing the Plan

The project began in July 2009 with a meeting between project partners, including: Oatka Creek Watershed Committee (OCWC); Black Creek Watershed Coalition (BCWC); G/FLRPC; Genesee County Soil and Water Conservation District (GCSWCD); Genesee Community College; Monroe County Planning and Development; and New York State Department of State (DOS).

Following the 1998 "Caring for Creeks" conference hosted by the Rochester Area Community Foundation, the OCWC was formed to protect and improve the health of the watershed. This *Oatka Creek Watershed Management Plan*, developed from 2009 to 2014, builds on Timothy Tatakis' 2003 *Oatka Creek Watershed State of the Basin* report, prepared under the guidance of the OCWC.

The OCWC served as the core of the Oatka Creek Watershed Management Plan Project Advisory Committee (PAC), responsible for reviewing draft documents, making revision suggestions, and generally overseeing the plan's development. (Another joint Oatka Creek and Black Creek Watershed organizational meeting was held in August 2009 to encourage additional participants such as town supervisors and county agency staff.)

Regional Planning Councils are established pursuant to New York State General Municipal Law to address regional issues and assist with local planning efforts. The G/FLRPC supports watershed planning in the Oatka Creek watershed directly through the acquisition of funding sources for specific projects and indirectly through ongoing land use and water resources planning projects. County Planning departments also offer technical assistance and information regarding land use and related planning issues to municipalities.

Soil and Water Conservation Districts within each county play a critical role in the management of natural resources and agricultural activities in the Oatka Creek watershed, including applying for funding and implementing projects related to erosion and sediment reduction, streambank remediation, nonpoint source pollution control, and Agricultural Environmental Management (AEM).

Genesee Community College and the State University of New York at Brockport are very active in the Oatka Creek watershed, conducting various water quality sampling and quantity monitoring studies in support of a variety of short- and long-term projects and programs. Their independent research has significantly advanced the knowledge base within the watershed.

The New York State Department of State helps protect and enhance coastal and inland water resources and encourage appropriate land use through technical assistance for plans and projects that expand public access, restore habitats, and strengthen local economies.

The following documents are components of the Oatka Creek Watershed Management Plan, and were prepared to ultimately determine recommendations and priority projects in order to enable decision makers, stakeholders and residents to make decisions that will ultimately improve and protect the water quality of Oatka Creek and its tributaries:

- A community education and outreach program on water quality and quantity and watershed protection issues, completed in 2009;
- A characterization of the watershed and its constituent sub-watersheds, land use and land cover, demographics, natural resources, and infrastructure, completed in 2012;

- An evaluation of subwatersheds throught existing water quality data, run-off characteristics, and pollutant loadings, completed in 2013;
- Establishment of a formal Intermunicipal Organization;
- Evaluation of government and non-government organizations, local laws, plans, programs, and practices that have an impact on water quality in the watershed, completed in 2013; and
- An implementation strategy, including the identification of watershed-wide and site-specific projects and other actions necessary to protect and restore water quality, completed in 2014.

A summary of each component can be found below. These documents can be found in their entirety at the websites listed in each summary section.

Community Outreach and Education

Community outreach was a significant part of the planning process. The *Community Outreach and Education Plan* was developed to clarify and define the variety of forums and outreach mechanisms used to engage people in the Oatka Creek Watershed Management Plan. Guided by the PAC, the G/FLRPC, and the respective county Soil and Water Conservation District representatives reached out to a broad set of stakeholders.

The *Community Outreach and Education Plan* report includes brief guidance on the plan's structure and process:

- Regular PAC Meetings
- Project Website
- Identification of Watershed Stakeholders
- Consultations, Discussions, and Reporting
- Special Stakeholder Focus Groups, Meetings and Key Contact Interviews
- Public Information Meetings

The Community Outreach and Education Plan defined the role of the Project Advisory Committee: its purpose; membership; chairperson; public participation protocol; meeting notification, scheduling, format, and location. PAC meetings were held to manage the project's progress, prepare and review draft documents, and advise the participating members of the PAC of project business or materials. Meetings of the PAC were open to the public (and used the consensus form of decision-making) to encourage broad participation among all residents and municipal officials throughout the watershed.

The PAC also included various additional "Key Contacts": representatives from each watershed community, County Planning Departments, County Soil and Water Conservation Districts, the NYS Department of Environmental Conservation, and environmental, recreational, historic preservation and economic development interests such as conservationists, boaters, and other regional recreation and trail groups.

The *Community Outreach and Education Plan* included the protocol for arranging at least two public information meetings and for outreach to special focus groups such as property owners, business owners, farmers, local highway superintendents, and local code enforcement officers.

Watershed Characterization Report (2012)

The Oatka Creek *Watershed Characterization Report* describes, or characterizes, the condition of natural resources and the built environment in the watershed. It is an environmental inventory containing a wealth of data on the watershed's character, including the 217 square miles of drainage areas and subwatersheds

that make up Oatka Creek. The 121-page *Characterization* contains 30 maps, figures, and tables produced by project consultants at EcoLogic and the staff of the G/FLRPC. Building on previous work completed by SUNY College at Brockport researchers for the 2003 *Oatka Creek Watershed – State of the Basin* report[1], the *Characterization* report is the most comprehensive scientific report on Oatka Creek to date.

The Oatka Creek watershed lies within the Lower Genesee River Basin – part of the larger Lake Ontario Drainage Basin – and occupies 138,092 acres (216.8 sq. mi.) across portions of Wyoming, Genesee, Livingston and Monroe Counties of New York State. The watershed overlaps portions of 26 municipalities. The Lower Genesee River Basin has an area of 2,500 square miles and drains the hills and valleys over a wide swath of western New York and part of northern Pennsylvania into the Genesee River, which flows north into Lake Ontario. Of the 17 watersheds that comprise the Genesee River Basin, the Oatka Creek watershed has the second largest drainage area, constituting approximately 9% of the entire Genesee River Basin.

The primary water quality issues in Oatka Creek are nutrients, invasive species, and contaminants. Streambank erosion and agriculture were cited as the suspected sources of the excessive nutrients and sediments. Failing on-site wastewater disposal systems were cited as an additional source in one segment of Oatka Creek.

The *Characterization* report is comprised of the following sections:

1. Project Overview and Background
2. Description of the Study Area
3. Physical Characteristics of the Watershed
4. Planning Considerations
5. Surface Water Chemical Characteristics
6. Biological Characteristics of the Watershed
7. Watershed Runoff Export Coefficients
8. Identification of Impairments and Threats

Project Overview and Background

This section describes the history of past Oatka Creek watershed planning efforts and the background of the current plan, including the intermunicipal – yet separate – planning effort with Black Creek. The *Characterization* report is intended to facilitate the development of an overall strategy to protect and restore water quality within the Oatka Creek watershed by establishing a reliable inventory of existing vital and accurate information, identifying any significant knowledge gaps, and building on previous work already begun in the *State of the Basin* report.

Description of the Study Area

This section provides an overview of the study area and explains how a watershed can be defined and delineated. A watershed may be described as a geographic area of land drained by a river and its tributaries to a single point. A watershed's boundaries are generally defined by the highest ridgeline around the stream channels that meet at the lowest point of the land; at this point, water flows out of the watershed into a larger river, lake, or ocean. Watersheds can be small and represent a single river or stream within a larger drainage network or be quite large and cover thousands of square miles.

The Oatka Creek watershed lies within the Lower Genesee River Basin – part of the larger Lake Ontario Drainage Basin – and occupies 138,092 acres (216.8 sq. mi.) across portions of Wyoming, Genesee,

Livingston, and Monroe Counties of New York State. The watershed overlaps portions of 26 municipalities:

- Wyoming Village
- Town of Castile
- Town of Byron
- Scottsville Village
- Town of Riga
- Town of Bergen
- Caledonia Village
- LeRoy Village
- Warsaw Village
- Town of Caledonia
- Town of Bethany
- Town of Perry
- Town of Orangeville
- Town of Stafford
- Town of Gainesville
- Town of Middlebury
- Town of Wheatland
- Town of Covington
- Town of Warsaw
- Town of Pavilion
- Town of LeRoy

(The Town of York, Gainesville Village, the Town of Wethersfield, the Town of Chili, and the Town of Castile have less than 2% of their total land area within the watershed and thus were excluded from detailed analysis in this report.) The Lower Genesee River Basin has an area of 2,500 square miles and drains the hills and valleys over a wide swath of western New York and part of northern Pennsylvania into the Genesee River, which flows north into Lake Ontario. Of the 17 watersheds that comprise the Genesee River Basin, the Oatka Creek watershed has the second largest drainage area, constituting approximately 9% of the entire Genesee River Basin.

The USDA's National Resource Conservation Service designates all water bodies in the United States through hydrological units, or HUCs. The Oatka Creek is a Fifth level, or watershed HUC, with the assigned 10-digit HUC # 0413000304. The Oatka Creek HUC has six subwatersheds, all assigned a 12-digit HUC: Oatka Creek Headwaters (041300030401); Pearl Creek (041300030402); White Creek (041300030403); Mud Creek (041300030404); Village of LeRoy (041300030405); and the Oatka Creek Outlet (041300030406).

An ecoregion is a biological designation useful for making comparisons in ecosystems by type, quality, and quantity of environmental resources. The Oatka Creek sits in a Level IV ecoregion known as the Ontario Lowlands, largely defined by the extent of glacial Lake Iroquois. (A very small area of the southern-most portion of the Oatka Creek watershed is located in the Cattaraugus Hills and the Finger Lakes Uplands and Gorges ecoregions.) The relative proximity of the Ontario Lowlands ecoregion to Lake Ontario tempers its climate, so that summer heat and winter cold are lessened. The climate in and around the Oatka Creek watershed is generally defined as humid-continental and the average annual

precipitation in the Oatka Creek watershed ranges between 33 and 43 inches per year, depending on the location within the watershed.

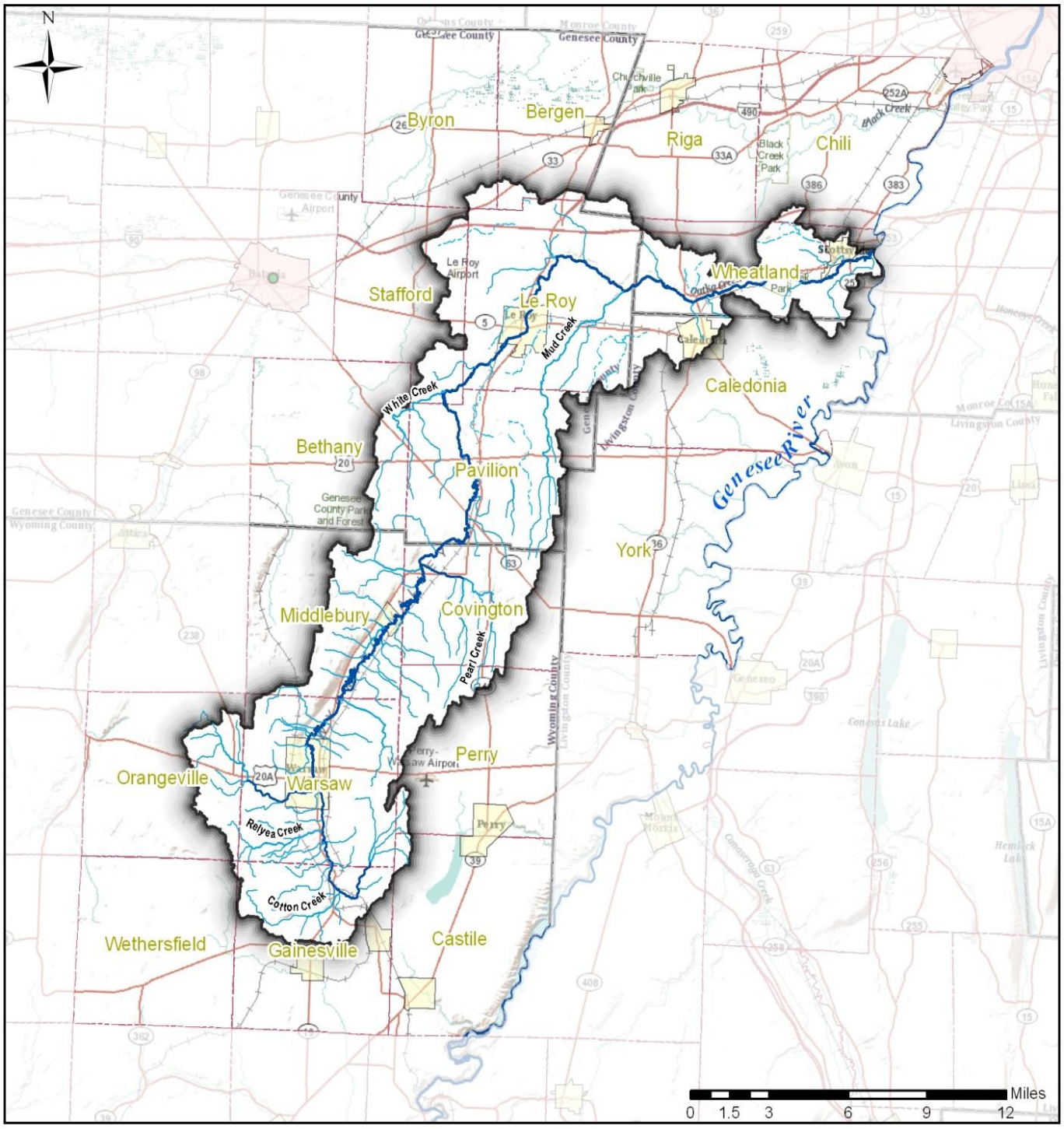
Physical Characteristics of the Watershed

The physical makeup of the Oatka Creek watershed is explained through bedrock and surficial geology, location of mines, geomorphology, geography, hydrology, climate, soils, elevation, demographics, and land use (including a build-out analysis). Much of the physical form of the Oatka Creek watershed is owed to the long-ago advancement and retreat of glaciers, and the modern streams that resulted still flow in low floodplain areas and nourish wetland swamps and deposit alluvial sediments. The dissolution of soluble rocks such as the limestone, dolostone, and gypsum in the bedrock of the Oatka Creek watershed have resulted in karst areas, underground drainage systems sensitive to fertilizer application and with potential for groundwater contamination.

About 44% of the soils in the Oatka Creek watershed have a moderately low runoff potential and just over 50% have a moderately high to high runoff potential. About four percent of the acreage in the Oatka Creek watershed sits at or below the 100-year flood elevation, further illustrating the importance of watershed planning in a future of higher levels of precipitation. Groundwater flows northward from the Allegheny Plateau and discharges into Lake Ontario. Deviations from this path may locally be affected by discharges into surface waters or withdrawal from surface waters. Oatka Creek's headwaters originate at 1,941 feet above sea level in the Town of Orangeville.

More than half (53.7%) of the land in the Oatka Creek watershed – over 72,000 acres – is used for agricultural purposes, largely pasture hay and cultivated crops. The watershed is 23% residential, 11.8% vacant, and 1.4% wild, forested or conserved lands. The watershed has a relatively low percentage of impervious cover, though more research is needed to quantify the areas of effective impervious cover in its urbanized areas.

Figure 1: Municipalities of the Oatka Creek Watershed



Planning Considerations

This section provides an overview of organizational structures, land uses, and regulatory measures relevant to environmental planning in the Oatka Creek watershed, beginning with the history of research, planning, and assessment on the Rochester Embayment Remedial Action Plan in the late 1980's. This section also contains information on federal, state, and local government entities as well as local regulations in the watershed, a topic further explored in the subsequent *Regulatory and Programmatic Environment Report*.

The watershed's 2000 estimated population is just fewer than 28,000 people. The most significant population increases are concentrated in the municipalities near the outlet of the watershed, which are also the most suburbanized towns in the watershed. An estimated build-out analysis is available in Table 4.12.

There are over 520 center-line miles of roads and 55 major bridges which cross a hydrologic feature in the Oatka Creek watershed. Centralized sewer systems are located in most of the villages in the watershed, excluding the Villages of Wyoming and Caledonia. Nearly all the public acreage in the watershed is in a land trust, easement, or is county and municipal parkland. In addition, the Village of Warsaw owns and maintains 354 acres of land in the Oatka Creek headwaters as part of its municipal water supply system. There are over 100 miles of officially-designated snowmobile trails within the watershed.

As agriculture is the dominant land use within the Oatka Creek watershed, this section also dedicates extensive analysis to agricultural districts and the local impact of New York State's Agricultural Environmental Management (AEM) and the State Pollution Discharge Elimination System (SPDES) programs. Following this is an examination of pollutants in the watershed, including permittees governed by SPDES, EPA regulated facilities, hazardous waste sites, spills, and landfills.

Surface Water Chemical Characteristics

This section explains the science behind water quality criteria, data collection, and its subsequent analysis in relation to the classification of surface waters in the state (precluded, impaired, stressed, or threatened.) Much of Oatka Creek is classified as stressed.

This section also includes a water quality data summary which further explains the data collection and monitoring results over many decades in the Oatka Creek, including statistics for concentrations of phosphorus, nitrogen, and total suspended solids (TSS).

Biological Characteristics of the Watershed

This section analyzes collected data on coliform bacteria from on-site wastewater disposal systems (septic systems), wastewater treatment facilities and animal feeding operations, including pastured animals with access to streams, confined animal feeding operations (CAFOs), and run-off from manured fields. It also presents data on macroinvertebrates, fish, birds, and other species that call the creek home.

Watershed Runoff Export Coefficients

An export coefficient model estimates annual loss of water and materials from the landscape. The predictions of phosphorus loading in the Oatka Creek watershed (the sum of land cover and discharge loading) were compared with recent USGS data from the Oatka Creek at Garbutt monitoring site. The model estimates were close to the values obtained by USGS.

Identification of Impairments and Threats

This section summarizes a complex and varied group of watershed "issues" organized into specific categories that lay the groundwork for a completed watershed strategy and subsequent implementation program, including agriculture, climate change, failing septic systems, habitat fragmentation, industrial and municipal discharges, nuisance and invasive species, spills, contamination, stormwater management, streambank erosion, and water quantity, flow, and channel maintenance.

These water quality issues identified in the Oatka Creek *Watershed Characterization Report* were considered and evaluated to formulate specific practices, approaches and strategies to better protect, restore and enhance water quality and watershed functions of Oatka Creek in the final component of the watershed plan, the *Identification and Description of Management Practices, Approaches and Strategies for Watershed Protection and Restoration & Implementation Strategy and Schedule*.

The *Oatka Creek Watershed Management Plan: Characterization Report* is available at : http://www.gflrpc.org/uploads/5/0/4/0/50406319/finaloatkacharacterizationinwmp1reduced.pdf.

Subwatershed Report (2013)

The *Subwatershed Report* provides a description of Oatka Creek's natural features such as hydrology, floodplains, and wetlands. Along with consideration of water quality within the subwatersheds or stream segments, the report evaluates Oatka Creek's subwatersheds according to impairments and/or threats to water quality and habitat, and identifies priority subwatersheds for focused, nonpoint source pollution management action.

The upstream portion of the watershed includes the Oatka Creek Headwaters and Pearl Creek subwatersheds. Pearl Creek is the largest subwatershed. In general these two subwatersheds are relatively undeveloped with a low percent of impervious cover, high percent of forest cover, riparian cover and agricultural uses, and fairly low population density. The mid-section of the Oatka Creek Watershed, the White Creek and Mud Creek subwatersheds, are characterized by relatively low impervious cover and forest cover, a high percentage of wetlands in the case of the White Creek subwatershed and agricultural uses, and fairly low population density. The downstream portion of the Oatka Creek Watershed, the Village of LeRoy and Oatka Outlet subwatersheds are large subwatersheds with relatively high population density and agricultural uses, relatively low forest and riparian cover, and in the case of the Oatka Creek Outlet subwatershed, very high impervious cover.

Also included in the report is more recent analysis based on water quality information found in the *Oatka Creek Water Quality Assessment: Identifying Point and Nonpoint Sources of Pollution with Application of the SWAT Model*,[2] Dale Matthew Pettenski's 2012 thesis submitted to the Department of Environmental Science and Biology of the State University of New York College at Brockport.

The *Oatka Creek Watershed Management Plan: Subwatershed Report* is available at: http://www.gflrpc.org/uploads/5/0/4/0/50406319/oatkacreeksubwatershedreportinwmp.pdf

Regulatory and Programmatic Environment Report (2013)

A *Regulatory and Programmatic Environment Report* is an assessment of federal, state, and local laws, programs and practices that affect water quality was conducted for the entire watershed, in order to determine gaps between present laws/practices and model best management practices (BMPs), and to

provide specific recommendations to each watershed municipality to address those gaps and improve water quality. Each municipality was provided with its own individual assessment based on a review and evaluation of laws, practices, and plans.

Many of the gaps in local laws and practices across the watershed are similar. Recommendations are specifically presented for each municipality based on the report, but also refer to recommendations that are applicable to multiple municipalities, such as amending a comprehensive plan or developing subdivision regulations. These recommendations may be used as a starting point to help municipalities and counties hone in on top priorities, determine what additional information is needed, and what steps are needed for implementation.

Generally, the regulatory deficiencies found in the *Regulatory and Programmatic Environment Report* are related to on-site wastewater management, lack of stream or riparian buffers, and lack of oversight in floodplain development. Additionally, a number of municipalities within the watershed are utilizing obsolete or incomplete comprehensive plans and zoning ordinances. This is directly reflected in the planning matrix, in both the sections on Wastewater Treatment Systems and Management as well as Regulatory Management. The highest recommendation, consistently prioritized across the planning matrix, is the adoption of stream buffer setbacks to reduce the amount of harmful runoff and sedimentation caused by land use activities, achieved through an environmental protection overlay district (EPOD) or setbacks from waterbodies within the zoning code. The other highly prioritized actions are related to water quantity, water quality, and flood management, such as a requirement for new developments to maintain the volume of runoff at predevelopment levels and an ordinance to prohibit development in 100-year floodplains and to restrict the location of barnyards and manure pits in these areas.

Water quality management is a regional issue and thus collaboration and standardization of strategies can be beneficial to all. The inclusion of some standardized recommendations is intended to facilitate the sharing of information between counties and municipalities; collaboration and standardization can make initial efforts more efficient and allow groups to focus on implementation work. Some examples of recommendations proposed to improve water quality through the reduction of nonpoint source pollution focus on increased participation in Agricultural Environmental Management Program; creation of riparian buffers; strengthened floodplain, onsite wastewater treatment, and subdivision regulations; development of green infrastructure standards; updating site review procedures; and recommendations based on stream monitoring, best management practices and education and outreach. Recommendations found in the *Regulatory and Programmatic Environment Report* are grouped together by municipality, and can also be cross-referenced in the overall implementation matrix.

The *Regulatory and Programmatic Environment Report* provides a broad overview of the regulatory and programmatic environment in the Oatka Creek watershed as well as specific analysis of the land use laws governing 21 municipalities – excluding five municipalities that have less than 2% of their total land area within the watershed – and four counties. The assessment is intended to determine gaps between present laws/practices and model best management practices (BMPs).

The assessment contains:

- Evaluation of government and non-government roles:
    - Descriptions of local, county, regional, state, and federal organizations that have an impact on water quality in the watershed
- Analysis of local laws, plans, programs, and practices affecting the watershed:

- Assessment of local laws, plans, programs, and practices based on water quality best management practices (BMPs);
- Recommendations for priority additions or changes to local laws, plans, programs, and practices.

The *Oatka Creek Watershed Management Plan: Regulatory and Programmatic Environment Report* is available at: http://www.gflrpc.org/uploads/5/0/4/0/50406319/final_oatka_creek_regulatory_and_programmatic_environment_reportinwmp1.pdf.

Intermunicipal Cooperation and Intermunicipal Organization

The basis for intermunicipal cooperation is founded in a Memorandum of Understanding (MOU) between the four counties and 26 municipal governments that geographically fall within the Oatka Creek Watershed. The MOU would link those municipalities with project partners, county and state officials, watershed groups, and local scientists in an intermunicipal watershed organization. Article 12-C of New York State General Municipal Law authorizes formation of joint survey committees for this purpose.

The recommended Intermunicipal Organization Memorandum of Understanding (IO MoU) can help municipalities work together to implement the Watershed Management Plan – ultimately preserving, restoring, and enhancing the health of Oatka Creek through efforts in adopting improved ordinances, greater code enforcement, water monitoring, and staff training.

For more information on Intermunicipal Cooperation, please consult the Local Government Management Guide[3] published by the New York State Office of the State Comptroller. It contains a wealth of information on recommended practices, cooperative studies, communication between parties and stakeholders, and how best to implement an intermunicipal agreement.

An example Intermunicipal Organization MOU is available in the Appendix of the Identification and Description of Management Practices, Approaches and Strategies for Watershed Protection and Restoration & Implementation Strategy And Schedule at: http://www.gflrpc.org/uploads/5/0/4/0/50406319/oatkaidentificationanddescriptioninwmp.pdf.

SECTION 2.0 ENDNOTES

[1] Tatakis, Timothy. *Oatka Creek Watershed – State of the Basin*. December 2002. http://www.oatka.org/Reports/StateofBasin.pdf

[2] Pettenski, Dale Matthew, *Oatka Creek Water Quality Assessment: Identifying Point and Nonpoint Sources of Pollution with Application of the SWAT Model*. Environmental Science and BiologyTheses, Paper 38. 2012. .http://digitalcommons.brockport.edu/cgi/viewcontent.cgi?article=1037&context=env_theses

[3] New York State Office of the Comptroller, Division of Local Government and School Accountability. *Local Government Management Guide: Intermunicipal Cooperation*. November 2003. http://www.osc.state.ny.us/localgov/pubs/lgmg/intermunicipal.pdf

Identification and Description of Management Practices, Approaches and Strategies for Watershed Protection and Restoration & Implementation Strategy and Schedule

Recommendations were developed in order to address a number of areas of concern. These recommendations are presented in the *Regulatory and Programmatic Environment Report* and *Identification and Description of Management Practices, Approaches and Strategies for Watershed Protection and Restoration & Implementation Strategy and Schedule* sections. The matrix in this section represents the culmination of years of deep research into the current conditions of Oatka Creek. The matrix includes recommendations that are presented in the *Regulatory and Programmatic Environment Report* section, and shows specific steps and strategies needed to complete an action, the groups responsible for completing the actions, and the timeline by which the tasks must be completed.

The matrix includes priority assignments, actions, objectives, steps, strategies, anticipated reductions and water quality improvements, benefits, related issues, lead organizations, potential funding sources, long- and short-term measures, approximate cost, and regulatory approvals in the following areas of concern for Oatka Creek:

Coordination, Collaboration & Partnership Recommendations – This set of recommendations addresses the need for improved collaboration amongst watershed municipalities, citizens and stakeholders; addresses the need for continuous water resource related monitoring activities; and identifies specific educational opportunities. The strongest recommendations are to present information on achievements in watershed planning to municipal boards and to develop an intermunicipal organization. Shared practice allows for better design, better maintenance, and economic incentives that can deliver higher performance and lower cost. Specific recommendations pertaining to Coordination, Collaboration & Partnership opportunities can be found in the *Identification and Description of Management Practices, Approaches and Strategies for Watershed Protection and Restoration & Implementation Strategy and Schedule* section.

Agriculture – Farming can have a negative effect on water quality through erosion of crop land, sedimentation, and runoff contaminated with fertilizers or animal wastes. This section includes some of the highest prioritized actions of all the recommendations in the watershed, including the creation of riparian buffer zones around streams adjacent to agricultural land, the encouragement of farm participation in NYS Agricultural Environmental Management (AEM) program and the development of Comprehensive Nutrient Management Plans (CNMPs) tailored to all farms in the watershed. Further specific recommendations pertaining to agriculture can be found in the *Identification and Description of Management Practices, Approaches and Strategies for Watershed Protection and Restoration & Implementation Strategy and Schedule* section.

Stormwater Management & Erosion Control – Stormwater runoff contains pollutants such as nutrients, pathogens, sediment, toxic contaminants, and oil and grease, resulting in water quality problems. This section's highest recommendation is to restore severely eroded streambank segments, focusing on restoring these critical processes that form, connect, and sustain habitats. Protecting these stream banks is vital to controlling sediment loading and maintaining the rock structures. Vegetation helps prevent erosion. Thus the other highest priority in this category is the revision of land use laws to require new developments to maintain the volume of runoff at predevelopment levels by using structural controls and pollution prevention strategies. Further specific recommendations pertaining to stormwater management and erosion control can be found in the *Identification and Description of Management Practices, Approaches and Strategies for Watershed Protection and Restoration & Implementation Strategy and Schedule* section.

Forestry and silviculture management – Loss of large trees to the creek and poor maintenance of existing trees along the creek edge highlights one of the top overall recommendations in the watershed: the encouragement of private landowners to apply sound forest management practices based on the NYS Forestry Best Management Practices for Water Quality guide. Sustainable forestry balances preserving the integrity of our forests with economic development and maintaining our diverse wildlife population while minimizing damage to the agriculture and rural communities. An array of tools is available from the New York State Cooperative Forest Management Program; further details are available in the *Identification and Description of Management Practices, Approaches and Strategies for Watershed Protection and Restoration & Implementation Strategy and Schedule* section.

On-Site Wastewater Management Systems (OWTS) – The number one source of nonpoint source pollution in New York State is on-site wastewater treatment systems. The highest recommendation in this category is to secure a funding stream to bring substandard septic systems into compliance, based on the classification of substandard OWTS. Substandard OWTS are defined as systems that are piped directly to surface waters, in close proximity to the surface or groundwater, or discharging directly to the surface. Further specific recommendations pertaining to on-site wastewater treatment systems can be found in the *Identification and Description of Management Practices, Approaches and Strategies for Watershed Protection and Restoration & Implementation Strategy and Schedule* section.

Wastewater Treatment Plant Systems (WWTPS) – One of the highest overall recommendations for the Oatka Creek watershed is to upgrade some WWTPs to tertiary treatment or consider closing and transferring sanitary flows. Further specific recommendations pertaining to wastewater treatment systems and management can be found in the Identification and Description of Management Practices, Approaches and Strategies for Watershed Protection and Restoration & Implementation Strategy and Schedule section.

Hazardous Waste Management – Highly-ranked priorities in the Oatka Creek watershed are determining the location of inactive or unpermitted landfills; implementing a watershed-wide hazardous waste pick-up or drop-off; and preventing discharge of pharmaceuticals through community collection programs and by promoting best management practices and process changes at health care institutions, livestock and food industries, and other manufacturers. Educating the public and providing an opportunity to safely dispose of hazardous products keeps dangerous wastes out of landfills, lowering the environmental risks associated with improper disposal. Further specific recommendations pertaining to hazardous waste management can be found in the *Identification and Description of Management Practices, Approaches and Strategies for Watershed Protection and Restoration & Implementation Strategy and Schedule* section.

Roads and Highways – The highest-ranked priority in this section is educating municipal and county highway departments on ditch and culvert design and stream bank stabilization methods. Paved development has the highest coefficient of runoff, and thus highway departments have a very important role in preserving watershed quality. Further specific recommendations pertaining to highway department practices can be found in the *Identification and Description of Management Practices, Approaches and Strategies for Watershed Protection and Restoration & Implementation Strategy and Schedule* section.

Wetlands, Riparian Zones, and Floodplains – Floodplains act as a check valve for streams; they allow water to be slowed down, to dissipate energy after a rainstorm or snow melt. The original analysis of the 100-year base flood elevation developed for the *Oatka Creek Watershed Characterization Report* indicated that 4.4% of the total land areas within the Oatka Creek watershed are within this zone, known as a Special Flood Hazard Area (SFHA). FEMA's 2014 draft Discovery report indicates an average

annualized loss of $5.7B concentrated around Oatka Creek, Black Creek, the Genesee River, and Spring Creek, making this a critical recommendation area both environmentally and economically. The highest recommendation under this heading is for all municipalities that do not presently deal sufficiently with flood plain development within local law to adopt ordinances prohibiting development in 100-year floodplain, and further restricting the location of barnyards and manure pits. More specific recommendations pertaining to wetlands, riparian zones, and floodplains can be found in the *Identification and Description of Management Practices, Approaches and Strategies for Watershed Protection and Restoration & Implementation Strategy and Schedule* section.

Regulatory management – The highest recommendation is for the enforcement of the aforementioned floodplain development controls. Two other highly prioritized regulatory recommendations pertain to the building blocks of local land use: zoning and comprehensive plans. The highest recommendation is to adopt stream buffer setbacks to reduce the amount of harmful runoff and sedimentation caused by land use activities, achieved through an environmental protection overlay district (EPOD) or setbacks from waterbodies within the zoning code. Another highly prioritized action is the drafting (or revision) of comprehensive plans in municipalities without one, emphasizing the protection of local water resources and recognizing the importance of watershed planning efforts within the Oatka Creek watershed and other neighboring watersheds within the municipality. A number of municipalities within the watershed are utilizing obsolete or incomplete comprehensive plans. Further specific recommendations pertaining to regulatory management can be found in the *Identification and Description of Management Practices, Approaches and Strategies for Watershed Protection and Restoration & Implementation Strategy and Schedule* section.

Nutrient and contaminant inputs to surface waters – Continuing the emphasis on nutrient loading and sediment reduction strategies, this section covers recommendations ranging from the highest prioritized action, the development of nutrient and sediment reduction strategies for Oatka Creek subwatersheds, to community outreach about green chemistry, safe disposal of household hazardous waste, and the assessment of contaminants present in fish and wildlife populations. Further specific recommendations pertaining to the reduction of nutrient and contaminant inputs to surface waters can be found in the *Identification and Description of Management Practices, Approaches and Strategies for Watershed Protection and Restoration & Implementation Strategy and Schedule* section.

Natural Resource and Habitat Protection – The highest ranked priority is the preparation and implementation of a comprehensive invasive species management plan as well as leadership and support for further research and monitoring to improve early detection and management of invasive species. The Finger Lakes PRISM (Partnership for Regional Invasive Species Management) is a cooperative partnership in central New York focused on reducing the introduction, spread, and impact of invasive species through coordinated education, detection, prevention and control measures. Other related recommendations pertaining to invasive species can be found in the *Identification and Description of Management Practices, Approaches and Strategies for Watershed Protection and Restoration & Implementation Strategy and Schedule* section.

The complete *Identification and Description of Management Practices, Approaches and Strategies for Watershed Protection and Restoration & Implementation Strategy and Schedule* section can be found at: http://www.gflrpc.org/uploads/5/0/4/0/50406319/oatkaidentificationanddescriptioninwmp.pdf.

Next Steps

The basis for intermunicipal cooperation was founded in a Memorandum of Understanding (MOU) between the four counties and 26 municipal governments that geographically fall within the Oatka Creek Watershed. The MOU would ink those municipalities with project partners, county and state officials, watershed groups, and local scientists in an intermunicipal watershed organization.

This "new" intermunicipal organization (IO) could combine with the OCWC. This group can further the Plan's goals of preserving, restoring, and enhancing the health of Oatka Creek through efforts through overseeing the implementation of the *Oatka Creek Watershed Management Plan*.

The Memorandum of Understanding document does not request or require funding from municipalities. OCWC members (agencies, DEC, etc.) and municipalities not in the watershed but with interest in creek water quality may be non-voting *ex-officio* members of the IO. The importance of the watershed management plan in accessing grant funding for implementation of water quality protection measures was emphasized.

The key next steps for the Oatka Creek Watershed Management Plan's advancement are:

- OCWC and the PAC continuing to work with municipalities to sign the IO/MOU;
- An organizational meeting of the IO scheduled by the end of 2014;
- OCWC continuing its mission to provide representation of all important sectors in the Oatka Creek Watershed and to facilitate the development of a watershed management plan for use by municipalities, stakeholders and individuals for the conservation and protection of the Oatka Creek watershed;
- Implementation of the Oatka Creek Watershed Management Plan; and
- Finding funding for the advancement of research in identified knowledge gaps, as delineated below.

As the data and related information reported in the *Characterization* is not exhaustive, pursuing funding to close gaps in knowledge is essential. The following specific gaps in research and monitoring criteria should be considered when seeking and applying for implementation funding:

- Securing a funding stream to classify and bring substandard septic systems into compliance;
- Continue to partner with FEMA's Discovery Risk MAP (Mapping, Assessment, and Planning) program to identify communities and areas at risk of flooding and solutions for reducing that risk;
- Monitoring of fish and macroinvertebrate distributions, heavy metal concentrations, and other associations in the watershed's tributaries;
- Linkages between stream corridors, sediment transport, and habitat availability and quality; and
- Developing a historical record of heavy metals, organic and other potentially toxic compounds for the watershed.

CHARACTERIZATION REPORT

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TABLES AND FIGURES

1.0 Project Overview And Background

1.1 Introduction

The *Oatka Creek Watershed Characterization* provides a description of Oatka Creek's watershed and the condition of natural resources and the built environment within that drainage area. This characterization is the first component of a comprehensive watershed management plan for the Oatka Creek watershed. This component includes:

- Description of the watershed and its constituent subwatersheds, land use and land cover, demographics, natural resources, and infrastructure;
- Evaluation of existing water quality data, run-off characteristics and pollutant loadings, including the identification of critical knowledge gaps pertaining to these subject areas; and
- Identification of pollution sources, sources of water quality impairment, and potential threats to water quality and watershed hydrology and ecology.

In addition to the watershed characterization, subsequent project components together comprise an overall strategy to protect and restore water quality and quantity within the Oatka Creek watershed. These components include:

- A community education and outreach program on water quality and quantity and watershed protection issues;
- Identification of management strategies and prioritization of projects and other actions for watershed protection and restoration;
- Identification of land and water use controls for water quality and quantity management and roles and responsibilities of governmental and non-governmental organizations; and
- An implementation strategy, including the identification of watershed-wide and site-specific projects and other actions necessary to protect and restore water quality.

This *Oatka Creek Watershed Characterization* report facilitates these subsequent tasks by establishing a reliable inventory of existing and available information to apply or build upon, as well as to identify any significant knowledge gaps that may be present.

This report is based on existing reports and studies, including the *Oatka Creek Watershed State of the Basin Report* (2002) and other pertinent documents.[1] It is not the intent to duplicate the information that was established through these earlier efforts. Rather, information considered vital or useful to the watershed management planning process is re-organized in a manner that facilitates its application and improves its accuracy and utility.

SECTION 1.0 ENDNOTES

[1] *Oatka Creek Watershed State of the Basin Report*. [Online] In *Oatka Creek Watershed Committee*. Last retrieved 12/8/10 from http://www.oatka.org/Reports/StateofBasin.pdf

2.0 Description of the Study Area

The Oatka Creek watershed lies within the Lower Genesee River Basin – part of the larger Lake Ontario Drainage Basin – and occupies 138,092 acres (215.8 sq. miles) across portions of Wyoming, Genesee, Livingston and Monroe Counties of New York State. Of the 17 watersheds that comprise the Genesee River Basin, the Oatka Creek watershed has the second largest drainage area, constituting approximately 9% of the entire Genesee River Basin.

Section 2.0 of this report is intended to provide the reader with an understanding of the study area as well as how a watershed can be defined and delineated. Subsequent sections of this Characterization report will provide more detailed information on various aspects of the watershed and its condition as well as the extent of our knowledge in these areas.

2.1 Watershed Delineation

A watershed may be described as a geographic area of land that is drained by a river and its tributaries to a single point. Watershed boundaries are typically defined by the highest ridgeline around the stream channels that meet at the lowest point of the land; at this point water flows out of the watershed into a larger river, lake or ocean. Watershed scale is an important consideration, particularly for watershed planning. Watersheds can be small and represent a single tributary within a larger drainage network or be quite large and cover thousands of square miles.

2.1.1 Hydrologic Units

In order to clearly delineate watersheds within the United States, the United States Geologic Survey (USGS) began developing the hydrologic unit system. Originally created in the 1970s and modified several times since then, hydrologic unit boundaries define the aerial extent of surface water drainage to a point (i.e., a watershed). Working in conjunction with the USGS, the National Resource Conservation Service (NRCS – a division of the US Department of Agriculture) has delineated all watersheds in the continental United States based on this standard hierarchical system.[2]

Today, hydrologic units are uniformly classified through six levels. Each hydrologic unit is identified by a unique hydrologic unit code (HUC) number consisting of two to twelve digits based on the six levels of classification. In addition to hydrologic unit codes, each hydrologic unit has been assigned a name corresponding to the principal hydrologic feature(s) within the unit. In the absence of such features, the assigned name will reflect a cultural or political feature within the unit (such as with HUC # 041300030405, “Village of LeRoy”). The intent of this system is to provide a useful framework of hydrologic delineation that facilitates watershed planning and restoration for managers and analysts across a wide geographic area.

The hydrologic unit system of watershed delineation as it applies to the Oatka Creek watershed is illustrated in Table 2.1 and Figures 2.1 and 2.2 on the following pages.

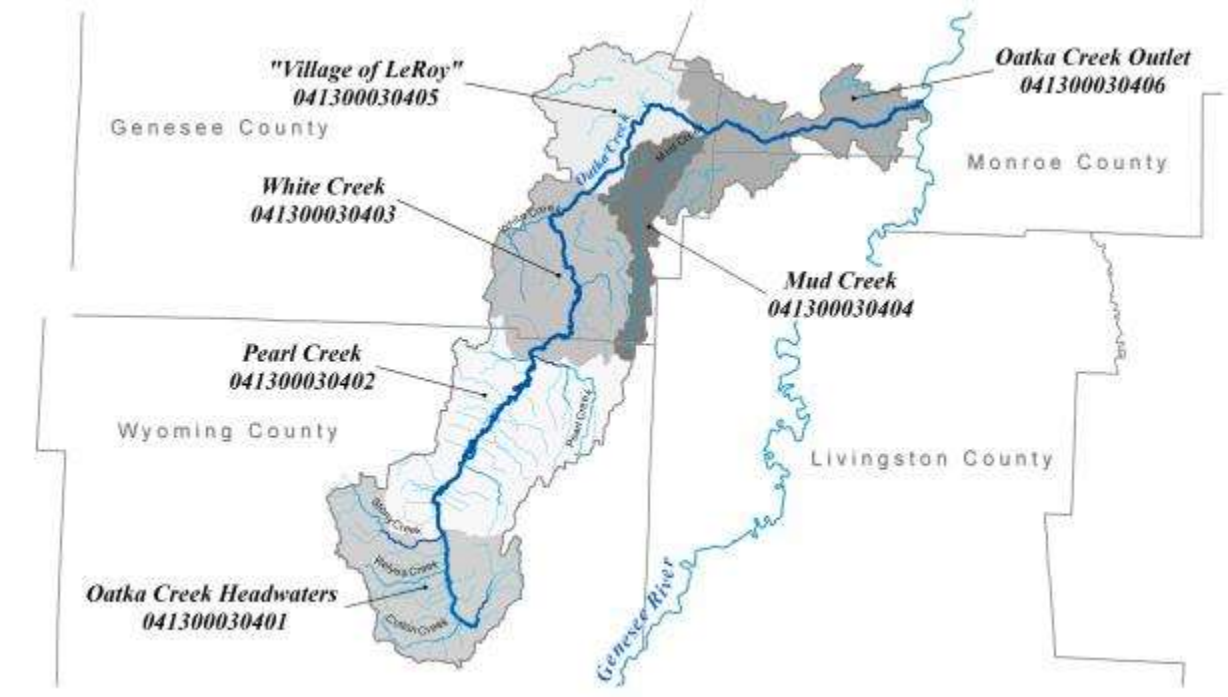
Figure 2.1: The Genesee River Basin and the Oatka Creek Watershed

Figure 2.1*. The Genesee River Basin is divided into two separate 8-digit hydrologic units – the Upper (HUC No. 04130002) and the Lower (HUC No. 04130003). The Oatka Creek watershed lies within the Lower Genesee River Basin and is identified as a 10-digit hydrologic unit (HUC No. 0413000304).*

Table 2.1: The Hydrologic Unit System of Watershed Delineation Applied to the Oatka Creek Watershed

HUC Classification Level	HUC Name	HUC #
2 digit HUC – First level (Region)	Great Lakes Region of the United States	**04**
4 digit HUC – Second level (Subregion)	Southwestern Lake Ontario	04**13**
6 digit HUC – Third level (Accounting unit)		041300
8 digit HUC – Fourth level (Cataloguing unit)	Lower Genesee River	04130003
10 digit HUC – Fifth level (Watershed)	Oatka Creek Watershed	0413000304
12 digit HUC – Sixth level (Subwatershed)	• *Oatka Creek Headwaters Subwatershed*	*041300030401*
	• *Pearl Creek Subwatershed*	*041300030402*
	• *White Creek Subwatershed*	*041300030403*
	• *Mud Creek Subwatershed*	*041300030404*
	• *Village of LeRoy Subwatershed*	*041300030405*
	• *Oatka Creek Outlet Subwatershed*	*041300030406*

Figure 2.2: The Oatka Creek Watershed and Associated "HUC12 Watersheds"



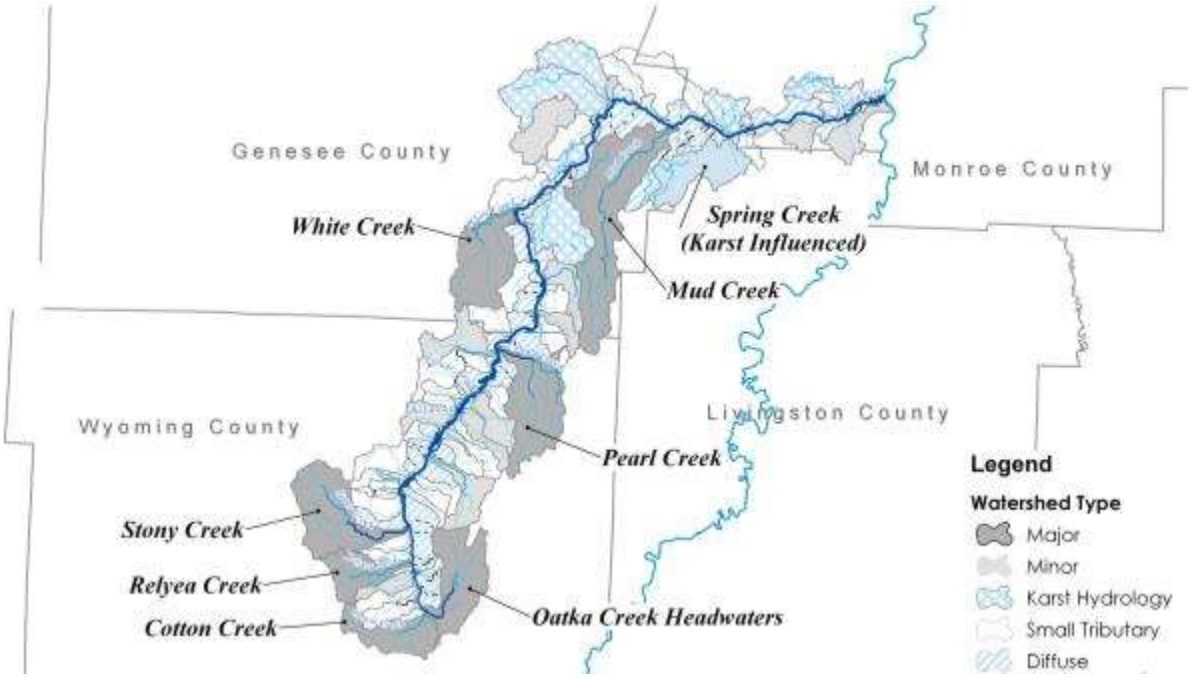
HUC12 subwatersheds may be described more accurately as *hydrologic units*. The term "hydrologic unit" is used to describe a spatial unit that exhibits common characteristics, such as principal hydrologic features, land uses, or topography (for example, HUC#041300030405 is called "Village of LeRoy"). Hydrologic units are not always synonymous with true hydrologic watershed boundaries. This is the case with HUC12 subwatersheds in the Oatka Creek watershed. As can be seen on Figure 2.2, 5 of the 6 HUC12 subwatershed boundaries actually traverse the Oatka Creek and include upland areas on both sides of the creek. While this is somewhat contrary to our understanding of a true hydrologic watershed or subwatershed, the HUC12 subwatershed delineation can nonetheless be useful for planning purposes due to the uniformity of their application across the continental United States.

2.1.2 Hydrologic Subwatersheds

True hydrologic subwatersheds can be delineated by identifying the major and minor hydrologic features in the watershed and selecting their corresponding catchment boundaries. A catchment is the land area that contributes runoff to a drainage area; it is the smallest unit used to measure space in a watershed. GIS analysis identified 256 individual catchments within the Oatka Creek watershed that were used to draw the boundaries shown in Figure 2.3. Once these boundaries are identified, they can be categorized according to hydrologic features, land uses, topography or other units of analysis.

The subwatershed boundaries shown in Figure 2.3 were drawn using flow line features in combination with catchment boundaries. A number of subwatershed boundaries remain obscure due to the presence of karst hydrology throughout the watershed. Karst is a term applied to areas where extensive dissolution of rock has led to the development of subterranean channels through which groundwater flows in conduits. In a number of locations in the Oatka Creek watershed, mapped streams essentially disappear beneath the surface, having no clear confluence with the

Figure 2.3: Hydrologic Subwatersheds of the Oatka Creek Watershed



surrounding hydrologic network. There are at least ten such streams in the Oatka Creek watershed (as identified through topographic maps and corresponding GIS data). In such instances, clear subwatershed boundaries are very difficult to determine given the unknown flow paths of surface waters and their underground flow systems.

Seven major subwatersheds (labeled) and 11 minor subwatersheds were identified, along with a 33 small, relatively narrow tributaries. The watershed also has a significant diffuse drainage area in locations that lie adjacent to the main stem of Oatka Creek; these areas generally have no significant tributaries and often correspond with the flood plain. More information on karst features, subwatershed delineation, and hydrology can be found in Section 4.2 of this report. A larger version of Figures 2.2 and 2.3 can be found in Appendix A of this report.

~Text continues on following page~

2.2 Municipalities

As illustrated on Figure 2.4, the Oatka Creek watershed overlaps portions of four counties and 25 municipalities, 11 of which account for less than 1% of the total watershed area. Table 2.2 lists each municipality that has land area within the Oatka Creek watershed, listed in ascending order.[4]

Table 2.2: Municipal Watershed Acreage[3]

Municipality	County	Watershed Acres	Percent Share of Watershed	Percent of Municipality within Watershed
Town of York	*Livingston*	*0.006*	*0.000004%*	*0.00002%*
Gainesville Village	*Wyoming*	*6.2*	*0.004%*	*0.03%*
Town of Wethersfield	*Wyoming*	*44*	*0.03%*	*0.2%*
*Town of Chili**	*Monroe*	*247*	*0.18%*	*0.97%*
Wyoming Village	Wyoming	431	0.31%	100%
Town of Castile	Wyoming	452	0.33%	2%
Town of Byron*	Genesee	530	0.38%	3%
Scottsville Village	Monroe	538	0.39%	86%
Town of Riga	Monroe	552	0.40%	3%
Town of Bergen*	Genesee	881	0.64%	5%
Caledonia Village	Livingston	957	0.69%	70%
LeRoy Village	Genesee	1,719	1.24%	100%
Warsaw Village	Wyoming	2,647	1.92%	100%
Town of Caledonia	Livingston	2,735	1.98%	10%
Town of Bethany*	Genesee	3,493	2.53%	15%
Town of Perry	Wyoming	4,422	3.20%	20%
Town of Orangeville	Wyoming	4,673	3.38%	20%
Town of Stafford*	Genesee	4,776	3.46%	24%
Town of Gainesville	Wyoming	8,334	6.04%	38%
Town of Middlebury*	Wyoming	10,900	7.89%	49%
Town of Wheatland*	Monroe	12,469	9.03%	65%
Town of Covington	Wyoming	12,812	9.28%	76%
Town of Warsaw	Wyoming	19,514	14%	97%
Town of Pavilion*	Genesee	20,124	15%	88%
Town of LeRoy*	Genesee	24,836	18%	98%
Total Acreage		**138,092**	**100%**	**--**

Table 2.2*: Municipalities that have less than 1% of their total land area within the watershed are listed in italics; these will be excluded from detailed analysis in this report. Municipalities marked with an asterisk '*' also have significant land area within the Black Creek watershed and will therefore receive similar focus and analysis in that watershed's respective management plan.*

Figure 2.4: Municipalities of the Oatka Creek Watershed

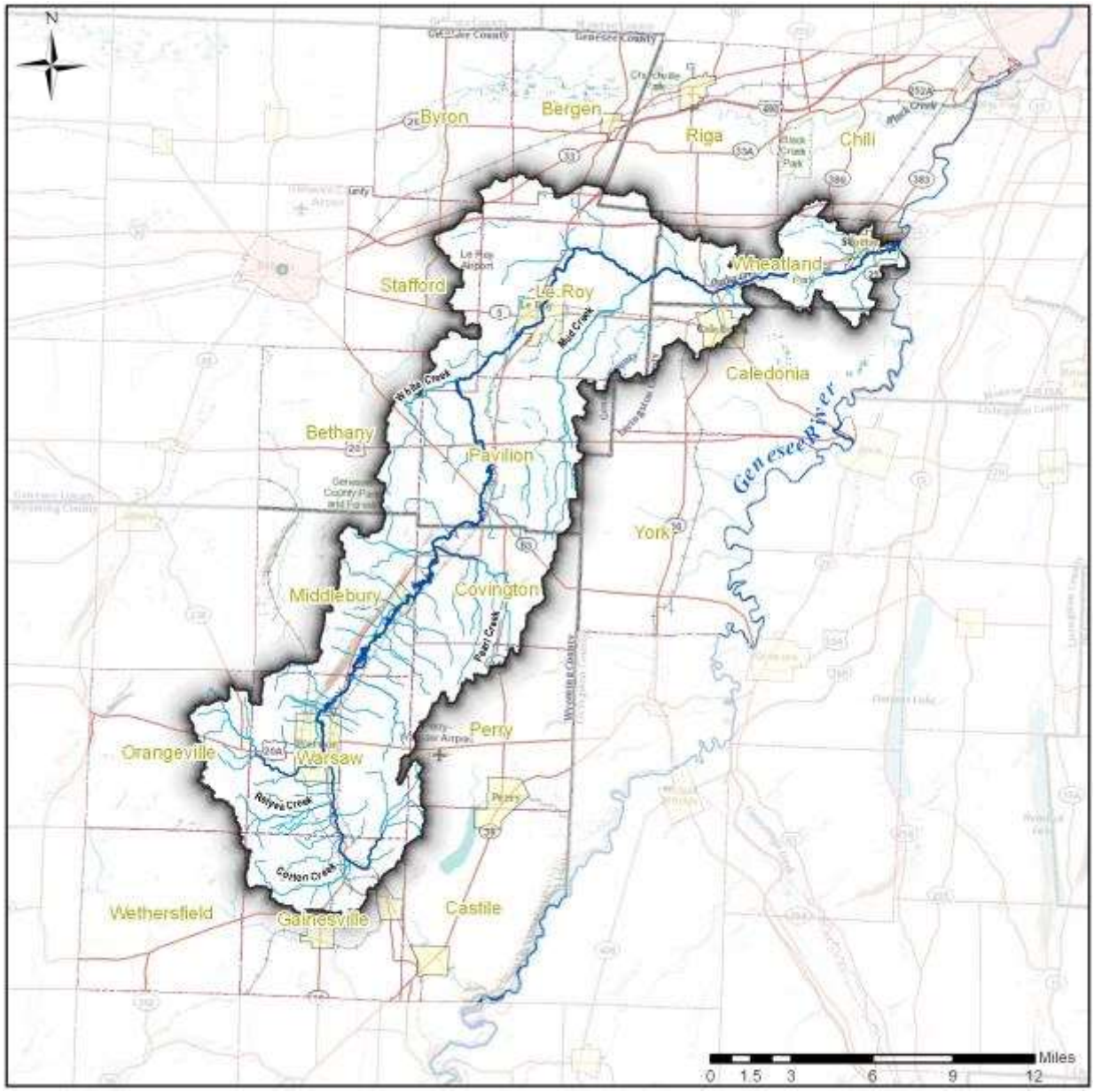


Table 2.3: Spatial Distribution of the Oatka Creek Watershed by County

	Percentage of the Oatka Creek Watershed in the County	Percentage of the County Within the Oatka Creek Watershed
Genesee County	40.8%	26.1%
Livingston County	2.7%	1.3%
Monroe County	10.0%	4.8%
Wyoming County	46.5%	24.7%

2.3 Ecoregion[5]

"Ecoregions" denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources; they are designed to serve as a spatial framework for research, assessment, management, and monitoring of ecosystems and ecosystem components. By recognizing the spatial differences in the capacities and potentials of ecosystems, ecoregions stratify the environment by its probable response to disturbance. These general-purpose ecological regions are critical for structuring and implementing ecosystem management strategies across federal agencies, state agencies, and nongovernmental organizations responsible for different types of resources within the same geographical areas. The approach used to compile these maps was based on the premise that ecological regions can be identified through the analysis of the composition and spatial pattern of biotic and abiotic phenomena that affect or reflect differences in ecosystem quality and integrity. These phenomena include geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology.

Levels I and II are the coarsest levels of ecoregions and are not illustrated here. Level I separates North America into a total of 15 ecological regions. The *Eastern Temperate Forests* region is the predominant Level I ecoregion of the eastern United States east of the Mississippi River, stretching to the Atlantic coast and including the entire Great Lakes region. Level II separates the continent into 50 regions; Oatka Creek watershed lies squarely in the *Mixed Wood Plains* Level II region, which includes much of the lowland area of upstate New York as well as similar areas throughout portions of the Great Lakes and the North Eastern regions of the United States.

2.3.1 Level III Ecoregion

New York State contains great ecological diversity in its low coastal plains, large river valleys, rolling plateaus, glacial lakes, forested mountains, and alpine peaks. Nine Level III ecoregions and 42 Level IV ecoregions occur in New York and many continue into ecologically similar parts of adjacent states or provinces. As illustrated in Figure 2.5, Oatka Creek watershed lies primarily in the "Eastern Great Lakes Lowlands" Level III ecoregion with a small portion of its southern tip reaching into the "Northern Alleghany Plateau" Level III ecoregion.

The *Eastern Great Lakes Lowlands* ecoregion surrounds the highland ecoregions of northern New York State. Valleys and lowlands are underlain by interbedded limestone, shale, and sandstone rocks that are more erodible than the more resistant rocks composing the adjacent mountainous areas. The topography and soils of the lowlands have also been shaped by glacial lakes and episodic glacial flooding. Limestone-derived soils are fine-textured, deep, and productive. As a result, much of the region was cleared for agriculture or urban development and less native forest remains than in surrounding ecoregions like the Northeastern Highlands or the Northern Allegheny Plateau. Most agricultural activity is devoted to dairy operations, although orchards, vineyards, and vegetable farming are important locally, particularly near the Great Lakes.

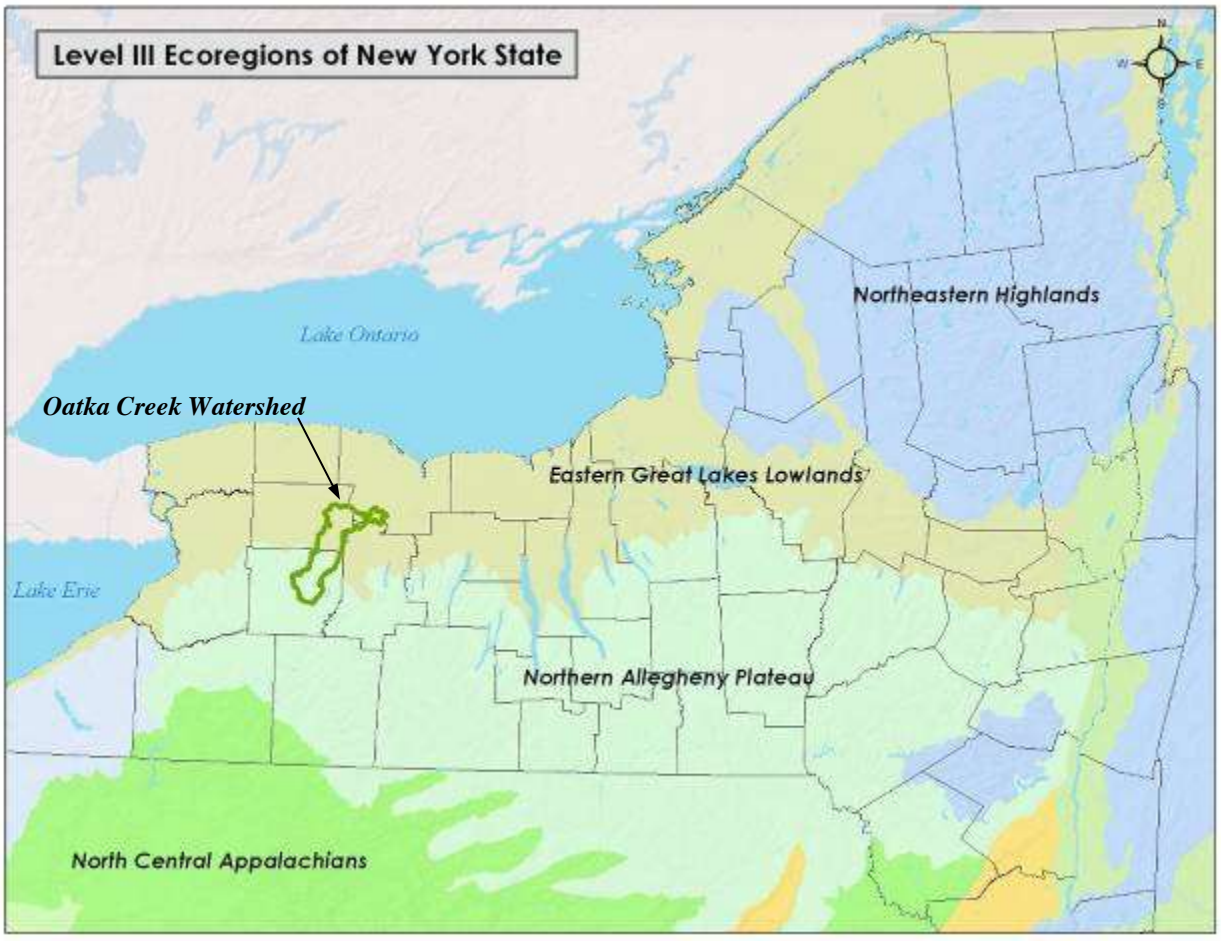


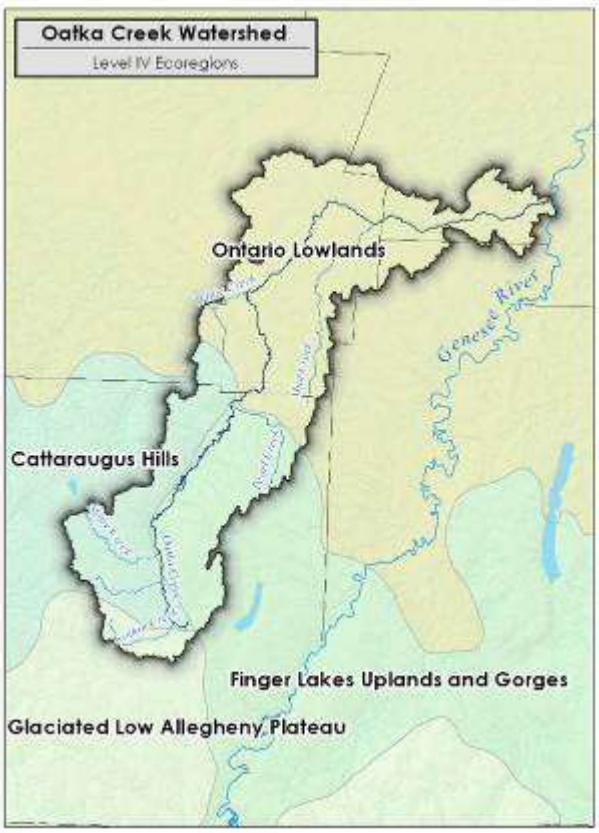
Figure 2.5: Level III Ecoregions of New York State

2.3.2 Level IV Ecoregion

The Oatka Creek watershed lies primarily in the Level IV ecoregion known as the *Ontario Lowlands*. The Ontario Lowlands are defined by the extent of Glacial Lake Iroquois. The relative proximity of the Ontario Lowlands ecoregion to Lake Ontario tempers its climate, meaning that summer heat and winter cold are reduced. Although the influence is strongest within a few miles of the lakeshore in the Erie/Ontario Lake Plain, the lake effect penetrates inland enough to make a noticeable winter temperature difference between the Ontario Lowlands and the north shore of Lake Ontario. The lake effect contributes to clouds in November and December, frequent fog in winter, and high snow amounts. Historically, the forest was dominated by beech and sugar maple with smaller amounts of white oak, basswood, elm, and white ash. Although forests once entirely covered the Ontario Lowlands, only scattered woodlots remain today because of the region's high agricultural capability. The loamy soils of the Ontario Lowlands are derived from limestone and calcareous shale (Alfisols); they are generally deep and finely textured. Although dairy and livestock farming are common, the soils and climate of the Ontario Lowlands are also suitable for growing fruit, vegetables, and other specialty crops.

Very small areas of the southern-most portion of the Oatka Creek watershed straddle the ecoregions of the *Cattaraugus Hills* and the *Finger Lakes Uplands and Gorges*.

Figure 2.6: Level IV Ecoregions of the Oatka Creek Watershed



2.4 Climate[6]

The climate in and around the Oatka Creek watershed is generally defined as humid-continental. Atmospheric flow and weather systems come predominantly from continental sources. Warm, occasionally humid, weather results when the airflow is from the south or southwest; cold, dry weather results when the flow is from the northwest or north. From time to time, well-developed weather systems off the mid- or north-Atlantic coast bring airflow from maritime sources into the region. Cool, cloudy, and often damp weather conditions prevail in this flow coming from the easterly quadrant.

Lake Erie and Lake Ontario have an important influence on the climate of the region. For example, they have a moderating effect on temperature. Summertime heating is less than in areas farther away from these large bodies of water. Consequently, thunderstorms are reduced in number and frequency, and there is less damage from hail and strong winds. The moderating effect of the lakes also reduces cooling at night and thus provides a growing season that is longer than that in areas at a greater distance from the lakes. Also influencing the climate are differences in relief and elevation, but these are secondary to the effect of the Great Lakes.

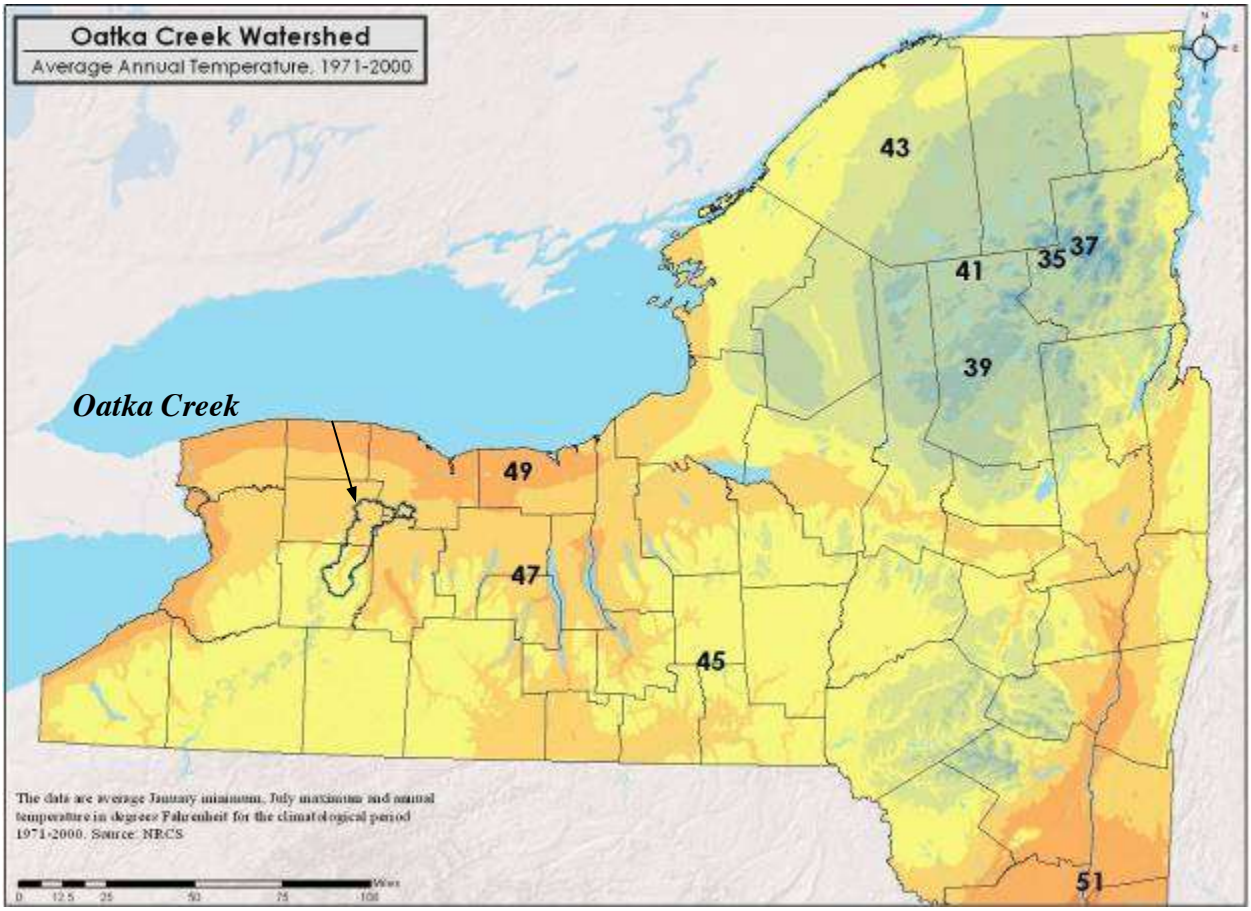
2.4.1 Temperature

Temperature in the Oatka Creek watershed usually varies noticeably, both in extremes and in averages, from day to day and from week to week. Summers are pleasantly warm in the Oatka Creek watershed while winters are generally long and cold and have frequent periods of stormy, unsettled weather. Although climate in the Oatka Creek watershed is chiefly continental, the ranges in temperature are smaller than those in the more centrally located areas of North America.

As the map in Figure 2.7 shows, average annual temperature range from 45 degrees Fahrenheit in the upper reaches of the watershed to 47 degrees near the lower reaches. The temperature reaches 90 degrees Fahrenheit or higher on an average of 7 days per year, almost entirely in June, July, and August. Temperatures of 0 degrees or below can be expected on 5 to 10 days in most winters.

Temperature tends to be slightly lower in the higher elevations of the watershed. There is a corresponding influence on the length of the frost-free growing season, the duration of snow cover, and other factors of climate affected by temperature. Depending on the seasonal conditions, the frost-free growing season can vary between 120 to 180 days in length.

Figure 2.7: Average Annual Temperatures for New York State



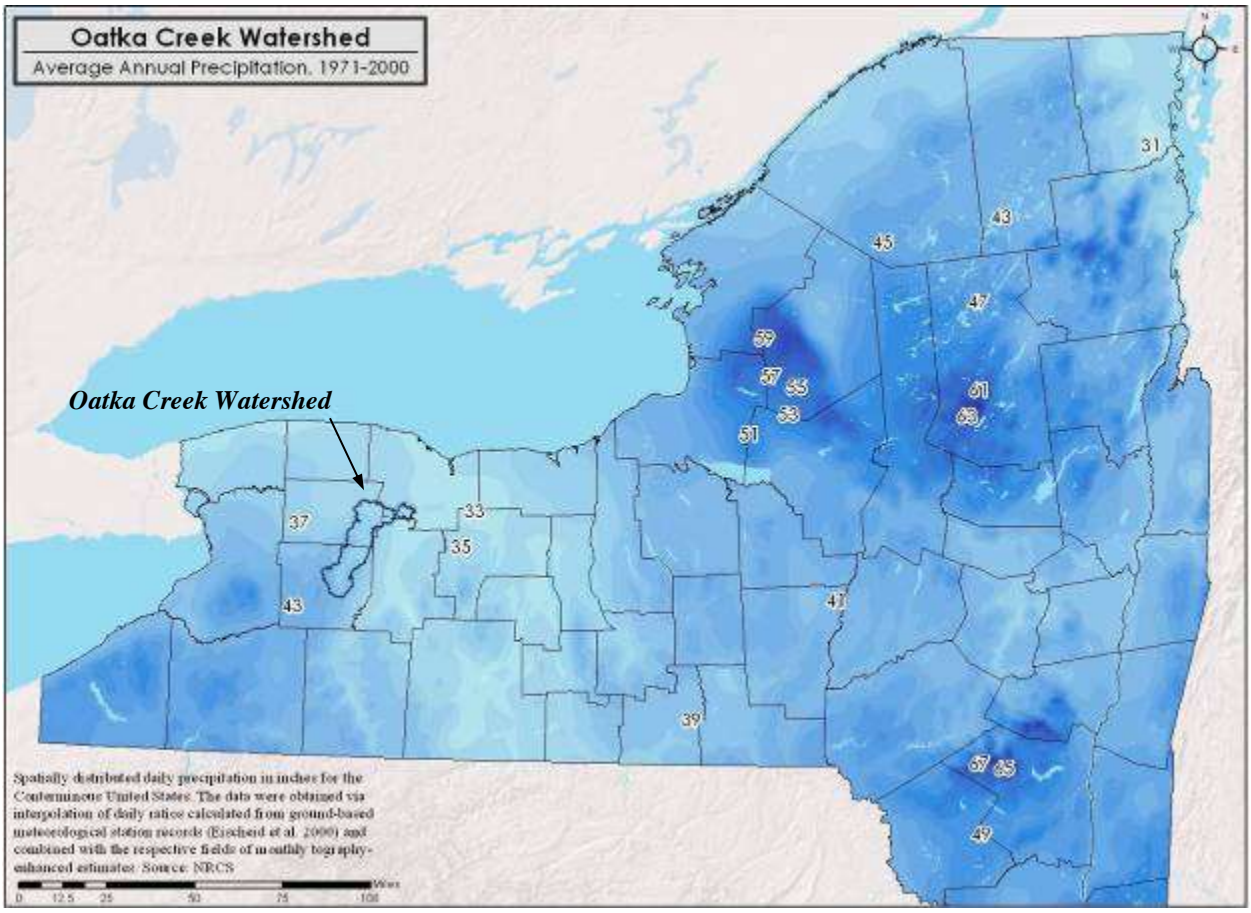
2.4.2 Precipitation

As the map in Figure 2.8 illustrates, average annual precipitation in the Oatka Creek watershed ranges between 33 and 43 inches per year, depending on the location within the watershed.

Monthly precipitation is at a minimum during winter whereas maximum amounts occur late in spring and in summer. The variation of seasonal precipitation is relatively small, even in comparison with other parts of New York State. During the May-September portion of the growing season, the average total precipitation is approximately 14 to 16 inches. These amounts make up to 45 – 50% of the total annual precipitation. Snowfall is frequently heavy, both in terms of individual storms and monthly amounts. The snowfall season usually begins in early or mid-November and continues through the early half of

April. The average winter snowfall is 90 to 100 inches and there is little variation throughout the watershed. Precipitation on the average is evenly distributed in winter.

Figure 2.8: Average Annual Precipitation for NYS



SECTION 2 ENDNOTES

[2] Hydrologic Units. [Online] In *United States Geologic Survey*. Retrieved 6/7/11 from http://water.usgs.gov/nawqa/sparrow/wrr97/geograp/geograp.html

[3] 1 acre = 43, 560 sq. ft = 0.0015625 sq. miles; town acreage calculations exclude area of villages & cities within.

[4] Calculations based on NHD HUC 10 watershed boundary. Municipalities that have less than 1% of their total land area within the watershed are listed in italics; these will be excluded from detailed analysis in this report. Municipalities marked with an asterisk '*' also have significant land area within the Black Creek watershed and will therefore receive similar focus and analysis in that watershed's respective management plan.

[5] Adapted from *Ecoregions of New York* map. [Online] In *New York State Department of Environmental Conservation*. Last viewed 1/3/11 at http://www.dec.ny.gov/about/66718.html

[6] Adapted from US Department of Agriculture Soil Surveys for Genesee, Livingston, Monroe, Orleans and Wyoming Counties. 1969 – 1973

3.0 Physical Characteristics Of the Watershed

"Maintenance of aquatic ecological integrity requires that we understand, not only the biological, chemical, and physical condition of water bodies, but also landscape condition and critical watershed attributes and functions, such as hydrology, geomorphology, and natural disturbance patterns."[7]

– An excerpt from *Identifying and Protecting Healthy Watersheds*, a publication of the U.S. Environmental Protection Agency. (Page 2-1)

Section 3.0 includes a selection of existing land cover, hydrologic, and other geo-spatial data sources in an effort to provide an accurate description of the primary physical characteristics of the Oatka Creek watershed. All of this information can be applied in an integrated assessment of watershed health and function at various scales. Opportunities for identifying or developing new data sources and data applications and integrating them with other monitoring and assessment approaches should be sought out as the watershed planning process evolves.

The assessment evaluates the Oatka Creek watershed and its physical components in an effort to provide a more complete understanding of the watershed's landscape and hydrologic conditions. By doing so, planners can begin to establish local protection and restoration priorities that will continue to be refined through the overall watershed management planning process. Specifically, the watershed management process will continue to utilize and refine this information in an effort to evaluate and rank subwatersheds and identify priority subwatersheds and focused management actions for those areas.

3.1 Geology

A brief overview of significant geologic features within the Oatka Creek watershed is provided below. Where deemed applicable, the comprehensive overview of geology that was conducted for the *Black Creek Watershed State of the Basin Report* have been included here for general reference to conditions in the neighboring Oatka Creek watershed.

3.1.1 Bedrock Geology

Bedrock geology in The Oatka Creek State of the Basin Report as follows:

> The bedrock geology of the Oatka Creek watershed is complex and variable…A major distinction in the bedrock geology can be made between the Upper and Lower Oatka. From the headwaters in Wyoming County to LeRoy, the bedrock consists of primarily shales and limestone from several geological groups (e.g. Hamilton, Genesee, Sonyea, West Falls). Downstream of the Village of LeRoy, the stream flows over the Onondaga limestone. In fact, just north of LeRoy, some stream water flows underground from a point upstream of Buttermilk Falls and reemerges from springs located downstream of Buttermilk Falls. The watershed in this region of the Lower Oatka is primarily limestone, Akron dolomite, gypsum, and some shale…The different bedrock types along Oatka Creek affect the water quality along the length of the creek…[8]

Furthermore, a comprehensive account of the bedrock geology for the adjacent Black Creek watershed was provided by SUNY Brockport in the *Black Creek Watershed State of the Basin* report. While the Oatka Creek watershed does have a number of variations and distinctions from its neighbor to the north, the description nonetheless provides valuable insight regarding the ancient geologic history of the area:

> Approximately 360 to 440 million years ago during the Devonian and Silurian periods of the Paleozoic Era, unconsolidated sediments were deposited when the region now containing the Black Creek Watershed was part of a continental sea (Isachsen and others, 1991). At this time the Appalachian Mountains were uplifting to the east, and the Michigan Basin to the northwest was subsiding. Paleozoic sediments, including clay, fine sand, limestone, rock salt and gypsum, were eventually compacted into rock formations.
>
> The bedrock of the Black Creek Watershed originated from this sediment deposition and compaction. Silurian to middle Devonian age bedrock is primarily limestone and dolostone while late Devonian age bedrock consists mostly of shales with some interbedded siltstone and limestone…Paleozoic strata dip to the south at approximately one degree resulting in the exposure of younger bedrock to the south and older bedrock to the north. After deposition, lithification, uplift and erosion, the bedrock was then subjected to a long period of erosion prior to the glaciations that affected the landscape of western New York. Permeable bedrock formations serve as groundwater aquifers and participate in both recharge and discharge between deeper bedrock aquifers and the surface water flow of Black Creek and its tributaries.
>
> The Clarendon-Linden fault zone is a regional compressive fault system that crosses western New York in general north-south direction. This fault zone crosses the western side of the Black Creek Watershed. Three prominent fault segments, known as splinter faults, are identified across the watershed…This fault zone is seismically active and has generated low to moderate scale historic earthquakes with a sporadic and poorly known recurrence level.[9]

Bedrock geology, including many of features described above, can be found in Map 15 in Appendix A.

3.1.2 Surficial Geology

As with bedrock geology, the description of surficial geology prepared by SUNY Brockport in the *Black Creek Watershed State of the Basin* report can be extended to the Oatka Creek watershed:

> Glaciation over the last two million years had a dramatic influence in shaping surface topographic features in the [region]. An ice sheet of greater than one mile in thickness advanced and retreated several times across western New York during the Pleistocene Epoch (Isachsen and others, 1991). Repeated advances and retreats of glaciers were the primary influence on landscape processes in the Black Creek Watershed, however, most landscape features owe their origins to the last glaciation from about 30,000 to 10,000 years ago.
>
> Ice advance scoured bedrock with resistant rock formations persisting as higher areas and less resistant bedrock being carved into landscape lows. A thin blanket of glacial till was spread across most areas and distinct elliptical drumlins pointing to the southwest mark the local ice advance flow direction. Brief pauses in ice retreat resulted in deposition of moraine ridges…Ice stagnation created broad areas of hummocky topography to the north of the moraine ridges. The ice stagnation areas are locally interrupted by kames, eskers and outwash deposits formed by melt water within the glacier or flowing beyond the glacial margin. After glacial ice retreated from the [region], lake deposits, mucklands and stream alluvium partly infilled the lowest topographic areas. Modern streams flow in these low floodplain areas and continue to nourish wetland swamps and deposit alluvial sediments.
>
> Surficial sediments provide the geologic parent material for soil formation, contribute significantly to the infiltration and storage of precipitation, are a source of sediment load to surface waters, comprise a sizable groundwater aquifer system and provide recharge to deeper bedrock aquifers.[10]

Map 10 in Appendix A illustrates these features.

3.1.3 Karst Features and Shallow Soils

In 2010 the U.S. Geological Survey published the scientific investigative paper titled *Hydrogeologic and Geospatial Data for the Assessment of Focused Recharge to the Carbonate-Rock Aquifer in Genesee County, New York*.[11] This study stemmed from concern expressed by local officials regarding chemical and bacteriological contamination in carbonate-rock aquifers present across Genesee County, commonly referred to as the "karst area." The report describes the general characteristics of the carbonate-bedrock aquifer and overlying soils and unconsolidated deposits and presents geospatial information on factors that affect where focused recharge and surface contaminants have the highest potential to enter the carbonate-rock aquifer. Genesee County SWCD is presently using this information to guide its AEM planning activities. In addition, they are coordinating with other agencies and local offices such as the Genesee County Department of Health to assist farmers and landowners in the karst area with problems that have occurred related to fertilizer application and groundwater contamination. A direct result of these efforts is the document *Manure Management Guidelines for Limestone Bedrock/Karst Areas of Genesee County, New York: Practices for Risk Reduction*.[12] The document outlines the manure management practices for the karst area of Genesee County, New York. The paper notes that the risk reduction practices may also be effective in karst and other sensitive areas throughout New York State.

GIS data pertaining to the karst area prepared by the USGS is provided on Map 21in Appendix A of this report.

3.1.4 Mines

Map 18 in Appendix A illustrates a total of 13 active and inactive mines in the Oatka Creek watershed that are identified in the NYSDEC Mined Land Reclamation Program database maintained by the NYS DEC. A summary of information on those facilities is provided in Table 3.1; unabridged information on those facilities can be found online at the referenced source.

Table 3.1: NYS DEC Mined Land Reclamation Program Database Records for the Oatka Creek Watershed[13]

Mine Name (as listed)	County	Status	Commodity	Total acres affected by mining since 1975	Life of mine acres
Reynard's Pit	Wyoming	Reclaimed	Sand and Gravel	1	1
Schillaci Pit	Wyoming	Active	Sand and Gravel	2	2
Johnson Gravel Pit	Wyoming	Active	Sand and Gravel	3	49
Wick Gravel Pit	Wyoming	Reclaimed	Clay	8	8
Herman Gravel Pit	Wyoming	Reclaimed	Sand and Gravel	8	8
Wright Pit	Wyoming	Active	Sand and Gravel	8	8
Trademark Sand And Gravel Pit	Wyoming	Active	Sand and Gravel	10	27
Ewell Gravel Pit	Wyoming	Reclaimed	Sand and Gravel	2	2
Keith Herrmann Gravel Pit	Wyoming	Reclaimed	Sand and Gravel	2	9
Dill Brothers Pit	Wyoming	Active	Sand and Gravel	3	15
Offhaus Gravel Pit	Wyoming	Reclaimed	Sand and Gravel	19	19
Starr Pit	Genesee	Reclaimed	Sand and Gravel	2	2
Marta	Genesee	Active	Sand and Gravel	5	5
Macduffie Pit	Genesee	Active	Sand and Gravel	41	70

Leroy Quarry	Genesee	Active	Limestone	211	454
Leroy Quarry	Genesee	Active	Limestone	109	142
Circular Hill Quarry	Genesee	Active	Sand and Gravel	52	62
Stevens Pit	Genesee	Unknown	Sand and Gravel	13	13
Diehl Sand And Gravel	Genesee	Active	Sand and Gravel	34	60
Route 19 Pit	Genesee	Reclaimed	Sand and Gravel	4	4
North Road #2	Genesee	Reclaimed	Sand and Gravel	5	5
Seldon Road Pit	Genesee	Reclaimed	Sand and Gravel	10	10
Bishoping Mine	Genesee	Reclaimed	Marl	17	17
Clark Marl Mine	Genesee	Active	Marl	12	12

Natural gas has been commercially drilled in New York State since 1821. It has been piped to towns for light, heat, and energy since the 1870s. The first storage facilities were developed in 1916. Hydraulic fracturing of vertical wells was first used in New York to develop low permeability reservoirs in the Medina Group around the 1970s-80s. Six new Trenton-Black River plays (underground reservoir rocks with fossil fuels) were discovered in 2005. There are dozens of plays across the country. Soon New York State may witness its first Marcellus Shale 'play'.

Recent advances in horizontal drilling and hydraulic fracturing have allowed extraction of natural gas from deep gas shale reserves, such as the Marcellus shale, to be economically feasible. The Utica Shale is a deeper and more expansive formation that may also have economic viability for the state. The shale must be below approximately 3,000 ft. of overlying rock before it is a successfully play.

The increased demand for cleaner energy and the proximity of these reserves to the Northeast's population hubs makes these particular 'plays' significant. There are certain financial benefits landowners may receive for leasing their land and certain economic gains a community could reap, but there will be challenges and costs that are associated to these benefits.

The New York State Department of Environmental Conservation is developing the generic environmental impact statement to permit high volume hydraulic fracturing natural gas by horizontal well extraction. Many wells that are not considered high volume hydraulic fracturing wells have already been permitted. The developing horizontal well regulations are designed to ensure that all natural gas extraction is safe, does not significantly disrupt the natural flow of surface (or ground) water to make the hydrofracking fluids, and hydrofracking fluids will be disposed of safely as to not pollute our local water sources. This is vital as the surface and ground water is the source for Class AA drinking water for residents in the watershed.

3.2 Soils[14]

Soil conditions in the Oatka Creek watershed were described as follows on the website of the Oatka Creek Watershed Committee:

> Subsequent to glacial retreat and the formation of north-south hills and valleys, water flowing off the hills carried away topsoil and produced deep fertile valley soils. Underlying much of the watershed soil are shales and sandstone, of varying thickness. Where severe valley wall erosion cuts through these layers, local cascades formed. Valleys and northern slopes are a mixture of alluvial deposits and glacial gravel, producing well-drained, fertile and highly productive soils. In some locations, soils containing small particles produce heavy clay…Below Buttermilk Falls…overlying soils are mainly limestone-derived loams to the west, tending towards sandy

> loams to the east, interspersed with areas of muck. The buffering action of the limestone underlying the stream and its major tributary, Spring Creek, and surrounding lands, contributes greatly to the water quality of the lower stream.[15]

Maps illustrating soils can be found in Appendix A of this report.

3.2.1 Hydrologic Soils

According to the NRCS, a hydrologic group is a group of soils having similar runoff potential under similar storm and cover conditions. Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are: depth to a seasonal high water table, saturated hydraulic conductivity after prolonged wetting, and depth to a layer with a very slow water transmission rate. Changes in soil properties caused by land management or climate changes also cause the hydrologic soil group to change. The influence of ground cover should be treated independently.

Hydrologic soil groups are used in equations that estimate runoff from rainfall. These estimates are needed for solving hydrologic problems that arise in planning watershed-protection and flood-prevention projects and for planning or designing structures for the use, control, and disposal of water.

Assignment of soils to hydrologic groups is based on the relationship between soil properties and hydrologic groups. Wetness characteristics, water transmission after prolonged wetting, and depth to very slowly permeable layers are properties used in estimating hydrologic groups.[16]

This report defines four hydrologic soil groups: A, B, C, and D. An analysis of the four soil categories in the Oatka Creek watershed yielded the following results:

Table 3.2: Hydrologic Soil Groups in the Oatka Creek Watershed

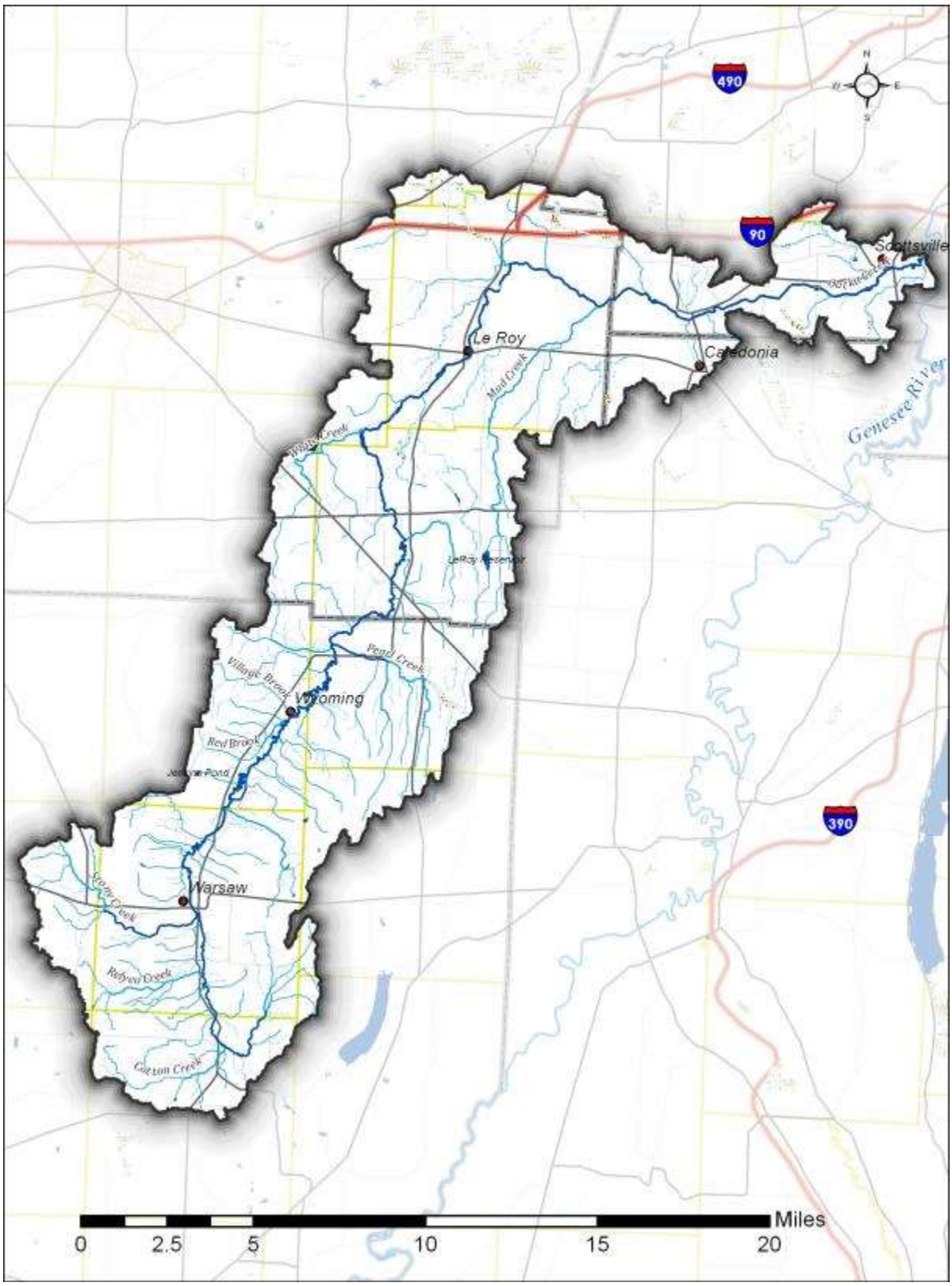
Hydrologic Soil Groups (HSGs)	Total Acres	% of Watershed Cover
HSG A: Low runoff potential when thoroughly wet; water is transmitted thoroughly through the soil. Group A soils typically have less than 10% clay and more than 90% sand or gravel and have gravel or sand textures.	7,154.4	5.2%
HSG B: Soils in this group have moderately low runoff potential when thoroughly wet. Water transmission through the soil is unimpeded. Group B soils typically have between 10% and 20% clay and 50% to 90% sand and have loamy sand or sandy loam textures	61,039.3	44.2%
HSG C: Soils in this group have moderately high runoff potential when thoroughly wet. Water transmission through the soil is somewhat restricted. Group C soils typically have between 20% and 40% clay and less than 50% sand and have loam, silt loam, sandy clay loam, and silty clay loam textures	51,520.3	37.3%
HSG D: Soils in this group have high runoff potential when thoroughly wet. Water movement through the soil is restricted or very restricted. Group D soils typically have greater than 40 percent clay, less than 50 percent sand, and have layer textures. In some areas, they also have high shrink-swell potential.	18,380.2	13.3%

3.3 Hydrology[17]

Hydrology is determined by a complex interaction between geology, groundwater, climate, physiography, and land cover. Perhaps the most distinctive trait that characterizes the topography and, in turn, hydrology of the Oatka Creek watershed is that it lies within an area of North America that has been largely influenced by prolonged periods of glaciation. As a general rule, groundwater flow beneath western New York is northward from the Allegheny Plateau through the Eastern Great Lakes Lowlands with ultimate discharge into Lakes Erie and Ontario [refer to Ecoregions map under Section 2.3]. Local deviations from this regional northward flow pattern may occur in response to small changes in topography caused by drumlins, beach ridges, recessional moraines, or bedrock escarpments. In addition, shallow groundwater flow paths may locally be affected by discharges into surface waters or withdrawal from surface waters.

The following sections describe the hydrologic features and properties of the Oatka Creek watershed and how their function relates to watershed management.

Figure 3.1: Streams and Primary Waterbodies in the Oatka Creek Watershed



3.3.1 Hydrologic Overview

An excellent overview of the hydrology of the Oatka Creek watershed is provided on the website of the Oatka Creek Watershed Committee [note: elevation figures referenced herein have been revised for accuracy; emphasis added to indicate features shown on Figure 3.1]:

> Tributaries in central Wyoming County, the eastward trending ***Cotton Creek*** in Gainesville, and ***Relyea*** and ***Stony Creeks*** in Warsaw drain the western highlands; small streams drain the eastern highlands, and the junction of this drainage creates ***Oatka Creek***. As the Oatka progresses north through the Wyoming Valley, several unnamed seasonal tributaries drain west and east valley walls, bringing water from the hilltops at [approximately 1,900] feet elevation to 950 feet in the valley. The Oatka Creek itself falls only about five feet as it winds its way from Warsaw to Wyoming. ***Pearl Creek***, originating in Covington at an elevation of [1,400] feet, joins the Oatka Creek a short distance south of the Genesee County line. ***White Creek*** drains the towns of Bethany (elevation 1,020 feet) and Pavilion (elevation 910 feet). ***Mud Creek***, rising southeast of the LeRoy Reservoir (elevation 1,058 feet), drains in a NE direction before joining Oatka Creek 2 1/2 miles east of Buttermilk Falls [elevation 775 feet at crest] at an elevation of 630 feet. Few significant tributaries enter the Oatka between ***Mud Creek*** and the Hamlet of Mumford, where ***Spring Creek*** and some smaller limestone spring-fed streams that rise in the Onondaga limestone in Caledonia enter from the south, infusing the stream with high purity water and moderating both winter and summer water temperatures in the downstream reaches. Oatka Creek joins the ***Genesee River*** east of Scottsville at an elevation of [512] feet.[18]

Further valuable information on the LeRoy Reservoir was noted in *The Oatka Creek Watershed State of the Basin Report*:

> The Village of LeRoy use[d] a small reservoir, [***LeRoy Reservoir***], located on Mud Creek….The reservoir was built in 1915 and…has a surface area of approximately 59 acres, a maximum depth of 25 feet and an average depth of 10.5 feet. Daily water use range[d] seasonally from approximately 700,000 gallons per day to occasionally over 1,300,000 gallons per day in summer months... [***LeRoy Reservoir***] serves as a settling basin for nutrients and sediment that enter it from the headwaters of Mud Creek. These materials probably remain in Lake LeRoy and do not flow downstream toward Oatka Creek. The water level in the reservoir is usually below the top of the spillway except in the late winter and spring months. At those times, water from the headwater regions of Mud Creek and from [***LeRoy Reservoir***] will flow downstream in Mud Creek and, ultimately, to Oatka Creek.[19]

LeRoy Reservoir is no longer used as a public drinking supply and was sold to Noblehurst Farms in 2009. Further information on specific hydrologic characteristics of the Oatka Creek watershed are provided under Section 3.1; information on water quality is provided in Section 5 of this report.

3.3.2 Oatka Creek Watershed Stream Network and General Flow Statistics

General flow statistics and other fundamental characteristics of the hydrologic network in the Oatka Creek have been summarized in Table 3.3. These data were derived from two primary sources – GIS analysis of the National Hydrography Dataset (NHD) and through the web-based USGS New York StreamStats GIS application. StreamStats allows users to obtain streamflow statistics, basin characteristics, and descriptive information for USGS data-collection stations and user-selected ungauged sites.[20] The program can estimate streamflow statistics for ungauged sites either on the basis of regional regression equations or on the basis of the known flows for nearby stream-gauging stations. All of the

flow statistics provided in Table 3.3 are estimates that were derived through a combination of these approaches.

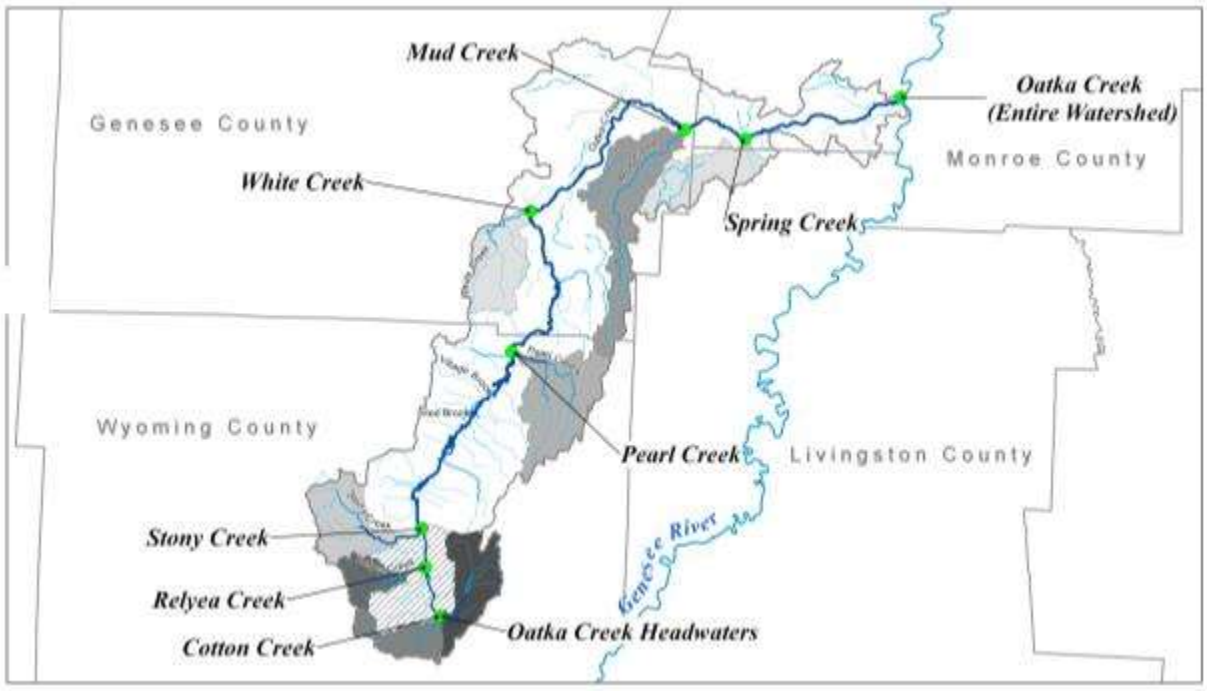
Table 3.3: Characteristics of Streams and Associated Subwatersheds in the Oatka Creek Watershed

	Oatka Creek Watershed	Spring Creek	Mud Creek	White Creek	Pearl Creek	Upstream of Warsaw (including Stony Creek)	Stony Creek	Relyea Creek	Cotton Creek	Headwaters (above Cotton Creek)
Drainage Area ($Miles^2$)	**216**	8.62	16.3	9.2	13.7	39	9.3	4.06	5.1	8.6
Main Channel Stream Length (Miles)*	**62.5**	9.68	14	7.9	8.6	11.5	7.8	5.31	5.85	6.4
Total Stream Network Length (Miles)	**430.2**	17.2	25.1	16.3	37.2	102	22	13.1	25	55.9
Mean Annual Precipitation (inches)	**33.7**	30.4	31.6	34.7	33.1	37.3	38.6	39.1	37.9	35.2
Mean Annual Runoff (inches)	**14.2**	10.4	12	15	14.1	18.2	19.4	19.9	18.8	15.9
Basin Lag Factor (hours)	**3.42**	.33	.36	.24	.2	.22	.07	.04	.09	.19
Basin Storage**	**.62**	.26	.68	.27	.35	.54	.4	.81	.61	.95
Average basin slope (feet per mi.)	**277**	101	161	238	394	335	320	300	305	264
Minimum daily flow (cfs)	**13**	--	--	--	--	--	--	--	--	--
Maximum daily flow (cfs)	**6,500**	--	--	--	--	--	--	--	--	--
Average daily stream flow (cfs)	**215.386**	--	--	--	--	--	--	--	--	--
Mean Annual Flow (cfs)	**213**	--	--	--	--	--	--	--	--	--

*Stream lengths vary here from those listed in Section 3.3.1 due to variations in calculation method. StreamStats includes braided channels and other intermittent stream reaches, creating greater stream lengths in some cases

**Defined as the percentage of total drainage area of identified lakes, ponds and swamps

Figure 3.2: Streams and Associated Watersheds Assessed Using StreamStats



Recent work by Prof. Paul Richards and his students in the Dept. of Earth Sciences at SUNY Brockport indicates how important the karst geology of the region is to its hydrology. Sinkholes and fissures in the bedrock redirect surface flows into groundwater conduits that may appear far downstream in seeps and springs. Mud Creek, for example, which appears to be an important tributary of Oatka Creek, apparently loses much of its flow to a large sinkhole such that surface flow in the creek makes it past this sinkhole only under high-water conditions, and Mud Creek's contribution to the discharge of Oatka Creek is unimportant. The flow of Spring Creek, which joins Oatka Creek near the Village of Mumford downstream from the mouth of Mud Creek, is largely groundwater-fed from springs and seeps and is not very affected by meteorological events. The source of this groundwater is probably sinkholes along NYS Route 5 and Mud Creek. A large sinkhole in the main channel of Oatka Creek above Buttermilk Falls, where the Onondaga Limestone Formation surfaces, diverts much of the surface flow into sub-surface flow, some of which rejoins the creek below the falls. Measurements of flow along the creek indicate that not all of this flow rejoins the creek here, however, and discharge of Oatka Creek downstream from the sink hole remains lower than that above all the way to the creek's convergence with the Genesee River near Garbutt.[21] (*Using a Mixing Model to Estimate Complex Mixtures within Conduits of Dissolution Karst: A Case Study near Le Roy, NY*, by Jill Libby).

3.3.3 Flood Recurrence Intervals[22]

Flood recurrence refers to the probability that a river will reach flood stage – maximum instantaneous flow – in a given period of time. These estimates are based on regional historical data about rainfall volumes and stream stage. In other words, a 100-year flood has a 1 percent chance of happening in any given year. The USGS StreamStats application was used to generate estimates of peak flows for the Oatka Creek watershed and subwatersheds; these results are provided in Table 3.4.

Table 3.4: Estimated Peak Flow Statistics for Selected Recurrence Intervals (all flow levels measured in cubic feet per second)

	Oatka Creek	Spring Creek	Mud Creek	White Creek	Pearl Creek	Upstream of Warsaw (including Stony Creek)	Stony Creek	Relyea Creek	Cotton Creek	Headwaters (above Cotton Creek)
2 Year Peak Flood (50% chance)	**3,320**	241	388	348	543	1,520	602	305	331	371
5 Year (20% chance)	**4,780**	349	561	505	832	2,330	936	484	515	578
10 Year (10% chance)	**5,780**	420	676	606	1,030	2,890	1,170	607	641	720
25 Year (4% chance)	**7,110**	508	822	736	1,290	3,640	1,470	775	810	913
50 Year (2% chance)	**8,080**	572	929	829	1,480	4,210	1,710	902	936	1,060
100 Year (1% Chance)	**9,070**	633	1,030	921	1,680	4,800	1,940	1,030	1,060	1,200
200 (.5% chance)	**10,100**	697	1,140	1,020	1,890	5,420	2,190	1,170	1,200	1,360
500 Year (.2% chance)	**11,500**	775	1,280	1,140	2,160	6,260	2,530	1,350	1,380	1,560

3.3.4 Floodplains[23]

The National Flood Insurance Program (NFIP) is a federal program that enables property owners to purchase affordable flood insurance. Before the NFIP, flood insurance was generally unavailable. The program is based on a partnership between communities and the federal government in which the community adopts floodplain management regulations to reduce flood risks and the federal government makes flood insurance available within the community.

The National Flood Insurance Program uses the 100-year flood as the standard on which to base its regulations. This is a national standard used by virtually every Federal and most state agencies, including New York State agencies, in the administration of their programs as they relate to floodplains. The technical and engineering methods involved in determining the magnitude of these floods are well established. Although the 100-year flood is the event that is estimated to have a one percent chance of being equaled or exceeded each year, there is no guarantee that a flood of this magnitude could not occur in fewer than 100 years or that one will necessarily occur in each 100 year period at a precise location.

Flood Insurance Rate Maps (FIRM) are produced by the Federal Emergency Management Agency and provide the official record of special flood hazard areas. While paper or flat FIRM maps are generally available online for every community in the Oatka Creek watershed, corresponding digital GIS data pertaining to the flood boundary is not available for every Oatka Creek watershed community through state or federal agencies. Furthermore, some portions of watershed communities have never been mapped by FEMA at all, creating significant and sometimes perplexing gaps in the floodplain record. (In order to create efficiencies in the mapping process, FEMA likely elected to skip certain areas that were not prone to frequent flooding or had low population density). Information provided by FEMA has been combined with information created by local offices and agencies in an effort to provide comprehensive picture of the 100-year flood zone across the entire Oatka Creek watershed.

Map 7 in Appendix A illustrates those areas identified as within the 100-year flood zone. While these boundaries are generally very close to the actual boundaries as indicated on official FIRM maps, some variation is evident from place to place. Maps and associated data are therefore for planning purposes only and should not be used to determine the level of flood hazard in any particular area.

Table 3.5: Analysis of 100-Year Flood Zone in the Oatka Creek Watershed

Subwatershed	Acres at or below 100-year flood elevation	% of Subwatershed Area	% of Oatka Creek Watershed Area
Oatka Creek Headwaters	289.56	1.2%	0.2%
Pearl Creek	1,818.05	5.0%	1.3%
White Creek	1,045.58	4.1%	0.8%
Mud Creek	316.07	3.0%	0.2%
Village of LeRoy	934.74	5.1%	0.7%
Oatka Creek Outlet	1,655.14	7.4%	1.2%
Oatka Creek	**6,059.14**	**4.4%**	**--**

Analysis of the 100-year base flood elevation (1% flood risk) indicated that 4.4% of the total land area within the Oatka Creek watershed is within this zone. The Oatka Creek Outlet subwatershed has the highest concentration of lands in the 100-year floodplain, with 1,655 acres accounting for 1.2% of total watershed area. Full results of this analysis are provided in Table 3.5:

3.3.5 Water Withdrawals

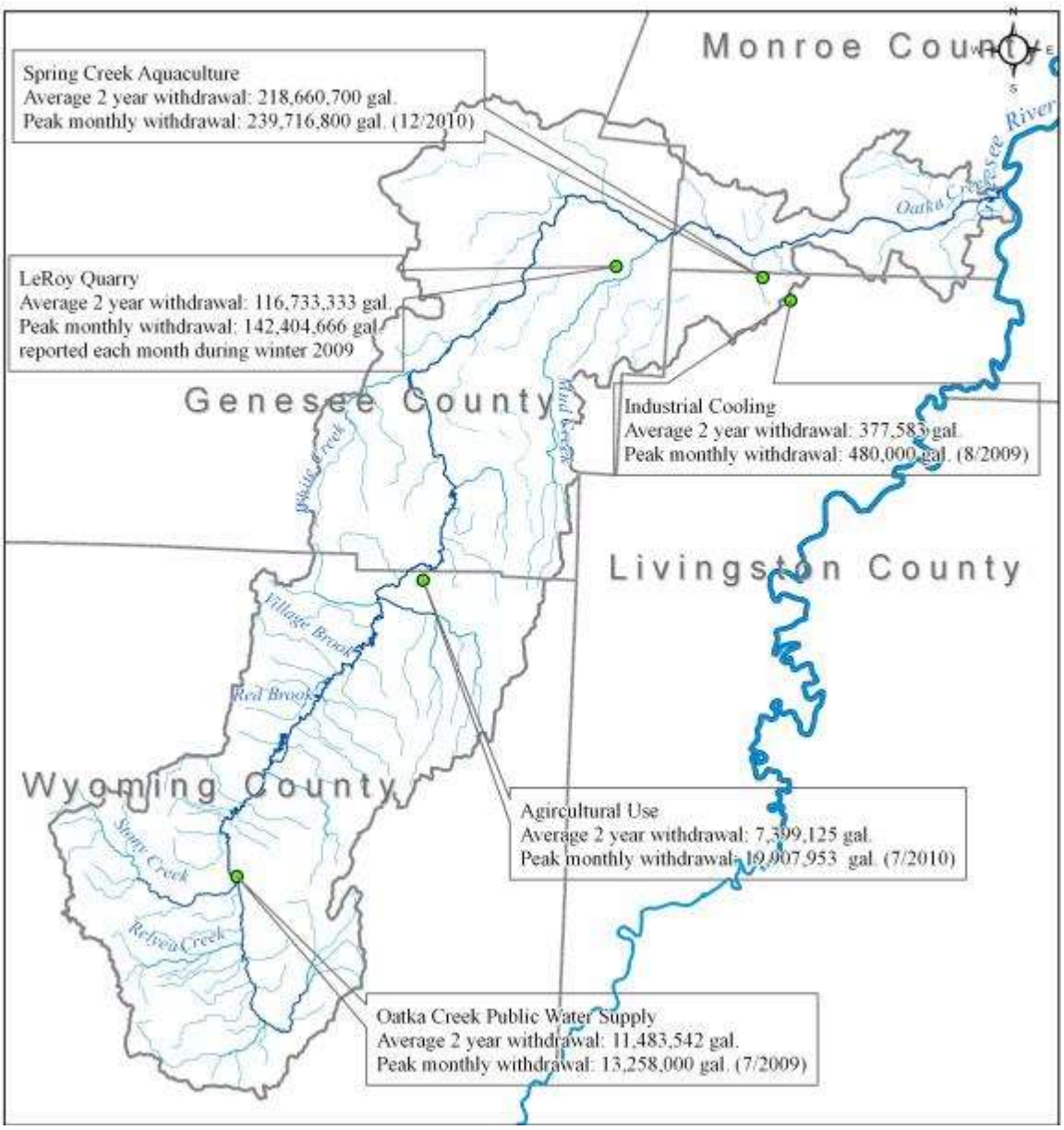
In accordance with ECL Article 15 Title 33 (Water Withdrawal Reporting), NYSDEC maintains records on water withdrawals in excess of 100,000 gallons of water per day.[24] Figures for the Oatka Creek watershed were requested for the Oatka Creek watershed and provided for a 2-year time period during the years 2009 and 2010. The results of those figures have been summarized on Figure 3.3:

Data provided are only the facilities that voluntarily provided the data to DEC; the Department notes that there may be others that they are not aware of. DEC reports the type of facility (Use Sector) and listed what that facility reported as their water supply source; latitude and longitude coordinates were also provided which were used to generate points on the map. None of the facilities that provided data indicated that water is diverted out of their basin. It can therefore be assumed that the water is returned to its source.

3.3.6 Strahler Stream Order

The Oatka Creek watershed has streams that range in order from 1 (first order/smallest streams) to 4. As shown in the map below, Oatka Creek becomes a fourth order stream very high up within the watershed in the Village of Warsaw and remains so until its confluence with the Genesee River.

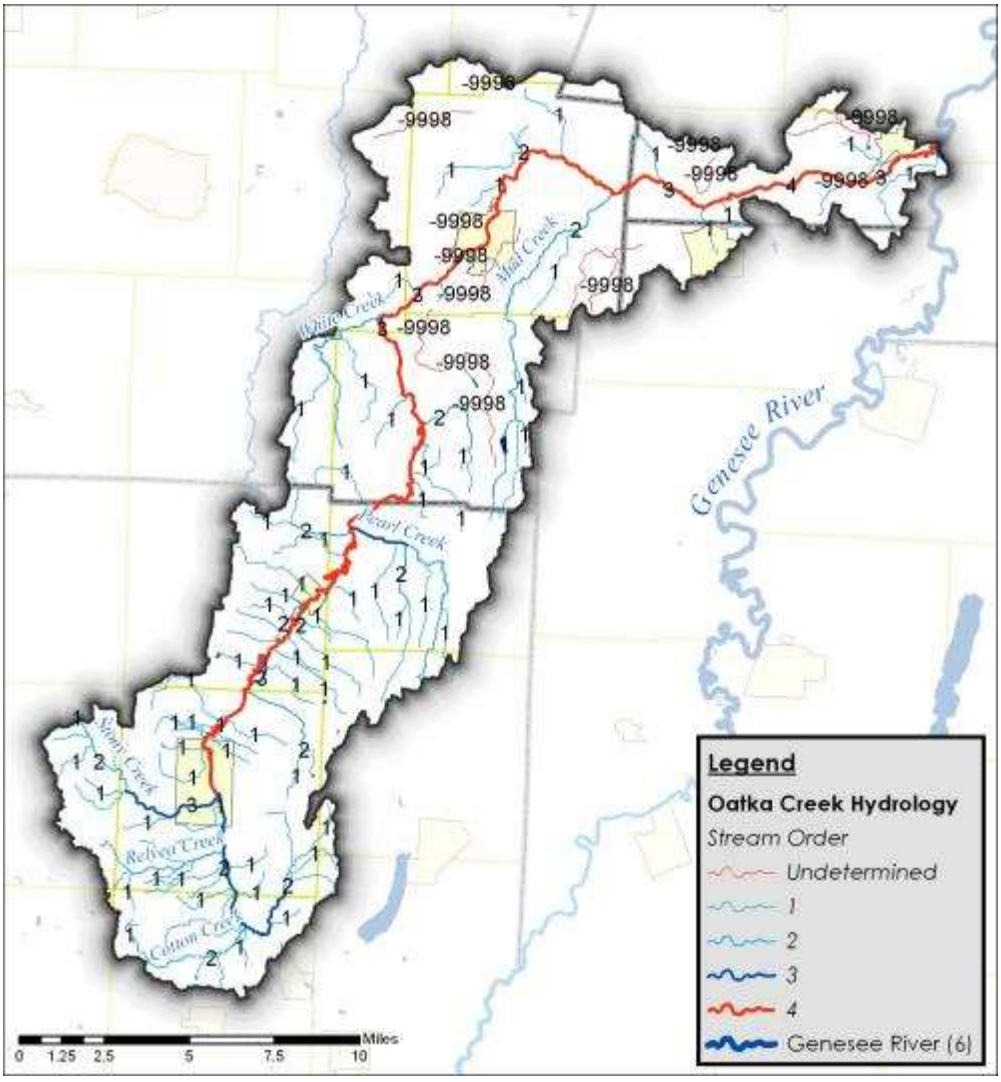
Figure 3.3: Water Withdrawals Reported to NYSDEC in Excess of 100,000 gal, 2009 – 2010



The method by which stream order is derived for the NHD is not perfect; the technique does at times yield erroneous results. One will note, for example, the presence of a number of disconnected stream segments found throughout the watershed. The GIS logarithm used to calculate stream order is unable to determine values for disconnected flow lines. These segments are labeled by the GIS as "-9998" which indicates that the stream order value for the flow line is missing or undetermined. Some of these isolated flow lines are indeed mapping errors, while many others are actually streams that are influenced by the Karst region of the watershed and effectively disappear underground (see Section 3.1.3 for an explanation of Karst topography in this watershed). A number of these streams, however, do in fact connect to the stream network throughout most of the year and require field verification. This does not affect the output

of the stream order classification for the major tributaries in the watershed and helps to identify those areas that may be under the influence of unique geologic conditions.

Figure 3.4: Strahler Stream Order Derived from the National Hydrologic Dataset



3.3.7 Wetlands

Wetlands are lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface.[25] Wetlands serve a number of important functions within a watershed, including sediment trapping, chemical detoxification, nutrient removal, flood protection, shoreline stabilization, ground water recharge, stream flow maintenance, and wildlife and fisheries habitat. Numerous federal and state laws affect the use and protection of wetlands. Because no single one of these laws was specifically designed as a comprehensive policy for wetlands management, understanding how and when the various laws and levels of regulation apply can be confusing.

The principal federal laws that regulate activities in wetlands are Sections 404 and 401 of the Clean Water Act, and Section 10 of the Rivers and Harbors Act. Wetlands, as defined under the Federal Clean Water Act, are: "…those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."[26]

In 1986, the Emergency Wetlands Resources Act mandated that the US Fish and Wildlife Service complete the mapping and digitizing of the nation's wetlands. The result is the Wetlands Geospatial Data Layer of the National Spatial Data Infrastructure. This digital data provides highly detailed information on freshwater wetlands and ponds with numerous classifications and sub-classifications. Federal wetlands (referred to as the National Wetlands Inventory (NWI)) in the Oatka Creek watershed are illustrated on Map 6 in Appendix A. A subwatershed analysis of the NWI geospatial information is provided in Table 3.6:

Table 3.6. US Fish and Wildlife Service National Wetlands Inventory for Oatka Creek Watershed

Subwatershed	Total Acreage	*Freshwater Emergent Wetland*	*Freshwater Forested/Shrub Wetland*	*Freshwater Pond*	*Lake*	*Other*	*Riverine*
Oatka Creek Headwaters	1,612.5	264.5	1,183.5	164.4	*0*	0.1	*0*
Pearl Creek	2,809.1	766.2	1,808.5	198.0	*0*	*0*	36.5
White Creek	2,689.3	259.7	2,264.1	56.0	*0*	0.3	109.2
Mud Creek	715.2	16.8	581.8	61.8	47.8	7.0	
Village of LeRoy	1,515.3	231.1	1,163.7	51.0	23.4	1.5	44.6
Oatka Creek Outlet	1,769.6	202.7	1,311.8	65.0	*0*	107.7	82.4
Oatka Creek Watershed	11,111.0	1,741.1	8,313.3	596.2	71.2	116.7	272.6

The principal New York State regulation affecting development activities in and near wetlands in the Oatka Creek watershed is the Freshwater Wetlands Act, Article 24 and Title 23 of Article 71 of the NYS Environmental Conservation Law. The NYSDEC has mapped the approximate boundaries of all freshwater wetlands of 12.4 acres or more in New York. In some cases, these maps include smaller wetlands of unusual local importance. An adjacent area of 100 feet is also protected to provide a buffer zone to the wetland.

New York State regulated freshwater wetlands in the Oatka Creek watershed are illustrated on Map 5 in Appendix A. The largest continuous wetland is located along a segment of Oatka Creek in the vicinity north of the Village of Wyoming. Fragmented wetlands are dispersed throughout the watershed but the highest concentrations of wetlands are within the Pearl Creek and White Creek watersheds.

Table 3.7. NYS Regulated Wetland Acreage by Subwatershed

Subwatershed	NYS Regulated Wetland Acreage
Oatka Creek Headwaters	521.6
Pearl Creek	1,862.9
White Creek	1,522.1
Mud Creek	274.5
Village of LeRoy	987.5
Oatka Creek Outlet	881.1

Oatka Creek Watershed	6,049.7

Results of a geographic analysis of the NYS regulated wetland areas by subwatershed is provided in Table 3.7.

3.3.8 Understanding the Active River Area

The Nature Conservancy recently developed an approach to address river health in areas directly adjacent to streams. This "active river area" framework can be used as a tool to inform conservation, restoration and management of riparian areas and entire watersheds. This approach to riparian planning and protection is described in the TNC manual, *The Active River Area: A Conservation Framework for Protecting Rivers and Streams*:

> River health depends on a wide array of processes that require dynamic interaction between the water and land through which it flows. The areas of dynamic connection and interaction provide a frame of reference from which to conserve, restore and manage river systems. We choose the term active river area to define this framework. "Active" indicates the dynamic and disturbance-driven processes that form and maintain river and riparian systems and their associated habitats and habitat conditions. "River area" represents the lands that contain both of aquatic and riparian habitats and those that contain processes that interact with and contribute to a stream or river channel. The *active river area* framework offers a more holistic vision of a river than solely considering the river channel as it exists in one place at one particular point in time. Rather, the river becomes those lands within which the river interacts both frequently and occasionally.[27]

The active river area, therefore, is a critical area in which watershed restoration and protection efforts should be focused. Defining the active river area on a watershed-wide scale, however, can be challenging, as the characteristics of the active river area evolve from headwaters to outlet and are dependent on a number of variables. In the headwaters of a watershed, which typically have steeper slopes, deep "V"-shaped channels, and fewer meanders, the active river area will be relatively smaller in size as compared to downstream locations. As streams converge in these downstream areas, the active river area will tend to widen and become more dynamic, encompassing larger areas of land and generally will be subject to a larger variety of natural processes (erosion, flooding, sediment transport, debris accumulation, etc.) at varying levels of intensity.

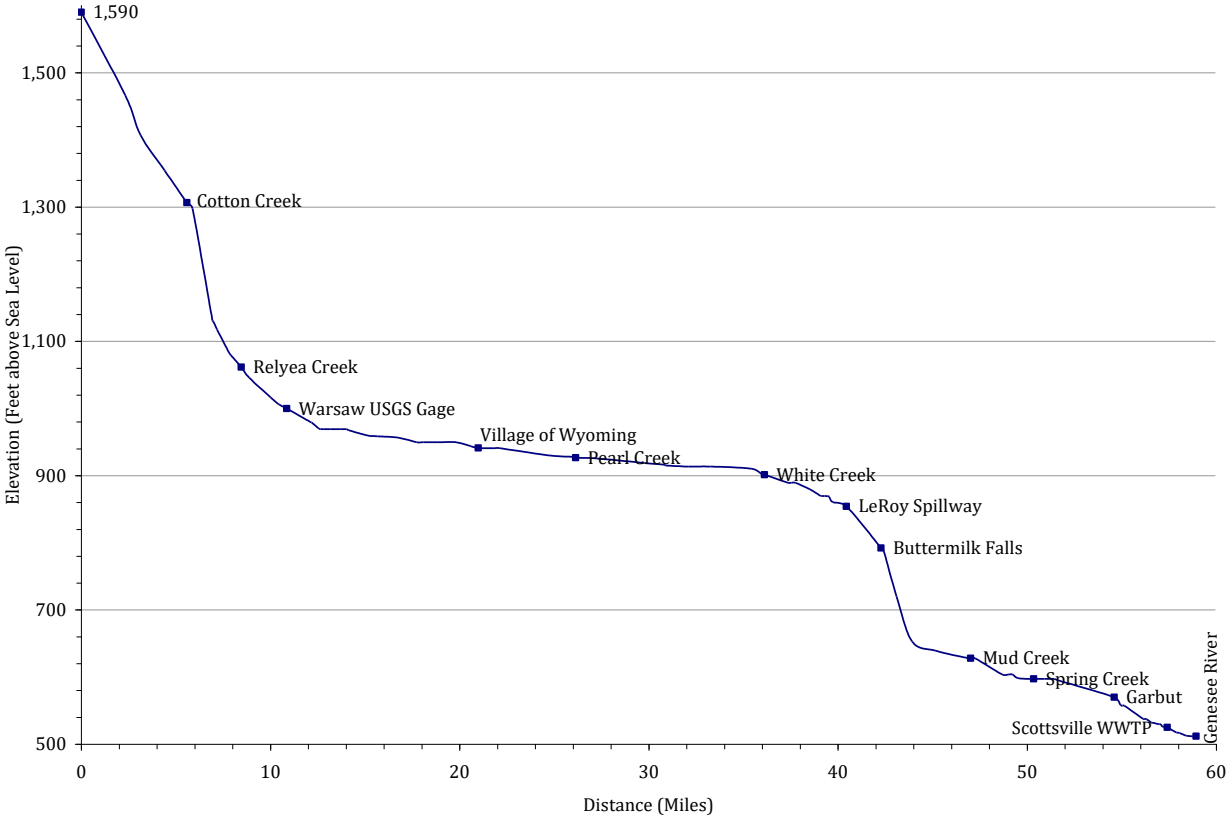
The 150 foot buffer area used for the riparian analysis above is a broad generalization and should not be construed as representative of the active river area. The active river area is comprised of five components: material contribution areas; the meander belt; floodplains; terraces; and riparian wetlands. Map 8 in Appendix A illustrates the location of these areas in the Oatka Creek watershed.

3.4 Elevation and Steep Slopes

Elevation is the vertical distance from mean sea level to a point on the earth's surface. Elevation influences the genesis of natural soil bodies and soil drainage within a landscape. Elevation in the Oatka Creek watershed was analyzed using 10 meter resolution Digital Elevation Model (DEMs) raster quads and authenticated against U.S. Geological Survey topographic maps.

Figure 3.5: Elevation Profile of Oatka Creek

The geography in the Wyoming County portion of the watershed is characterized by relatively high ridgelines and plateaus that drop steeply down into the valley in and around the Village of Warsaw. The elevation changes by as much as 1,000 feet from lowest to highest points in this portion of the watershed. The relief is partly the result of the action of the ice that entirely covered Wyoming County during the last continental glaciation and to postglacial stream cutting. As the Oatka Creek flows through Genesee and into Monroe County, relief begins to decrease, giving way to a gently rolling, hummocky landscape. Although the elevation ranges from 900 to about 1,000 feet when considering areas in the Town of Pavilion, the difference in elevation overall is generally 30 feet or less in any given part of the area,



though it is as much as 50 feet in some places. Total relief (highest to lowest points) in the Oatka Creek watershed is 435.4 meters or 1,428 feet. The maximum elevation in the watershed was determined to be 591.5 meters or 1,941 feet above sea level (located in the Town of Orangeville in the Oatka Creek Headwaters subwatershed just north of the Quaker Settlement Cemetery off of Quakertown Road). The lowest point in the watershed is at the outlet of Oatka Creek where it converges with the Genesee River; the elevation at this junction is 156.1 meters or 512 feet above sea level.

Map 14 in Appendix A illustrates the total relief and slopes greater than 15% in the Oatka Creek watershed. In addition, data included in the National Hydrography Dataset was used to produce a stream elevation profile of the main stem of the Oatka Creek, as illustrated in Figure 3.5. Elevations used in this profile are also based on the 10-meter resolution Digital Elevation Model (DEM) terrain data and represent the estimated stream elevation at the base of the stream bed (as opposed to the mean water level).

3.5 Land Use and Land Cover

Land activities and water quality are inherently linked. The types of activities that take place on the land directly influence the quality and characteristics of the water that runs off it. Understanding the characteristics of the land within a watershed area is therefore a central aspect of watershed planning. A variety of GIS data sources can be used to provide a clear understanding of how land within the watershed has been adapted to human uses, such as agriculture, residential, or commercial use. Landscape conditions can further be analyzed in order to assess elements of the watershed including natural land cover patterns, land disturbance regimes, and ecological connectivity, and how these conditions are changing over time. This information can be manipulated in a variety of ways (adjusting spatial and temporal scales, for example) to provide users with multiple applications for the management and restoration of land and water resources.

3.5.1 Land Use

Land use refers to the human purposes ascribed to the land, such as "industrial" or "residential" use. Land use can be analyzed utilizing Geographic Information System data derived from county Real Property System (RPS) tax parcel records. As explained on the New York State Department of Taxation and Finance Office of Real Property Tax Services website:

> The Assessment Improvement Law (Laws of 1970, Chapter 957) required local governments to prepare and maintain tax maps in accordance with standards established by the State Board of Equalization and Assessment (currently Office of Real Property Services). For the most part, this requirement is a county responsibility…Perhaps the most essential of all assessment tools is an adequate tax map reflecting the size, shape and geographical characteristics of each parcel of land in the assessing unit. The tax map is a graphic display of each assessing unit's land inventory and as such is the major source to the real property assessment roll. The working copy of the tax map used by the assessor can be utilized to record and analyze property transfers, to record other features pertinent to the valuation of land and in the development of a Geographic Information System (GIS). [The GIS] allows us to analyze and map the wealth of parcel level assessment information to solve problems related to: property valuation, local government reassessments, land use, environmental assessment, facility siting and economic development, public health, emergency services and disaster planning.[28]

Tax parcel information is available in GIS format from each county within the study area. Each GIS utilizes the same uniform classification system developed by the New York State Office of Real Property Services that is used in assessment administration in New York State. The system of classification consists of numeric codes in nine categories. An analysis of land use classification within the Oatka Creek watershed is shown in Table 3.8.

It is important to note that property classification and tax map maintenance is a responsibility of the county assessor's office (or equivalent). While the classification system standards are intended to create uniform results, human error and subjectivity can sometimes lead to different interpretations of property types from place to place. Some level of inaccuracy with the results in Table 3.8 should therefore be assumed. Furthermore, properties are classified primarily for the purposes of taxation and public finance, not environmental analysis. While the information aids environmental assessment, the application of these results to watershed planning has its limitations. The information is therefore presented simply to provide a snapshot of the land use within the Oatka Creek watershed and subwatersheds and to facilitate rapid assessment of watershed and subwatershed site conditions.

Table 3.8: Land Use within the Oatka Creek Watershed[29]

Property Classification Category	Acres	% of Oatka Creek Watershed Area
Agricultural Property used for the production of crops or livestock	72,042.50	53.67%
Residential Property used for human habitation	31,312.95	23.33%
Vacant Land Property that is not in use, is in temporary use, or lacks permanent improvement	15,910.77	11.85%
Commercial Property used for the sale of goods and/or services	1,511.65	1.13%
Recreation and Entertainment Property used by groups for recreation, amusement, or entertainment	1,048.24	0.78%
Community Services Property used for the well being of the community	1,639.84	1.22%
Industrial Property used for the production and fabrication of durable and nondurable man-made goods	3,701.38	2.76%
Public Services Property used to provide services to the general public	1,328.88	0.99%
Wild, Forested, Cons. Lands & Public Parks Reforested lands, preserves, and private hunting and fishing clubs	1,853.28	1.38%
Unclassified *Property or land that has not been or is unable to be classified*	*3,880.07*	*2.89%*

3.5.2 Land Cover

Land cover refers to the type of features present on the surface of the earth. For example, agricultural fields, water, pine forests, and parking lots are all land cover types. Land cover may refer to a biological categorization of the surface, such as grassland or forest, or to a physical or chemical categorization such as concrete.

Land cover was assessed in the Oatka Creek watershed utilizing imagery associated with the National Land Cover Dataset. This dataset was developed by the Multi-Resolution Land Characteristics (MRLC) Consortium, a group of federal agencies who first joined together in 1993 to purchase satellite imagery for the conterminous U.S. to develop the NLCD. In 1999, a second-generation MRLC consortium was formed to purchase three dates of satellite imagery for the entire United States (MRLC 2001) and to coordinate the production of a comprehensive land cover database for the nation called the National Land Cover Database (NLCD 2001).[30] The latest NLCD version available was completed in 2006 and is used throughout this report.

GIS analysis of the 2006 NLCD provided the following information:

Table 3.9: 2006 NLCD Land Cover within the Oatka Creek Watershed

NLCD Category	Acres	% Cover
11 - Open Water	263.54	0.2%
21 - Developed, Open Space	6,233.06	4.5%
22 - Developed, Low Intensity	2,194.81	1.6%
23 - Developed, Medium Intensity	553.99	0.4%
24 - Developed, High Intensity	130.77	0.1%
31 - Barren Land	521.52	0.4%
41 - Deciduous Forest	23,331.22	16.9%
42 - Evergreen Forest	819.75	0.6%
43 - Mixed Forest	4,733.67	3.4%
52 - Shrub/Scrub	5,663.28	4.1%
71 - Grassland/Herbaceous	479.71	0.3%
81 - Pasture Hay	43,436.60	31.5%
82 - Cultivated Crops	43,042.30	31.2%
90 - Woody Wetlands	6,221.27	4.5%
95 - Emergent Herbaceous Wetlands	407.65	0.3%
Total	138,033.14	

As Table 3.9 shows, the Oatka Creek watershed is dominated by agricultural land cover, with 31.2% devoted to "Cultivated Crops" and 31.3% of lands devoted to "Pasture/Hay." This is a larger amount of land area than is indicated by the land use analysis provided in Table 3.8. This discrepancy is likely due to the reporting methodology used by local Offices of the Assessor. It is likely that large tracts of lands identified as "residential" in real property records may also have some significant amount of pasture or other agricultural use. Forest cover accounts for approximately 21% of total land cover, while "developed" land accounts for a total of 6.8% of land cover within the Oatka Creek watershed.

Natural land cover – defined here by NLCD categories 41 (Deciduous Forest), 42 (Evergreen Forest), 43 (Mixed Forest), 90 (Woody Wetlands) and 95 (Emergent Herbaceous Wetlands) – are important components of a healthy watershed. As stated in the EPA manual, *Identifying and Protecting Healthy Watersheds:*

> Natural vegetative cover stabilizes soil, regulated watershed hydrology, and provides habitat to terrestrial and riparian species. The type, quantity, and structure of the natural vegetation within a watershed have important influences on aquatic habitats…Conversely, agricultural and urban landscapes serve as net exporters of sediment and nutrients, while increasing surface runoff and decreasing infiltration to ground water stores.[31]

A summary of 2006 NLCD data focusing on natural land cover categories is shown in Table 3.10:

Table 3.10: 2006 NLCD Natural Land Cover within the Oatka Creek Watershed

HUC 12 Subwatershed	Subwatershed Area (Acres)	*% Forest*	*% Wetland*	Natural Cover Total
Oatka Creek Headwaters	24,945.36	*35.7%*	*2.7%*	38.4%
Pearl Creek	36,308.63	*21.6%*	*2.7%*	24.3%

White Creek	25,435.30	*16.6%*	*5.8%*	22.4%
Mud Creek	10,442.77	*15.9%*	*6.5%*	22.3%
Village of LeRoy	18,462.55	*15.2%*	*6.4%*	21.6%
Oatka Creek Outlet	22,445.64	*15.5%*	*7.3%*	22.8%
Oatka Creek Watershed	**138,033.14**	***20.9%***	***4.8%***	**25.7%**

As the figures indicate, natural cover is relatively low throughout the watershed, with the highest percent natural cover found in the headwaters in Wyoming County. This is another indication of the watershed's intensive agricultural character.

A full explanation of 2006 NLCD categories and results by subwatershed are provided in Appendix D of this report.

3.5.3 Land Cover in the Riparian Zone

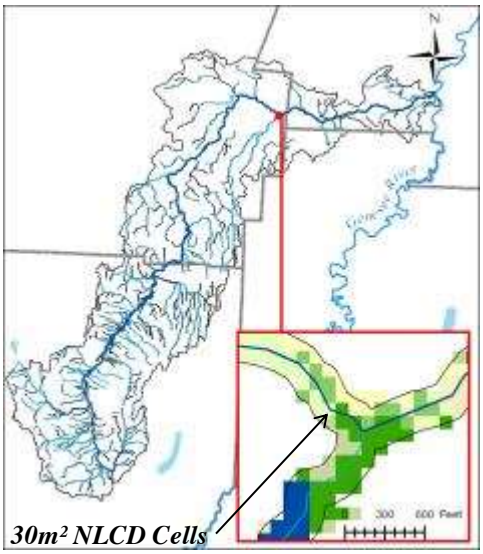
The land area directly adjacent to streams is considered to be among the most dynamic and sensitive components of a watershed and has a significant influence on water quality. A stream surrounded by tree cover and vegetation, for example, will benefit from the cooling effects of shade from the tree canopy above and bank stabilization from tree roots and other types of plant cover below. Detritus from surrounding plants will also be contributed to the stream as a source of nutrition and habitat for a variety of animals and organisms. Conversely, streams surrounded by impervious, hard, non-vegetative cover or agricultural cover will likely experience greater soil loss and more impacts from nonpoint source pollution.

Table 3.11: Analysis of Natural Land Cover within a 300' Buffer of All Streams, by Subwatershed

HUC 12 Subwatershed	Riparian Buffer Area (Acres)	*% Forest*	*% Wetland*	Natural Cover Total	*% Impervious*
Oatka Creek Headwaters	4,034.2	42.4%	7.5%	50%	<1%
Pearl Creek	6,345.1	32.4%	5.3%	37.7%	<1%
White Creek	3,198.9	26.4%	18.8%	45.2%	<1%
Mud Creek	1,368.8	19.2%	21.0%	40.2%	<1%
Village of LeRoy	1,511.2	18.5%	26.2%	44.7%	2.3%
Oatka Creek Outlet	1,960.2	27.5%	27.4%	54.9%	<1%
Oatka Creek Watershed	**18,389.61**	**30.9%**	**13.4%**	**44.3%**	**<1%**

In an effort to ascertain the level of natural cover within areas surrounding streams, a 300' buffer was created around each tributary within the watershed (150' linear distance perpendicular from the stream on both sides of the stream). The riparian buffer linear distance of 150' (45.7m) was selected in an effort to accommodate 30m² cells used by the NLCD raster grid. While correlations exist between various riparian buffer widths and specific ecological, chemical and stream morphological conditions, no such

Figure 3.6: Illustration of 300' Riparian Buffer Applied to the Oatka Creek Watershed



implications are made here with this selection of the 150' linear distance. Rather, the goal is simply to provide a snapshot of land cover in and around the riparian zone throughout the watershed.[32]

It is again important to emphasize that NLCD land cover classification is generalized on a 30x30 meter scale (.22 acres). Random ground-truthing of NLCD land cover pixels against aerial photography generally reveals a diverse array of actual land cover types within a given NLCD 30x30 meter pixel area. Results of this analysis should therefore be viewed with a degree of caution. Full results by subwatershed are provided in Appendix D.

As Table 3.11 illustrates, the lands adjacent to stream corridors within the Oatka Creek watershed have a modest percentage of natural cover within them, ranging from 40.2% natural cover in the Mud Creek subwatershed to 54.9% natural cover in the Oatka Creek Outlet subwatershed, with an overall total average of 44.3% natural cover throughout the entire Oatka Creek watershed. In the absence of natural cover, agricultural land cover – mainly pasture hay and cultivated crops – is often found to be the predominant land cover type (refer to full figures in Appendix D).

Table 3.11 also includes the percentage of impervious cover, which is a good indicator of aquatic system health.[33] This particular measure of impervious cover is a statistical average of the four "development" subcategories of the NLCD. Impervious cover is very low throughout the riparian area across the entire Oatka Creek watershed, with the highest level of riparian area impervious cover found in the 'Village of LeRoy' subwatershed at 2.3%.

3.5.4 Impervious Cover

The Center for Watershed Protection (CWP) defines impervious cover as "any surface in the urban landscape that cannot effectively absorb or infiltrate rainfall."[34] It is the sum of roads, parking lots, sidewalks, rooftops, and other impermeable surfaces of the urban landscape. The impacts of impervious cover on aquatic systems are well documented.[35] In 1994, CWP published the paper *The Importance of Imperviousness*, which outlined the empirical evidence showing the relationship between impervious cover and stream quality. Among the conclusions drawn from that paper:

- Impervious surfaces reduce infiltration of stormwater and increase stormwater runoff volumes and velocities;
- Impervious surfaces increase stream channel instability which, in turn, triggers a cycle of streambank erosion and habitat degradation;
- Impervious surfaces collect and accumulate pollutants deposited from the atmosphere, leaked from vehicles or derived from other sources and quickly directs those pollutants into receiving waterbodies in a concentrated fashion;
- Impervious surfaces along with other associated factors (such as decreased tree cover) amplify stream warming;
- Increases in impervious surfaces are associated with a decrease in the diversity, richness and composition of the aquatic insect community, such as macroinvertebrates; and

- Levels of subwatershed imperviousness in excess of 10 to 15% can have a negative impact on the abundance and diversity of fish communities as well as the richness of both the wetland plant and amphibian community. (pages 1-8)

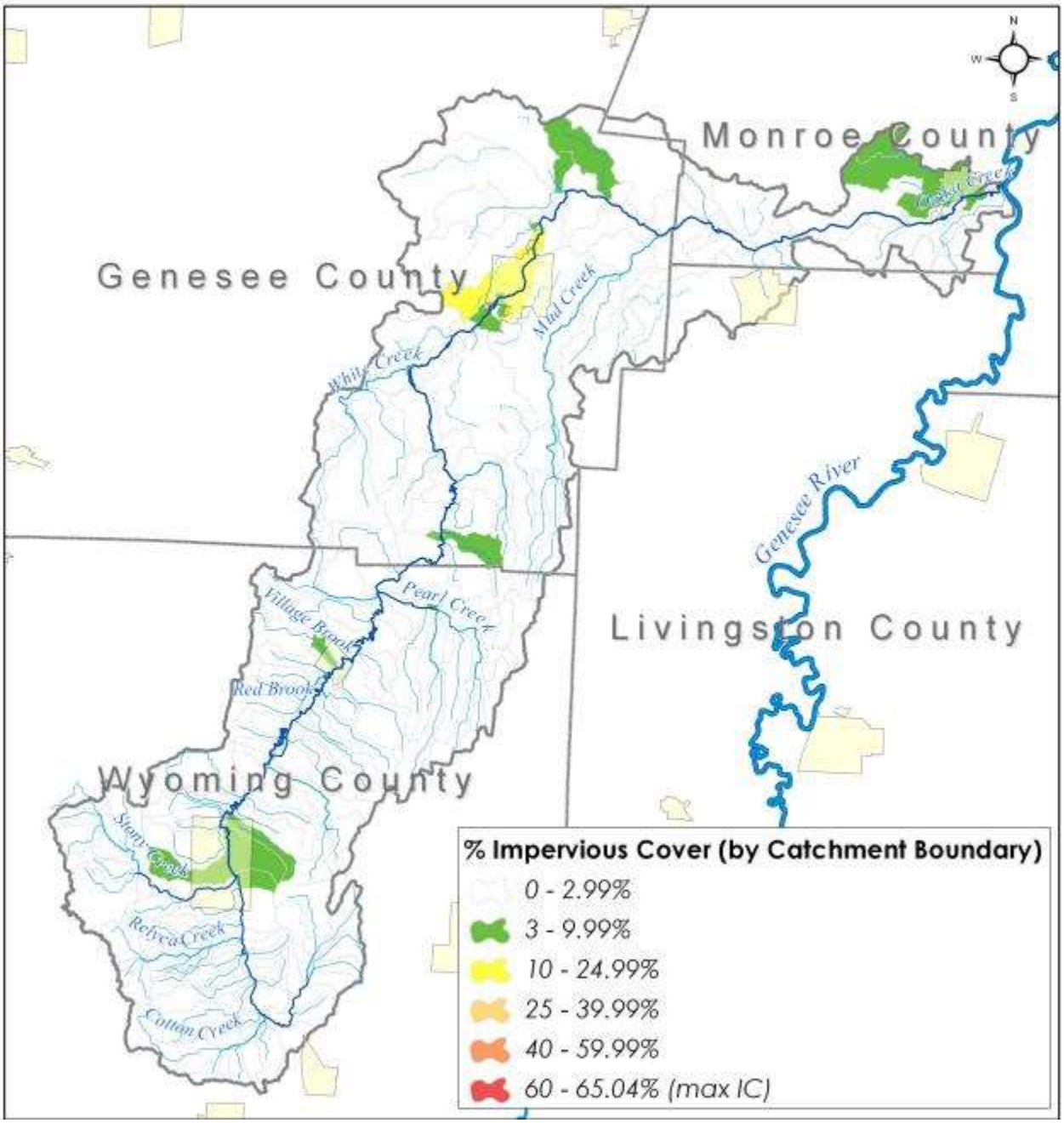
Impervious cover (IC) is therefore a key indicator of stream quality and watershed health. The CWP has integrated these research findings into a general watershed-planning model, known as the Impervious Cover Model (ICM). The ICM predicts that most stream quality indicators decline when watershed IC exceeds 10%, with severe degradation expected beyond 25% IC. While the actual stream response to the level of IC will vary based on a variety of conditions (local topography and physiology, other prevailing land cover characteristics, stormwater practices, watershed history), IC has nonetheless been identified as a significant contributor to aquatic system decline and therefore a reliable indicator of urban hydrologic stress.[36]

Table 3.12 illustrates the basic three-tiered threshold classification scheme of urban stream-quality potential based on watershed imperviousness levels.

Table 3.12: Relationship between Urban Stream Quality and Impervious Cover

Urban Stream Quality	Level of Imperviousness
Stressed	*1 – 10% Imperviousness*
Impacted	*11 – 25% Imperviousness*
Degraded	*>26% Imperviousness*

Figure 3.7: **% Impervious Cover by Catchment for Oatka Creek Watershed**



Impervious cover is obviously highest in urbanized areas within the watershed, such as the Villages of Warsaw, LeRoy, Caledonia and Scottsville. The density of buildings and streets creates a high degree of impervious cover in these areas. Because the catchment boundary in the Caledonia area is large, the ratio of impervious cover to open space is reduced, creating a low IC value. Overall, IC is not a major concern across the Oatka Creek watershed when measured by this standard, even in most villages. The Village of

LeRoy does have several small catchments with a high %IC. The ICM therefore provides a starting point for further research into how these areas affect local aquatic health.

Additional research might include the identification of *effective IC* within these catchments – that is, the specific locations where impervious surfaces are contiguous and directly tied to adjacent waterbodies. These particular areas could then be targeted for stormwater retrofit and mitigation projects in order to eliminate or reduce the negative impacts that they have on local aquatic health.

SECTION 3 ENDNOTES

[7] US EPA *Identifying and Protecting Healthy Watersheds* March 2011: page 2-1. Retrieved 8/11/11 from http://water.epa.gov/polwaste/nps/watershed/hw_techdocument.cfm.
[8] Tatakis, Timothy A. *The Oatka Creek Watershed State of the Basin Report*. 2002, page 10.
[9] *Black Creek Watershed State of the Basin* (2003), page 25.
[10] *Black Creek Watershed State of the Basin* (2003), pages 25-26.
[11] Reddy, J.E., and Kappel, W.M., 2010, Compilation of existing hydrogeologic and geospatial data for the assessment of focused recharge to the carbonate-rock aquifer in Genesee County, New York: U.S. Geological Survey Scientific Investigations Map 3132, 17 p., 20 sheets, at http://pubs.usgs.gov/sim/3132/.
[12] *Manure Management Guidelines for Limestone Bedrock/Karst Areas of Genesee County, New York: Practices for Risk Reduction. [Online] In Cornell University Nutrient Management Spear Program*. Retrieved 8/8/11 from http://nmsp.cals.cornell.edu/publications/files/Karst_2_15_2011.pdf
[13] *Downloadable Mining Database*. [Online] In *New York State Department of Environmental Conservation*. Retrieved 2/3/11 from http://www.dec.ny.gov/lands/5374.html
[14]. *Hydrologic Soil Groups*. [Online] In *National Engineering Handbook*, Title 210-VI, Part 630, Chapter 7, 2009. Retrieved 12/13/10 from USDA NRCS, online at http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba
[15] *A Guide to Oatka Creek*. [Online] In *Oatka Creek Watershed Committee*. Last retrieved 2/2/11 from http://www.oatka.org/creekhistory.php
[16] *Soil Properties and Qualities*. [Online] In *Natural Resources Conservation Service*. Retrieved 12/2/10 from http://soils.usda.gov/technical/handbook/contents/part618.html#36
[17] Portions of this description were adapted from the USDA Soil Surveys for Genesee (1969), Monroe (1973), and Wyoming (1974) Counties.
[18] *A Guide to Oatka Creek*. [Online] In *Oatka Creek Watershed Committee*. Last retrieved 2/2/11 from http://www.oatka.org/creekhistory.php
[19] Tatakis, Timothy A. *The Oatka Creek Watershed State of the Basin Report*. 2002, page 30.
[20] *StreamStats*. [Online] In *USGS*. Retrieved 8/1/11 from http://water.usgs.gov/osw/streamstats/.
[21] *Using a Mixing Model to Estimate Complex Mixtures within Conduits of Dissolution Karst: A Case Study near Le Roy, NY*, Jill Libby
[22] *Floods: recurrence intervals and 100 year floods*. [Online] In *USGS*. Retrieved 8/8/11 from http://ga.water.usgs.gov/edu/100yearflood.html.
[23] Text adapted from NYS DEC *Floodplain Regulation and the National Flood Insurance Program* handbook. 1990
[24] *ECL Article 15 Title 33 – Water Withdrawal Reporting*. [Online] In *New York State Department of Environmental Conservation*. Retrieved 8/01/11 http://www.dec.ny.gov/regulations/55632.html
[25] *Classification of Wetlands and Deepwater Habitats of the United States*. [Online] In *US EPA*. Retrieved 12/23/10 from http://www.fws.gov/wetlands/_documents/gNSDI/ClassificationWetlandsDeepwaterHabitatsUS.pdf
[26] EPA Regulations listed at 40 CFR 230.3(t)
[27] Smith, Mark P., Roy Schiff, Arlene Olivero, and James MacBroom. T*he Active River Area: A Conservation Framework for Protecting Rivers and Streams*. The Nature Conservancy: April 2008, page 1.
[28] *Tax Mapping in New York State*. [Online] In *New York State Department of Taxation and Finance Office of Real Property Tax Services*. Retrieved 12/01/10 from http://www.orps.state.ny.us/gis/taxmap/index.htm.
[29] Waterbodies, road rights of way and other minor boundary irregularities account for a cumulative discrepancy between the actual total area of the watershed and the total property acreage that is ultimately classified through the real property system.

[30] *National Land Cover Database*. [Online] In *Multi-Resolution Land Characteristics Consortium (MRLC)*. Retrieved 12/13/10 from http://www.mrlc.gov/about.php

[31] US EPA. *Identifying and Protecting Healthy Watersheds*. March 2011: pages 2-5. Retrieved 8/11/11 from http://water.epa.gov/polwaste/nps/watershed/hw_techdocument.cfm

[32] For a comprehensive literature review of riparian buffer functions and benefits, see *Riparian Buffer Functions and Benefits*. [Online] In *Maryland Department of Natural Resources*. Retrieved 8/8/11 from http://www.dnr.state.md.us/irc/bibs/riparianbuffers.html.

[33] For a comprehensive literature review of the association between impervious cover and aquatic system health, see *The Impervious Cover Model*. [Online] in *Center for Watershed Protection*. Retrieved 8/8/11 from http://www.stormwatercenter.net/monitoring%20and%20assessment/imp%20cover/impercovr%20model.htm .

[34] Center for Watershed Protection. Impacts of Impervious Cover on Aquatic Systems. March 2003, page 139.

[35] *Review of Key Findings of Recent Research Examining the Relationship of Urbanization on Aquatic Systems*. [Online] In *Stormwatercenter.net/*. Last viewed online 3/3/11 at http://www.stormwatercenter.net/monitoring%20and%20assessment/imp%20cover/impercovr%20model.htm

[36] Center for Watershed Protection. *Impacts of Impervious Cover on Aquatic Systems*.

4.0 Planning Considerations

"Ecology involves the study of the reciprocal relationships of all organisms to each other and to their biological and physical environments. Landscapes comprise the sum of natural and cultural elements seen in a single view. When we add "planning" to each of these terms, the combined term refers to developing future options for our surroundings, for the interrelationships among biological and physical processes, and for the visual manifestation of those relationships. Because our surroundings contain physical, biological, and built elements, environmental planning involves using knowledge about those elements to provide options for decision making."[37]

– "Environmental Planning Considerations." An excerpt from *Planning and Urban Design Standards*, a publication of the American Planning Association.

Section 4 of this report provides an overview of the various organizational structures, land uses, and regulatory measures relevant to environmental planning in the Oatka Creek watershed. Information pertaining to recent planning and organizational history, demographics, development trends, agricultural and other land use activities is provided herein.

4.1 Planning History[38]

A wide variety of planning, monitoring and restoration initiatives have been accomplished or are presently underway within the Oatka Creek watershed. These include activities being undertaken by academic institutions, county Soil and Water Conservation Districts, state and local government agencies, and a variety of other public and nonprofit entities.

While independent environmental research, planning and assessment has been taking place within the Oatka Creek watershed for decades, organized intermunicipal watershed planning activities within the watershed did not begin to emerge until the late 1980s and early 1990s. One of the more significant regional watershed planning efforts to take place in and around the Oatka Creek watershed was the Rochester Embayment Remedial Action Plan (RAP), a response to the 1987 US-Canada Great lakes Water Quality Agreement that required "Areas of Concern" to prepare RAPs.[39] The Rochester Embayment was named as an "Area of Concern" and its RAP, completed in 1997 (with updates as recent as 2011), was developed by representatives of the six counties that share the Genesee River Basin and the Rochester Embayment drainage. This report recognized the value of using a Basin-wide approach to addressing localized water quality issues that in some cases result from upstream activities, which would include the area of the Oatka Creek watershed.

An overarching goal of the watershed management planning process is the integration of these various initiatives and disciplinary perspectives into a more cohesive and holistic framework for natural resource management. The "Regulatory and Programmatic Environment" report builds upon information provided in the sections below.

4.1.1 Federal and State Agencies

Various Federal and State agencies have also been active for several decades in the management of Oatka Creek watershed resources. These actions have arisen both through cooperative agreements among county and local governments and specific agencies as well as through direct initiative by responsible agencies. These agencies include (but are likely not limited to) the following:

Table 4.1: Federal and State Agencies Active in the Oatka Creek Watershed

Agency	Relevant Roles and Responsibilities
United States Army Corps of Engineers (USACE)	The US ACE's stated vision is to "Provide vital public engineering services in peace and war to strengthen our Nation's security, energize the economy, and reduce risks from disasters." In doing so, the USACE plays a significant role in planning and building water resource improvements. The Corps of Engineers regulates construction and other work in navigable waterways under Section 10 of the Rivers and Harbors Act of 1899, and has authority over the discharge of dredged or fill material into the "waters of the United States" (a term which includes wetlands and all other aquatic areas) under Section 404 of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500, the "Clean Water Act"). Under these laws, those who seek to carry out such work must first receive a permit from the Corps. Other significant areas regarding the Corp's role in planning and building water resource improvements include recreation, emergency response and recovery, flood control and floodplain management, navigation, erosion and shore protection, hydrologic modeling, hydropower and water supply management.
United States Geologic Survey (USGS)	A division of the US Department of the Interior, the USGS focuses on research in the natural sciences with emphasis on subjects such as climate and land use change, core science systems, ecosystems, energy, minerals and environmental health, natural hazards, science quality and integrity and water
Federal Emergency Management Agency	A division of the US Dept. of Homeland Security, FEMA's mission is to support citizens and first responders to build, sustain, and improve capability to prepare for, protect against, respond to, recover from, and mitigate all hazards. Responsibilities includes floodplain management, flood hazard mapping and administration of the National Flood Insurance Program.
Environmental Protection Agency	Primary mission is to protect human health and the environment. EPA's FY 2011-2015 Strategic Plan identifies five strategic goals to guide the Agency's work: Goal 1: Taking Action on Climate Change and Improving Air Quality; Goal 2: Protecting America's Waters; Goal 3: Cleaning Up Communities and Advancing Sustainable Development; Goal 4: Ensuring the Safety of Chemicals and Preventing Pollution; and Goal 5: Enforcing Environmental Laws. The EPA enforces the Clean Water Act, the Safe Drinking Water Act, and a number of other important environmental regulations.
Natural Resources Conservation Service	A division of the US Department of Agriculture, the NRCS works with landowners through conservation planning and assistance designed to benefit the soil, water, air, plants, and animals that result in productive lands and healthy ecosystems.
US Fish and Wildlife Service	The U.S. Fish and Wildlife Service is a bureau within the Department of the Interior. Its mission is working with others to conserve, protect and enhance fish, wildlife and plants and their habitats for the continuing benefit of the American people. Among its key functions, the Service enforces Federal wildlife laws, protects endangered species, manages migratory birds, restores nationally significant fisheries, and conserves and restores wildlife habitat such as wetlands.
NYS Dept. of Environmental Conservation	The NYSDEC plays a major role in a diverse array of watershed planning and management issues, including regulatory, chemical and pollution control, dam safety, management of public lands and waters, wetlands protection, stormwater management, mining and reclamation, and the protection and management of animals, plants, aquatic life and associated habitats.
NYS Dept. of Health	NYSDOH tracks environmental health data and trends; oversees the delivery of drinking water in coordination with the EPA, addresses pathogens and other sources of contamination in public sources of drinking water; coordinates emergency preparedness and response for water systems; and provides financing mechanisms such as the NYS Drinking Water State Revolving Fund to help protect and expand public water systems.

NYS Dept. of State	Includes the Division of Coastal Resources, which is involved in a wide variety of programs and initiatives that help revitalize, promote and protect New York's communities and waterfronts. Functions include implementing the State's *Waterfront Revitalization of Coastal Areas and Inland Waterways Act*, planning and technical assistance for redevelopment of brownfields, abandoned buildings and deteriorated urban waterfronts, protecting water quality through intermunicipal watershed planning, as well as investing in improvements to waterfront areas through state and federal grant programs.
NYS Dept. of Agriculture and Markets	Relevant Divisions include Soil and Water Conservation and Agriculture Protection and Development which in conjunction with other divisions administer programs such as Agricultural Environmental Management, Agricultural Districts and Farmland Protection.
Great Lakes Commission	The Great Lakes Commission is a public agency established by the Great Lakes Basin Compact in 1955 to help its Member states and provinces speak with a unified voice and collectively fulfill their vision for a healthy, vibrant Great Lakes - St. Lawrence River region. Houses a wide variety of action-oriented programs intended to address specific concerns related to regional coordination and management of natural resources.

4.1.2 County and Local Government

Many local, state and federal offices and agencies are acting both independently and cooperatively in an effort to monitor and manage the natural resources in the Oatka Creek watershed.

County governments have a large stake in the pragmatic management of watershed resources. Protecting the public's health and safety through flood and hazard management and the maintenance or monitoring of regional water quality are important responsibilities that a number of county departments and divisions share. Flood monitoring and control also have direct implications for the protection of public infrastructure, such as roads, bridges and other forms of public property that may cross or lie within a floodway. Since 2000, stormwater management efforts associated with state and federal stormwater regulations have been administered cooperatively by the Stormwater Coalition of Monroe County. The Coalition consists of 28 regulated municipal entities throughout Monroe County. The Coalition implements a wide range of projects and programs that reduce stormwater pollution, including public education, training for municipal employees, and assistance with stormwater system mapping.

A number of counties in the Oatka Creek watershed manage a significant amount of public parkland in the watershed. These spaces serve multiple functions, including recreation and habitat protection. A review of existing reports and studies included in Appendix E illustrates some of the efforts undertaken to inventory and maintain those spaces. Similarly, local citizens have over time made their towns, cities and villages responsible for providing a variety of public services to varying extents. Parks, wastewater treatment plants, and departments of public works are among the important services that local municipalities provide that can play a role in maintaining watershed integrity.

4.1.3 Regional Planning

The Finger Lakes-Lake Ontario Watershed Protection Alliance (FL-LOWPA) is comprised of county representatives from multiple disciplines and agencies, including Soil and Water Conservation Districts, Planning and Health Departments, and Water Quality Management Agencies. Governed by a Water Resources Board made up of appointees from its member counties, FL-LOWPA's purpose is to protect and enhance water resources by promoting the sharing of information, data, ideas, and resources pertaining to the management of watersheds in New York's Lake Ontario Basin; fostering dynamic and

collaborative watershed management programs and partnerships; and emphasizing a holistic, ecosystem-based approach to water quality improvement and protection.[40]

A major tenet of FL-LOWPA is grassroots programming. Water quality problems are defined and solutions are developed and implemented at the local level. Through participation in the Alliance, member counties develop a more regional perspective that informs local programming and encourages cooperation. To date, FL-LOWPA has helped to provide significant funding for Oatka Creek watershed planning and restoration projects.

The Genesee Transportation Council (GTC) is the designated Metropolitan Planning Organization (MPO) responsible for transportation policy, planning, and investment decision making in the Genesee-Finger Lakes Region. The U.S. Department of Transportation (USDOT) requires every metropolitan area with a population of over 50,000 to have a designated MPO to qualify for the receipt of federal highway and transit funds. These highway funds can be a significant share of funding for transportation improvement projects in the Oatka Creek watershed, such as road and bridge maintenance or construction. All GTC activities are responsive to mandates and guidelines, including, but not limited to, the Americans with Disabilities Act, Clean Air Act Amendments of 1990, Title VI of the Civil Rights Act of 1964, and environmental justice considerations.

Genesee/Finger Lakes Regional Planning Council (G/FLRPC) supports watershed planning in the Oatka Creek watershed directly through the acquisition of funding for specific projects as well as indirectly through its ongoing land use and water resources planning projects that are active across its nine-county region. These programs and projects encompass a variety of services that advance the overall goal of protecting and improving water quality and quantity. As a regional agency, G/FLRPC is able to examine and coordinate water resource issues effectively at a watershed scale.

4.1.4 County Soil and Water Conservation Districts (SWCDs)

Soil and Water Conservation Districts (SWCDs) within each watershed county play a critical role in the management of natural resources and agricultural activities in the watershed. SWCD activities are guided through the leadership of the New York State Soil and Water Conservation Committee, which works closely with the New York State Department of Agriculture and Markets. The mission of the New York State Soil and Water Conservation Committee is to develop an effective program to conserve soil and water, to maintain water quality, and to manage agricultural nonpoint-source water pollution for the State of New York. These programs are implemented primarily through county Soil and Water Conservation Districts.[41] SWCDs in the Oatka Creek watershed have played an instrumental role in the implementation of agricultural Best Management Practices (BMPs) on local farms, as well as applying for funding and implementing projects that address erosion and sediment reduction, streambank remediation, and nonpoint-source pollution control.

4.1.5 Academic Institutions

Regional academic institutions have played an important role in watershed planning and management in the Oatka Creek watershed. Independent research conducted by environmental science, geology, biology and other similar departments at regional colleges and universities has significantly advanced the knowledge base within the watershed. This is evidenced by the extensive list of research papers cited in

Appendix E. SUNY Brockport is presently active in the watershed conducting various water quality and quantity monitoring studies in support of a variety of short- and long-term projects and programs. In addition, SUNY Geneseo, Genesee Community College, the State University at Buffalo, Rochester Institute of Technology, University of Rochester, and Cornell University have each focused research and expertise specifically on the Oatka Creek watershed. Academic institutions will continue to be important watershed stakeholders that play a vital role in information gathering and analysis.

4.1.6 Not-for-Profit Organizations

The list of not-for-profit organizations that have initiated or assisted watershed planning, protection and restoration efforts in the Oatka Creek watershed is long and diverse.

The Oatka Creek Watershed Committee (OCWC) is a not-for-profit organization whose mission in part is to "facilitate the development of a watershed management plan for use by municipalities, stakeholders and individuals for the conservation and protection of the Oatka Creek watershed."[42] The Committee was formed in 1998 with the support and direction of the Rochester Area Community Foundation (RACF), and was established as a stand-alone organization consisting of a wide variety of stakeholders and agency members. It was incorporated in January of 2002, and remains an active participant in planning efforts for the watershed. In addition, the OCWC website is used as a repository for information related to watershed planning activities taking place in and around the watershed. The website also serves as an important tool for information dissemination and tracking progress. The website address is http://www.oatka.org/.

As indicated above, the Rochester Area Community Foundation has provided important financial support for a number of organizational and educational and outreach activities, such as the *Guide to Oatka Creek* brochure. In addition, local and international organizations such as Trout Unlimited and the Genesee Land Trust are a sample of the organizations that have supported important research, mitigation and preservation actions in the Oatka Creek watershed.

4.2 Existing Watershed Reports and Studies

An annotated bibliography of existing reports and studies pertaining to water quality and natural resource protection has been compiled and posted online at the project website; a summary bibliography has been included in Appendix E of this report.[43]

4.3 Inventory of Local Regulations

The Constitution of the State of New York specifies that the primary authority for guiding community planning and development is vested in cities, towns and villages. This authority is commonly referred to as "home rule" and is implemented locally through the creation of comprehensive plans, zoning, subdivision, site plan and other regulatory mechanisms. From time to time, when devising or administering these documents, local government agencies may voluntarily turn to certain entities for consultation or support, such county or regional planning departments, municipal associations, and state agencies such as the Departments of Transportation, Environmental Conservation, or State.

Table 4.2: Summary of Local Land Use Regulations Among Primary Municipalities in the Oatka Creek Watershed44

	Comprehensive Plan	Zoning	Site Plan Review	Subdivision Law	Provisions for Planned Unit or Cluster Dev't	Erosion/ Sediment Control Law	Flood Damage Prevention
Town of Bergen*	1996	1983 (e-code)	Yes	Yes	Yes	Yes	Yes
Town of Bethany*	2007	2008	Yes	Yes	Yes	Yes	Yes
Town of Byron*	1993 (under revision)	1997 (under revision)	Yes	Yes	Yes	Yes (see General Provisions)	Yes
Town of Caledonia	1964	1994 (e-code)	Yes	Yes	Yes	No	Yes
Village of Caledonia	2003	1999	Yes	Yes	Yes	unk	unk
Town of Castile	1967	1993	Yes	No (section reserved)	Yes	No (section reserved)	unk
Town of Covington	2006	2001	Yes	Yes	Yes	No (plat review by SWCD)	Yes
Town of Gainesville	1995 (within zoning)	2004	No	No	No	No	Yes
Town of LeRoy	2002	1989	Yes	Yes	Yes	No	Yes
Village of LeRoy	2001	1990	Yes	Yes	Yes	No	Yes
Town of Middlebury*	2009 (within zoning)	2009	Yes	No	Yes	No	Yes
Town of Orangeville	2009	2009 (online)	Yes	No	Yes	Yes	Yes
Town of Pavilion	2003	2006	Yes	Yes	Yes	No	Yes
Town of Perry	1969	2000	Yes	Yes	Yes	No	Yes
Town of Riga	2008	2008 (e-code)	Yes	Yes	Yes	Yes	Yes
Village of Scottsville	2004	2005	Yes	Yes	No	No	Yes
Town of Stafford*	2009	2009 (e-code)	Yes	Yes	Yes	No	Yes
Town of Warsaw	2004 (within zoning)	2004	Yes	Yes	Yes	No	Yes
Village of Warsaw	1994	1995	Yes	Yes	Yes	No	Yes
Town of Wheatland*	2004	1980 (e-code)	Yes	Yes	Yes	Yes	Yes
Village of Wyoming	None	1994	Yes	No	Yes	No	Yes

4.3.1 Municipal Plans and Regulations

An inventory of the local regulatory environment indicated that each municipality within the watershed has zoning and some form of comprehensive plan in place. The majority of municipalities have a host of additional supplemental regulations in place that are intended to decrease risks to the health and safety of the public and in some cases lessen the impacts of land development on the natural environment. A more in-depth review and analysis of the local regulatory environment will take place under subsequent tasks

associated with this watershed planning project in an effort to identify and elucidate the effectiveness of these local laws with respect to water quality and natural resource protection.[45]

4.3.2 County Plans and Regulations

According to the *New York State Local Government Handbook*, counties in New York State function as a municipal corporation with geographical jurisdiction, home rule powers and the fiscal capacity to provide a wide range of services to its residents.[46] To some extent, counties have evolved into a form of "regional" government that performs specified functions and that encompasses, but does not necessarily supercede, the jurisdiction of the cities, towns and villages within their borders. Counties therefore have the authority to implement a range of environmental and public health plans, studies and initiatives.

Table 4.3: Description of County Legislatures

County	Chief Administrative Official	Legislative Body	Number of Members*
Genesee County	Manager	Legislature	9
Livingston County	Administrator	Supervisors	17
Monroe County	Executive	Legislature	29*
Wyoming County	Administrator	Supervisors	16

**Updated population figures from the 2010 Census may result in redistricting and associated changes to the number of members in 2011.*

As summarized in Table 3.4, each county has its own farmland and agricultural protection plan in place. Farmland and agricultural protection plans are created pursuant to 1NYCRR Part 372 of the New York State Agriculture and Markets Law.[47] Such plans are required to include a statement of the county's goals with respect to agricultural and farmland protection, identification of any lands or areas that are proposed to be protected, and a description of the strategies intended to be used by the county to promote the maintenance of lands in active agricultural use. In addition, Livingston County has aggressively pursued a farmland purchase of development rights (PDR) program, leveraging funds from the New York State Department of Agriculture & Markets to protect over 3,000 acres of farmland in the county to date.[48]

Table 4.4. Summary of Selected County Plans and Regulations

	Farmland and Agricultural Protection Plan	Dept. of Health Onsite Wastewater Treatment System Inspection		Hazard Mitigation Plan
		Inspection for new construction	*Inspection at time of refinance or property transfer*	
Genesee County	2002	Yes	Yes*	Yes
Livingston County	2006	Yes	Yes	Yes
Monroe County	1999	Yes	Recommended[49]	Yes
Wyoming County	2005	Yes	Yes	Yes

**For refinancing, inspections are typically performed upon request from the lending institution.*

Information on how county health departments approach the management of septic systems is also provided in Table 4.4. Sections 347 and 308 of NYS Public Health Law give county boards of health the authority to enact regulations for protection of public health. Each county within the study area has a department of health that performs or requires new onsite wastewater treatment system inspections at the time of new construction; Genesee, Livingston and Wyoming Counties require inspections at the time of property transfer as well. It is important to note, however, that the specific requirements associated with individual inspection of on-site septic systems vary significantly from county to county. Sewage disposal

system failures can manifest in a number of ways over time, and those failures can be very difficult to detect because the system is buried. Standard inspections, which are typically non-invasive, are not necessarily thorough enough to ensure that the system is functioning properly. A full review and comparison of county inspection procedures will be included in the subsequent *Evaluation of the Regulatory and Programmatic Environment* associated with this project.

Each county has developed a multi-jurisdictional "all-hazard" mitigation plan that operates under a five-year mandatory review cycle.[50] These plans typically include a detailed characterization of natural and man-made hazards in the county (such as flooding risk or hazard materials risk); a risk assessment that describes potential losses associated with the hazards; a set of goals, objectives, strategies and actions that will guide the county's hazard mitigation activities; and a detailed plan for implementing and monitoring the plan.

Table 4.5. Summary of Hazards Rated as "High" or "Moderately High" within County Hazard Mitigation Plans[51]

County	Genesee County	Livingston County	Monroe County	Wyoming County
Blight				
Civil Unrest			MH	
Dam Failure			MH	
Earthquake				
Energy Crisis			MH	
Explosion			MH	
Extreme Temperatures				
Flood	MH	MH	MH	MH
Fire	MH	MH	MH	MH
Hazardous Materials (Fixed Site)	MH	MH	MH	
Hazardous Materials (in transit)	MH	H	MH	MH
Ice Storm	MH	MH	MH	MH
Infestation				
Landslide			MH	
Oil Spill		MH		
Radiological (Fixed Site)			MH	
Severe Storm			MH	MH
Structural Collapse			MH	
Terrorism		MH	MH	MH
Tornado		MH	MH	
Transportation Accident	MH		MH	
Utility Failure			MH	
Water Supply Contamination	MH		MH	MH
Winter Storm (Severe)			MH	MH

"H" – High Hazard; "MH" – Moderately High Hazard

In addition to the plans listed above, Genesee County has developed an innovative regional planning tool called the Genesee County Smart Growth Plan. Implemented in 2001, the Plan is described as "a mitigating action of potential significant environmental impacts of the Genesee County Water Supply Project upon the viability of agriculture in Genesee County."[52] The Plan is intended to encourage the revitalization of villages and hamlet areas and protect valuable agricultural resources by focusing new industrial, commercial, and residential development opportunities in those areas presently served by public water.

As with municipal plans and regulations, a more in-depth review and analysis of the county and regional regulatory environment will take place under subsequent tasks associated with this watershed planning project.[53]

4.4 Population

Population and the environment are inherently connected. Local economic prosperity is closely tied to residential and commercial growth and development, which in turn are influenced by population growth. Population growth – rapid population growth in particular – can sometimes occur at the expense of the natural environment, putting strains on the carrying capacity of terrestrial and aquatic ecological communities. It is therefore important that we understand where population growth is occurring and at what rate.

In the simplest of terms, local population is determined by net mortality and fertility rates along with net migration either into or out of the geographic unit of observation (in our case a watershed, or a community within a watershed). Our understanding of population figures and trends is largely based on information provided through the decennial census of population conducted by the US Census Bureau. During years between decennial censuses, measuring migration in areas of interest can be challenging and is typically based on estimates and extrapolation. The following sections provide a brief overview of our understanding of current population statistics and trends in the Oatka Creek watershed.

4.4.1 Census Block Analysis

The smallest geographic unit of observation (or land area) that the US Census Bureau reports population figures for is called the *census block*. Census blocks generally conform to municipal or neighborhood boundaries, not natural boundaries (such as a watershed). Therefore, it is not possible to ascertain specific population figures for a watershed boundary utilizing decennial data from the US Census. Furthermore, the census block boundaries sometimes change between decennial census years, making 10-year trend analysis at the block level a difficult endeavor. A number of methods do exist, however, that can be used to provide insight and estimates for population figures within a watershed area.

Typical towns and villages within the Oatka Creek watershed consist of multiple census blocks; by identifying those blocks that are completely within the watershed boundary and those that overlap the watershed boundary, we are provided with a reliable population range. An analysis of census block figures within the Oatka Creek watershed from figures reported in Census 2000 showed a population range between 21,054 and 28,780 persons, a difference of over 7,700 persons. While this range is significant, it can be assumed that the actual population of the Oatka Creek watershed is closer to the high end and is likely approximately 28,000 persons. This assumption is based on close observation of population density maps in combination with the census block boundaries themselves.

Table 4.6. Population Estimates for Subwatersheds	
Subwatershed Name	**Estimated Subwatershed Population (Census 2000)**
Oatka Creek Headwaters	<3,585
Pearl Creek	<6,707
White Brook	<3,713
Mud Creek	<3,733
Village of LeRoy	<7,103
Oatka Creek Outlet	<8,453

A similar method was used to identify census blocks that intersect subwatersheds, the results of which are illustrated in Table 4.6. This process yields very rough figures; in some cases census blocks and the population figures within them are counted for more than one subwatershed because they overlap subwatershed boundaries. While these figures therefore are not exclusive, they nonetheless provide a general estimate of the concentration of population in the general vicinity of the subwatershed. Furthermore, the estimate also provides a basic figure of the population that have a direct influence on the watershed.

4.4.2 Population Density

Population density maps (Maps 22 and 23 in Appendix A) provide insight to the locations with the highest concentrations of population in the watershed. Population densities are generally highest within villages and hamlets. In many instances, population densities are also high directly outside of village boundaries following major highways.

4.4.3 Population Change[54]

Population figures for the Census years 1980 – 2010 are shown for the Towns in the Oatka Creek watershed in Table 4.7. Overall, population has been relatively stable across the Oatka Creek watershed since 1980 and population trends are generally in line with those across Upstate New York and throughout the Great Lakes region of the United States for this same time period. The most significant population increases since 1980 have been in the Towns of Riga, Bergen, Orangeville, and Covington, although it should be noted that the population gains made in Orangeville have very likely occurred in areas outside of the Oatka Creek watershed. Five municipalities showed a population decline during this same time period : Perry, Bethany, LeRoy, Stafford and Wheatland. Overall, the total population increase for all towns listed in Table 4.7 was 3%.

Table 4.7. Population Change of Towns in the Oatka Creek Watershed, 1980 – 2010 (total town population; figures include population of villages and cities within)

Municipality	Population 1980[55]	Population 1990[56]	Population 2000[57]	Population 2010[58]	*Percent Change*			
					1980-1990	*1990-2000*	*2000-2009*	***1980-2009***
Town of Bergen	2,568	2,794	3,182	3,120	9%	14%	-2%	**21%**
Town of Bethany	1,876	1,808	1,760	1,765	-4%	-3%	0.3%	**-6%**
Town of Byron	2,242	2,345	2,493	2,369	5%	6%	-5%	**6%**
Town of Caledonia	4,034	4,441	4,567	4,255	10%	3%	-7%	**5%**
Town of Castile	2,865	3,042	2,873	2,906	6%	-6%	1%	**1%**
Town of Covington	1,075	1,266	1,357	1,232	18%	7%	-9%	**15%**
Town of Gainesville	2,133	2,288	2,333	2,182	7%	2%	-6%	**2%**
Town of LeRoy	8,019	8,176	7,790	7,641	2%	-5%	-2%	**-5%**
Town of Middlebury	1,561	1,532	1,508	1,441	-2%	-2%	6%	**2%**
Town of Orangeville	1,103	1,115	1,301	1,355	1%	17%	4%	**23%**
Town of Pavilion	2,375	2,327	2,467	2,495	-2%	6%	1%	**5%**
Town of Perry	5,437	5,353	6,654	4,616	-2%	24%	-31%	**-15%**
Town of Riga	4,309	5,114	5,437	5,590	19%	6%	3%	**30%**
Town of Stafford	2,508	2,593	2,409	2,459	3%	-7%	2%	**-2%**
Town of Warsaw	5,074	5,342	5,423	5,064	5%	2%	-7%	**-0.2%**
Town of Wheatland	4,897	5,093	5,149	4,775	4%	1%	-7%	**-2%**

4.4.4 Population Projections

Population projections to the year 2040 were prepared by G/FLRPC in 2003. While these projections do not incorporate actual figures from the 2010 Census, the relatively minor variances between actual and projected population figures for 2010 do not result in significant changes in the numbers. Results of these projections for the towns in the Oatka Creek watershed are provided in Table 4.8 on the following page.

Table 4.8. Population Projections, 2000 – 2040

	2000 (actual)	*2010 (projected)*	*2020*	*2030*	*2040*	% Change 2000 – 2040
Town of Bergen	3,182	*3,272*	*3,296*	*3,324*	*3,345*	**5.1%**
Town of Bethany	1,760	*1,772*	*1,782*	*1,791*	*1,798*	**2.2%**
Town of Byron	2,493	*2,547*	*2,591*	*2,629*	*2,661*	**6.7%**
Town of Caledonia	4,567	*4,698*	*4,817*	*4,912*	*4,994*	**9.3%**
Town of Castile	2,873	*2,923*	*2,927*	*2,927*	*2,926*	**1.8%**
Town of Covington	1,357	*1,388*	*1,414*	*1,436*	*1,454*	**7.1%**
Town of Gainesville	2,333	*2,377*	*2,353*	*2,326*	*2,296*	**-1.6%**
Town of Le Roy	7,790	*7,792*	*7,767*	*7,743*	*,7716*	***.9%***
Town of Middlebury	1,508	*1,525*	*1,505*	*1,481*	*1,458*	**-3.3%**
Town of Orangeville	1,301	*1,340*	*1,372*	*1,399*	*1,423*	**9.4%**
Town of Pavilion	2,467	*2,512*	*2,549*	*2,581*	*2,608*	**5.7%**
Town of Perry	4876	*4,811*	*4,761*	*4718*	*4682*	**-4.0%**
Town of Riga	5437	*5549*	*5636*	*5710*	*5767*	**6.1%**
Town of Stafford	2,409	*2,441*	*2,466*	*2,488*	*2,507*	**4.1%**
Town of Warsaw	5423	*5503*	*5426*	*5348*	*5269*	**-2.8%**
Town of Wheatland	5149	*5240*	*5311*	*5369*	*5414*	**5.1%**

4.5 Development

Communities depend on new development to help broaden the local tax base and alleviate the costs of public services. New development, however – if left unchecked – can have a cumulative, detrimental effect on the stability of a community's ability to provide cost-efficient public services and protect the natural environment. Even when faced with declining population trends, communities across the region continue, actively or passively, to encourage development outside of traditional population centers. The result is "sprawl without growth," a phrase coined by Rolf Pendall of Cornell University to describe the disproportionate rate of new green-field land development in the face of slow population growth or outright population decline.[59]

While most indicators seem to imply that sprawl is not presently a major concern throughout the entire Oatka Creek watershed, it is nonetheless a potential concern of significance. New home construction has been relatively flat across Upstate New York for several decades; with isolated exceptions, this trend holds true for most municipalities within the watershed. Anemic regional growth rates are largely a product of external forces such as global and regional economic trends, state finance and taxation policies, and national migration patterns. Oatka Creek watershed communities are in fact capable of accommodating significant residential and commercial development given the presence of ample available land and a well-maintained infrastructure that could support and enable growth if market conditions allow. If external forces happen to shift and begin to favor new development once again in Upstate New York, it remains to be seen how prepared communities in the Oatka Creek watershed will be to address rapid residential or commercial development.[60]

4.5.1 Roads and Bridges

As shown in Table 4.9, there are over 520 center-line miles of roads and 55 major bridges that cross a hydrologic feature in the Oatka Creek watershed (a major bridge is considered any road/stream crossing structure other than a culvert).

Table 4.9: Center Line Road Miles and Associated Bridges in the Oatka Creek Watershed[61]

	Federal	State	County	Local (Town/City/Village)	Private	Total
Road Miles	38.63	73.37	128.48	277.34	2.43	520.25
Bridges	3	16	14	22	-	55

Roads and highways have the potential to generate or contribute substantial amounts of eroded material and other pollutants into local waterbodies. Specific contaminants associated with road runoff include sediment, oils and grease, heavy metals, garbage/debris, and road salts, as well as fertilizers, pesticides and herbicides applied to roadside facilities or spilled on or near roads. Hydrologically-connected roads – roads designed to contribute surface flow directly to a drainage channel – have the greatest potential to deliver road-derived contaminants to streams.

Bridges present a number of additional risks to hydrologic function. In some cases, the bridge itself creates a direct connection between the roadway and stream if the bridge drain is not diverted to an on-land treatment facility (generally ground infiltration or retention). Bridges and culverts, if built too small, can restrict and concentrate stream flow, thereby creating or accelerating stream bank erosion and stream incision. When not properly maintained or designed, bridges and culverts will cause debris accumulation and contribute to upstream flooding and possible property damage. Bridges and culverts can also restrict wildlife passage and fish movement, if not properly designed and maintained. Conversely, bridge crossings also offer excellent opportunities for recreational access to rivers and streams, a possibility that should be considered during any necessary construction or repair of such facilities.

Table 4.10: Major Bridge Crossings by Waterbody

	Federal	*State*	*County*	*Local*
Oatka Creek	2	11	9	13
Mud Creek		1		2
Pearl Creek		1	1	1
Relyea Creek		1		
Spring			1	
Stony Creek	1	1	1	3
White Creek				2
Unnamed Tributary		1	2	1

Map 12 in Appendix A illustrates the various categories of roads as described above and provides locations of each of the 55 bridges identified. In addition, a more comprehensive discussion of the impacts of impervious surfaces on waterbodies is provided under Section 3.5.4.

4.5.2 Water and Sewer Infrastructure

A basic indicator of residential and commercial growth and development is the presence of infrastructure – in particular, public water and sewer supply. Maps in Appendix A illustrate the location of water lines and sewer lines in the Oatka Creek watershed as of December 2008. As the maps illustrate, centralized sewer systems are located in the Villages of Warsaw, Churchville, Scottsville, and the hamlet of Pavilion. (Note that while no line data are available for the Village of Scottsville, it is also serviced by a central wastewater treatment facility). The Villages of Wyoming and Caledonia do not have centralized wastewater treatment facilities; homes in these population centers rely on onsite wastewater treatment systems.

Centralized water systems are spread throughout the northern half of the Oatka Creek watershed, but become less prevalent in Wyoming County.

4.5.3 Land Use Monitoring Report[62]

The Genesee Transportation Council (GTC) provides funding annually to G/FLRPC in order to conduct the Regional Land Use Monitoring Report (LUMR). This report provides information on the issuance of building permits within each municipality dating back to 1999. The primary purpose for collecting these data is to identify areas of growth within the region that might require transportation planning and service modifications. These data can also help to draw very general conclusions pertaining to threats to watershed integrity that may be posed by high rates of growth and development.

LUMR figures for towns that issued an average of 4 or more residential building permits per year between the years 2005 through 2010 are summarized below:

Table 4.11: Municipalities Averaging 4 or more Residential Building Permits per Year (entire town)[63]

	2005	2006	2007	2008	2009	2010	6 Year Average
Town of Riga	13	7	5	3	5	3	**6.0**
Town of Castile	5	6	3	4	6	5	**4.8**
Town of Wheatland*	12	4	3	5	4	1	**4.8**
Town of Perry	8	3	4	6	3	0	**4.0**

As stated above, these figures are for residential building permits only; they include only permits issued for the construction of buildings. Furthermore, permit issuance does not imply actual construction. Results for all municipalities are available in Appendix C.

4.5.4 Projected Build Out

"Build out" refers to a hypothetical time when a municipality (or, more specifically, a zoning district within a municipality) cannot accommodate any more development due to the lack of additional space as dictated by local land use regulations. Build out scenarios are typically mathematical exercises that attempt to calculate the time when build out is likely to occur given a projected rate of growth and development. In order to calculate build out, a number of basic assumptions are made. First, the model assumes that zoning laws regarding allowable lot densities will remain the same over time. Second, the model requires a projected rate of growth to be assumed over time; these are typically based on standard

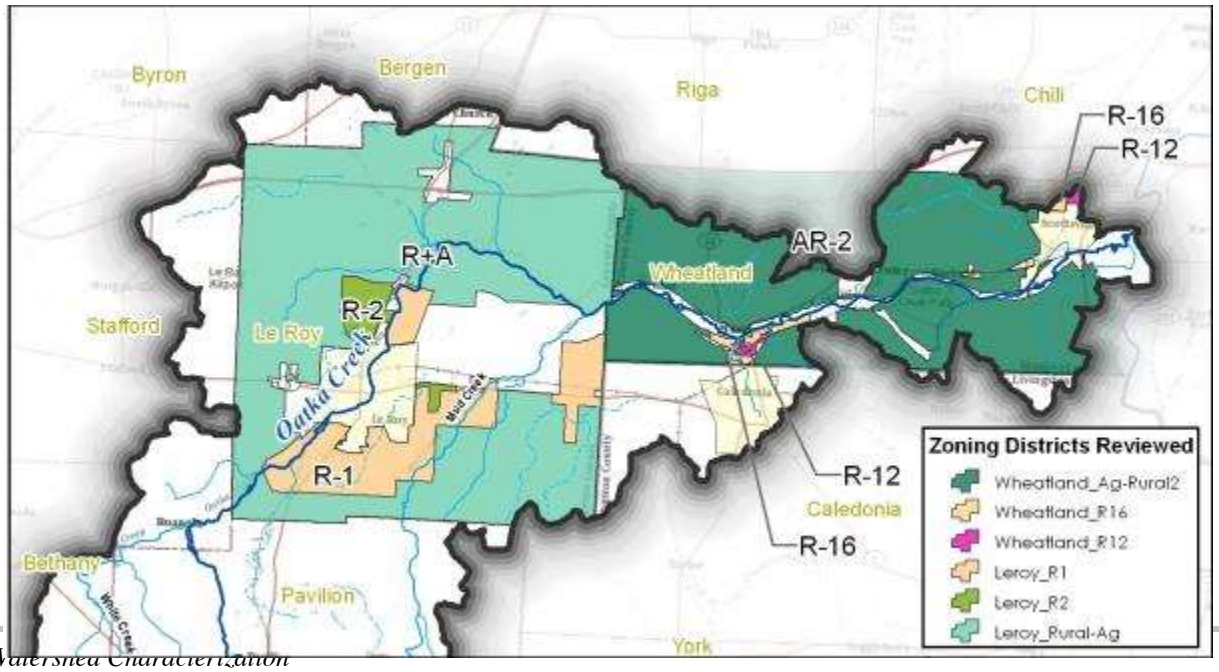
population projections. Finally, the model attempts to calculate or predict standardized "restraints" to development within a given area. Restraints comprise an estimate of gross land that would not be open to new home construction due to environmental restrictions or other physical constraints. Restraints might include areas of standing water, regulated floodplains, regulated/protected wetlands, steep slopes, or simply the area of land required for roads, parks, and other public services.

Even in situations where land use, zoning, and population information is accurate and readily available, build out scenarios have limited application when generalized across a large land area or multiple zoning districts. Furthermore, given that the scenarios are based on population projections, any projected decreases in population will render the build out model null and void. In light of these challenges, a focused approach to build out was conducted in the Oatka Creek watershed, one that limited the scope strictly to those municipalities known to have relatively high rates of growth occurring in them.

The build out analysis was based on the following criteria:

- Exclude villages (most villages are at or near buildable capacity or have strict limits to growth governed by their municipal boundaries)
- Focus only on towns with high rates of growth relative to other towns in the watershed by reviewing:
  - Rate of residential building permit issuance over a 5-year period
  - Rate of population change between the years 2000 and 2010, recognizing only those towns with an increase in population during that time period
  - Any municipalities that show tepid growth rates or population decline will be excluded from analysis
- Within selected towns, analyze only those zoning districts presently zoned 'residential' or 'agricultural'
  - While many agricultural areas in the watershed are deliberately zoned as such in order to protect and maintain agricultural uses, the model assumes that those protections may be waived by the land owner or municipality in lieu of residential development

Figure 4.1: Zoning Districts Reviewed for Build Out Analysis



- Zoning districts must have adequate vacant land within them to accommodate new lots or subdivisions
- Focus only on those zoning districts that have public water available in or very near to them
  - Public water has the potential to induce residential growth and development

Full methodology of the build out analysis can be found in Appendix B: Data Sources and Notes. Based on the assumptions above, the build out analysis produced the following results for these selected zoning districts:

Table 4.12: Estimated Build Out for Selected Zoning Districts in High-Growth Municipalities

Municipality/ Zoning District	Net acres available for development within watershed portion of district (adjusted for all constraints)	Minimum lot size (sq. feet) as stipulated by code	Estimated number of units that could be built in the zone**	Annual residential building permits – 5 year average	Years Until "Build-Out" Occurs (# of units/av. # of permits per year)
Wheatland					
AR2	7,181.3	50,000	6,033	1.7	>50 years
R12	24.8	12,000	80		47 years
R16	106	16,000	264		>50 years
LeRoy					
R1	1,629.9	25,000	2,825	3.5	>50 years
R2	316.0	21,780	629		>50 years
RA	9,617.2	28,125	14,859		>50 years

1 acre = 43,560 square feet
* Adjusted for open space requirements
** For most zoning districts, the # of units was adjusted down to account for existing homes on large lots 10 acres or greater in size

Some weaknesses are apparent with this model. The final column – *Years Until Build-Out" Occurs* – is a very general estimation that applies the town-wide 6 year average permit rate to a specific zoning district. In fact, the building permit rate figure used represents the issuance of permits throughout the entire town, not the number of permits issued for a specific zoning district. Furthermore, if an increase in building permit issuance were to occur, this could significantly alter the figures in the *Years until Build-out" Occurs* column.

Furthermore, build out models operate under the presumption that residential and commercial development are the primary forces behind market-based land use. In fact, many other market demands influence local land use consumption patterns. Large portions of Genesee and Wyoming Counties, for example, consist of some of the most productive and profitable agricultural lands in New York State. Demand for land in these areas of the watershed is largely driven by the desire to farm and the need for more arable land, not for the construction of residential subdivisions.

Nonetheless, the model provides several useful insights. The first is the result of the calculation of "net acres available for development." These are reliable figures that can provide local officials with a very

rapid assessment of a zoning district's potential for further development. The other is the "estimated number of units" figure, which similarly provides local officials with a rough idea of what the district might look like in the future if growth were to occur. Municipalities should use these figures and apply serious consideration regarding the type of future growth and development that should take place in their communities, regardless of whether they have "a lot" or "a little" land left for future development.

Establishing better site planning and design standards and creating incentives for developers to conserve natural areas can help to meet a community's demand for future growth without sacrificing environmental quality. Decreasing minimum lot sizes and increasing density, mandating cluster subdivisions, conserving sensitive lands, and buffering water resources are among the tools and practices that can be incorporated directly into local law. By doing so, communities can make strides toward creating economically viable, yet environmentally sensitive development decisions. Such principles – often referred to as Better Site Design standards – will be addressed under Task 13 – *Evaluation of the Regulatory and Programmatic Environment*. As explained in the NYSDEC publication *Better Site Design* (2008), "The aim of better site design is to reduce the environmental impact "footprint" of the site while retaining and enhancing the owner/developer's purpose and vision for the site. Many of the better site design concepts employ non-structural on-site treatment that can reduce the cost of infrastructure while maintaining or even increasing the value of the property relative to conventional designed developments."[64]

4.6 Public Lands and Trails

Public lands can be classified into a number of different categories. In fact, the "parks" that exist in the study area vary tremendously in terms of size, ownership, operation and maintenance, and designated and permitted uses. Public land uses range from local municipal ball fields and cemeteries to significant holdings of public fishing access areas along the Oatka Creek itself.

Refer to Map 11 in Appendix A for an illustration of these lands and trail corridors.

4.6.1 Public Lands

An analysis of public lands using county data and other GIS data sources yielded the following results:

Table 4.13: Identified Public Park, Recreation and Conservation Lands in the Oatka Creek Watershed

Public Land Category	Acreage
NYSDEC Lands	209
Other State Park/Recreation Lands (Includes the Genesee Valley Greenway)	55
Land Trust or Easement (Includes the Genesee Country Village & Museum)	725
County Parkland	458
Municipal Park or Similar Local Public Space	416
Cemetery	108
Watershed Total	*1,974*

Lands owned and maintained by the NYSDEC within the watershed include a portion of Carlton Hill State Recreation Area (170 acres) as well as the historic Caledonia State Fish Hatchery, recognized as the oldest fish hatchery in the United States and Western Hemisphere. A portion of the Genesee Valley Greenway is present in the Town Wheatland near Scottsville, accounting for 50 acres of right-of-way; a small 5-acre tract of land/trail right-of-way was also identified in the Town of Pavilion. The greenway is owned and maintained through cooperative agreement between the NYS DEC, NYS Office of Parks, Recreation, and Historic Preservation and the Friends of the Genesee Valley Greenway, Inc.

Fifteen small municipal parks were identified throughout the watershed accounting for approximately 60 acres of total land area. In addition, the Village of Warsaw owns and maintains 354 acres of land in the Oatka Creek headwaters as part of its municipal water supply system. Various cemeteries scattered throughout the watershed account for a total of approximately 108 acres of land. The largest contiguous portion of public land is Oatka Creek Park in the Town of Wheatland. The park comprises 458 acres and is owned and maintained by Monroe County.

Genesee Country Village and Museum complex – a not-for-profit living history museum chartered by the NYS Department of Education – comprises 672 acres in the Towns of Wheatland and Caledonia. While not a public park, the Museum's mix of grounds and facilities, including the Genesee Country Nature Center, represent a significant public asset of regional importance. Two conservation easements were identified in the Wyoming County town of Warsaw that account for nearly 53 acres of land. County real property information does not always clearly identify private lands that are held in permanent conservation easement, making it difficult to identify all such properties in the watershed. While these the two properties identified here are important pieces of the spectrum of open space, they very likely represent a small fraction of the private lands that are protected under permanent conservation easement within the watershed.

4.6.2 New York State Open Space Conservation Plan

The *2009 New York State Open Space Conservation Plan* includes lists of regional priority conservation projects that have been identified by Regional Advisory Committees and through public comments received through the Plan's review process. Priority projects included on this list are eligible for funding from the State's Environmental Protection Fund, and other State, federal and local funding sources. For most of the project areas identified, a combination of State and local acquisition, land use regulation, smart development decisions, land owner incentives and other conservation tools used in various combinations, will be needed to succeed in conserving these open space resources for the long term. In addition to the Priority Projects listed in the body of the report, the Region 8 Advisory Committee also identified "additional priority projects" warranting attention and focus for preservation and enhancement if resources allow.

Priority Projects

> **Genesee River Corridor** - This project will protect the variety of habitats and landscapes found along the Genesee River as it flows north from Pennsylvania to Lake Ontario… (page 108)
>
> **Genesee Greenway/Recreationway** - The Genesee Valley Greenway (GVG) is a 90-mile long corridor that extends from the city of Rochester in Monroe County through to the Village of Hinsdale in Cattaraugus

> County. It passes through woodlands, wetlands, river and stream valleys and rolling farmlands providing connections to Letchworth State Park, local parks, major trail systems and historic villages and towns in Monroe, Livingston, Wyoming, Allegany and Cattaraugus Counties… (page 110)

In addition, Ecological Corridors, Exceptional Forest Communities, Grassland Preservation and Restoration (specifically in the Towns of Covington and Middlebury in Wyoming County), Trails and Trailways, and Significant Wetlands are identified as general Priority Project areas (pages 112 – 113).

Additional Priority Projects

> **Caledonia Springs** - This project is to provide protection to the high-quality water source that supplies the Caledonia Fish Hatchery in Livingston County, the oldest in the nation. Locally known as Spring Creek, this resource and the associated wetlands are surrounded by development. It also provides a significant wintering habitat for thousands of waterfowl.
>
> **Fossil Coral Reef** - This 100 plus-acre property located in the Town of LeRoy, Genesee County has been on the US Department of Interior, National Park Service's Registry of National Natural Landmarks since 1967. It is known locally as the "Bradbury Quarry" [and is located near the north side "right angle bend" of Britt Road]. It contains an abandoned limestone quarry and woodlands. It is abundant with ancient fossils, wildlife and trails. Specimens of fossils date back 350 to 400 million years ago. Geologically, the quarry contains the only preserved and well-exposed Middle Devonian Onondaga Coral Reef in Western New York. Rare fossil and flank deposits are abundant in the reef and include numerous tabulate and rugose corals, crinoids, gastropods and trilobites. The site is visited on a regular basis by paleontology groups from local colleges. (page A-123)
>
> **Buttermilk Falls on Oatka Creek** - Buttermilk Falls is an approximately 70-foot waterfall in Oatka Creek. It is the point where the creek drops over the Akron-Bertie Onondaga Dolomite and Limestone Formation in the Town of LeRoy, Genesee County. During periods of low rainfall (perhaps several weeks during the summer) the creek disappears into the bedrock upstream of the falls and reappears either at the base of the falls or at points on the rock face. It is a very scenic area, but currently unavailable for public viewing. (page A-123)

Unabridged versions of the reports containing the regional priority project narratives and information on the identification process of the priority projects can be found in the Plan's appendices.[65]

4.6.3 Trails

Regional recreational trails that cross through the Oatka Creek watershed include the Genesee Valley Greenway, which crosses through the watershed near the Village of Scottsville. The trail weaves through Canawaugus Park directly adjacent to the Oatka Creek and is a well-known stop among frequent users of the Greenway. In addition to the Genesee Valley Greenway, the New York State Office of Parks, Recreation and Historic Preservation identifies over 102 miles of officially designated snowmobile trails within the watershed.[66]

A Triple Divide Trail System Strategic Plan was developed in 2011.[67] It indicates that the Triple Divide Trail System will be a unified conservation and recreational system stretching ca. 230 miles along the Genesee River and Pine Creek from Lake Ontario in Rochester, NY, to the Susquehanna River in Williamsport, PA. The name derives from its passage over a triple continental divide separating the headwaters of three national watersheds: the Allegheny River, the Genesee River, and the Susquehanna River (West Branch and Pine Creek). This recreational system is being created by connecting existing rail-trails (greenways), water trails (blueways), and nature park areas, including

Letchworth State Park (NY) and Pine Creek Gorge (PA). It combines water conservation, natural flood control, outdoor recreation, environmental education, and sustainable economic development, including new jobs in construction and eco-tourism.

4.6.4 Public Fishing Access

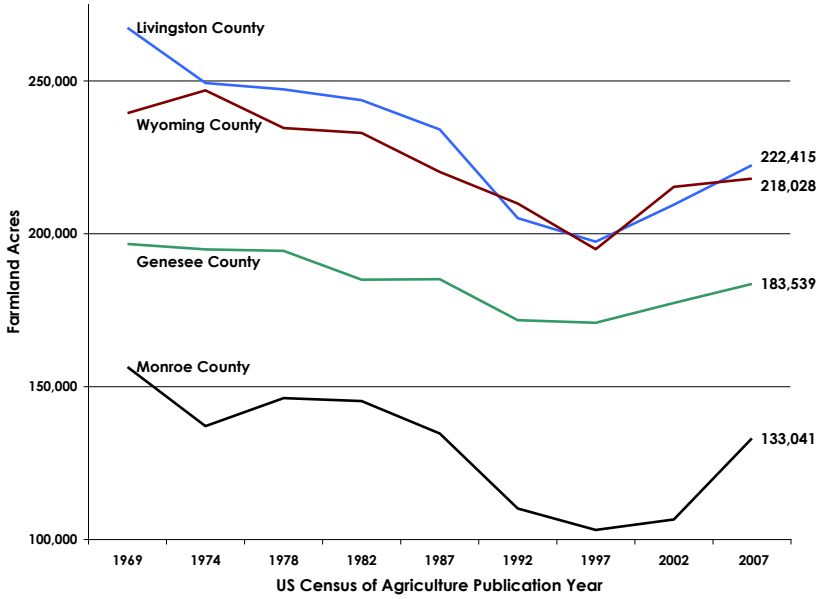
The Oatka Creek watershed is well known for excellent fishing opportunities throughout its extent. Oatka Creek Park in Wheatland offers ample access to Oatka Creek and is prized for its wild brown trout fishing. The NYS DEC also maintains a number of public fishing access areas in the watershed. One access point with parking is located directly on Oatka Creek along Main Street north of the hamlet of Mumford. Another popular DEC fishing access site is located in the Town of LeRoy along Oatka Trail Road. This location offers the public approximately 2 miles of linear stream bank fishing access. Public access is also available at the Caledonia State Fish Hatchery in the Village of Caledonia and in the Village of Scottsville at Canawaugus Park.

More information on NYSDEC Public Fishing Rights along Oatka Creek can be found on the DEC's website at http://www.dec.ny.gov/outdoor/7749.html

4.7 Agriculture

As noted under Section 3.5, real property records indicate that land use within the Oatka Creek watershed is devoted principally to agriculture uses, with 55% of properties classified as "agricultural" under the NYS real property classification system. This is over twice the land area of the next highest land use type ("residential" properties account for 23% of total properties in the watershed). There is therefore no doubt that agriculture is a significant factor when considering land use activities in the Oatka Creek watershed.

Figure 4.2: Change in County Farmland Acreage, 1969 – 2007



Public agencies such as the New York State Department of Agriculture and Markets, county Soil and Water Conservation Districts and the National Resources Conservation Service (a division of the USDA) provide a number of beneficial services to regional agribusinesses. Outreach services provided by these agencies include crop and nutrient management,

flood and erosion control, and agricultural environmental Best Management Practice implementation. In providing these services, these agencies compile information on a variety of agricultural- and environmental-related subjects that, in turn, are intended to help measure the effectiveness of and scope of their work. This information can provide us with important insight regarding the state of agricultural activities within the watershed, how those activities impact the natural environment, and how they are changing over time.

As with population statistics, data on agricultural operations can be difficult to ascertain at the watershed level. The lands that belong to a single agribusiness in some cases will cross more than one watershed boundary. Considering that the uses of a farmer's land will often change over time due to necessary crop rotation schedules or changes in a farm's business plan or operational focus, identifying specific land uses or production statistics over time can be challenging. Nonetheless, a selection of basic agricultural indicators has been included herein in an effort to begin describing the state of agriculture in the Oatka Creek watershed. As the watershed management planning process continues, developing a more accurate and complete assessment of the activities occurring on the land will be a critical component of watershed planning and water quality restoration. Furthermore, this will require close coordination with relevant farm service agencies and land owners.

4.7.1 Local Agricultural Districts

Local agricultural districts are described in detail on the New York State Department of Agriculture and Markets website:

> Article 25-AA of the Agriculture and Markets Law authorizes the creation of local agricultural districts pursuant to landowner initiative, preliminary county review, state certification, and county adoption…The purpose of agricultural districting is to encourage the continued use of farmland for agricultural production. The Program is based on a combination of landowner incentives and protections, all of which are designed to forestall the conversion of farmland to non-agricultural uses. Included in these benefits are…protections against overly restrictive local laws, government funded acquisition or construction projects, and private nuisance suits involving agricultural practices.
>
> The [Division of Agricultural Protection & Development] manages the certification of new districts and the review and recertification of existing districts. State certification confirms that a district meets the purposes and intent of the Agricultural Districts Law and all eligibility criteria described therein… The Division administers the Land Classification System, including maintenance of the statewide master list of agricultural soils.[68]

Map 27 in Appendix A illustrates those lands presently enrolled in a local agricultural district within Genesee, Livingston, Monroe and Wyoming Counties. Within the Oatka Creek watershed, 98,980 acres of land fall within a local agricultural district, which accounts for 72% of the total land area within the watershed.

Table 4.14: Lands within the Oatka Creek Watershed Enrolled in a Local Agricultural District

	Acreage within the Oatka Creek Watershed	County Watershed Share within an Ag. District	Percent of County Watershed Share within an Ag. District
Genesee County	56,359	40,314	72%

Livingston County	13,805	11,483	83%
Monroe County	3,693	1,776	48%
Wyoming County	64,234	45,407	71%
Total	138,091	98,980	72%

4.7.2 Agricultural Environmental Management (AEM)

As stated on the program's website: "AEM is a voluntary, incentive-based program that helps farmers make common-sense, cost-effective and science-based decisions to help meet business objectives while protecting and conserving the State's natural resources. Farmers work with local AEM resource professionals to develop comprehensive farm plans using a tiered process…"[69] The result is a coordinated approach to implementing agricultural conservation practices that make a meaningful improvement to the health and stability of the natural environment.

AEM is coordinated by county Soil and Water Conservation Districts in each of the four Oatka Creek watershed counties. AEM priorities are detailed in county AEM strategic plans, which are updated on a five-year cycle. The plans prioritize actions by specific watersheds within the county based on local water quality concerns and input from a local advisory committee.

Table 4.15: Summary of County AEM Statistics – Oatka Creek Watershed[70]

	Approx. Acres of Ag. Land Reported in AEM Surveys	AEM Farms	CAFOs	Types of Farms							
				Crop	*Equine*	*Dairy*	*Beef*	*Veg.*	*Deer*	*Sheep*	*Orchard/ Tree*
Genesee County	37,410	54	6	23	1	19	4	5	-	-	2
Monroe County	10,931	11	1	7	-	4*	-	-	-	-	-
Wyoming County	13,281	-	-	4	2	23	1	-	-	-	1

No AEM statistics provided for Livingston County
**2 of these 4 farms are based outside of Monroe County*

It is important to note that, as stated above, many farms and their operations cross watershed boundaries. In many cases, manure spreading and/or the location of other farm-related facilities might be spread across one of more watersheds. The information above reflects statistics of the general principal location of the farm operation.

In addition, SWCDs have provided estimates of the percentage of AEM farms ***in both*** the Black Creek and Oatka Creek watersheds using the following Best Management Practices:

Table 4.16: Summary of County AEM Statistics – Oatka Creek Watershed[71]

BMPs	Genesee	Monroe
Conservation Tillage	30%	70%
Stripcropping	15%	45%
Ag-to-Forest Land Conversion	1%	10%

Ag-to-Wetland Conversion	5%	10%
Nutrient Management	45%	65%
Grazing Land Management	10%	35%
Terraces/Diversions	5%	55%
Streambank Protection	48%	40%
Barnyard Management	43%	50%
Cropland Management*	50%	75%

Specific data not available for Wyoming and Livingston Counties

4.7.3 Concentrated Animal Feeding Operations (CAFOs)

The general trend occurring in United States agriculture over the past half century has been a reduction in the number of small, family-operated farms and consolidation into larger, more centralized operations. The Concentrated Animal Feeding Operation (CAFO) is a direct reflection of that trend and represents an economy of scale in agricultural commodity production. CAFOs are defined as lots or facilities where animals are stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period; they are categorized as either "large" or "medium" based on the numbers of animals confined.[72] However, there are many small facilities where animals are stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period (see Appendix E) that may fall below the CAFO threshold. CAFOs that discharge to waters of New York State are regulated by the NYS DEC under the authority of the Clean Water Act through the New York State Pollution Discharge Elimination System (SPDES) (refer to Section 3.8 for more information on the NYS SPDES program.[73]

A total of 17 Concentrated Animal Feeding Operations (CAFOs) were found to be located directly within the boundary of the Oatka Creek watershed – five medium size and 3 large sized. In addition, 12 CAFOs (eight medium and four large) were found to be within 2 miles of the Oatka Creek watershed boundary. Identification of CAFOs near the watershed border is an important consideration, as manure spreading often takes place across large areas that are associated with the farm operation. Information on each of these facilities is summarized in Table 4.17; a corresponding map illustrating the location of these farms is included in Appendix A of this report.

Table 4.17: NYSDEC Medium and Large CAFOs in Oatka Creek

FACILITY Name	Location (business address)	County	DEC Region	CAFO Size	CAFO Type			CAFO Area
					Mature Dairy	Heifers	Other	
Broughton Farm Operation LLC	Silver Springs	Wyoming	9	Large	2165	510		8 Acres
Double B Farms	Silver Springs	Wyoming	9	Medium	0	400	20	6 Acres
Swiss Valley Farms	Warsaw	Wyoming	9	Large	850	400	400 Calves	10 Acres
East Hill Farm LLC	Warsaw	Wyoming	9	Medium	648	0		14,250 SF
Flint Farm	Warsaw	Wyoming	9	Medium	580	0		4 Acres
Bowhill Farm	Wyoming	Wyoming	9	Medium	285	0	50 Calves	25,720 SF
Highland Farms	Wyoming	Wyoming	9	Medium	428	0	158 Dairy Replacements	47,080 SF
Synergy LLC	Pavilion	Wyoming	9	Large	1350	0		<1 Acres
Logwell Acres INC	Pavilion	Wyoming	9	Medium	300	150	60 Calves	8.5 Acres
Craig T. Harkins	Wyoming	Wyoming	9	Medium	183	100		28,755 SF
Hildene Farms, Inc.	Wyoming	Genesee	8	Large	873	250		2.5 Acres
Cottonwood Farms	Pavilion	Genesee	8	Medium	350	0		40,000 SF
Mowacres Farm II, LLC	LeRoy	Genesee	8	Large	510	250	170 Calves	10 Acres
D & D Dairy	Scottsville	Monroe	8	Medium	375	0		1 Acres
Pagen Farms, Inc.	LeRoy	Genesee	8	Medium	657	640		2 Acres
Stein Farms LLC	LeRoy	Genesee	8	Large	630	0	550 Young Stock	66,793 SF
Udderly Better Acres	LeRoy	Genesee	8	Medium	330	0		0
CAFOs within a 2mi Buffer of Oatka Creek Watershed								
SUNNY KNOLL FARMS	Perry	Wyoming	9	Large	840			93,060 SF
WOODVALE FARMS	Perry	Wyoming	9	Medium	325			140,000 SF
VICTORY ACRES	Perry	Wyoming	9	Medium	240	200		1.1 Acres
MCCORMICK FARMS, INC. - DAIRY	Bliss	Wyoming	9	Large	1250	700		4 Acres
PINGREY FARM 2	Silver Springs	Wyoming	9	Medium	250			2 Acres
ARMSON FARMS LLC	Pavilion	Wyoming	9	Medium	200		100 feeder cattle; 2 horse; 75 calves	
BARNIAK FARMS	Pavilion	Genesee	8	Medium	498			6 Acres
NOBLEHURST FARMS INC.	Pavilion	Livingston	8	Large	1150	900		4.84 Acres
LOR-ROB DAIRY FARM	EAST BETHANY	Genesee	8	Large	1700		2,000 heifers/calves	25 Acres
HY HOPE FARMS, INC.	STAFFORD	Genesee		Medium	491		216 (UNREADABLE) , 97 heifers, 122 Steers	6 Acres
ERNEST/TOM GATES	Pavilion	Livingston		Medium	450	200		
HUBERT W. STEIN & SONS				Medium	430	240	23 swine; 75 calves	

4.7.4 NRCS Crop Cover

The USDA National Agricultural Statistics Service (NASS) Cropland Data Layer (CDL) is a raster, geo-referenced, crop-specific land cover data layer with a ground resolution of 30 meters. The data layer is aggregated to a possible 85 standardized categories for display purposes, with the emphasis being agricultural land cover (a total of 50 are identified in the Oatka Creek watershed). The purpose of the Cropland Data Layer Program is to use satellite imagery to (1) provide acreage estimates to the Agricultural Statistics Board for the state's major commodities and (2) produce digital, crop-specific, categorized geo-referenced output products. Classification accuracy is generally 85% to 95% correct for the major crop-specific land cover categories. The accuracy of the CDL non-agricultural land cover classes is entirely dependent upon the USGS National Land Cover Dataset (NLCD 2001). Thus, the NASS recommends that users consider the NLCD for studies involving non-agricultural land cover.[74] To that end, results of the NLCD are included in Section 4 of this report and should be used for land use comparison and analysis.

GIS analysis of the 2010 data layer yielded the following results:

Table 4.18: 2010 Cropland Data Layer Analysis for the Oatka Creek Watershed

Crop/Land Cover Category	Acres	% Share of Watershed
Forest Categories Combined*	40,738.29	28.9%
Corn	28,376.25	20.1%
Alfalfa	22,335.78	15.8%
Other Hay	10,836.19	7.7%
Developed Space Categories Combined*	8,940.72	6.3%
Pasture/Grass	5,562.32	3.9%
Wetland Categories Combined*	5,139.77	3.6%
Other Cash Crops Combined*	5,099.51	3.6%
Soybeans	5,097.51	3.6%
Shrub/Fallow/Idle Lands Combined*	4,808.18	3.4%
Winter Wheat	4,056.48	2.9%
Barren	209.72	0.1%

*Tabular results for all land cover categories provided in Appendix D.

4.8 Pollution Control

The US EPA divides water pollution sources into two categories: point and non-point. Point sources of water pollution originate from a defined location such as sewage treatment plants and factories. Under the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. In New York State this program is administered by the NYSDEC and is referred to as the State Pollutant Discharge Elimination System (SPDES).

Water pollution and potential adverse environmental and public health effects associated therein can result from sources other than traditional point sources; these are referred to as non-point sources of pollution. Non-point sources are more diffuse and include sources such as agricultural runoff, construction site runoff, and pollutants collecting and running off of impervious surfaces.

Understanding the sources of pollution in the Oatka Creek watershed and the degree to which they are monitored and managed is an important element of watershed management. The US EPA, in conjunction with state and local authorities, monitors pollution levels in the nation's water and provide status and trend information on compliance and other issues. A selection of pollution control metrics are provided here under Section 4.8.

4.8.1 State Pollution Discharge Elimination System (SPDES)

As stated above, New York State has a state program that has been approved by the United States Environmental Protection Agency for the control of wastewater and stormwater discharges in accordance with the Clean Water Act. Under New York State law the program is known as the State Pollutant Discharge Elimination System (SPDES) and is broader in scope than that required by the Clean Water Act in that it controls point source discharges to groundwater as well as surface waters. A list of permitted SPDES discharge points that are present in the Oatka Creek watershed is provided in Table 3.18.

Table 4.19: New York State Pollution Discharge Elimination System Permittees within the Oatka Creek Watershed

Facility Name	SPDES No.	Municipality	Owner
Warsaw Sewage Treatment Plan	NY0021504	Village of Warsaw	Village of Warsaw
Markin Tubing	NY0084689	Town of Covington	Markin Tubing LP
Pavilion (Hamlet) Sanitary Sewage Disposal System	NY0247197	Pavilion	Town of Pavilion
PCore Electric Company, Inc.	NY0247308	Village of LeRoy	Hubbell Incorporated (of Delaware)
Lapp Insulator	NY0000779	Village of LeRoy	Lapp Insulators LLC
Caledonia Fish Hatchery	NY0035432	Village of Caledonia	NYSDEC
Leroy Village Waste Water Treatment Plant & Sludge Fac.	NY0030546	Village of LeRoy	Village of LeRoy
Scottsville Village Sewage Treatment Plant	NY0020133	Village of Scottsville	Village of Scottsville

A review of Enforcement and Compliance History records through the USEPA Enforcement & Compliance History Online (ECHO) database yielded the following information for each facility:

Effluent Violations refers to the number of times a monitored value at a facility exceeds the effluent limit set in the facility's permit. Effluent violations at every pipe and parameter may be counted once over each reporting period. For example, if a facility had one pipe with two parameters reported every month, the maximum number of effluent violations would be 1(pipe)x2(parameters)x12(months)x3(years)=72 effluent violations.

Notices of Violation are activities taken by EPA or the state that often precede a formal administrative or civil/judicial enforcement action. Not all notices of violation are escalated to formal enforcement action for a variety of reasons, including the following: the facility quickly corrects the problem(s) indicated in the notice, the violation is determined to be less severe than originally thought, or consultation between the facility and EPA or the state indicates that a violation has not occurred.

USEPA Enforcement & Compliance History Online (ECHO) database can be accessed online at http://www.epa-echo.gov/echo/index.html.

Table 4.20: USEPA Enforcement & Compliance History Online (ECHO) of Oatka Creek SPDES Permitees

Facility Name/Desc.	Discharge Point/Waterbody	Effluent Exceedances (9/08 – 9/11)	Description	Notices of Violation (NOV) or Informal Enforcement (9/06 – 9/11)
Warsaw Sewage Treatment Plant (Public Sewage Treatment Fac.)	Oatka Creek		None reported	
Markin Tubing (small manufacturing fac.)	Oatka Creek	Combination of non-compliance factors were recorded over the five year period including: pH; Iron; Lead; Oil & Grease; and TSS		1 Clean Water Act NOVs 01/15/2009
Pavilion (Hamlet) Sanitary Sewage Disposal System (Public Sewage Treatment Fac.)	Oatka Creek	4	Combination of non-compliance factors were recorded over the five year period including: pH and BOD	None reported
PCore Electric Company, Inc. (Elec. Indust. Apparatus)	Oatka Creek		None reported	
Lapp Insulator (Porcelain Elec. Supplies)		3	Combination of non-compliance factors were recorded over the five year period including: pH; Cobalt exceeded by 4% , Oil/Grease exceeded by 137%	1 Clean Water Act NOV 05/18/2010
Caledonia Fish Hatchery	Spring Creek	None reported		1 Clean Water Act NOV 01/15/2009
Leroy Village Waste Water Treatment Plant & Sludge Fac. (Public Sewage Treatment Fac.)	Oatka Creek	5	Combination of non-compliance factors were recorded over the five year period including: BOD and Flow	Violation Of CWA / §405 Sludge Disposal Requirements resulting in formal administrative procedures and $1,000 fine 1/15/2009
Scottsville Village Sewage Treatment Plant (Public Sewage Treatment Fac.)	Oatka Creek	7	Combination of non-compliance factors were recorded over the five year period including: Solids and Flow	None reported

The above charts exclude Dolomite Products Co. Inc. (LeRoy Quarry – 250 Gulf Road, LeRoy) and Hanson Aggregates (6895 Ellicott St (ST RTE 63), Pavilion), both listed by the USEPA as a Minor;

General Permit Covered Facility under NPDES. No record of this facility is included in NYSDEC SPDES GIS records. No violations were reported for either of these facilities by the EPA.

Descriptive data obtained from the NYSDEC on municipally owned waste water treatment plants (WWTPs) is provided in the table below.

Table 4.21: Descriptive Data of Municipal WWTPs in Oatka Creek Watershed[75]

Facility Name	SPDES No.	Discharge Waterbody/Stream Classification	Year Built	Last Update	Plant Class	Collection	Additional Treatment
Leroy Village Waste Water Treatment Plant & Sludge Fac.	NY0030546	Oatka Creek, Class C	1962	1993	3A	Separated System	--
Pavilion (Hamlet) Sanitary Sewage Disposal System	NY0247197	No information provided due to age of plant (recently constructed)					
Scottsville Village Sewage Treatment Plant	NY0020133	Oatka Creek, Class B	1968	1999	2A	Separated System	--
Warsaw Sewage Treatment Plant	NY0021504	Oatka Creek, Class C	1939	1998	2	Separated System	One stage biological nitrification and phosphorus removal

Plant Class explanation:
Plant Class - Refers to the certification required for the chief operator based on scoring of the plant's treatment train: Activated Sludge Treatment, with a definition of a biological treatment process in which a mixture of wastewater and activated sludge is agitated and aerated. The activated sludge is subsequently separated from the treated wastewater by sedimentation and wasted or returned to the process as needed.

- 4A plant score greater than 75 points
- 3A plant score between 56 and 75 points
- 2A plant score between 31 and 55 points
- 1A plant score or less than 30 points

Any biological oxidation process other than activated sludge.

- 4 plant score greater than 75 points
- 3 plant score between 56 and 75 points
- 2 plant score between 31 and 55 points
- 1 plant score or less than 30 points

Generally speaking, the higher the plant class the more sophisticated the system and hence a higher level of technical training is required.

4.8.2 NYS Construction Permit

The NYS General Permit for Construction Activities (Permit No. GP-0-10-001) is required for any construction activity that will disturb more than 1 acre of land.[76] Before commencing construction activity, the owner or operator of a construction project that will involve soil disturbance of one or more acres must obtain coverage under the Permit for Stormwater Discharges from Construction Activity. The permit is intended to reduce impacts to area waterbodies from sediment runoff. This is achieved in part through the development of a Stormwater Pollution Prevention Plan (SWPPP) as well as strict enforcement standards.

A review of General Permit issuances in the Oatka Creek watershed during the period 2003 and 2010 resulted in the following information:

Table 4.22: NYS General Permit for Construction Activities – Permits Issued in the Oatka Creek Watershed, 2003 – 2010

	2003	2004	2005	2006	2007	2008	2009	2010
No. of Permits Issued	5	1	2	7	5	6	5	3
Average Disturbed Area (Acres)	11.8	16.8	2.0	6.2	3.9	9.4	13.6	2.0

Source: NYSDEC

The majority of permits issued in the Oatka Creek watershed were in the Town of Warsaw (10) followed by Caledonia and LeRoy (7, respectively), and Wheatland (4).

4.8.3 EPA Regulated Facilities

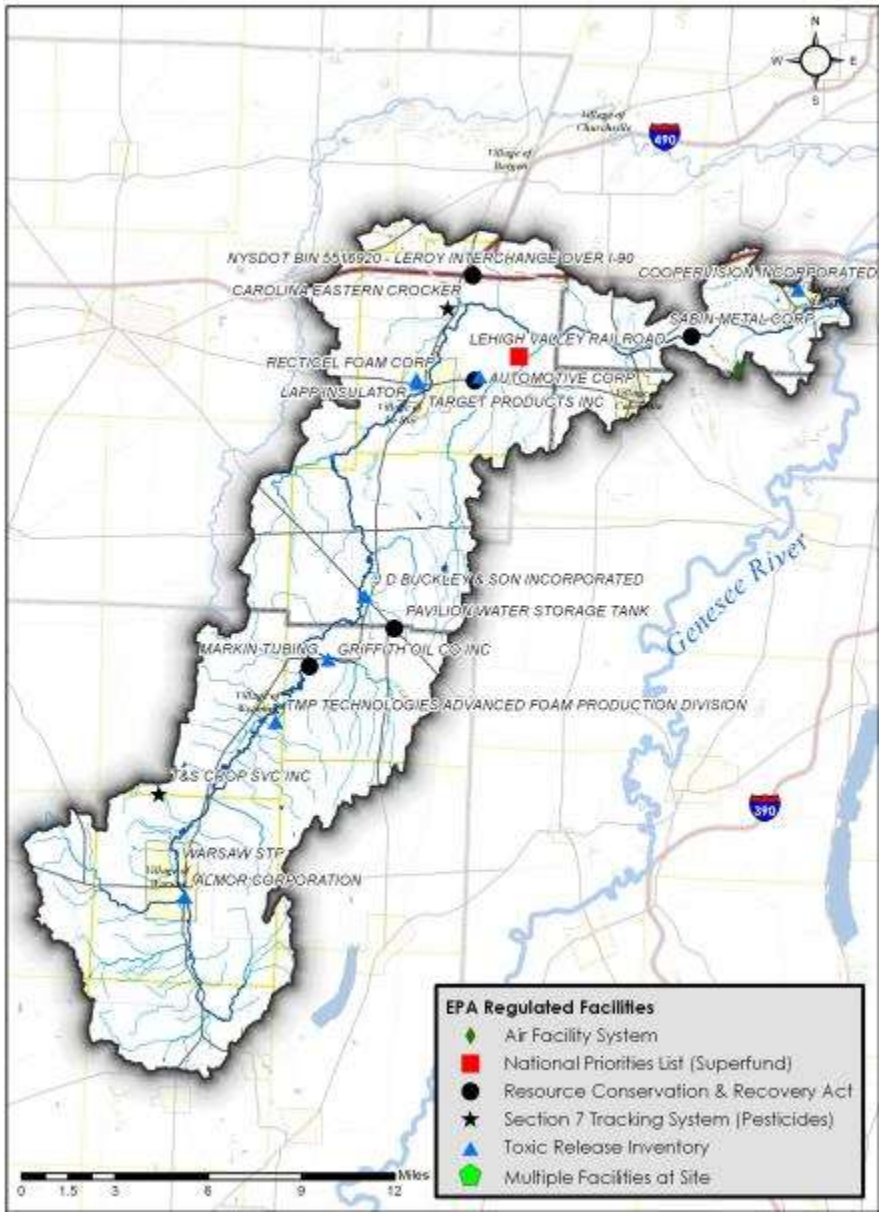
To improve public health and the environment, the EPA collects information about facilities or sites subject to environmental regulation. A query of this database identified 15 facilities present in the Oatka Creek watershed, as listed in Table 4.22 and illustrated on Figure 4.3.

The public is able to conduct research on facilities within their neighborhoods or areas of interest through the US EPA *Envirofacts* database, an online database and retrieval system for regulated facilities in the United States. Information on the facilities listed in Table 4.22 as well as other facilities can be found therein by visiting http://www.epa.gov/enviro/index.html.

The regulatory programs and authorities covered through this database and reported for the Oatka Creek watershed are as follows:

- **Toxic Release Inventory**: EPCRA Section 313 requires EPA and the States to collect data annually on releases and transfers of certain toxic chemicals from industrial facilities and make the data available to the public through the Toxics Release Inventory (TRI).
- **Resource Conservation & Recovery Act (RCRA):** Through RCRA, Congress directed EPA to regulate all aspects of hazardous waste. As a result, EPA developed strict regulations for the treatment, storage, and disposal of hazardous waste. States may implement stricter requirements than the Federal regulations as needed. Facilities listed here may be assumed to be required to perform one or more of the following procedures: treatment and disposal of hazardous materials; storage of hazardous materials, record keeping and reporting of activities associated with hazardous materials; and other requirements as stipulated by Federal law.

Figure 4.3: EPA Regulated Facilities



- **Risk Management Plan**: Under the authority of section 112(r) of the Clean Air Act, the Chemical Accident Prevention Provisions require facilities that produce, handle, process, distribute, or store certain chemicals to develop a Risk Management Program, prepare a Risk Management Plan (RMP), and submit the RMP to EPA.
- **Air Facility System**: Required by Title V of the Clean Air Act, the System consists of legally-enforceable documents designed to improve compliance by clarifying what facilities (i.e. Air pollution sources) must do to control air pollution. Issued to all large sources ("major" sources) and a limited number of smaller sources (called "area" sources, "minor" sources, or "non-major" sources).

Table 4.23: Oatka Creek EPA Regulated Facilities

Facility Name	Location	Facility Type
Almor Corporation	Warsaw	Toxic Release Inventory
T&S Crop Svc, Inc.	Warsaw	Section 7 Tracking System (Pesticides)
TMP Technologies Advanced Foam Production Div.	Wyoming	Toxic Release Inventory
Markin Tubing	Wyoming	Resource Conservation and Recovery Act
Griffith Oil Co., Inc.	Wyoming	Toxic Release Inventory
Pavilion Water Storage Tank	Pavilion	Resource Conservation and Recovery Act
J D Buckley & Son, Inc.	Pavilion	Toxic Release Inventory
Lapp Insulator	LeRoy	Multiple Facilities on Site
Target Products, Inc.	LeRoy	Toxic Release Inventory
Recticel Foam Corp.	LeRoy	Toxic Release Inventory
Hanson Aggregates – LeRoy Quarry	LeRoy	Resource Conservation and Recovery Act
Automotive Corp	LeRoy	Toxic Release Inventory
Monroe Livingston Sanitary Landfill	Scottsville	Air Facility System
Lehigh Valley Railroad	LeRoy	National Priorities List (Superfund)
Sabin Metal Corp	Scottsville	Resource Conservation and Recovery Act
Carolina Eastern Crocker	LeRoy	Section 7 Tracking System (Pesticides)
Coopervision Inc.	Scottsville	Toxic Release Inventory
NYSDOT BIN 5516920 – LeRoy Interchange over I-90	LeRoy	Resource Conservation and Recovery Act

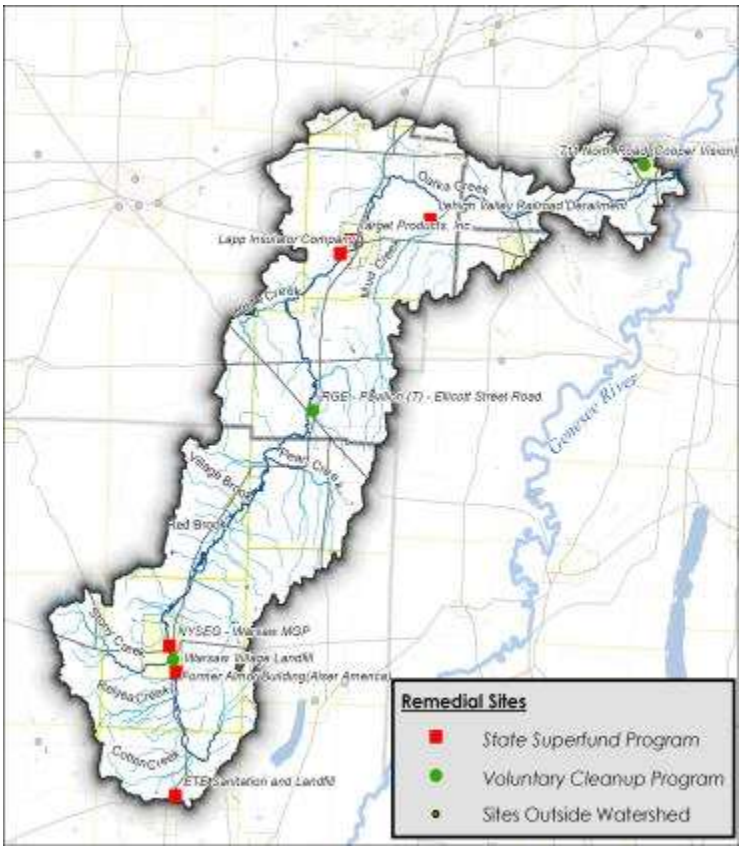


Figure 4.4: NYSDEC Hazardous Waste Sites

4.8.4 NYSDEC Hazardous Waste Sites

The NYS DEC Division of Environmental Remediation maintains a database of sites being addressed under one of the Division's remedial programs – *State Superfund*, *Brownfield Cleanup*, *Environmental Restoration* and *Voluntary Cleanup*. This database also includes the Registry of Inactive Hazardous Waste Disposal Sites and information on Institutional and Engineering Controls in New York State. A query of this database identified four facilities present in the Oatka Creek watershed. The locations of those facilities are shown in the map below; a description of the facility and facility status is provided in Table 4.24 on the following page.

Table 4.24: Oatka Creek DEC Hazardous Waste Sites

Site Name	Site Location	Site Program	Site Priority Classifications
Target Products, Inc.	9 Lent Avenue, LeRoy	State Superfund Program	C
Lehigh Valley Railroad Derailment	Gulf Road and Lehigh Valley Railroad Crossing, LeRoy	State Superfund Program	02
Lapp Insulator Company	130 Gilbert Street, LeRoy	State Superfund Program	02
RGE - Pavilion (T) - Ellicott Street Road.	6903 Ellicott Street Road, Pavilion	Voluntary Cleanup Program	A
711 North Road (Cooper Vision)	711 North Road, Scottsville	Voluntary Cleanup Program	C
NYSEG - Warsaw MGP	Court and Mechanic Streets, Warsaw	State Superfund Program	C
ETE Sanitation and Landfill	Broughton Road, Gainesville	State Superfund Program	02
Warsaw Village Landfill	Industrial Street, Warsaw	State Superfund Program	03
Former Almor Building (Alser America)	220 South Main Street, Warsaw	Voluntary Cleanup Program	C

Explanation of remediation site priority classifications:[77]

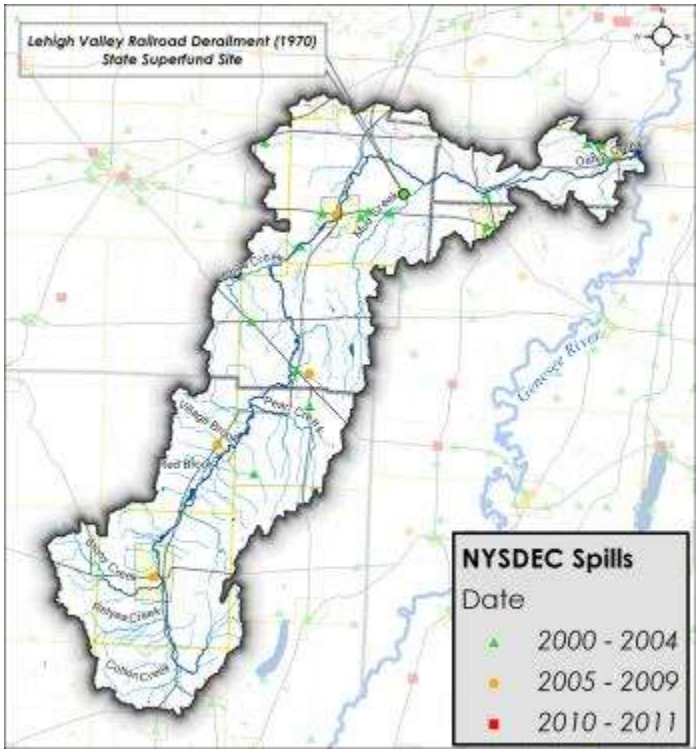
Classification Code: 2
The classification assigned to a site at which:
the disposal of hazardous waste has been confirmed and the presence of such hazardous waste or its components or breakdown products represent a significant threat to the environment or to health as described in subdivision (a) above; or hazardous waste disposal has not been confirmed, but the site has been listed on the Federal National Priorities List (NPL).

Classification Code: 3
The classification assigned to a site at which:
contamination does not presently constitute a significant threat to public health or the environment, as described in subdivision (a) above. This classification is used only when there is sufficient information available to conclude that the site does not pose a significant threat. This classification is not used for sites where the information is insufficient to make a definitive decision concerning significant threat.

Classification Code: A
The classification assigned to a non-registry site in any remedial program where work is underway and not yet completed (i.e., Brownfield Cleanup Program, Environmental Restoration Program, and Voluntary Cleanup Program sites).

Classification Code: C
The classification used for sites where the Department has determined that remediation has been satisfactorily completed under a remedial program (i.e., State Superfund, Brownfield Cleanup Program, Environmental Restoration Program, Voluntary Cleanup Program).

Figure 4.5: NYSDEC Spills, 2000 – 2011



4.8.5 Spills

The NYSDEC maintains a database of chemical and petroleum spills that have been reported to the Department since 1978. GIS analysis of the information was performed to illustrate the degree to which spills have occurred in and around the Oatka Creek watershed over time. An initial query of spills data identified over 10,000 spill incidences across NYSDEC Region's 8 and 9 dating back to 1978. These data were sorted to include only spills dating back to January 1, 2000 in order to narrow down the number of records and to allow a limited GIS analysis. The records were then geo-coded, a process in which an x-y point location is generated based on address data provided in the database, allowing the user to assign a point location on a map for each reported incident. In some cases, these locations are generalized due to limited information on the actual location.

A total of 37 spills were identified within the Oatka Creek watershed during the period 2000 to 2011. Those incidences were classified as follows:

- Commercial Vehicle (16)
- Commercial/Industrial (6)
- Unknown (5)
- Institutional (4)
- Private Residence (3)
- Passenger Vehicle (2)
- Gas Station (1)

Specific materials and volumes are not available through this particular query mechanism but can be obtained for specific incidences utilizing the NYSDEC Spill Incidences Database online search tool at http://www.dec.ny.gov/cfmx/extapps/derexternal/index.cfm?pageid=2.

Also noted on Figures 4.3, 4.4 and 4.5 is the location of the Lehigh Valley Railroad Derailment Site, a spill of significance within this watershed. A December 1970 railroad derailment in the Town of LeRoy spilled 30,000 gallons of trichloroethene, which caused extensive groundwater contamination. Little remediation was conducted at the time of the spill and there was no follow-up regarding the spill until January 1991. An investigation conducted in 1991 found that the spill had migrated at least 3.5 miles from the spill site and contaminated over 35 private water supply wells. The site currently presents no

apparent public health hazard due to treatment systems installed to reduce exposures.[78] The site continues to be monitored by state and federal agencies.

SECTION 4 ENDNOTES

[37] American Planning Association. Planning and Urban Design Standards. (Hoboken: John Wiley & Sons, 2006. 99
[38] Portions of this section adapted from USGS & Monroe County DOH article "The Black Creek Watershed Coalition," printed in the Improving Water Quality in Monroe County newsletter. Fall 2002, Issue 8.
[39] USEPA. Rochester Embayment Area of Concern. http://epa.gov/greatlakes/aoc/rochester.html#Background. Last visited online 12/2/10.
[40] *About Us*. [Online] In *Finger Lakes-Lake Ontario Watershed Protection Alliance*. Retrieved 2/3/11 from http://www.fllowpa.org/about.html
[41] *What We Do*. [Online] In *New York State Soil and Water Conservation Committe*e. Retrieved 12/14/10 from http://www.nys-soilandwater.org/about_us/what_we_do.html
[42] *About Us*. [Online] In *Black Creek Watershed Committe*e. Retrieved 12/23/10 from www.oatka.org/aboutus.php
[43] *Related Materials*. [Online] In *Intermunicipal Planning for the Black & Oatka Creek Watersheds*. Retrieved 1/2/11from http://gflrpc.org/Publications/BlackOatka/Summary%20of%20Reports.pdf
[44] Year indicates the year that the law was originally adopted; amendments have often been made since this date. "E-codes" are those made available online through the General Code website. General Code is an independent, for-profit service; it is assumed that the municipality provides the company with appropriate updates to their code on a regular basis. An entry of 'unk' indicates that the municipality's code was not available in its entirety at the time of review; it is therefore unknown whether the component exists. Municipalities listed as a "Regulated MS4" are required to have an erosion and sediment control law in place as per State and Federal law.
[45] Refer to Task 15 (as described above).
[46] New York State Department of State Division of Local Government Services. New York State Local Government Handbook, p. 39. Online at http://www.dos.state.ny.us/LG/publications/Local_Government_Handbook.pdf.
[47] *Farmland Protection Program*. [Online] In *New York State Department of Agriculture and Markets*. Retrieved 1/2/11from http://www.agmkt.state.ny.us/AP/agservices/farmprotect.html#county .
[48] *Livingston County Purchase of Development Rights Program*. [Online] In *Livingston County*. Retrieved online 12/2/10 from http://www.co.livingston.state.ny.us/planning.htm.
[49] Monroe County DOH recommends an 8-part series of checks at time of property transfer and further emphasizes the need to apply strict scrutiny on a case-by-case basis.
[50] Federal authorization to prepare a countywide all-hazard mitigation plan comes from the Disaster Mitigation Act of 2000 and 44 CFR (Code of Federal Regulations, Title 44). These regulations provide a mandate directing local governments to assess the potential dangers posed by natural hazards to their communities and propose cost effective means of reducing/eliminating the threats posed by those hazards. Hazard mitigation planning programs are strongly encouraged and supported by the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1974, known as the Stafford Act (PL 93-288, as amended) and New York State Executive Law Article 2B: State and Local Natural and Man-Made Disaster Preparedness.
[51] Genesee County Multi-Jurisdictional All-Hazard Mitigation Plan (2007); Livingston County Multi-Jurisdictional All-Hazard Mitigation Plan (2007); Wyoming County Multi-Jurisdictional All-Hazard Mitigation Plan (2008);
[52] *Genesee County Smart Growth Plan*. [Online] In *Genesee County New York State*. Retrieved 1/2/11 from http://www.co.genesee.ny.us/dpt/planning/smartgrowth.html.
[53] Refer to Task 15 (as described above).
[54] Due to difficulties associated with analyzing population change at the census block level, analysis in this section relies on total population figures for the entire municipality.
[55] US Census Bureau. 1980 Census of Population, Detailed Population Characteristics of New York
[56] US Census Bureau. American FactfFinder. Data Set: 1990 Summary Tape File 1 - 100% data, Total Population.
[57] US Census Bureau. American FactfFinder. Data Set: 2000 Summary File 1100% data, Total Population.
[58] US Census Bureau. Census 2010, Summary File 1 General Profile 1: Persons by Race, Age, and Sex, Urban and Rural
[59] *Sprawl Without Growth: The Upstate Paradox*. [Online] In *The Brookings Institution*. Retrieved 1/2/11 from http://www.brookings.edu/reports/2003/10demographics_pendall.aspx

[60] Subsequent project tasks associated with this watershed management planning process will provide a comprehensive review and evaluation of the regulatory and programmatic environment.

[61] Table 3.10. "Federal" includes all undivided Federal routes, 2 to 4 lane routes, interstate routes and associated ramps; center-line miles are accounted for in both directions for divided highways. "Local" includes all town, city, and village roads named or unnamed on official county base maps. Only bridges that cross a hydrologic feature, such as a stream, lake or wetland, are considered. Bridges are categorized according to the road/highway they are located on; column does not assume ownership or maintenance responsibilities. Bridge features counted exclude culverts and railroad bridges.

[62] *Regional Land Use Monitoring*. [Online] In *Genesee/Finger Lakes Regional Planning Council*. Retrieved 1/2/11 from http://gflrpc.org/Publications/LandUseMonitoring.htm

[63] Figures are for permits issued for the construction of residential buildings (single – five family including mobile/mnfctd homes) in respective year. Permitted construction does not guarantee actual construction.

[64] *Better Site Design*. [Online] In New York State Department of Environmental Conservation. Page 1. Retrieved 7/22/11 from http://www.dec.ny.gov/docs/water_pdf/bsdcomplete.pdf

[65] *2009 New York State Open Space Conservation Plan*. [Online] In *New York State Department of Environmental Conservation*. Retrieved 8/3/11 from http://www.dec.ny.gov/lands/47990.html

[66] Includes trails that are funded through the NYS Snowmobile Trail Fund. This fund, using snowmobile registration fees, provides grants to local governments, park regions, and the DEC to improve snowmobile trail systems.

[67] *Triple Divide Trail System Strategic Plan* [Online]. Retrieved 3/12/12 from http://www.geneseeriverwilds.org/tripledividetrail-plan2011.pdf

[68] *Agricultural Districts*. [Online] In *New York State Department of Agriculture and Markets*. Retrieved 1/2/11from http://www.agmkt.state.ny.us/AP/agservices/agdistricts.html

[69] *Agriculture Environmental Management*. [Online] In *New York State Soil and Water Conservation Committee*. Retrieved 1/2/11 from http://www.agmkt.state.ny.us/soilwater/aem/.

[70] Statistics provided by Genesee, Monroe and Livingston County Soil and Water Conservation Districts.

[71] Statistics provided by Monroe and Genesee Soil and Water Conservation Districts.

[72] See *§ 122.23.b* under *Part 122—EPA Administered Permit Programs*. [Online] In *US EPA*. Retrieved 8/3/11 from http://www.epa.gov/npdes/regulations/cafo_final_rule2008_comp.pdf.

[73] *Concentrated Animal Feeding Operations (CAFO) - Final Rule*. [Online] In *US EPA*. Retrieved 8/3/11 from http://cfpub.epa.gov/npdes/afo/cafofinalrule.cfm. See also *Permits for Concentrated Animal Feeding Operations (CAFOs)*. [Online] In *New York State Department of Environmental Conservation*. Retrieved 8/3/11 from http://www.dec.ny.gov/permits/6285.html

[74] *Land Use/Land Cover: Cropland Data Layer by State*. [Online] In *USDA NRCS GeoSpatial Data Gateway*. Metadata retrieved 6/3/11 from http://datagateway.nrcs.usda.gov/Catalog/ProductDescription/NASS_CDL.html

[75] *Descriptive Data of Municipal Wastewater Treatment Facilities* (Jan 2004). [Online] In *NYSDEC Division of Water*. Retrieved 7/7/11 from http://www.dec.ny.gov/chemical/8721.html

[76] *Stormwater Permit for Construction Activity*. [Online] In *New York State Department of Environmental Conservation*. Retrieved 8/3/11 from http://www.dec.ny.gov/chemical/43133.html

[77] Site Priority Classifications. [Online] In *New York State Department of Environmental Conservation*. Retrieved 8/3/11 from http://www.dec.ny.gov/chemical/8663.html

[78] NYS Department of Health. Public *Health Assessment: Lehigh Valley Railroad Derailment Site*. NYD086950251: July 6, 2000.

5.0 Surface Water Chemical Characteristics

The chemistry of surface waters, including those in streams, is affected by the nature of the underlying bedrock geology and the soil in the watershed, by the biota, especially the vegetation, and by the nature of the precipitation that falls on the watershed. Limestone bedrock and soils containing other carbonates, for example, buffer the pH of acid precipitation before it reaches the stream. The bedrock and, especially, the soils add other substances to the water as well—organic debris, inorganic sediment and various dissolved substances. Inasmuch as human activities alter the nature of the watershed's soil and overlying vegetation, they too have important impacts on the chemistry of water in the stream.

Because of their importance to living organisms or because they serve as indicators of human impact, certain chemical attributes of the water are of special interest. Forms of phosphorus and nitrogen—typically phosphate and nitrate—are of particular importance, because they tend to limit or promote the growth of plants and algae. Where these limiting nutrients are abundant, plant and algal growth flourishes. Such excess growth may be unsightly or otherwise troublesome in its own right, but, as it senesces and decays, it may also consume much of the oxygen dissolved in the water, leading to other chemical and biological problems. This process of excess fertilization of plant and algal growth is frequently referred to as cultural eutrophication. Other chemicals, often those of anthropogenic origin, are essentially toxic to the biota: heavy metals—e.g., mercury and lead—and certain synthetic organic compounds—e.g., some pesticides and PCBs—accumulate in biological tissues ("bioaccumulation") and become concentrated at higher levels of the food web ("biomagnification"). Sediment eroding from the watershed makes the water turbid, blocking sunlight from reaching the algae that coat the bottom of the stream and that, along with organic debris washed in from the riparian area around the stream, serve as the base of the foodchain. Sediment also smothers microhabitats that harbor animals that live on the bottom of the stream. Turbidity may also interfere with many human uses of the waterbody.

5.1 Water Quality Criteria and Standards

5.1.1 Ambient Water Quality Standards (AWQS) Screening

New York State DEC classifications for surface waters in the state range from A (or AA) to D, depending on the current of expected best use of the water:

A or AA:	Suitable as a source of drinking water
B:	Suitable for swimming or other contact recreation
C:	Supporting fisheries; suitable for non-contact recreation
D:	Unsuitable for any of the uses above

In addition, classification of B or C waters may be designated "T", supporting a trout population, or "TS" supporting trout spawning. Currently, all of the upper portion of Oatka Creek and its tributaries are classified "C", but the lower portions of the creek, from just above its confluence with Mud Creek to its confluence with the Genesee River near Scottsville are classified "B". Some sections of this lower portion are further classified "T" or "TS", indicating they support trout fisheries. Segments of an Oatka

Creek tributary flowing from the Village of Caledonia is classified C(T) or C(TS). These trout fisheries from the lower portions of the Oatka Creek Watershed are recognized as important regional natural resources.

We have surveyed the available data to assess Oatka Creek's compliance with NYSDEC ambient water quality standards, principally originating from studies completed in 2005, to identify areas of potential concern. Identification of temporal trends and comparison of water quality from place to place within the watershed are inhibited by important data gaps, and it is important to note when and where these water-quality parameters were measured and by whom. Some parameters of water quality have only "narrative" standards. These include the important nutrients phosphorus and nitrogen as well as total and suspended solids.

The data selected were the most recent sample dates within the past 10 years from three datasets:

- USGS 04230500 OATKA CREEK AT GARBUTT NY – Data available from this station range from 1954 to 2009. For the purposes of this screening, data from 2005 through 2009 were used.
- RIBS OATKA CREEK IN SCOTTSVILLE @ STATE ROUTE 251 – Rotating Intensive Basin Study, conducted in 2005 by the New York State DEC; these data appear to be—at least in part—replicated in the USEPA Storet database.
- SUNY Brockport – Data collected by for the Genesee River Project by Dr. Joseph C. Makarewicz (SUNY Brockport) during 2010 on Oatka Creek from a sample location described as "Garbutt", which is presumably comparable to the USGS Garbutt station.

Dr. Makarewicz's group from SUNY Brockport is conducting an ongoing study of Oatka Creek Watershed and a number of other watersheds in the Genesee River Basin. Additional data from a number of sites in the Oatka Creek Watershed will be available soon. These data can be added to t his characterization and used to set priorities for restoration and protection of Oatka Creek and its tributaries.

Analytical results from the datasets currently available that meet the AWQS are shown in Table 5-1, while parameters that exceeded the AWQS are shown in Table 5-2. The parameters listed in Table 5-3 are those with narrative standards; the data available pertaining to these narrative standards do not allow a determination of compliance or non-compliance.
In summary:

- The majority of measurements of nitrite nitrogen, dissolved oxygen and pH meet the NYSDEC ambient water quality standards for Class B waters at Scottsville, where measurements have been made for a number of years. Although the minimum dissolved oxygen measured in the RIBS program on one occasion was very low, other values and all the averages fall well within the standard. Nitrite N was measured in excess of the ambient water quality standard to protect a cold water fish community, but within the warm water standard, on one occasion in June, 2005.
- Levels of aluminum, mercury and total solids in Scottsville, near the confluence of Oatka Creek with the Genesee River, all exceed the NYS ambient water quality standards, and, in the case of mercury, by a factor of 20 or more.

- There is no indication from these data that the narrative standards have been exceeded, and the quality of the water in Oatka Creek and its tributaries appears to be suitable for its designated best use with regard to these nutrients.

Table 5.1: Summary of Ambient Water Quality Standards (AWQS) for parameters sampled in recent years which met the standards.

Parameter	AWQS for Class B and C Waters	Data Source/Location	Meets Standards?
Ammonia	Varies with pH and temperature. *For this data set, standards range from 1.1 to 1.4 mg/l*	RIBS – Scottsville @ State Route 251 (2005)	Standards met.
Cadmium	0.85 exp (0.7852 [ln (ppm hardness)] - 2.715) (A[C]) *Varies depending on sample hardness. For this dataset, standards range from 4.22 to 9.32 ug/l.*	RIBS – Scottsville @ State Route 251 (2005)	Standards met.
Coliforms, Fecal	The monthly geometric mean, from a minimum of five examinations, shall not exceed 200 cfu/100ml. *Applicable when disinfection is required for SPDES permitted discharges directly into, or affecting the best usage of, the water; or when the department determines it necessary to protect human health.*	RIBS – Scottsville @ State Route 251 (2005)	Insufficient data to assess compliance. *Period:* Apr-Nov *N samples:* 9 *Geometric mean* = 98 cfu/100ml.
Copper	(0.96) exp(0.8545 [ln (ppm hardness)] - 1.702) (A[C]) *Varies depending on sample hardness. For this dataset, standards range from 19.3 to 45.5 ug/l.*	RIBS – Scottsville @ State Route 251 (2005)	Standards met.
Fluoride	(0.02) exp(0.907 [ln (ppm hardness)] + 7.394) (A[C]) *Varies depending on sample hardness. For this dataset, standards range from 4,777 to 11,897 ug/l.*	RIBS – Scottsville @ State Route 251 (2005)	Standards met.
Lead	(1.46203 - [ln (hardness) 0.145712]) exp (1.273 [ln (hardness)] - 4.297) (A[C]) *Varies depending on sample hardness. For this dataset, standards range from 9.89 to 28 ug/l.*	RIBS – Scottsville @ State Route 251 (2005)	Standards met.
Nickel	0.997 exp (0.846 [ln (ppm hardness)] + 0.0584) (A[C]) *Varies depending on sample hardness. For this dataset, standards range from 111 to 260 ug/l.*	RIBS – Scottsville @ State Route 251 (2005)	Standards met.
pH	Shall not be less than 6.5 nor more than 8.5	RIBS – Scottsville @ State Route 251 (2005)	Standards met.
Zinc	exp (0.85 [ln (ppm hardness)] + 0.50) (A[C]) *Varies depending on sample hardness. For this dataset, standards range from 177 to 416 ug/l.*	RIBS – Scottsville @ State Route 251 (2005)	Standards met.

A[C] – Standard for aquatic life, chronic exposure.

Table 5.2: Summary of Ambient Water Quality Standards (AWQS) for parameters sampled in recent years that did not meet the standards.

Parameter	AWQS for Class B and C Waters	Data Source/Location (Year)	Meets Criteria?
Aluminum	100 ug/l (A[C])	RIBS – Scottsville @ State Route 251 (2005)	30% of measurements exceeded standard
Coliforms, Fecal	The monthly geometric mean, from a minimum of five examinations, shall not exceed 200 cfu/100ml. *Applicable when disinfection is required for SPDES permitted discharges directly into, or affecting the best usage of, the water; or when the department determines it necessary to protect human health.*	RIBS – Scottsville @ State Route 251 (2005)	Insufficient data to assess compliance. Geometric mean of 9 samples collected Apr-Nov = 98 cfu/100ml.
Coliforms, Total	• The monthly median value of the samples, from a minimum of five examinations, shall not exceed 2,400 cfu/100 ml, and; • more than 20 percent of the samples, from a minimum of five examinations, shall not exceed 5,000 cfu/100ml *Applicable when disinfection is required for SPDES permitted discharges directly into, or affecting the best usage of, the water; or when the department determines it necessary to protect human health.*	SUNY Brockport – Garbutt (2010)	No monthly medians exceeded the standard of 2,400 cfu/100ml. 25% of September and October samples exceeded the percent standard of 5,000 cfu/100ml.
		RIBS – Scottsville @ State Route 251 (2005)	Insufficient data to assess compliance. Median of 9 samples collected Apr-Nov = 190 cfu/100ml. 11% of 9 samples exceeded 5,000 cfu/100ml.
Dissolved Oxygen	For trout spawning waters (TS), the DO concentration shall not be less than 7.0 mg/L from other than natural conditions. For trout waters (T), the minimum daily average shall not be less than 6.0 mg/L, and at no time shall the concentration be less than 5.0 mg/L.	RIBS – Scottsville @ State Route 251 (2005)	20% of samples were less than 7 mg/l 10% of samples were less than 5.0 mg/l.
Mercury	0.0007 µg/l (H[FC])	RIBS – Scottsville @ State Route 251 (2005)	Measurements reported with detectable concentrations exceeded standard.
Nitrite Nitrogen	100 ug/L except 20 ug/L for trout waters (T or TS) (A[C])	RIBS – Scottsville @ State Route 251 (2005)	Standard not met for trout waters; 10% of samples exceeded 20 ug/l.
Solids, Total Dissolved	Shall be kept as low as practicable to maintain the best usage of waters but in no case shall it exceed 500 mg/L.	RIBS – Scottsville @ State Route 251 (2005)	80% of samples exceeded standard.

A[C] – Standard for aquatic life, chronic exposure.
H[FC] – Standard for human exposure via fish consumption

Table 5.3: Summary of Ambient Water Quality Standards (AWQS) for parameters sampled in recent years with narrative standards difficult to evaluate against numerical data.

Parameter	AWQS for Class B and C Waters	Data Sources/Location
Nitrogen, Total	None in amounts that will result in growths of algae, weeds and slimes that will impair the waters for their best usages.	USGS – Garbutt (2005-2009) SUNY Brockport – Garbutt (2010)
Phosphorus, Total	None in amounts that will result in growths of algae, weeds, and slimes that will impair the waters for their best usages.	RIBS – Scottsville@ STATE ROUTE 251 (2005) USGS – Garbutt (2005-2009) SUNY Brockport – Garbutt (2010)
Solids, Total Suspended	None from sewage, industrial wastes or other wastes that will cause deposition or impair the waters for their best usages.	RIBS – Scottsville @ State Route 251 (2005) USGS – Garbutt (2005-2009) SUNY Brockport – Garbutt (2010)
Solids, Total	None from sewage, industrial wastes or other wastes that will cause deposition or impair the waters for their best usages.	RIBS – Scottsville @ State Route 251 (2005)
Turbidity	None from sewage, industrial wastes or other wastes that will cause deposition or impair the waters for their best usages.	RIBS – Scottsville @ State Route 251 (2005)

5.1.2 Priority Waterbodies List (PWL)

States must complete periodic assessments of water quality and habitat conditions in order to evaluate whether standards are met, and whether the designated uses are supported. In New York, surface waters exhibiting symptoms of degradation are placed on a Priority Waterbodies List (PWL), and categorized based on the severity of water quality and/or habitat degradation (Table 5-4).

Table 5-4: Categories of water quality, based on the severity of water quality and/or habitat degradation

Severity	Criteria
Precluded	*Frequent*/*persistent* water quality, or quantity conditions and/or associated habitat degradation *prevents all aspects* of the waterbody use.
Impaired	Occasional water quality, or quantity conditions and/or habitat characteristics *periodically prevent* the use of the waterbody, or; Waterbody uses are not precluded, but some aspects of the use are *limited* or *restricted*, or; Waterbody uses are not precluded, but *frequent*/*persistent* water quality, or quantity conditions and/or associated habitat degradation *discourage* the use of the waterbody, or; Support of the waterbody use *requires additional*/*advanced* measures or treatment.
Stressed	Waterbody uses are not significantly limited or restricted, but occasional water quality, or quantity conditions and/or associated habitat degradation *periodically discourage* the use of the waterbody.

Threatened	Water quality currently supports waterbody uses and the ecosystem exhibits no obvious signs of stress, however *existing or changing land use patterns* may result in restricted use or ecosystem disruption, or; Monitoring *data reveal increasing contamination* or the presence of toxics below the level of concern, or; Waterbody uses are not restricted and no water quality problems exist, but the waterbody is a *highly valued resource* deemed worthy of special protection and consideration.

The most recently published Priority Waterbodies List (2003) evaluates 5 segments of Oatka Creek: upper, middle (Genesee Co.), middle (Wyoming Co.), lower Oatka Creek, each with its associated minor tributaries, and the LeRoy Reservoir (Table 5-5). [79]

Table 5-5: Priority waterbody listings (PWL) for segments of Oatka Creek and its tributaries (NYSDEC PWL 2003).

Oatka Creek Segment	Use Impairment	Cause Source	Class	W B Category
Lower Oatka Ck & Minor Tribs.	Aquatic Life suspected of being **stressed** Aesthetics suspected of being **stressed** Public bathing suspected of being **stressed**	algal/weed growth; silt/sediments agriculture; stream-bank erosion	B	minor impacts
Middle Oatka Ck & Minor Tribs. (Wyoming Co.)	Recreation suspected of being **stressed** Aesthetics suspected of being **stressed**	algal/weed growth; nutrients; silt/sediment agriculture; stream-bank erosion	C	Minor Impacts
Middle Oatka Ck & Minor Tribs. (Genesee Co.)	Recreation suspected of being **stressed** Aesthetics suspected of being **stressed**	algal/weed growth; nutrients; silt/sediment agriculture; stream-bank erosion	C	minor impacts
Upper Oatka Ck & Minor Tribs.	Recreation suspected of being **stressed** Aesthetics suspected of being **stressed**	algal/weed growth; nutrients; silt/sediment agriculture; stream-bank erosion	C	minor impacts
LeRoy Reservoir (Sect. 303(d) listed waterbody)	Water supply known to be **stressed**. Aesthetics known to be **stressed**.	water level/flow, nutrients, pathogens hydro modification; failing on-site systems		minor impacts

5.1.3 Section 303(d) Listing

In New York, waterbodies with designated uses considered precluded or impaired are eligible for placement on the 303(d) list. This list is named for the section of the Clean Water Act requiring states, territories, and authorized tribes to assess water-quality conditions within their jurisdictions and compare the data to promulgated standards. The 303(d) list is a product of this assessment; water bodies are placed

on the list when additional controls are needed to bring water quality into compliance with standards and criteria.

The Final New York State (June 2010) Section 303(d) List of Impaired Waters Requiring a TMDL/Other Strategy (http://www.dec.ny.gov/docs/water_pdf/303dlistfinal10.pdf) lists no segments of Oatka Creek with impairments significant enough to require TMDL development or other controls.

5.2 Water Quality Data Summary

The water chemistry of Oatka Creek (and its tributaries) was characterized in the Oatka Creek Watershed State of the Basin Report (2002) using principally data from the DEC-RIBS Program for 1989 & 1990, a similar study by Sutton (1995), and water-flow and water-chemistry data from the USGS gauging station at Garbutt. There are also very recent data for some chemical parameters (Fall 2010) from a site near the Garbutt gauging station (Makarewicz, unpublished[80]). These data suggest that the water quality of Oatka Creek and its tributaries is generally good with only minor impairments and does not appear to be deteriorating.

Table 5.6: Comparison of selected analytical results from three data sets

Parameter (units)	RIBS at Scottsville Route 237 2000 & 2005 (N = 20)	USGS at Garbutt 2005-2009 (N = 48)	SUNY Brockport 2010 (N = 15)
Phosphorus (mg/l)			
Min	0.011	0.022	0.008
Max	0.247	0.482	0.036
Average	0.034	0.099	0.020
Median	0.019	0.077	0.019
Nitrogen (mg/l)			
Min	1.39[a]	1.4	1.61
Max	4.11[a]	6.8	1.94
Average	2.28[a]	2.6	1.80
Median	2.26[a]	2.7	1.79
TSS (mg/l)			
Min	1.0	6.0	0.10
Max	114	171	7.5
Average	9.4	40	2.6
Median	2.85	31	2.4

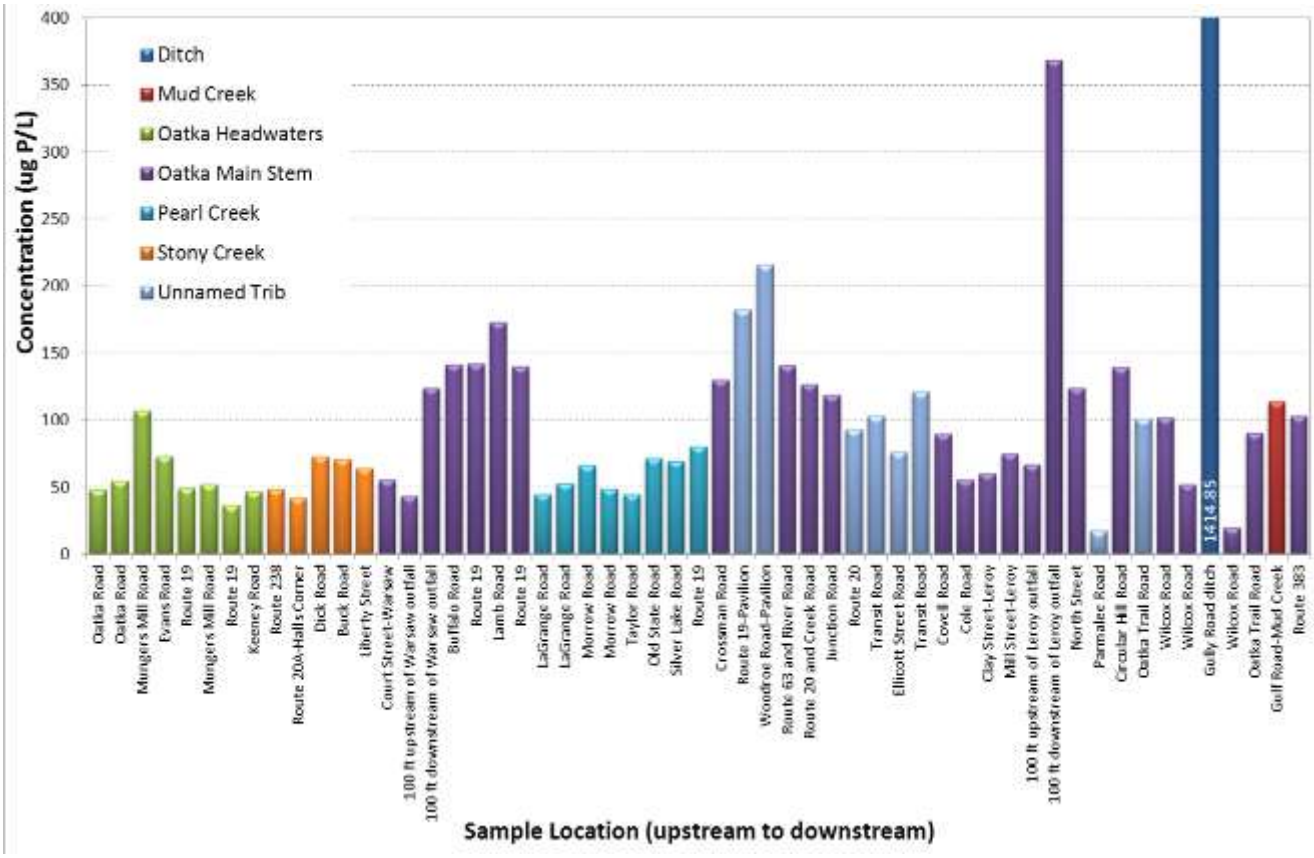
[a]Total nitrogen calculated as the sum of ammonia, TKN and nitrate/nitrite.

5.2.1 Water chemistry 2002-2004

The State of the Basin Report (2002) noted few, if any, water quality parameters that fall outside ambient water quality standards or guidance values. However, concentrations of phosphorus, an important

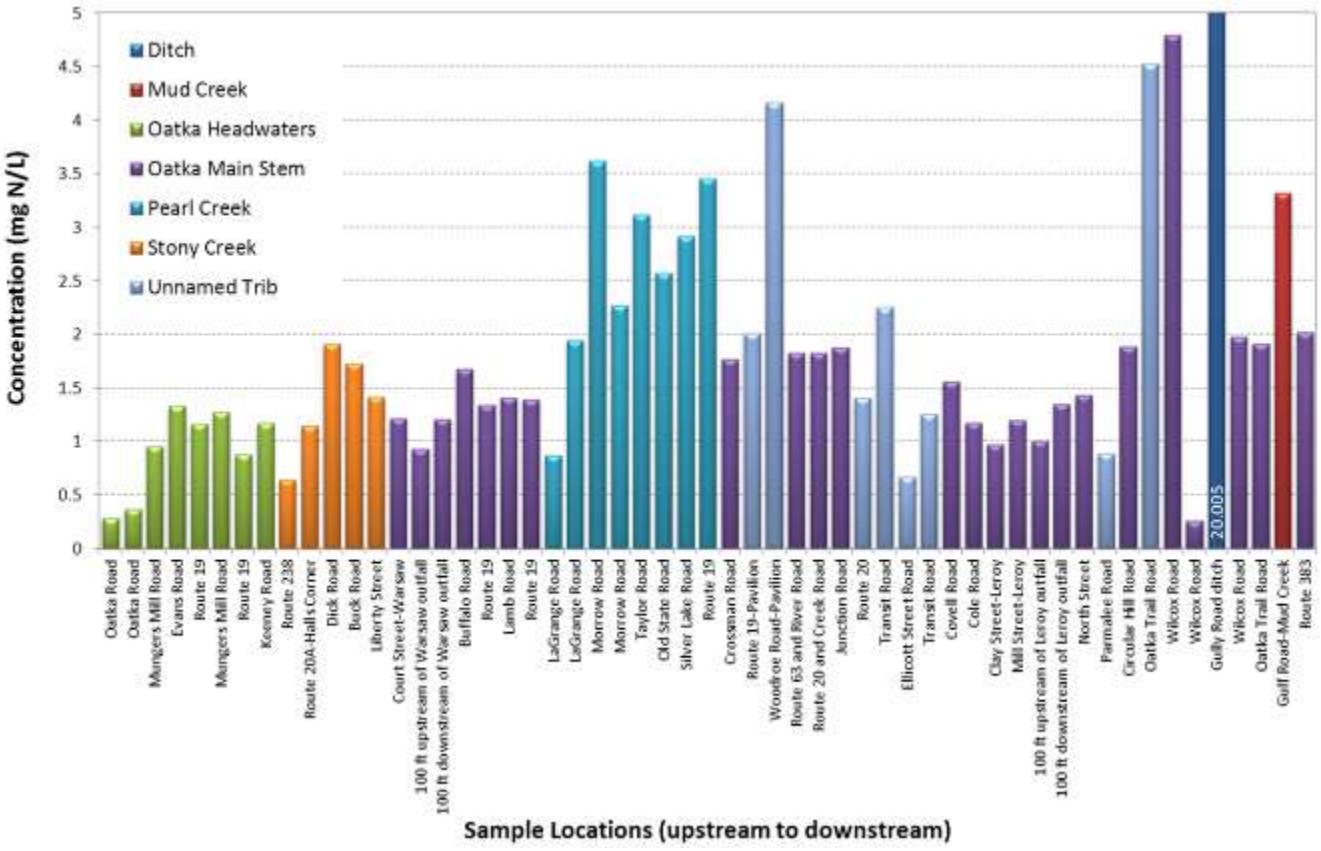
nutrient, and of suspended solids that contribute to turbidity, are especially high at times of high flow. The report recommends regular monitoring of these parameters of potential concern.

Figure 5.1: Total Phosphorus average concentrations, 2003-2004, from upstream (left) to downstream (right) on Oatka Creek. (Source: Makarewicz and Lewis, 2004).



As a follow-up to this recommendation, Makarewicz and Lewis (2004) collected grab samples at multiple sites along the main stream and a number of tributaries on eight dates between Sept. 2003 and May 2004, measuring total and soluble reactive phosphorus (TP (Figure 5-1) and SRP), nitrate and total Kjeldahl nitrogen (NO3-N (Figure 5-2) and TKN), sodium and total suspended solids (TSS) in order to locate sources of point and non-point pollution. This study identified seven areas affected by non-point sources of pollution on tributaries or the main stream. In each case, the sites were in proximity to agricultural lands. In addition, the study was able to discern the effects of the wastewater treatment plants at Warsaw and at LeRoy on in-stream concentrations of phosphorus and nitrogen. Makarewicz and Lewis (2004) recommend that landowners and managers in the watershed work together to implement best management practices (BMP) on agricultural lands in the watershed, especially at the sites they note as "stressed". The two wastewater treatment plants were operating within their current State Pollution Discharge Elimination System (SPDES) permits during the study period. The investigators recommended stakeholder discussions to consider the potential for the effects of increased population growth and associated increased point source loading on Oatka Creek.

Figure 5.2: Nitrate average concentrations, from upstream (left) to downstream (right) on Oatka Creek. *(Source: Makarewicz and Lewis, 2004).*

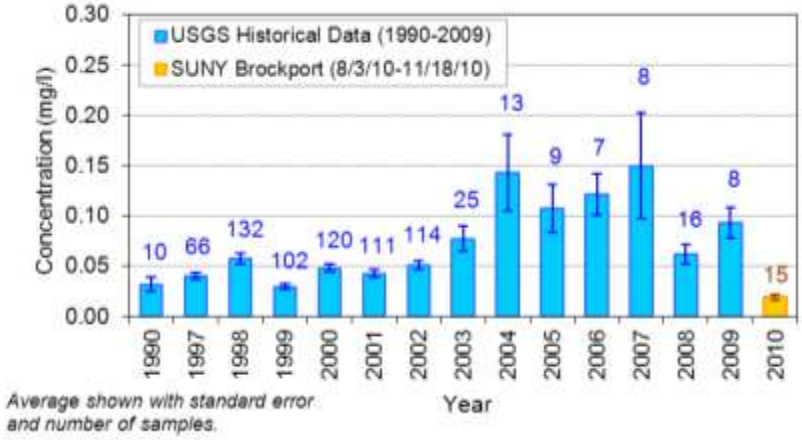


5.2.2 Water chemistry since 2004

The USGS data displayed in Figure 5.3 reflect an increasing trend or at least higher levels of total phosphorus (TP) for the years 2004-2007 and 2009. The averages for these years, however, are based on relatively fewer samples (7-13) and have more variability than those for the years 1990-2003 (up to 132 measurements). This change in the sampling program was designed to maintain the integrity of the long-term monitoring record despite reduced funding allocations; samples are collected during baseflow and runoff events, distributed throughout the annual cycle. While New York State has not yet proposed nutrient criteria for flowing waters, recent total P concentrations in Oatka Creek (with the exception of 2008) approach the 0.1 mg/L threshold cited as the EPA's goal for controlling eutrophication.

The values reported by Makarewicz from his 2010 sampling program are among the lowest reported for this site. Most of the 15 samples were collected during low flow conditions (refer to Figure 5.5), which likely contributes to the low variability in the measured concentrations as well.

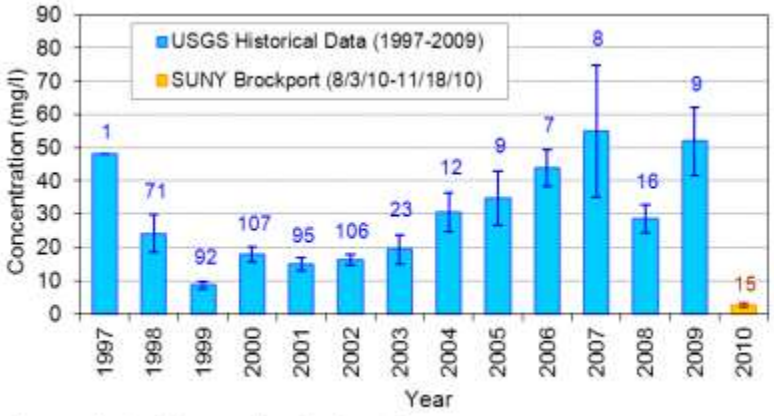
Figure 5.3: Annual statistics for phosphorus in Oatka Creek at Garbutt.



The same pattern holds for total suspended solids (TSS – Figure 5.4): values for 2004-2007 and for 2009 are high, with the reduced sampling regime likely contributing to the higher standard error of the mean. Once again, Makarewicz's results, collected during low flow conditions, are much lower than the USGS dataset. The TP and TSS results are highly correlated, and both are higher during high flow conditions. Ongoing investigations by the Brockport group in the upper reaches of the watershed have determined that farm-animal waste, especially from confined animal feeding operations (CAFOs) present significant loads of nitrogen and phosphorus, at least to the Evans Creek subwatershed, although wetlands along the stream serve as sinks for phosphorus and mitigate concentrations to some extent (D. Pettenski, pers. comm., Scholars' Day Presentation, SUNY Brockport, March 2011)

The same pattern holds for total suspended solids (TSS – Figure 5.4)): values for 2004-2007 and for 2009 are high, but represent small sample sizes. Once again, Makarewicz's values are much lower. Since the years for which the average concentrations of TP and TSS represent relatively few samples, since both TP and TSS concentrations in the creek depend strongly on the discharge rate (Figure 5.5), and since Makarewicz recently reported much lower concentrations, there is no clear trend of increase in either of these.

Figure 5.4: Annual statistics for Total Suspended Solids in Oatka Creek at Garbutt



Average with standard error and number of samples.

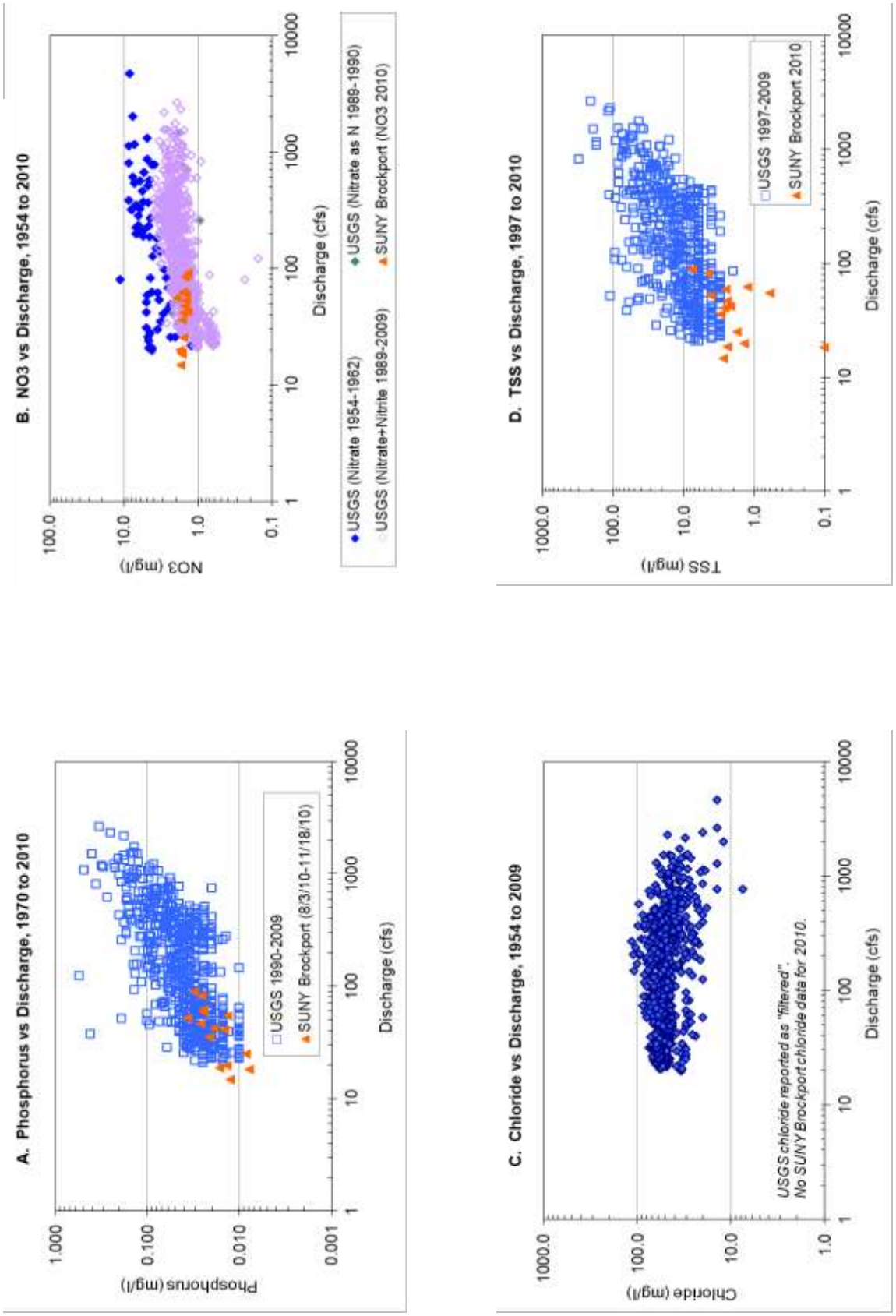


Figure 5.5. Comparison of parameter concentrations with stream discharge, Oatka Creek at Garbutt

SECTION 5.0 ENDNOTES

[79] Summary Listing of Priority Waters, [Online], NYSDEC, http://www.dec.ny.gov/docs/water_pdf/pwlgeneslist.pdf. Ont 117-25 and Ont 117- 25- 7-4-P24a
[80] The Genesee River Project, Joseph Makarewicz, SUNY College at Brockport, Brockport, NY

6.0 Biological Characteristics of the Watershed

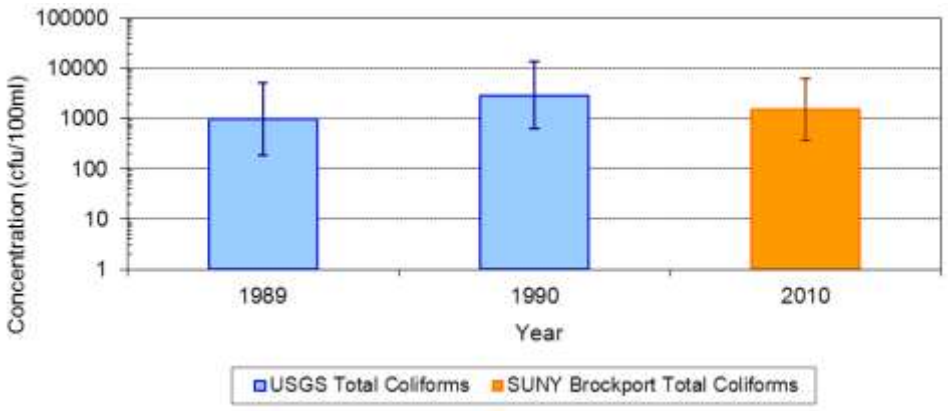
6.1 Coliform Bacteria

Coliform bacteria that originate in the intestinal tracts of birds and mammals, including humans, are reported as "fecal coliforms", and are used to indicate the potential presence of pathogenic (disease-causing) microorganisms in water. Although these bacteria themselves may not be pathogenic, because they are specific to the intestinal tracts of animals, however, they indicate that animal feces, perhaps containing pathogens, have entered the water. Other coliform bacteria are naturally present in the soil and may reach the waterway through erosion and runoff. Measurements reported as "total coliforms" include these soil organisms as well as the "fecal coliforms". Because erosion and runoff are greater during periods of high-flow storm events, counts of "total coliforms" can vary greatly with stream discharge rates.

Individual on-site wastewater disposal systems (septic systems), wastewater treatment facilities and animal feeding operations, including pastured animals with access to streams, confined animal feeding operations (CAFOs), or run-off from manured fields are likely sources of fecal coliform bacteria in waterways. Waterfowl, including Canada geese, can also contribute fecal coliform bacteria to waterways.

The State of the Basin Report (2002) cites the 1989-1990 RIBS program's findings for total coliform and fecal coliform bacteria in Oatka Creek at Garbutt. Among the monthly samples taken at that time, total coliform counts ranged from 96-8200 cfu (colony-forming units)/100 ml, and fecal coliform bacteria counts ranged from 10 to 1600 cfu/100 ml, and all of these levels are below criteria for secondary contact recreation (Class C Waterbody). The RIBS study was repeated in 2005 (9 samples from April to November). Total coliform ranged from 55 to 22,000 cfu/100 ml (median of 300 cfu/ 100 ml), and fecal coliform ranged from 15 to 7800 cfu/ 100 ml (median of 50 cfu/100 ml).

Figure 6.1: Annual statistics (geometric mean +/- standard deviation) for total coliforms in Oatka Creek at Garbutt. USGS data for 1989 and 1990; SUNY Brockport data from 2010



Recent studies by the SUNY Brockport group (Makarewicz. pers. comm[1].), however, report much higher levels of total coliforms ranging from 0 to 92,000 cfu/100 ml with a median of 900 cfu/100 ml at the Garbutt site (Figure 6-1).

The SUNY Brockport 2010 total coliform data were evaluated for compliance with the NY State Ambient Water Quality Standard (AWQS) (Table 6-1). The AWQS for total coliforms consists of two standards, based on a minimum of 5 examinations:

- The monthly median value shall not exceed 2,400 cfu/100ml, and
- more than 20 percent of the samples shall not exceed 5,000 cfu/100ml

Table 6.1: Evaluation of 2010 SUNY Brockport total coliforms data with AWQS

Month 2010	N samples	The monthly median value shall not exceed 2,400 cfu/100ml		more than 20 percent of the samples shall not exceed 5,000 cfu/100ml	
		Monthly Median	*Exceeds Criterion?*	*% of Samples >5000 cfu/100ml*	*Exceeds Criterion?*
August	5	1,500	No	0%	No
September	4	900*	No*	25%*	Yes*
October	4	2,200*	No*	25%*	Yes*
November	2	na	--	na	--

* - Number of samples less than 5 (4).
na – indicates insufficient number of samples (2) for evaluation with AWQS

[1] The Genesee River Project, Joseph Makarewicz, SUNY College at Brockport, Brockport, NY, pers. comm..

6.2 Benthic Macroinvertebrates

The community of animals living in a waterbody is a good indicator of the qualities of the water, especially the qualities important for supporting life. In particular, evaluation of the community of invertebrate animals—largely insects—living on the bottom of a stream has been widely used as an indicator of water quality. These bottom-dwelling invertebrate animals are large enough to be seen without the aid of a microscope and are referred to as benthic macroinvertebrates. Some of these animals are sensitive to pollution, and since many of them live in the stream for a year or more, they integrate the condition of the water over time, unlike so-called "grab samples" for chemical analysis that represent only a snapshot of conditions. The NYSDEC, the US-EPA and other agencies apply standard methods to the analysis of these communities to arrive at statements of overall water quality.

Based on an analysis of the community of benthic macroinvertebrates in Oatka Creek, the 1989-1990 DEC-RIBS study classified the water in the creek as "slightly impacted". This finding was confirmed by Sutton (1997), who carried out a series of similar assessments during the 1990s, and the State of the Basin Report (2002) lists the creek as "slightly impacted" and notes that these conditions did not change from the 1989-90 study to the 1997 study of Sutton (1997). An intensive RIBS study was repeated at the Scottville site in 2005, and evaluation of the benthic macroinvertebrate community once again led to a "slightly impacted" designation.

Freshwater mussels also reside in Oatka Creek and its tributaries, but Region 8 (Avon) NYSDEC biologists searched 13 sites from upstream of Warsaw to Scottsville and found live mussels representing 2 common species only at a site at Mumford (Table 6.2) (pers. com. DEC Region 8).

Table 6.2: Freshwater Mussels of the Oatka Creek Watershed (data provided by Jenny Landry, NYSDEC Bureau of Wildlife, Region 8, February 2011)

Scientific Name	Common Name
Oatka Creek	
Anodontoides ferussacianus (Lea)	Cylindrical papershell
Pyganodon grandis (Say)	Floater / Giant floater

6.3 Fish

The most recent general surveys of fish in the Oatka Creek Watershed were done by the NYSDEC Regions 8 and 9 between 1990 and 2003. Although the species lists from those surveys cannot be used reliably to detect changes in the fish community in the watershed, they may serve as baseline data for future program of surveys. A total of 30 species of fish were recorded among the surveys, as listed below (pers. com. DEC Region 8).

Brown trout	Sand shiner	Northern pike
Rainbow trout	Mimic shiner	Banded killifish
White sucker	Bluntnose minnow	Rock bass
Northern hog sucker	Fathead minnow	Pumpkinseed
Smallmouth bass	Cutlip minnow	Bluegill
Largemouth bass	Longnose dace	Greenside darter
Northern pike	Eastern Blacknose dace	Fantail darter
Central stoneroller	Shorthead redhorse	Johnny darter
Common shiner	Creek chub	Tessellated darter
Spottail shiner	Hornyhead chub	Logperch
Brook trout		

There is a productive trout fishery in Oatka Creek based mainly on brown trout introduced by the DEC with the help of local anglers. In 2009, the DEC stocked approximately 15,000 brown trout at Wheatland in Monroe Co., LeRoy in Genesee Co. and Warsaw in Wyoming Co. Stocking of a similar number in 2010 was planned, but the numbers stocked have not yet been posted by the DEC. This fishery, especially the lower reaches of the creek constitute an important regional natural resource worthy of protection and dependent on the maintenance of excellent water quality. Beginning in October 2001, the NYSDEC imposed a no-kill regulation for trout on the section of Oatka Creek managed for wild brown trout. After the imposition of the regulation, no-kill sections of the creek were compared with pre-regulation surveys conducted in the section (1998-2010) and with control sites outside the no-kill section. This study of the effects of the regulation indicated that overall trout biomass and growth was unchanged by the regulation, but that it resulted in a population shift toward larger, age-4 trout and, therefore, greater angler satisfaction. The no-kill regulation has remained in effect on this section of the creek (Sanderson, M, 2007. *The effect of a no-kill regulation on biomass, abundance, and growth of brown trout (Salmo trutta) in Oatka Creek*. NYSDEC Region 8). According to Matt Sanderson, NYSDEC Region 8, Wild brook trout are found in Oatka and Spring Creeks.

6.4 Other Animals

The Second Atlas of Breeding Birds in New York State (McGowan, KJ and K Corwin, Eds., 2008, Cornell Univ. Pr.) is available through NY DEC website. The Atlas lists bird species likely or confirmed to be breeding during the 2000-2005 survey period in each of 5,333, 5 km by 5 km, survey blocks statewide. Since the survey blocks do not correspond to watershed boundaries and since many survey blocks lie within the Oatka Creek Watershed, it would be difficult and time consuming to extract a species list for the entire watershed. If one wished to find if a particular bird had been noted as breeding in some small section of the watershed, however, one could locate the data here.

6.5 Biological Elements of Special Concern

A number of animals, plants and ecological communities rare either nationally or in the state of New York are listed with the NY Natural Heritage Program (Table 6.3), and some are listed or are candidates

for listing in the US Fish and Wildlife Service's threatened and endangered species program (Table 6.4). Special permitting policies pertain in locations where these elements may occur.

Table 6.3: Rare, Threatened and Endangered Species and Significant Habitats within Oatka Creek Watershed (NY Natural Heritage Program database)

Common Name[1]	Scientific Name	NY Protection Status[2]				Conservation Ranking[3]
		E	T	R	U	
Birds						
Short-eared Owl	*Asio flammeus* (nonbreeding)	x				S2; G5
Other						
Waterfowl Winter Concentration Area					x	S3S4; GNR
Vascular Plants						
Golden-seal	*Hydrastis canadensis*		x			S2; G4
Goosefoot Corn-salad	*Valerianella chenopodiifolia*	x				S1; G5
Green Gentian	*Frasera caroliniensis*		x			S2; G5
James' Sedge	*Carex jamesii*		x			S2; G5
Little-leaf Tick-trefoil	*Desmodium ciliare*		x			S2S3; G5
Log fern*	*Dryopteris celsa*	x				S1; G4
Marsh Arrow-grass	*Triglochin palustre*		x			S2; G5
Spreading Globeflower	*Trollius laxus*			x		S3; G4T3
Twin-leaf	*Jeffersonia diphylla*		x			S2; G5
Wild Hydrangea	*Hydrangea arborescens*	x				S2; G5
Willdenow's Sedge	*Carex willdenowii*		x			S2S3; G5
Woodland Agrimony	*Agrimonia rostellata*		x			S2; G5
Yellow Giant-hyssop	*Agastache nepetoides*		x			S2S3; G5
Communities						
Calcareous cliff community					x	S3; G4
Floodplain forest					x	S2S3; G3G4
Hemlock-northern hardwood forest					x	S4; G4G5
Limestone woodland					x	S2S3; G3G4
Maple-basswood rich mesic forest					x	S3; G4
Rich sloping fen					x	S1S2; G3
Rocky summit grassland					x	S3; G3G4

[1]Rare plants, rare animals and significant communities documented in the Oatka Creek watershed since 1980, unless marked with an asterisk (*), which indicates last documented in vicinity of the project site before 1980.

[2]NY Protection Status: E = Endangered; T = Threatened; R = Rare; U = Unlisted.

[3]Conservation rankings:

- State Ranking – Rarity in New York as ranked by NY Natural Heritage Program on a 1 to 5 scale.
  S1 = Critically imperiled S2 = Imperiled S3 = Vulnerable
  S4 = Apparently secure S5 = Abundant and secure
- Global Ranking – Global rarity as ranked by Nature Serve on a 1 to 5 scale.
  G1 = Critically imperiled G2 = Imperiled G3 = Vulnerable
  G4 = Apparently secure G5 = Secure GNR = Not ranked;
- T-ranks (T1-T5) are defined the same as the G-ranks (G1-G5), but T-rank refers only to the rarity of the subspecies or variety.

Table 6.4: Federally Listed Endangered, Threatened and Candidate Species within counties of the Oatka Creek Watershed (US Fish and Wildlife Service)

Common Name	Scientific Name	NY County[1]	Federal Status[2]				
			E	T	P	C	D
Birds							
Bald eagle[3]	*Haliaeetus leucocephalus*	*GLW*					x
Reptiles							
Bog turtle[4,5]	*Clemmys [=Glyptemys] muhlenbergii*	*GM*		x			
Eastern massasauga	*Sistrurus catenatus catenatus*	*G*				x	
Vascular Plants							
Eastern prairie fringed orchid[4]	*Platanthera leucophea*	*G*		x			
Houghton's goldenrod	*Solidago houghtonii*	*G*		x			

[1]Counties in NY: G = Genesee; L = Livingston; M = Monroe; W = Wyoming
[2]Federal Status: E = Endangered; T = Threatened; P = Proposed; C = Candidate; D = Delisted.
[3]"The bald eagle was delisted on August 8, 2007. While there are no ESA requirements for bald eagles after this date, the eagles continue to receive protection under the Bald and Golden Eagle Act (BGEPA). Please follow the Service's May 2007 Bald Eagle Management Guidelines to determine whether you can avoid impacts under the BGEPA for your projects." (USFWS)
[4]Historic
[5]Riga and Sweden Townships in Monroe County

The NYSDEC's Statewide Wildlife Conservation Strategy for the Southwest Lake Ontario Basin, which includes the Oatka Creek Watershed, lists many of these elements as of concern regionally. Habitat destruction and fragmentation associated with development poses a high-order threat to wildlife in the region in general, although invasive exotic species of animals and plants also pose threats.

7.0 Watershed Runoff Export Coefficients

The following approach utilizes an export coefficient model to estimate annual loss of water and materials from the landscape. Because limited data are available to calibrate or verify a model of chemical and sediment loss from the landscape (i.e., pollutant load) in Oatka Creek, a simple landscape approach was used with regionally-appropriate export coefficients based on land cover and soil hydrologic class. The export coefficient modeling approach is typically used to characterize rural landscapes, with nonpoint sources of pollution and limited - if any - stormwater collection and point source discharges.

This is an empirical modeling approach; the export coefficients were derived from field investigations of watersheds with a range of land cover and soil hydrologic class conditions. We endeavored to select export coefficients from areas with physiographic, climatic and soil conditions comparable to those found in the Oatka Creek watershed. The analysis estimates the annual export of material, and results are reported in units of mass per area per time (kg/ha/yr). For the purposes of this analysis, we focused on export of phosphorus from the landscape. Analysis of export for other parameters may be conducted in the future as needed.

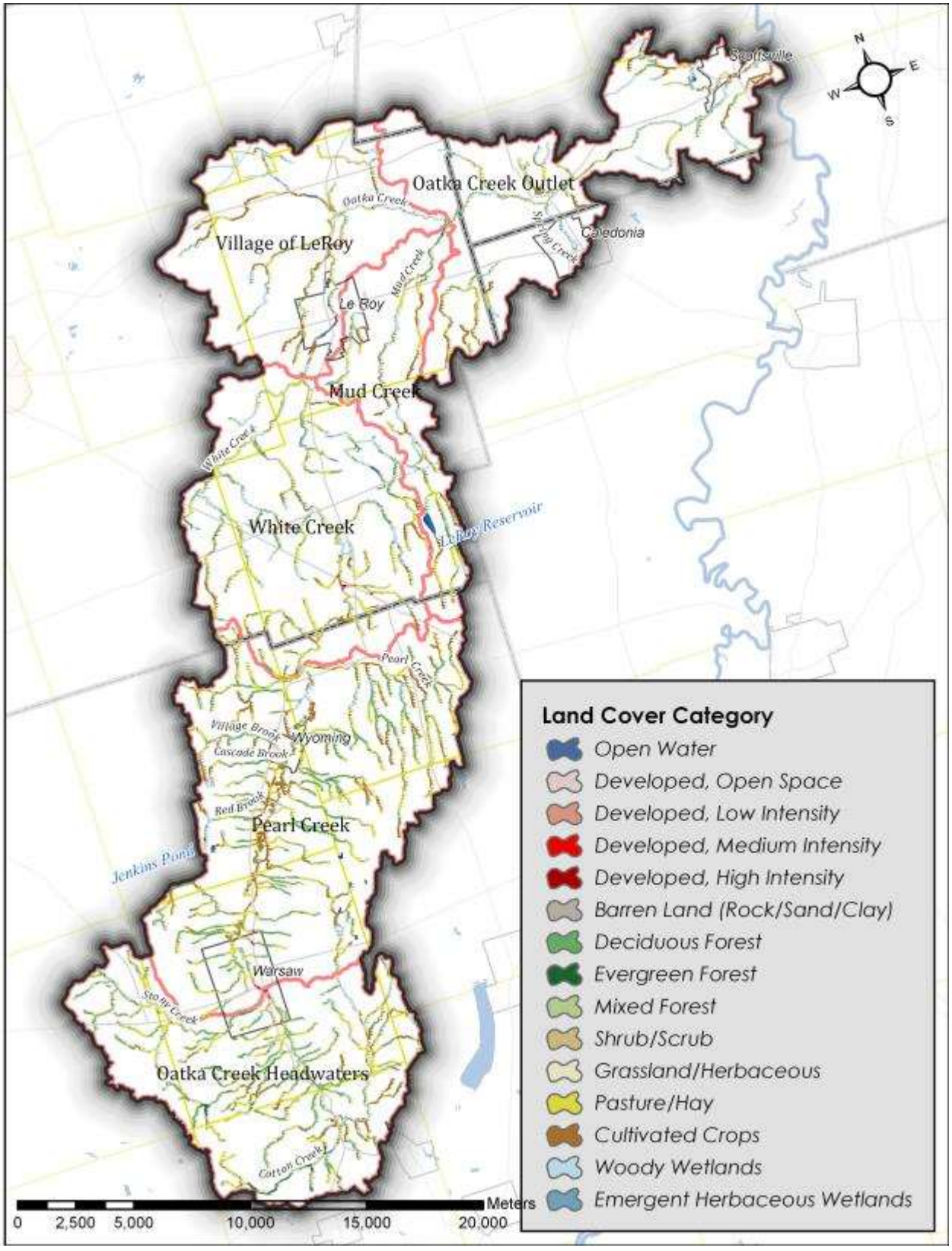
7.1 Method

Phosphorus export calculations were developed using two data sets: land cover and municipal/industrial discharges. Land cover data were obtained from the G/FLRPC GIS files prepared for the Characterization Report. Given that areas closer to streams are more likely to contribute pollutant load than areas farther away, land cover data within 100m of streams (Figure 7.1) were weighted for proximity. This weighting was accomplished by applying less than the full value of the phosphorus

Table 7.1: Land Cover within 100m of streams, Oatka Creek (2006 NLCD)

Land Cover (NLCD 2006)	Acres	%
Open Water	139.4	0.5%
Developed, Open Space	1189.1	3.9%
Developed, Low Intensity	292.0	1.0%
Developed, Medium Intensity	81.0	0.3%
Developed, High Intensity	14.9	0.049%
Barren Land	24.5	0.1%
Deciduous Forest	7008.6	22.8%
Evergreen Forest	234.6	0.8%
Mixed Forest	1815.4	5.9%
Shrub/Scrub	1475.1	4.8%
Grassland/Herbaceous	90.3	0.3%
Pasture /Hay	8803.9	28.7%
Cultivated Crops	6641.4	21.6%
Woody Wetlands	2702.1	8.8%
Emergent Herbaceous Wetlands	198.8	0.6%

Figure 7.1: Land Cover within 100m of Streams - Oatka Creek Watershed



export coefficient for the land cover areas more than 100m from streams. The actual proportion of the value for areas more than 100m was selected through an iterative process.

Phosphorus export coefficients, derived from literature and representing unit losses for a given land cover class, were assigned. Total annual load was derived by multiplying area (ha) by unit export (kg/ha/yr) for the annual load (kg/yr) for each land cover type.

In addition to land cover, municipal and industrial discharges are potential sources of phosphorus loading to Oatka Creek. Five wastewater discharge points were identified in the Oatka State of the Basin 2002 report (Table 7.2). Potential phosphorus loading from these points were derived by using design flow volume (mgd) and concentration limits for phosphorus based on SPDES permits (http://www.epa.gov/enviro/facts/pcs/search.html). Where there was no limit on phosphorus for a particular facility, no loading was estimated.

Table 7.2: Municipal/industrial discharges in Oatka Creek basin.

Permitted Discharges	Receiving Waters	Design Flow	SPDES TP limit
Warsaw STP	Oatka Headwaters	0.65 mgd	1.0 mg/l (average)
LeRoy (Village) WWTP	Village of LeRoy	1.0 mgd	1.0 mg/l (maximum)
Scottsville (Village) STP	Oatka Outlet	0.65 mgd	n/a
Caledonia Fish Hatchery	Spring Creek (Oatka Outlet)	3.15 mgd	n/a
Lapp Insulator Div.	Village of LeRoy	1.4 mgd	n/a
Pavilion SSDS	White Creek	0.08 mgd1	5.7 mg/l2 (median)
PCore Electric Company	Village of LeRoy	n/a	n/a
Markin Tubing	GW	n/a	n/a

Sources:
Oatka State of the Basin 2002 report
USEPA Envirofacts web site, Permit Compliance System database
Notes:
1Pavilion (Hamlet) Sanitary Sewage Disposal System flow based on SPDES permitted flow of 80,000 gd.
2PCS database indicated TP was regulated, but no limit was published. Some effluent measurements were provided; from these data, the median is shown.
n/a – no data available

The predictions of phosphorus loading in the Oatka Creek watershed (the sum of land cover and discharge loading) were compared with recent USGS data from the Oatka Creek at Garbutt monitoring site. Measurements of mean annual stream flow, unit discharge, water chemistry, and materials loading at this site for water years 2003 – 2008 were published in December 2010. By comparing predicted and observed data, the selection of export coefficients within the published range was refined; adjustments were made in an iterative manner.

Once reasonable comparisons of predicted and observed conditions were achieved, the model can be used to test scenarios of changes in land use, predicting the water quality (i.e., load) consequences of actions such as increased residential development or intensification of agricultural use.

7.2 Results

The USGS estimated the phosphorus yield of the Oatka Creek watershed from the median concentrations for a six-year period (2003-2008). The yields were not available on a sub-watershed basis, so the yield for the entire Oatka Creek watershed was used. Annual yields ranged from 0.32 to 0.42 kg/ha, and averaged 0.36 kg/ha. The average annual load of phosphorus, based on a 200 square mile watershed area, was 18,446 kg.

Phosphorus loading estimated from land cover types incorporated export coefficients with land cover area to derive total loading for the subwatersheds (Table 7.3), as described above. Areas within 100m of streams were weighted. The dominant land cover type related to agricultural uses – Cultivated Crops and Hay/Pasture account for 63% of total watershed land cover, and 50% of land cover within 100m of streams. The second most-common land cover type is Deciduous Forest, which accounts for 17% of the total watershed land cover, and 23% of land cover within 100m of streams.

Table 7.3: Summary of P load estimate for land cover, by subwatershed (weighted to 0.25 for area >100m)

Subwatershed	Land Cover TP Load Estimate (kg/yr)	Percent of Total
Oatka Headwaters	2,860	16%
Pearl Creek	5,419	30%
White Creek	3,245	18%
Mud Creek	1,585	9%
Village of LeRoy	2,186	12%
Oatka Outlet	2,951	16%
Oatka Creek Total	18,248	

Estimates of phosphorus loading were made for two of the five municipal and industrial dischargers to Oatka Creek, based on data availability (Table 7.4).

Table 7.4: Summary of P load estimate for dischargers, by subwatershed.

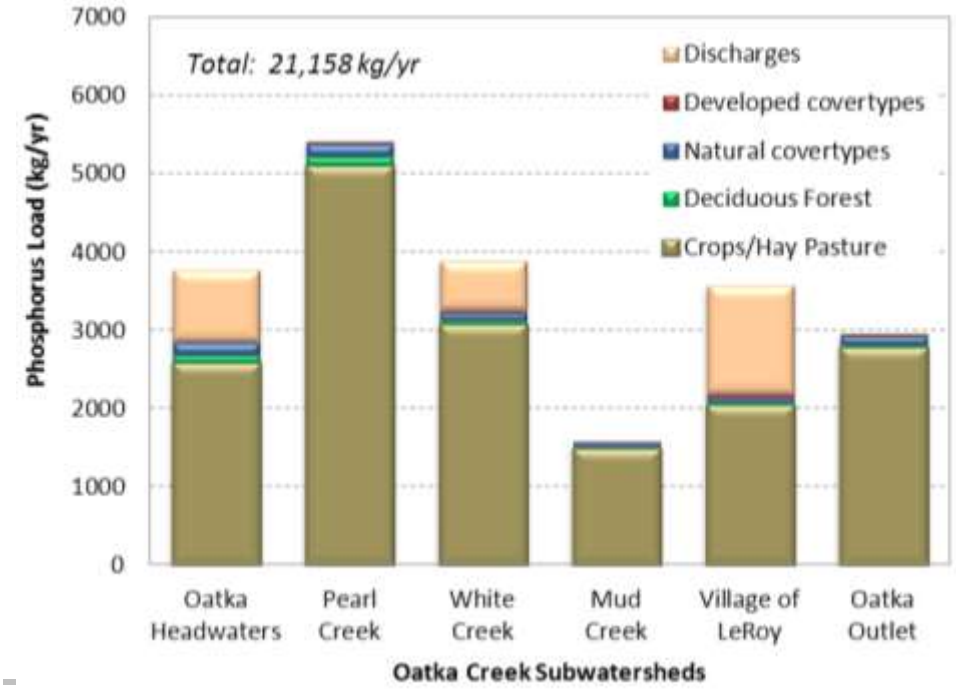
Subwatershed	Point Source TP Load Estimate (kg/yr)	Percent of Total
Oatka Headwaters	898	39%
Pearl Creek		
White Creek		
Mud Creek		
Village of LeRoy	1,382	61%
Oatka Outlet		
Oatka Creek Total	2,280	

Finally, these phosphorus loading estimates were compared with the USGS yields data. The initial analysis, using export coefficients representing average values from several sources, estimated the TP load substantially higher than that reported by the USGS. Weighting the land cover types farther than 100m from streams was conducted iteratively, until the phosphorus estimate calculated in this model approached the value obtained from the USGS yields. Ultimately, the weighting of one-quarter (0.25) of the export coefficient was applied for the land cover more than 100m from streams, which may be thought of as a quarter of the export from those areas actually reaches the stream (Table 7.5).

Table 7.5: Phosphorus Load Yield Estimates Compared to USGS Yield Data

Subwatershed	Phosphorus Load From USGS (2003-2008) Tributary Yields (kg/year)	Estimated Non-Point Phosphorus Load From Land Use (kg/year)	Estimated Point Source Loading From SPDES Permits (kg/year)	Estimated Total (kg/year)	Difference in Measured vs. Estimated
Oatka Headwaters	--	2,862	898	3,760	--
Pearl Creek	--	5,419	--	5,419	--
White Creek	--	3,245	630	3,875	--
Mud Creek	--	1,585	--	1,585	--
Village of LeRoy	--	2,186	1,382	3,567	--
Oatka Outlet	--	2,951	--	2,951	--
Oatka Creek	18,446	18.248	2,910	21,158	2,712

Figure 7.2: Estimated P Loading, Oatka Creek Watershed



SECTION 7 REFERENCES

Endreny and Wood (2003) - Endreny, T.A. and E.F. Woods. 2003. Watershed weighting of export coefficients to map critical phosphorus loading areas. J. of the American Water Resources Association (JAWRA) 39(1): 165- 181.

Reckhow et al (1980) - Reckhow, K.H., M. Beaulac, and J. Simpson. 1980. Modeling phosphorus loading and lake response under uncertainty: A manual and compilation of export coefficients. EPA 440/5-80-011. USEPA, Washington, DC.

Loehr et al (1989) – Loehr, R.C., Ryding, S.O., and Sonzogni, W.C. (1989). Estimating the Nutrient Load to a Waterbody. "The Control of Eutrophication of Lakes and Reservoirs, Volume I, Chapter 7."

WiLMS Precipitation loading rate calculated for Onondaga Lake by Dr. William Walker as part of Mass Balance calculations for the Onondaga Lake monitoring program

Source for municipal/industrial discharges:
USEPA EnviroFacts Permit Compliance System (PCS) (http://www.epa.gov/enviro/facts/pcs/)

8.0 Identification of Impairments and Threats

8.1 The Environmental Risk Assessment Process

The purpose of this summary of impairments and threats is to aid the preparation of a watershed management strategy that will describe and illustrate various impairments and threats in the watershed and evaluate approaches to addressing them. This strategy will enable watershed managers to make informed environmental decisions into the future.

What follows is a general representation of a complex and varied group of watershed "issues" organized into specific categories. This represents the beginning of an assessment process that will aid in the formulation of watershed goals, objectives, and final management strategies. The identification of data gaps is an important component of this process. The entire process is frequently an iterative one in which factual information learned during the analysis, characterization or discussion phases can lead to a reevaluation of the problem formulation or to new data collection and analysis.

Identification of threats and impairments is one of the first steps in the development of a watershed management strategy. The completed strategy will include an implementation program which will likely contain several basic elements, including

- Education and outreach to inform the public and encourage participation
- Implementation schedule
- Benchmarks and criteria for measuring progress
- Ongoing monitoring and research component to continue evaluation of the resource(s) and the effectiveness of any implementation (i.e. mitigation/restoration) efforts
- Financial estimates
- Responsible parties
- Formal framework for implementation and evaluation[81]

It will be important that the watershed management process allow for the incorporation of new information into watershed assessment on a continuing basis, which can then be used to improve the decision making process in an iterative fashion. This will be an ongoing process of analysis and deliberation assigned to a coordinated organization and associated technical advisory group to drive progress.[82] This watershed management planning process will make recommendations regarding this organization structure near the completion of the process.

These are the primary products of watershed planning: (1) clearly established and articulated management goals, (2) characterization of decisions to be made within the context of the management goals, and (3) agreement on the scope, complexity, and focus of the assessment, including the expected output and the technical and financial support available to complete it.

To begin the process of developing these planning products, we must first begin to identify the problems as they are known to exist. As stated in the USEPA document *Guidelines for Ecological Risk Assessment*:

> Descriptions of the likelihood of adverse effects may range from qualitative judgments to quantitative probabilities. Although risk assessments may include quantitative risk estimates, quantitation of risks is not always possible. It is better to convey conclusions (and associated uncertainties) qualitatively than to ignore them because they are not easily understood or estimated.[83]

After the problems are identified and agreed upon in a public format the process of systematic assessment and prioritization may commence. These steps will proceed in subsequent project components during 2012.

8.2 Resource Management and Risk Assessment in Perspective

The Oatka Creek watershed has been in a state of fluctuation. The rate of change has increased significantly since European-American settlement and activity began to grow during the late 18th and early 19th Centuries. Since then, the watershed has experienced a gradual transformation in the types of uses and their intensity. Land conversion from forest cover to agricultural cover was one of the most dramatic changes in the watershed in the past 12,000 years, since the last glaciation. Today, in some locations in the watershed, marginal land that was cleared for agricultural use has reverted back to shrub and forest cover. Farming continues to be the predominant use of the land throughout most of the watershed, however, and has a significant influence on local water quality. Agricultural practices continue to evolve as farmers look for ways to make more efficient use of the land and reduce the negative impacts of agricultural production.

Population density has also gradually increased in the watershed over time. Communities began to grow and prosper during the 19th Century as businesses and industry expanded to serve local and regional needs. While population density was largely concentrated in villages before WWII, patterns of suburban development in the post-war period have become more prevalent throughout the watershed. The rate of suburban growth has slowed significantly in the past 25 years, but some of the consequences of sprawl are evident. Those include increased stormwater runoff from construction sites and other sources, increased impervious surfaces, increased residential fertilizer application and runoff, the occurrence of failing onsite wastewater treatment systems, and increasing habitat fragmentation.

Habitat fragmentation resulting from land conversion for agriculture and human settlement has the potential to cause significant disruption to biological communities. Habitat fragmentation has occurred for thousands of years as a result of glaciation and other natural events, although this has generally occurred at a geologic pace and scale, allowing natural communities to adapt to changes gradually. The alteration of land cover across the watershed over the course of decades (as opposed to centuries) raises the likelihood of a reduction in species richness in the watershed. While nature resilient and adaptable to changes in the environment, decline in regional biodiversity is nonetheless a primary concern, particularly in light of other external threats, such as climate change and the influx of invasive and exotic species.

Pollution resulting from industry and municipal sources have gradually changed over time, particularly over the course of the 20th Century. Industrial and municipal discharges of wastewater into receiving water bodies in most instances went unchecked prior to Congressional approval of the Federal Clean Water Act in 1972. Point sources have been given strict oversight by the NYS DEC under approval and

guidance from the US EPA. While point source emissions continue to require close monitoring, the regulatory mechanisms to control them are in place and can be effective when applied. More recently, consolidation of municipal wastewater treatment plants into the Monroe County Pure Waters system has helped to alleviate costs to consumers by transferring wastewater to the Frank E. VanLare plant in Rochester, NY, for treatment and ultimate discharge into Lake Ontario. As a result, point sources have become less of a concern for watershed managers, although close monitoring of existing point source discharges remain an important priority in the watershed. Meanwhile, nonpoint sources have grown in their complexity and continue to be a difficult problem to address due to their diffuse and varying sources. Amendments to the Clean Water Act in 1987 have played an important role in expanding the research and development of nonpoint regulatory controls and management practices.

Management of the natural resources within the Oatka Creek watershed therefore presents a host of challenges. The process of problem formulation, analysis and risk characterization requires managers to frame the issues in their appropriate temporal, spatial and programmatic contexts. Furthermore, many of these issues are likely to be interrelated and new information is continually being developed – often by different entities – thereby further complicating the assessment and planning process. It is therefore critical that a singular process be established to systematically evaluate and organize data, information, assumptions, and uncertainties in an effort to better understand the challenges in a way that is useful to environmental decision making.[84]

8.3 Identification of Threats and Impairments

The following summary of threats and impairments is based on a review of existing literature (as cited in the appendix of this report) as well as consideration of significant national and regional trends in environmental assessment. Subsequent components of this watershed management planning process will seek to further explore the facts surrounding these issues, including levels of risk that they may impose on watershed resources. The development of a conceptual model (sometimes referred to as a *logic model*) may be a preferable approach.

> ***Uncertainty should not be an excuse for inaction…the process of reducing uncertainty must become a guide for action.***
>
> *P. 4 WWF series on adapting water management*

8.3.1 Water Quality Impairments

In general, water quality and aquatic habitat conditions in Oatka Creek are considered to be good, and there is no evidence of trends toward degradation, based on long-term monitoring data. Despite this general conclusion, there are specific segments of Oatka Creek where the waters are considered to be at risk of failing to fully support their designated use.

Oatka Creek includes both Class B and Class C segments (Appendix A, Map 5). As set forth in NYCRR Part 701.7, *"The best usages of Class B waters are primary and secondary contact recreation and fishing. These waters shall be suitable for fish, shellfish, and wildlife propagation and survival."* As set forth in NYCRR Part 701.8, *"The best usage of Class C waters is fishing; these waters shall be suitable for fish, shellfish, and wildlife propagation and survival. The water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes."*

In addition, certain segments of Oatka Creek are further classified as trout waters, designated with a T or TS. More stringent ambient water quality standards for certain parameters, including dissolved oxygen, ammonia and nitrite, are in place to protect these sensitive cold water fishes.

States must complete periodic assessments of water quality and habitat conditions in order to evaluate whether standards are met, and whether the designated uses are supported. In New York, the results of this evaluation are published in the 305(b) list, also known as the Priority Waterbodies List (PWL); surface waters exhibiting symptoms of degradation are categorized on the PWL based on the severity of water quality and/or habitat degradation. The most recent PWL for the Genesee Basin was issued in 2003. Several segments of Oatka Creek were included on the 2003 PWL. The pollutants of concern were nutrients and silt/sediments; these pollutants were stated to cause excessive growth of weeds and algae in the stream. Streambank erosion and agriculture were cited as the suspected sources of the excessive nutrients and sediments. Failing on-site wastewater disposal systems were cited as an additional source in one segment.

NYS regulations (NYSCRR 6 Part 703.2) include a narrative standard for phosphorus that specifies: "none in amounts that will result in growth of algae, weeds, and slimes that will impair the waters from their best use." The NYSDEC is developing nutrient criteria that would provide a benchmark for acceptable phosphorus levels in Oatka Creek; that is, concentrations that would mitigate the cited impairment. Progress has been slow, and it appears that nutrient criteria for flowing waters will not be released for comment before 2012.

In addition to or in lieu of specific nutrient criteria, the premise of adopting a method for using invertebrate sampling as a method of determining aquatic health could be considered and developed for the watershed by local watershed managers.[85] Physical, chemical and other biological measures could be used as well as macroinvertebrates to describe comprehensively the water and habitat quality of aquatic environments. However, with the ultimate goal being to provide water quality that will support a diversity of aquatic life, the assessment of water quality that utilizes the assemblages of aquatic organisms living in the stream would seem to be of primary importance in determining if improvements in water quality are meeting the desired goal.

With the exception of phosphorus, governed by the narrative standard, our data analysis indicates that the water quality of Oatka Creek is generally in compliance with ambient water quality standards. There are a few exceptions. Aluminum has been measured at concentrations exceeding the ambient water quality standard for this parameter; natural geologic conditions are considered to be the cause. Abundance of total coliform bacteria in the stream is elevated following storm events, particularly downstream of active agricultural areas. Total dissolved solids concentrations are elevated; again, this is attributed to background surficial geology. Mercury, whole not routinely detected in the stream waters, has been confirmed present at the NYSDEC Scottsville monitoring site. Assessing compliance with mercury standards is complicated by the fact that the analytical limit of detection is well above the ambient water quality standard for this metal. One exceedances of the nitrite standard to protect a cold water fish community was reported in June, 2005 at Scottsville.

8.3.2 Known or Suspected Threats

The following threats to water quality and living resources have been compiled based on the information gathered and analyzed in this report and through a review of literature germane to water and natural resource planning and protection in New York State. These issues are listed alphabetically and are not prioritized. Prioritization of issues based on magnitude and location will occur in subsequent project components.

8.3.2.1 Agriculture

The Oatka Creek watershed is largely agricultural in character with approximately 60% of its land area devoted specifically to cultivation of agricultural crops. A total of 17 Concentrated Animal Feeding Operations (CAFOs) are located directly within the boundary of the Oatka Creek watershed – 11 medium sizes and 6 large sized. In addition, 7 other CAFOs lie within 1 mile of the watershed boundary. The *2001 Genesee River Basin Waterbody Inventory and Priority Waterbodies List* (PWL) cited agriculture as a known source of pollution in each of the waterbodies that were assessed during that assessment period, including the primary sections of the main stem of the Oatka Creek (Upper, Middle and Lower). Water quality monitoring data and/or studies have been completed by the NYS DEC or partner organizations and have concluded that the uses of the waterbody are effected by agricultural sources. These uses include aquatic life, recreation, and aesthetics. The types of pollutants cited as likely to result from agricultural sources include nutrient enrichment, algal/weed growth, and silt/sedimentation each of which impact the waterbody to varying levels of severity.

In most cases, adverse water quality impacts resulting from agriculture are likely a result of poor agricultural practices. However, the character of the watershed – particularly its landscape and geology – lends itself to contaminant risk to surface and ground water supplies, complicating the Best Management Practice implementation. Poor agricultural practices may result in the following:

- Silt/sedimentation and associated nutrient loading/runoff
- Livestock access to stream banks and stream beds
- Excessive manure and other fertilizer application
- Destruction, removal or failure to maintain an adequate vegetated stream buffer strip/area adjacent to streams
- Excessive pesticide and herbicide use and contamination resulting from misapplication or improper mixing

In addition, the karst area of the watershed where cracks, fractures, and other solution channel irregularities are present provide a direct connection between surface water and ground water. As documented in the publication *Manure Management Guidelines for Limestone Bedrock/Karst Area of Genesee County, New York: Practices for Risk Reduction*, these areas present increased risk to contaminating groundwater due to rapid infiltration. USGS scientific investigations in conjunction with Cornell University and SWCD planning efforts will aid in the mitigation of nutrient management within these highly-sensitive areas of the watershed. While USGS scientific investigations have begun to map the specific locations of karst geology in Genesee County, further detailed analysis in other locations in the watershed are warranted.

8.3.2.2 Climate Change

The impact of climate change on freshwater ecosystems is explored in the document *Adapting Water Management: A primer on coping with climate change*.

> The impacts of climate change on freshwater ecosystems can be characterized by shifts in water quality (e.g., pollutants, temperature, dissolved oxygen), water quantity, and water timing (normal flood and dry periods)…Across the planet, numerous aspects of precipitation are changing, such as the amount of annual or seasonal precipitation; the seasonal timing of precipitation (such as snow versus rain); the intensity of precipitation events (how much per unit of time); the frequency and severity of extreme events like droughts and floods; and the net accumulation or loss of water in places like glaciers and the poles. Moreover, all of these aspects of precipitation are expected to continue to shift over the coming century.[86]

According to a fact sheet produced by the Union of Concerned Scientists summarizing findings from C*onfronting Climate Change in the Great Lakes Region*, the impacts of climate change on New York communities and ecosystems can be summarized as follows:

> In the Great Lakes region, the impacts of climate change will likely be manifested by average annual temperatures increasing; frequency and severity of rainstorms both increasing; winters becoming shorter; and the duration of lake ice decreasing (thereby influencing regional precipitation). More specifically, by the end of the 21st century, temperatures are projected to rise 7 – 13° F in winter and 7 – 14° F in summer. Overall, extreme heat will be more common. While annual average precipitation may not change much, precipitation is likely to increase in winter and decrease in summer. This may equate to drier soils and perhaps more droughts in NYS. The frequency of heavy rainstorms, both 24-hour and multi-day, will continue to increase. Declines in ice cover on the Great Lakes and inland lakes have been recorded during the past 100 – 150 years, although this trend has been moderated in areas of lake-effect snow. Ice cover declines are expected to continue.

Additional potential impacts from climate change include:

> **Water Supply and Pollution**
> - Lake levels are expected to decline in both inland lakes and the Great lakes, as more moisture evaporates due to warmer temperatures and less ice cover.
> - Reduced summer water levels are likely to diminish the recharge of groundwater, cause small streams to dry up, and reduce the area of wetlands, resulting in poorer water quality and less habitat for wildlife.
> - Pressure to increase water extraction…will grow…
> - Development and climate change will degrade the flood-absorbing capacities of wetlands and floodplains, resulting in increased erosion, flooding, and runoff polluted with nutrients, pesticides, and other toxins.
>
> **Human Health**
> - Of particular concern is the large projected increase in extreme heat days (exceeding 97° F) by 2080 – 2100.
> - Some waterborne infectious diseases such as cryptosporidiosis or giardiasis may become more frequent.
> - Changes in transmission occurrence of many infectious diseases, such as Lyme disease and West Nile encephalitis may occur.
>
> **Property and Infrastructure**
> - More frequent extreme rainstorms and floods, exacerbated by stream channeling and more paved surfaces, may result in greater property damage.

- Municipalities will have to upgrade water-related infrastructure including levees, sewer pipes, and wastewater treatment plants in anticipation of more frequent extreme downpours.

Agriculture
- Increased atmospheric CO2 and nitrogen as well as a longer growing season could boost yields of some crops, although severe rainstorms and flooding will likely depress productivity.
- Several climate changes will likely combine to create more favorable conditions for a number of pests and pathogens.

Recreation and Tourism
- Populations of cold water fish species and even some cool water fish may decline while warm water species may increase.
- The summer recreation season will likely expand as temperatures warm, although mal effects of extreme heat heavy rains and possible risks from insect and waterborne diseases may dampen outdoor enthusiasm.
- Continued stress on wetlands, thereby reducing habitat and food resources for migratory birds and waterfowl.[87]

Natural Resource and Habitat Protection
- Increased incursion on non-native, exotic species into natural habitats

8.3.2.3 Failing Onsite Wastewater Treatment Systems

The NYSDEC publication "Top Ten Water Quality Issues in NYS" cites failing onsite wastewater treatment systems (septic systems) as a prevalent causes/source of water quality impact in the assessed waters of New York State.[88] In a sense, failing onsite wastewater treatment systems can be considered as an externality of suburban sprawl. The problem is described as follows:

> While most residences are connected to sewer systems and larger centralized wastewater treatment plants, about one-quarter of New Yorkers and a comparable number of businesses and institutions are served by onsite wastewater treatment systems (OWTS). Onsite systems are effective and economical when properly designed, installed and maintained. However the lack of an adequate onsite system, poor routine maintenance, increased density of homes served by onsite systems, undersized and overused systems (particularly due to conversion of vacation cottages and camps into year-round residences), and the installation of systems on sites with unacceptable conditions can all lead to onsite system failure and water quality impacts.
>
> Acute failures resulting in wastewater pooling on the ground, impacts to beaches or backups into buildings are potential health problems. Chronic problems can result in bacteria contamination of groundwater and nutrient loadings to nearby lakes and other recreational waters that spur excessive aquatic weed and algal growth (see also Aquatic Weeds and Invasive Species).[89]

The *2001 Genesee River Basin Waterbody Inventory and Priority Waterbodies List* (PWL) cites failing OWTS as either a known or suspected source of pollution in portions of the Oatka Creek and its surrounding tributaries, particularly the middle section between Mud Creek and Pearl Creek. Real property information in combination with other GIS data sources (such as public sewer lines) can begin to identify the locations of populations served by onsite wastewater treatment systems. Once identified, a more detailed assessment as to the age and operation and maintenance needs of those facilities can occur.

8.3.2.4 Habitat Fragmentation/Degradation and Reduction of Open Spaces

Habitat fragmentation is the disruption of once large continuous blocks of habitat into less continuous habitat, primarily by human disturbances such as land clearing and conversion of vegetation from one type to another.[90] *Habitat quality* is defined as the ability of the environment to provide conditions appropriate for individual and population persistence.[91] The negative consequences of habitat degradation are manifested in the reduction of species diversity and the production or survival of a species is negatively affected. Fragmentation therefore reduces the extent and connectivity of remaining habitats, and species may or may not be able to persist as a result of those changes.

Given that habitat is defined with reference to a particular species, planning for habitat at the regional level is an extraordinarily complex process. Poor habitat quality can be the result of the combination of a number of complex interrelationships. Of significant concern is that the detrimental effects of habitat degradation are often not noticed until well after the destruction has occurred. Identifying and protecting those areas critical to the survival of sensitive or rare species before they are impacted by development is therefore an important aspect of watershed planning in the Oatka Creek watershed.

In the absence of a comprehensive regional approach to habitat and open space protection, uniform enforcement of existing regulations that are already in place that complement these goals is an important step forward. These include:

- Article 15 NYS Env. Conservation Law – Protection of Waters
- Article 24 NYS Env. Conservation Law – Freshwater Wetlands
- Section 404 of the Federal Clean Water Act regulating discharges to waters of the US, including the filling of wetlands

In addition, the creation of or enforcement of local laws which prevent development from occurring within floodplains and the active river area can help to protect critical aquatic and terrestrial habitats.

A review of existing approaches to the acquisition and permanent protection of sensitive lands within and around the watershed will also be an important consideration. Currently, the NYS Open Space Conservation Plan identifies *Ecological Corridors*, *Exceptional Forest Communities*, *Grassland Preservation and Restoration*, and *Significant Wetlands* as conservation priorities in and around the region of the Oatka Creek watershed. Further defining how those priorities can be achieved within the watershed will be an important step forward.

8.3.2.5 Industrial and Municipal Discharges

As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or man-made ditches. Individual homes that are connected to a municipal system, use a septic system, or do not have a surface discharge do not need an NPDES permit; however, industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. In New York State, the NPDES program is administered by the NYS DEC and referred to as the State Pollution Discharge Elimination System (SPDES).

SPDES permit for Private, Commercial or Institutional (P/C/I) Facilities program is designed to eliminate the pollution of New York waters and to maintain the highest quality of water possible – consistent with public health, public enjoyment of the resource, protection and propagation of fish and wildlife, and industrial development in the state.

SPDES permits for Concentrated Animal Feeding Operations, Construction Site Discharges and Municipal Separate Storm Sewer Systems are discussed under sections 7.3.1 and 7.3.4 respectively. Information pertaining to the regulation and monitoring of these facilities throughout the watershed is included in Section 3.0.

8.3.2.6 Nuisance and Invasive Species

As described on the website of the Invasive Species Taskforce NYSDEC website:

> **The Problem**
> Invasive species are non-native species that can cause harm to the environment or to human health. As a threat to our biodiversity, they have been judged second only to habitat loss. Invasives come from all around the world; the rate of invasion is increasing along with the increase in international trade that accompanies globalization.
>
> Invasive species have caused many problems in the past, are causing problems now, and pose threats to our future. A wide variety of species are problematic for many sectors of our world: our ecosystems, including both all natural systems and also managed forests; our food supply, including not only agriculture but also harvested wildlife, fish and shellfish; our built environments, including landscaping, infrastructure, industry, gardens, and pets. Invasive species have implications, too, for recreation and for human health.
>
> **Strategic Need**
> Existing management efforts are limited. Although the invasive species issue is recognized by professionals as a major threat to our natural resources, few resources have been allocated toward solutions. The National Invasive Species Council has been established by executive order to coordinate efforts among federal agencies, but there is no overarching federal legislation that recognizes the magnitude of invasive species as an issue. Thus, there is no dedicated funding stream available for their management.[92]

In response to this need to coordinate management efforts, the New York State Invasive Species Task Force (ISTF) was formed. The ISTF is described below:

> New legislation was passed in 2003 that called for a team to explore the invasive species issue and to provide recommendations to the Governor and the Legislature by November 2005. The statute describes the intended membership of the Task Force and directs that it be co-led by two New York State agencies: the Department of Environment Conservation and the Department of Agriculture and Markets. Other members of the Task Force include:
> - NYS Department of Transportation
> - NYS Thruway Authority (and Canals Corporation)
> - NYS Museum (and Biodiversity Research Institute)
> - NYS Office of Parks, Recreation and Historical Preservation
> - NYS Department of State
> - Adirondack Park Agency
> - New York Sea Grant

- Cornell University
- Invasive Plant Council
- The Nature Conservancy
- NYS Farm Bureau
- Empire State Marine Trades Association
- NYS Nursery and Landscape Association

The Task Force has taken numerous steps toward accomplishing its task. It first established a Steering Committee to oversee the day-to-day work of the Task Force. Early on, it arranged for the whole Task Force to consult with the leader of our federal counterpart, the National Invasive Species Council. The next big task was to design and conduct an in-depth survey of all Task Force member organizations. Then, they established several smaller teams to investigate in depth, to analyze existing efforts, to identify needs, and to develop recommendations. Each team has been designed to pull together organizations that share a common area of interest or expertise. The Task Force has reached out to numerous stakeholders to invite them to participate as members of these teams.

The Task Force has been meeting at various locations around New York. These meetings are open to the public and dates, times and locations are announced in the Environmental Notice Bulletin. Formal public review of the Draft Report of the Invasive Species Task Force will be accomplished through a combination of both in-person public meetings and internet communication. It is planned for the summer of 2005.[93]

The Final Report of the New York State Invasive Species Task Force is available online at http://www.dec.ny.gov/docs/wildlife_pdf/istfreport1105.pdf . The report outlines the nature and extent of the invasive species problem in specific regions of New York State, identifies existing efforts to manage invasive species, and provides specific recommendations.

A summary of report findings is included in Table 8.1.

Table 8.1. Summary of Findings of the Final Report of the New York State Invasive Species Task Force

Aquatic and Terrestrial Species and Issues of Concern in the Great Lakes Region of NYS (list identifies significant regional concerns and is not a comprehensive assessment of species present in or threatening the watershed)

- Mussels, Gobies, and Botulism
- Didymosphenia geminata, commonly known as didymo or "rock snot"
- Emerald Ash Borer
- Sudden Oak Death
- European Starling
- Purple Loosestrife
- Eurasian Watermilfoil
- Captive and ornamental wildlife
- Pet trade
- Live food trade
- Live bait
- Hemlock Woolly Adelgid
- Norway Maple
- Common Reed (Phragmites)
- Giant Hogweed
- Kudzu
- Oriental Bittersweet
- Japanese Knotweed

Existing Efforts to Manage Invasive Species

- USDA Food Safety and Inspection Service and Animal and Plant health Inspection Service
- Early detection and rapid response
- Cooperative Agricultural Pest Survey Program
- Taxonomic and Diagnostic support
- Pest databases
- Regional Coordination and Outreach
- Effective monitoring
- Sustained funding and Meaningful restoration

Recommendations

1. Establish a permanent leadership structure to coordinate invasive species efforts
2. Prepare and implement a comprehensive invasive species management plan
3. Allocate appropriate resources for invasive species efforts
4. Establish a comprehensive education and outreach effort
5. Integrate databases and information clearinghouses
6. Convene a regular invasive species conference
7. Formalize New York State policy and practices on invasive species
8. Establish a center for invasive species research
9. Coordinate and streamline regulatory processes
10. Encourage non-regulatory approaches to prevention
11. Influence Federal actions to support invasive species prevention, eradication and control

12. Recognize and fund demonstration projects

Given that many species have spread across wide regions of the US, the coordination of invasive species management must occur at the state or national level in order to be effective. Effective coordination of outreach efforts within the watershed can be an effective regional strategy to implementing the statewide effort to control and eradicate invasive species of concern.

Detailed information on the identification and tracking of invasive species in New York State can be found at the New York Invasive Species Program website http://nyis.info/, a publication of Cornell University Cooperative Extension and NYS Sea Grant. Additional information can also be found at the New York State DEC Nuisance and Invasive Species Resources website, http://www.dec.ny.gov/animals/265.html

8.3.2.7 Spills and Contamination

As described on the NYS DEC website:

> Accidental releases of petroleum, toxic chemicals, gases, and other hazardous materials occur frequently throughout New York State. Even small releases have the potential to endanger public health and contaminate groundwater, surface water, and soils. Every year, the New York State Department of Environmental Conservation receives approximately 16,000 reports of confirmed and suspected releases to the environment. Approximately ninety percent of those releases involve petroleum products. The rest involve various hazardous substances, unknown materials, or other materials such as untreated sewage and cooking grease.
>
> Environmental damage from such releases depends on the material spilled and the extent of contamination. Many of these reports are releases of small quantities, typically a few gallons, that are contained and cleaned up quickly with little damage to the environment. In other instances material releases seep through the soil and eventually into the groundwater, which can make water supplies unsafe to drink. Uncontained spills, especially those that impact surface water, can kill or injure plants, fish, and wildlife, and cause damage to their habitats.[94]

New York State (NYS) responds to reports of petroleum and other hazardous material releases through the Spill Response Program maintained by the NYS Department of Environmental Conservation (DEC). A total of 37 spills were identified within the Oatka Creek watershed during the period 2000 to 2011. An investigation conducted in 1991 into the Lehigh Valley Railroad Derailment Site found that the trichloroethene spill that had occurred there had migrated at least 3.5 miles from the spill site and contaminated over 35 private water supply wells. The site currently presents no apparent public health hazard due to treatment systems installed to reduce exposures.[95] The site will continue to be monitored by state and federal agencies.

8.3.2.8 Stormwater Management

Stormwater and erosion are best understood in the context of the land's interaction with precipitation and runoff. Changes in the character or cover of the land can cause changes in runoff volumes, rates, and velocities, which can lead to sedimentation and nonpoint source pollution. Sedimentation occurs when soil, sand, silt, clay, and minerals eroded from the land surface and are transported to receiving

waterbodies. Erosion and sedimentation are natural processes, but these processes can be accelerated when land cover is altered. Nonpoint source pollution includes sediments, as well as any materials that may be present along with sediments, such as litter, oils, chemicals, bacteria from animal fecal matter, pesticides, fertilizers and other nutrients (particularly phosphorus).

Sediment overload causes a number of problems for aquatic organisms. Because fine sediment particulates are suspended in water, the resulting cloudiness decreases the amount of sunlight that can reach aquatic plants that provide food and oxygen for aquatic organisms. As sediment settles, it fills the void between rocks, destroying habitat used by many invertebrates. Sediment also clogs the gills of fish, crayfish, and other underwater organisms. Sediment can bury fish and insect eggs and prevent them from hatching. Sediment particles often pick up other forms of pollution such as toxic substances, nutrients, or bacteria, which are then transferred into receiving waterbodies, which can also have adverse impacts.

In 1987, amendments to the Clean Water Act required states in coordination with the US EPA to develop an approach to addressing stormwater pollution. The primary regulatory mechanism used in New York State today is referred to as Stormwater Phase II as embodied by two main regulatory permits:

1. Multi- Sector General Permit for Stormwater Discharges Associated with Industrial Activities
2. Municipal Separate Storm Sewer Systems Permit, GP-0-10-002
3. SPDES General Permit for Stormwater Discharges from Construction Activity, GP-0-10-001[96]

Of these three rules, the third rule has primary relevance to the municipalities in the Oatka Creek watershed. The second rule listed which pertains to the Municipal Separate Storm Sewer Systems Permit requires operators of municipal separate storm sewer systems (MS4s) to develop Stormwater Management Program (SWMP) and submit annual reports to the NYSDEC. There are presently no municipalities regulated under GP-0-10-002 in the Oatka Creek watershed.

The SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-10-001) requires operators of small construction sites (greater than one acre) to obtain SPDES permits that implement programs and practices to control polluted stormwater runoff. All municipalities in NYS are regulated under GP-0-10-001 which is enforced by NYSDEC regional offices. Construction site operators are required to file a Notice of Intent (NOI) with the DEC in advance of land disturbance activities and develop a Stormwater Pollution Prevention Plan (SWPPP) to be kept on-site during the construction period.

State and federal stormwater regulations as described above went into effect in 2003 and since that time municipalities have been working in close coordination with SWCD offices and regional planning entities to meet the new requirements in an efficient and effective manner. These efforts have largely been focused on the urbanized/regulated areas in NYS, however, which excludes all areas of the Oatka Creek watershed (as of 2011). It will be important that Oatka Creek watershed communities remain vigilant and ensure that uniform enforcement of the construction permit take place throughout the watershed in the future.

The regulatory permits were revised by the NYSDEC in 2010 to reflect the evolution of the stormwater program. The 2010 updates to the *NYS Stormwater Management Design Manual* also reflect these changes.[97] The latest additions to the Design Manual are intended to address runoff reduction and planning and design of green infrastructure. Incorporation of stormwater mitigation and other green infrastructure measures early on during the design phase of new developments and minimizing land disturbance by preserving natural features and reducing the construction of impervious surfaces are major steps forward. It will be important for local municipalities to update their local regulatory framework to aid in the implementation of these guidelines.

8.3.2.9 Streambank Erosion

G/FLRPC, in consultation with LU Engineers, utilizing funds from the Great Lakes Commission Program on Erosion and Sediment Control completed a study in 2005 entitled *Controlling Sediment in Black and Oatka Creeks*. The purpose of the project was to identify areas experiencing significant stream bank erosion and plan for the restoration or remediation of the most severely-eroded sites. Site inventory data were reviewed from previous stream inventories and assessments completed by Wyoming, Genesee and Monroe County SWCD staff for both the Black and Oatka Creeks. Previous inventories rated sites along the stream channels for bank condition, stream condition, erosion and sedimentation potential. An initial list of high-erosion potential sites was generated from these previous inventories. Additional sites were suggested by SWCD staff.

An initial list of 41 candidate sites was developed from SWCD staff suggestions and from the stream inventories and further refined in subsequent meetings. To date, these inventories have been used to conduct mitigation projects in at least 1 location (Kennedy site – Wyoming County) identified in this study. The complete list of sites is included in the report *Identification and Analysis of the Riparian Corridor in the Black & Oatka Creek Watersheds*.[98]

Review and update of this initial assessment of locations with specific erosion and sedimentation should occur. Sites which were prioritized for remediation should continue to be monitored and addressed if and when funds become available. Furthermore, stream segments should be reviewed in order to ascertain the degree to which streambank erosion and sedimentation continues to occur in the watershed.

8.3.2.10 Water Quantity, Flow and Channel Maintenance

Flooding in the Oatka Creek watershed was well-documented in the 2002 G/FLRPC report Genesee & Wyoming Counties Joint Flood Mitigation Plan as follows:

> The Oatka Watershed has a history of annual flooding where the Oatka Creek flows through regions of Genesee County and Wyoming County. Floods can be expected yearly between late winter and throughout the spring. Severe flooding during this season is commonly the result of heavy rains.
>
> In addition to climate conditions, geographic factors of the watershed create interconnected weather patterns along the Creek. Flooding frequently begins where the Oatka Creek flows through Warsaw, which lies on lowland especially susceptible to flooding due to runoff waters from the nearby East Hills. As the Creek continues north and then east through Genesee County, there is potential for flooding along its banks in the Towns of Pavilion and LeRoy.

The most severe recorded Oatka Creek floods have occurred in July 1902, throughout the spring of 1916, June 1928, March 1942, March 1955, March 1973, February 1984, and July 1998.

Newspapers reported the flood of July 1902 at biblical proportions, alluding to the story of Noah. Damage was extreme; "nearly every bridge… all along the Oatka and its tributaries was either carried away or damaged to such an extent that they are unsafe." (The Western New-Yorker, July 11, 1902). The flood was caused by the combination of heavy rain with the bursting of three local reservoirs located north of Warsaw. Flooding may have been worsened by the loss of vegetation on the surrounding hills due to salt mining activities in the previous decades.

There would be two instances of especially severe Oatka Creek flooding during spring of 1916. The first instance occurred in April of 1916. Conditions in Warsaw were especially extreme because of a threefold combination of heavy rain, the Buffalo Street bridge acting as an inadvertent dam, and the improper drainage of rainwater into lower areas of Warsaw from nearby East Hill. Warsaw's water ran downstream, creating a severe region-wide flood. The flood initiated proposals to get rid of the Buffalo Street Bridge and to re-route the gully on East Hill.

May of 1916 was the date of the second occurrence of severe floods within the year. A brief, but intense rainfall was cited as the worst that Pavilion had ever recorded, and was severe enough to close all BR&P trains into LeRoy (The Western New Yorker, May 18, 1972). Severe floods resulted in water build-ups a much as eight feet deep. The intensity of the flood was due to heavy rainfall in Covington coupled with East Hill run-off water of heavy rains into Warsaw.

In March of 1955, the combination of melting snow with heavy rain led to flooding so severe that the Red Cross was called in to help with damages. Warsaw was hit especially hard; Buffalo Street was again inundated. In 1966, the Buffalo District's ACE initiated a public project to enlarge the Oatka Creek to maximize flood protection. The project was completed in 1968. A 1972 estimate by the ACE reported that the project had prevented an estimated $1 million in damages since its completion. (The Batavian Daily News, July 11, 1972)

1972's flood season was impacted by Hurricane Agnes and was one of the worst incidents of Oatka Creek flooding. As weather conditions worsened due to heavy rainfall, the Mt. Morris Dam (southwest of Warsaw) threatened to burst. Residents in low areas between Mt. Morris and as far north as Rochester were evacuated as a precaution. Luckily, water was systematically released from the dam, and calamity was avoided (The Western New-Yorker, June 27, 1972). However, more than twenty bridges within the watershed were washed away, and the area between Warsaw and Wyoming were especially flooded. East Hill run-off water resulted in excessive flooding in Warsaw. Among groups that assisted with repercussions of the rain included the Civil Defense and the National Guard watching water levels around the area, the Attica Correctional Institute gathering 200 volunteers to assist with cleanup, and the Red Cross assisted individuals with personal losses sustained from the flood.

In 1998, heavy rains caused severe floods in January and again in mid-July. January's floods were additionally complicated by an ice storm. Conditions in July were so severe that a state of emergency was declared for five days, and roads were closed throughout a range of areas along the watershed due to flooding.

8.4 Next Steps in the Watershed Planning Process

Watershed planning begins with *Problem Formulation*. Problem formulation is defined as the process for generating and evaluating preliminary hypotheses about why ecological effects have occurred, or may occur, from human activities. Section 8.3 is the first step toward problem formulation in the Oatka Creek

watershed. These problems will be reviewed, deliberated and revised by the Project Advisory Committee and then be released to the public for similar review in a public setting.

Problem formulation results in three products: (1) assessment endpoints that adequately reflect management goals and the ecosystem [or watershed] they represent, (2) conceptual models that describe key relationships between a stressor and assessment endpoint or between several stressors and assessment endpoints, and (3) an analysis plan.

The first two products – assessment endpoints and conceptual models – will be developed in subsequent phases that follow the completion of this Characterization report. Together with other project components (such as the evaluation of the regulatory and programmatic environment), each of these tasks will contribute to and ultimately comprise the final watershed management plan for the Oatka Creek watershed.

SECTION 8 ENDNOTES

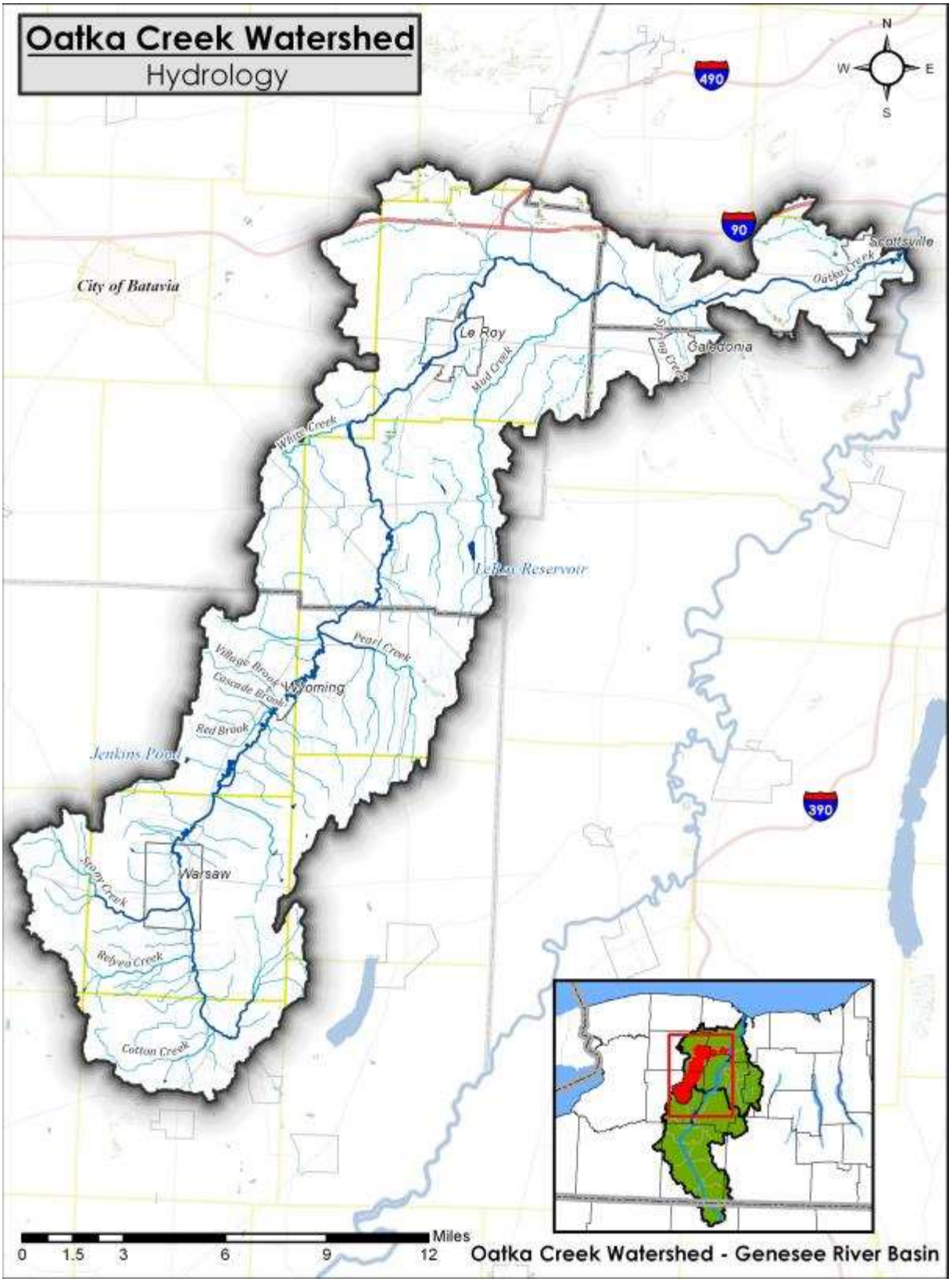
[81] Adapted from Chapter 12 of the *Handbook for Developing Watershed Plans to Restore and Protect Our Waters*. USEPA.
[82] *Guidelines for Ecological Risk Assessment*. [Online] In *US EPA*. Retrieved 2/2/11 from oaspub.epa.gov/eims/eimscomm.getfile?p_download_id=36512 (page 12)
[83] *Guidelines for Ecological Risk Assessment*. (page 1)
[84] *Guidelines for Ecological Risk Assessment*. (page 1)
[85] *Invertebrates as Indicators*. [Online] In *USEPA*. Retrieved 8/8/11 from http://www.epa.gov/bioiweb1/html/invertebrate.html
[86] *Adapting Water Management: A primer on coping with climate change*. [Online] In *World Wildlife Foundation*. Retrieved 3/1/11 from http://www.worldwildlife.org/climate/Publications/WWFBinaryitem12534.pdf
[87] *Great Lakes Communities and Ecosystems at Risk*. [Online] In *Union of Concerned Scientists*. Retrieved 3/1/11 from http://www.ucsusa.org/greatlakes/
[88] *Top Ten Water Quality Issues in NYS: Onsite Wastewater Treatment*. [Online] In *New York State Department of Environmental Conservation*. Retrieved 3/1/11 from http://www.dec.ny.gov/docs/water_pdf/top10inadqtonsite.pdf
[89] *Ibid*.
[90] Franklin, Alan B, Barry R. Noon, and T. Luke George. *What is Habitat Fragmentation?* [Online] In Global Restoration Network. Retrieved 3/1/11 from http://www.globalrestorationnetwork.org/uploads/files/LiteratureAttachments/368_what-is-habitat-fragmentation.pdf
[91] Franklin, Alan B, Barry R. Noon, and T. Luke George.
[92] *Invasive Species Task Force*. [Online] In *New York State Department of Environmental Conservation*. Retrieved 3/1/11 from http://www.dec.ny.gov/animals/6989.html
[93] *Invasive Species Task Force*. [Online]
[94] *Chemical and Petroleum Spills*. [Online] In *New York State Department of Environmental Conservation*. Retrieved 3/1/11 from http://www.dec.ny.gov/chemical/8428.html
[95] NYS Department of Health. Public *Health Assessment: Lehigh Valley Railroad Derailment Site*. NYD086950251: July 6, 2000.
[96] *Stormwater*. [Online] In *New York State Department of Environmental Conservation*. Retrieved 3/1/11 from http://www.dec.ny.gov/chemical/8468.html

[97] *NYS Stormwater Management Design Manual (August 2010)*. [Online] In. *New York State Department of Environmental Conservation*. Retrieved 3/1/11 from http://www.dec.ny.gov/chemical/29072.html

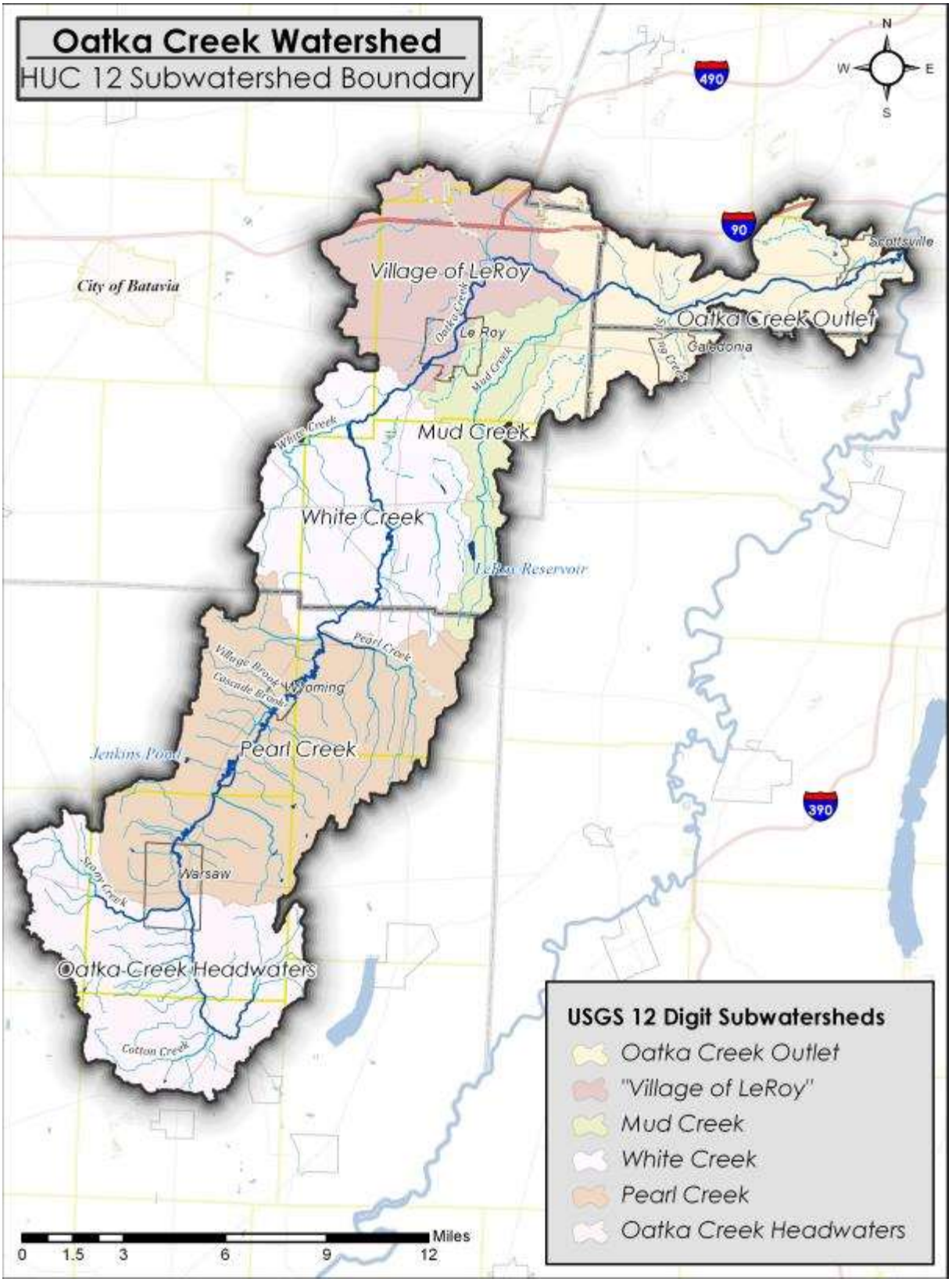
[98] *Identification and Analysis of the Riparian Corridor in the Black & Oatka Creek Watersheds*. [Online] In *G/FLRPC*. Retrieved 3/1/11 from http://gflrpc.org/Publications/RiparianCorridor.htm

Appendices

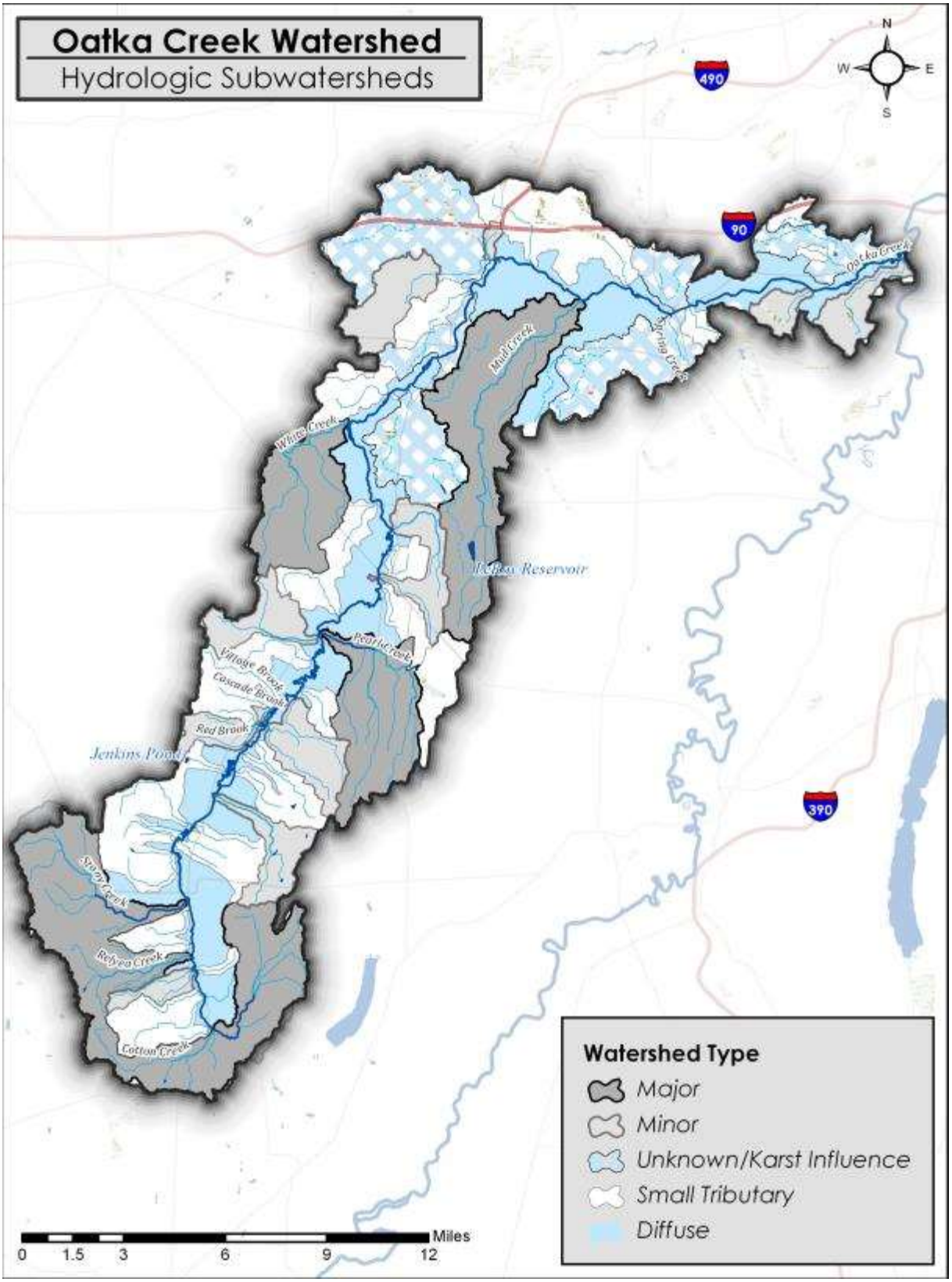
Map 1


Oatka Creek Watershed
Hydrology
N
W
E
S
490
90
390
City of Batavia
Le Roy
Caledonia
Scottsville
Oatka Creek
Mud Creek
Spring Creek
White Creek
LeRoy Reservoir
Pearl Creek
Village Brook
Wyoming
Cascade Brook
Red Brook
Jenkins Pond
Warsaw
Stony Creek
Rebyea Creek
Cotton Creek
Miles
0 1.5 3 6 9 12
Oatka Creek Watershed - Genesee River Basin

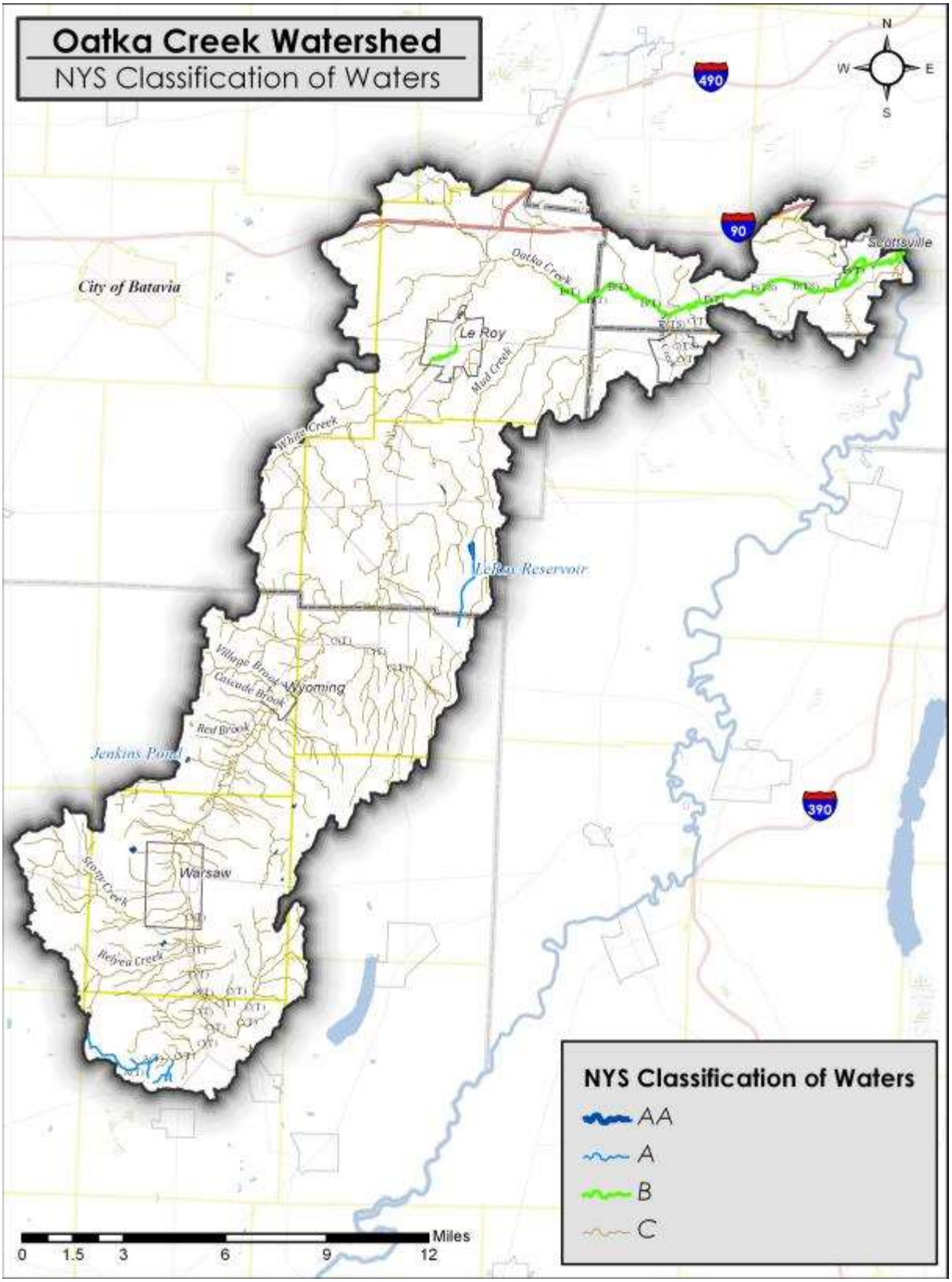
Map 2


Oatka Creek Watershed
HUC 12 Subwatershed Boundary
N
W
E
S
490
90
390
City of Batavia
Village of LeRoy
Oatka Creek Outlet
Le Roy
Caledonia
Scottsville
Mud Creek
White Creek
LeRoy Reservoir
Pearl Creek
Jenkins Pond
Warsaw
Oatka Creek Headwaters
Cotton Creek
Miles
0
1.5
3
6
9
12
USGS 12 Digit Subwatersheds
Oatka Creek Outlet
"Village of LeRoy"
Mud Creek
White Creek
Pearl Creek
Oatka Creek Headwaters

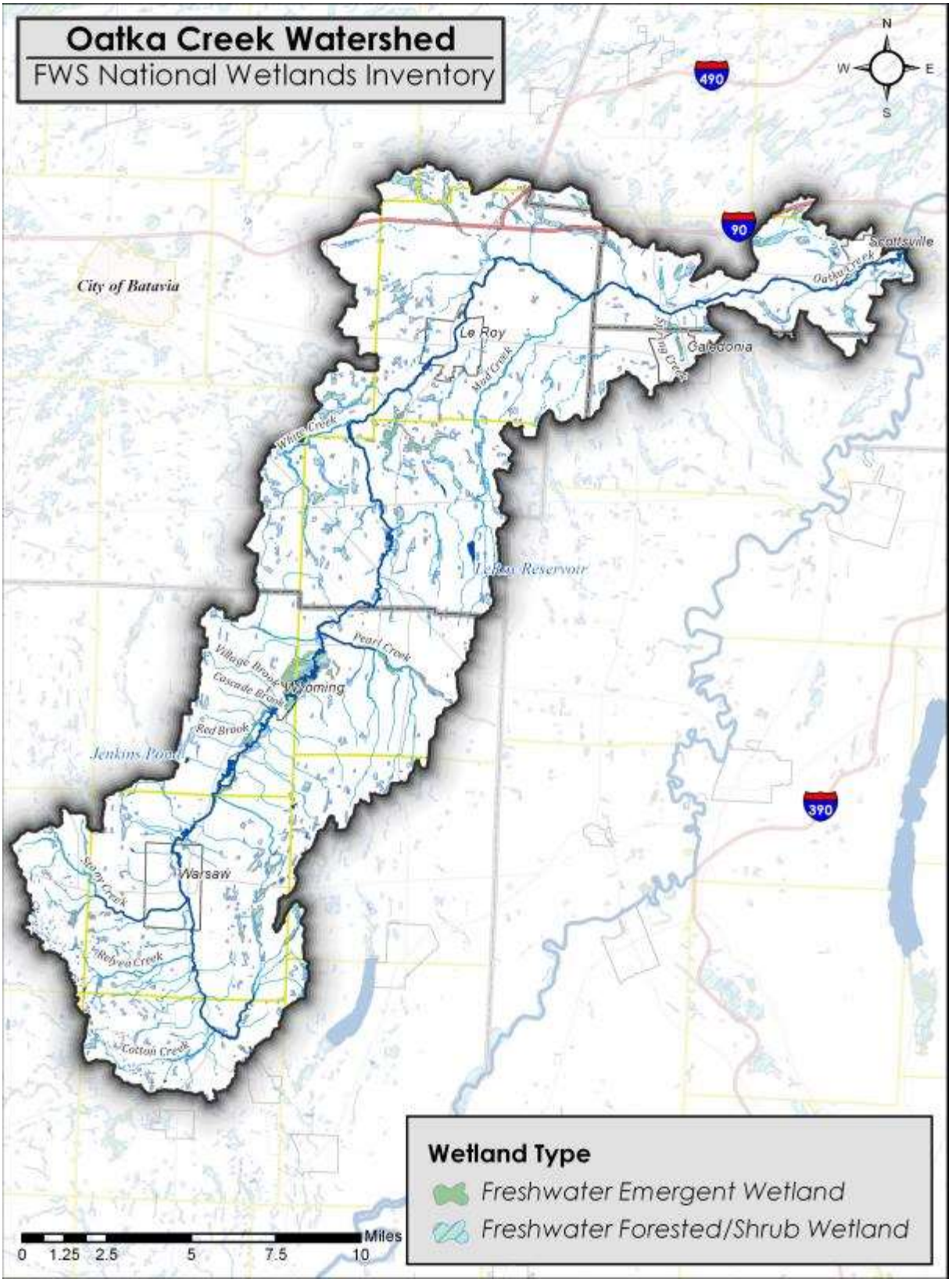
Map 3


Oatka Creek Watershed
Hydrologic Subwatersheds
N
W
E
S
490
90
390
Oatka Creek
Mud Creek
Spring Creek
White Creek
Oatka Reservoir
Pearl Creek
Village Brook
Cascade Brook
Red Brook
Jenkins Pond
Spring Creek
Rebyea Creek
Cotton Creek
Watershed Type
Major
Minor
Unknown/Karst Influence
Small Tributary
Diffuse
Miles
0
1.5
3
6
9
12

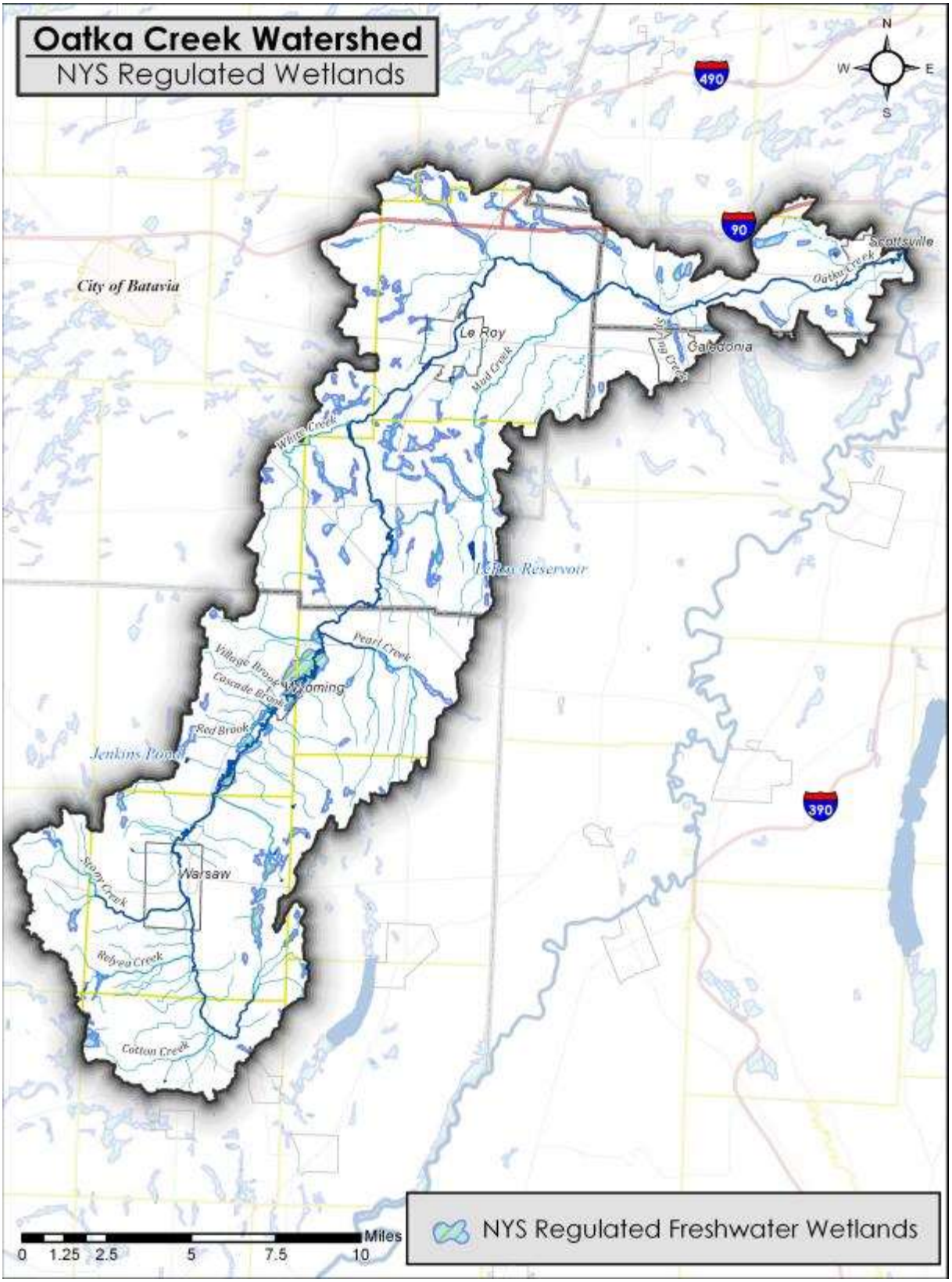
Map 4


Oatka Creek Watershed
NYS Classification of Waters
N
W
E
S
490
90
390
City of Batavia
Le Roy
Scottsville
Oatka Creek
Mud Creek
White Creek
LeRoy Reservoir
Village Brook
Cascade Brook
Wyoming
Red Brook
Jenkins Pond
Warsaw
Stony Creek
Retyrea Creek
Miles
0
1.5
3
6
9
12
NYS Classification of Waters
AA
A
B
C

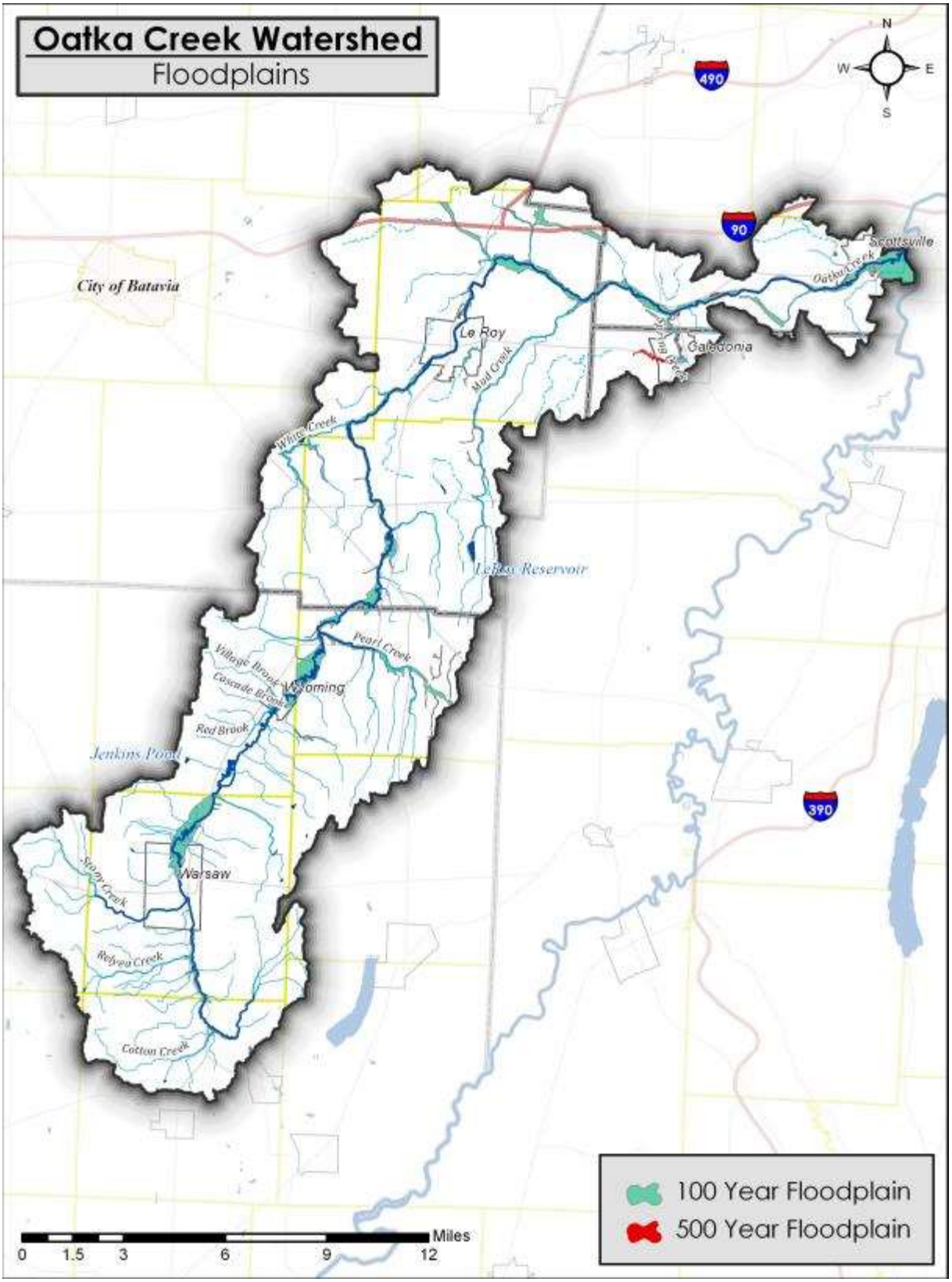
Map 5


Oatka Creek Watershed
FWS National Wetlands Inventory
N
W
E
S
490
90
390
Scottsville
Oatka Creek
City of Batavia
Le Roy
Mud Creek
Spring Creek
Caledonia
White Creek
Pearl Creek
Village Brook
Cascade Brook
Red Brook
Jenkins Pond
Warsaw
Stony Creek
Rebyea Creek
Cotton Creek
Miles
0 1.25 2.5 5 7.5 10
Wetland Type
Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland

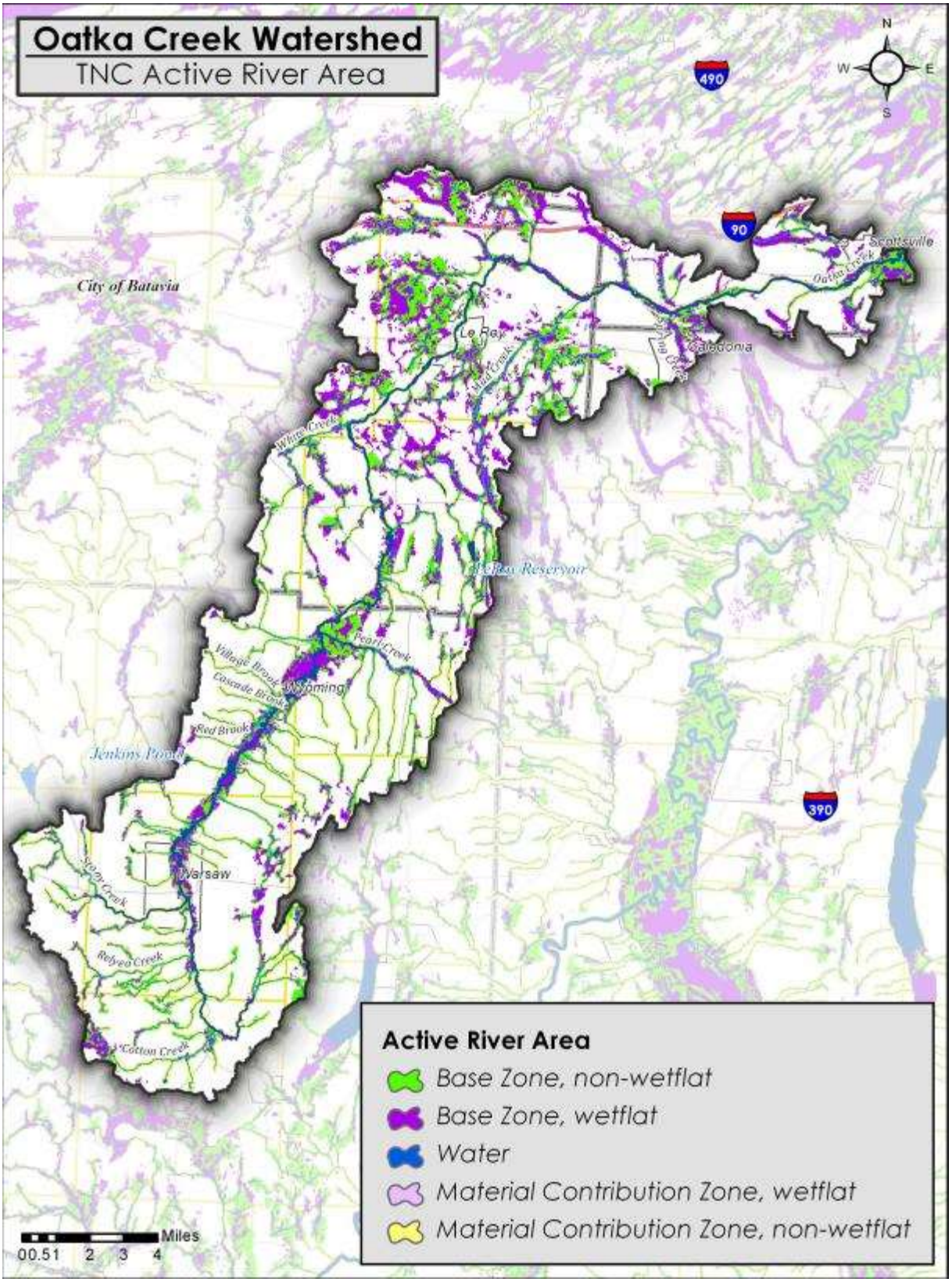
Map 6


Oatka Creek Watershed
NYS Regulated Wetlands
N
W
E
S
490
90
390
City of Batavia
Le Roy
Caledonia
Scottsville
Oatka Creek
Mud Creek
White Creek
Spring Creek
LeRoy Reservoir
Pearl Creek
Village Brook
Wyoming
Cascade Brook
Red Brook
Jenkins Pond
Warsaw
Sloop Creek
Rebyea Creek
Cotton Creek
Miles
0 1.25 2.5 5 7.5 10
NYS Regulated Freshwater Wetlands

Map 7


Oatka Creek Watershed
Floodplains
N
W
E
S
490
90
390
City of Batavia
Le Roy
Mud Creek
White Creek
Caledonia
Scottsville
Oatka Creek
Silver Lake
Pearl Creek
Village Brook
Cascade Brook
Wyoming
Red Brook
Jenkins Pond
Warsaw
Stony Creek
Rebyea Creek
Cotton Creek
0 1.5 3 6 9 12
Miles
100 Year Floodplain
500 Year Floodplain

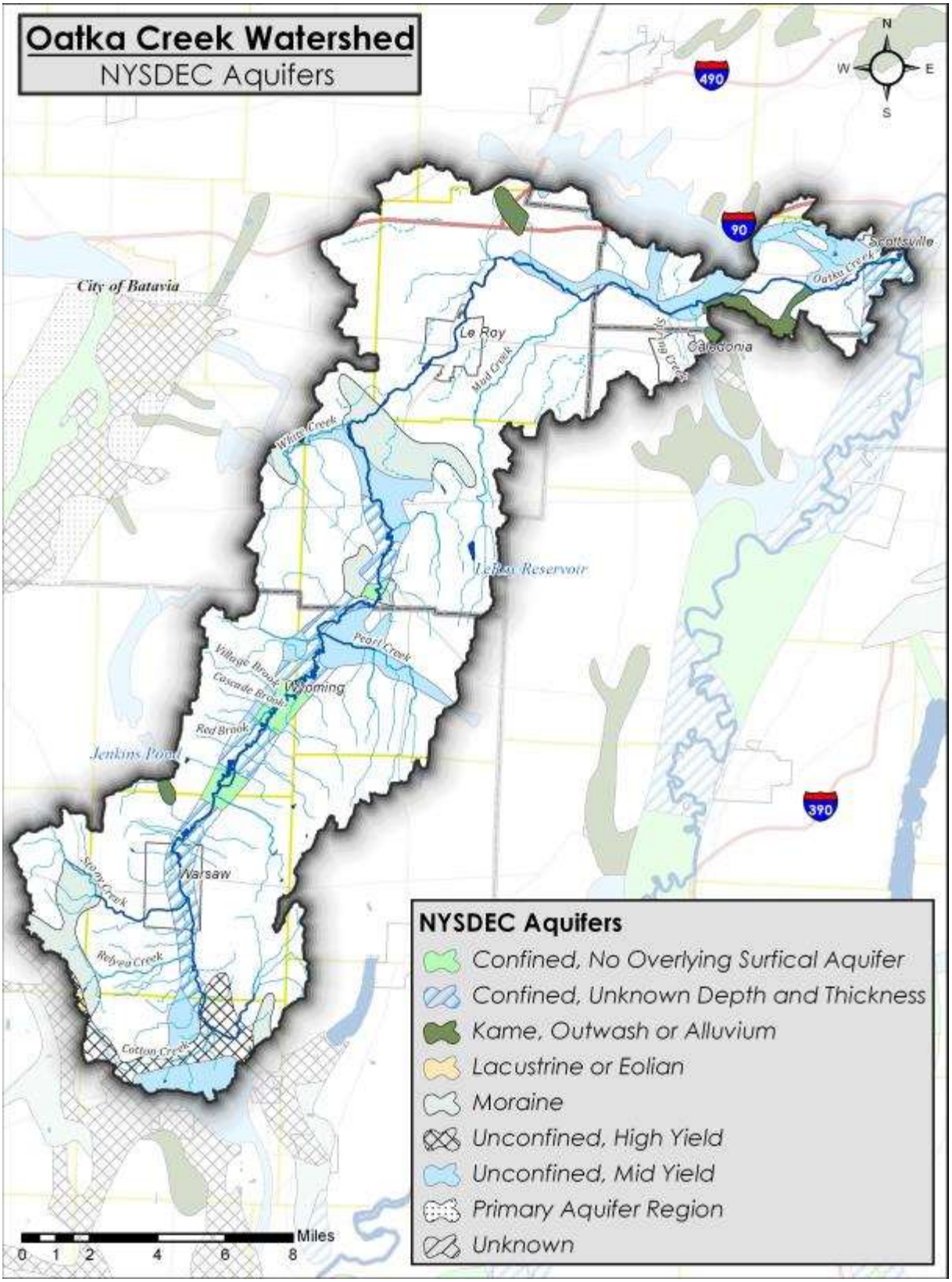
Map 8


Oatka Creek Watershed
TNC Active River Area
N
W
E
S
490
90
390
City of Batavia
Le Roy
Caledonia
Scottsville
Oatka Creek
Mud Creek
Spring Creek
White Creek
Pearl Creek
Village Brook
Cascade Brook
Red Brook
Jenkins Pond
Warsaw
Spoon Creek
Rebyea Creek
Cotton Creek
Miles
0 0.5 1 2 3 4
Active River Area
Base Zone, non-wetflat
Base Zone, wetflat
Water
Material Contribution Zone, wetflat
Material Contribution Zone, non-wetflat

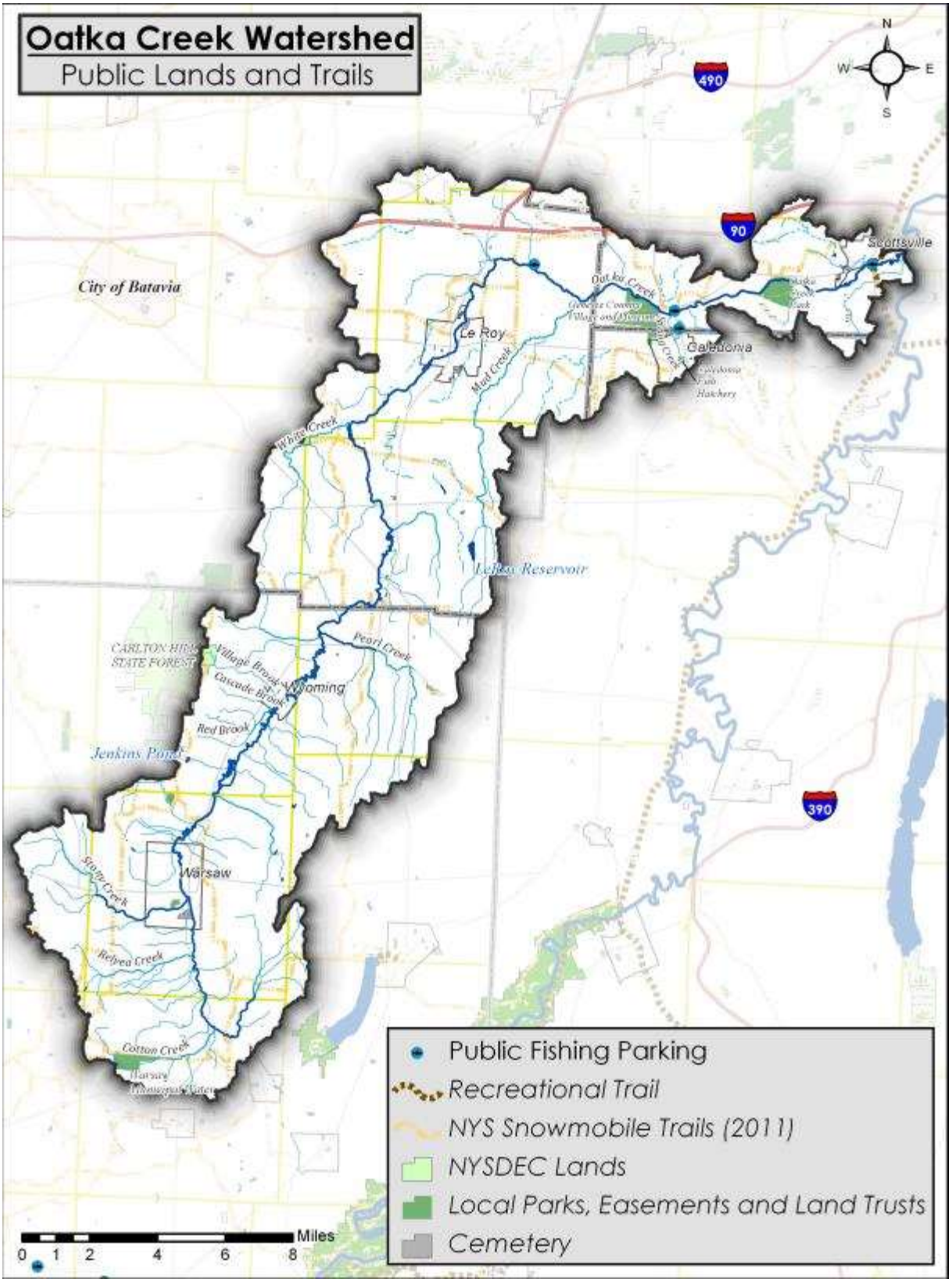
Map 9


Oatka Creek Watershed
NYSDEC Dam Inventory
N
W
E
S
490
90
390
City of Batavia
Scottsville
Le Roy
Caledonia
Warsaw
Wyoming
Jenkins Pond
Letchworth Reservoir
EDDY ROBERTSON DAM
COLEMAN DAM
GARBUTT DAM
DONALD WOODWARD DAM
JOHN WEHLE DAM
L H GARDNER PAPER CO DAM
OATKA CREEK DAM
OATKA CREEK DAM
CHARLES O'MILLER MARSH DAM
ROANOKE MILL DAM
BRADLEYS DAM
PIXLEY & SONS DAM
O PIXLEY & CO POND DAM
PAVILION CENTER DAM
LEROY RESERVOIR DAM
GILL MARSH DAM
LAWRENCE MOREHOUSE DAM
JENKINS DAM
RALPH C EPSTEIN DAM
HAWLEY-COBURN MARSH DAM
FLOWERS-COBURN MARSH DAM
CLIFFORD COEFIELD DAM
BAUER MARSH DAM
CARPENTER & BAUER WILDLIFE MARSH DAM
EMMA COOK MARSH DAM
RICHARD BANNISTER DAM
WARSAW RESERVOIR DAM
WILLIAM MILLIGAN DAM
Miles
0 1.5 3 6 9 12
NYSDEC Identified Dams

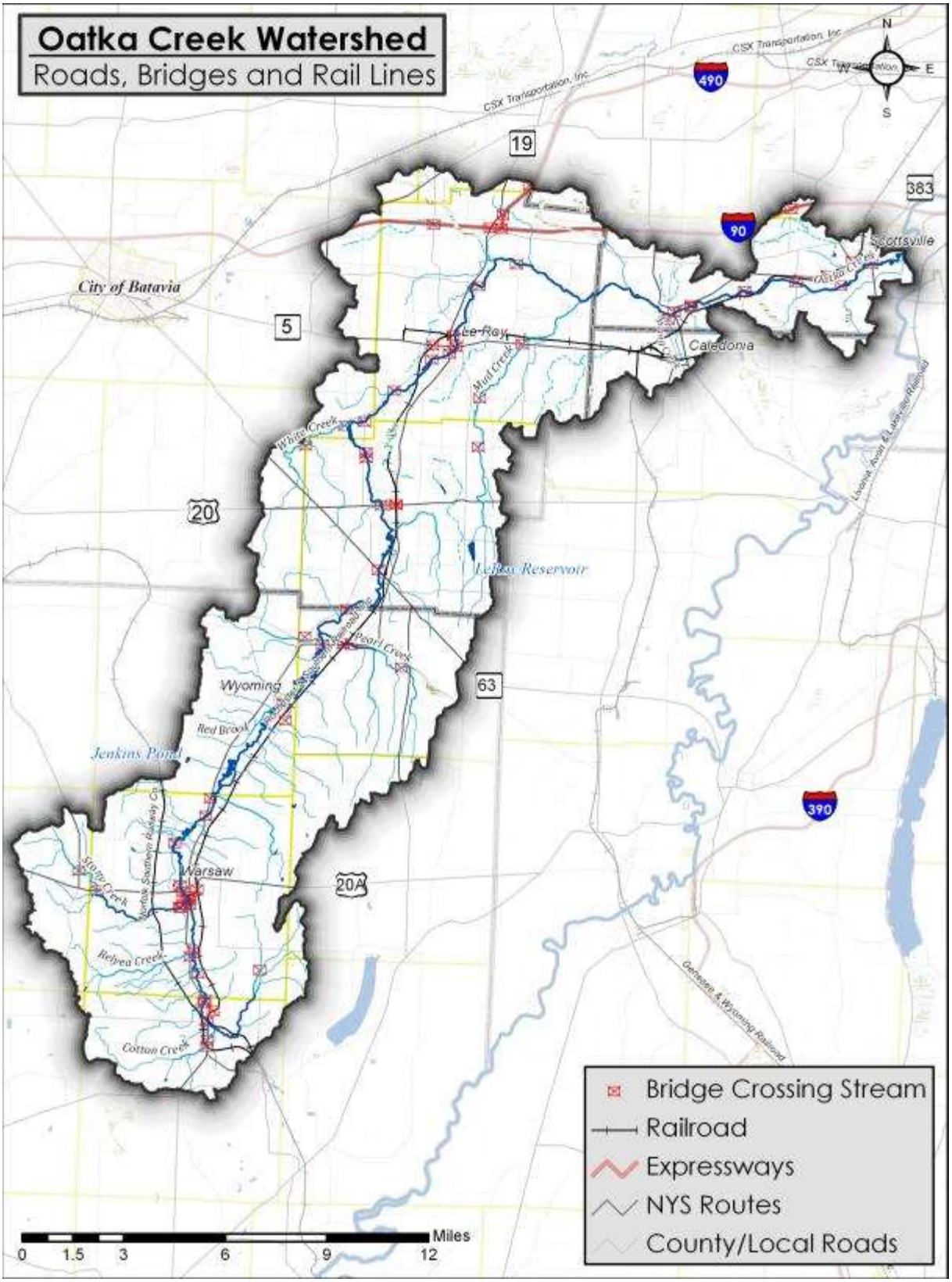
Map 10


Oatka Creek Watershed
NYSDEC Aquifers
N
W
E
S
490
90
390
City of Batavia
Le Roy
Caledonia
Scottsville
Oatka Creek
Mud Creek
White Creek
LeRoy Reservoir
Pearl Creek
Village Brook
Cascade Brook
Wyoming
Red Brook
Jenkins Pond
Warsaw
Stony Creek
Rebyea Creek
Cotton Creek
Miles
0 1 2 4 6 8
NYSDEC Aquifers
Confined, No Overlying Surfical Aquifer
Confined, Unknown Depth and Thickness
Kame, Outwash or Alluvium
Lacustrine or Eolian
Moraine
Unconfined, High Yield
Unconfined, Mid Yield
Primary Aquifer Region
Unknown

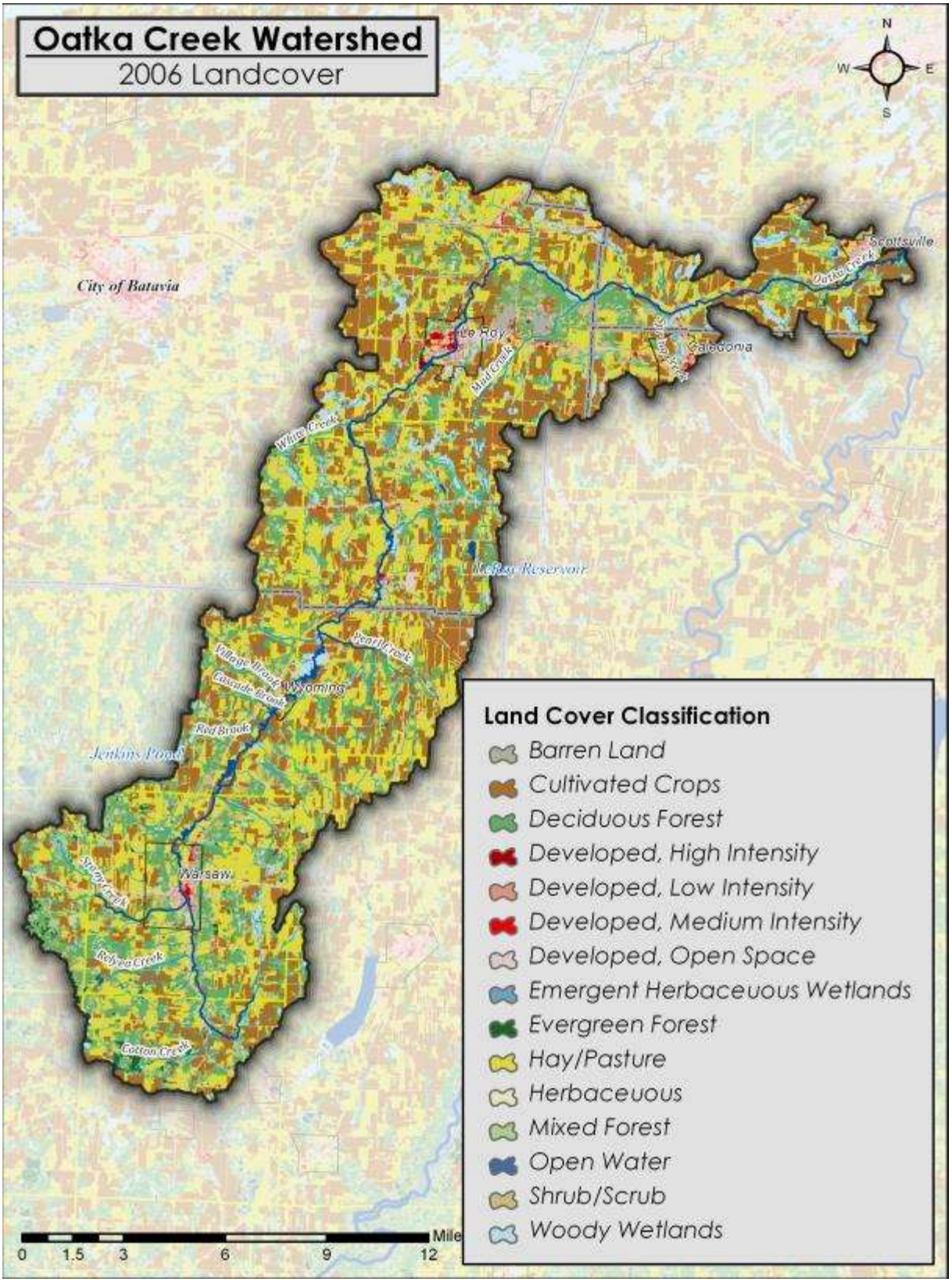
Map 11


Oatka Creek Watershed
Public Lands and Trails
N
W
E
S
490
90
390
City of Batavia
Le Roy
Caledonia
Scottsville
Oatka Creek
Mud Creek
White Creek
Oatka Reservoir
Peart Creek
Cascade Brook
Red Brook
Jenkins Pond
Warsaw
Rehrea Creek
Cotton Creek
CARLTON HILL STATE FOREST
Public Fishing Parking
Recreational Trail
NYS Snowmobile Trails (2011)
NYSDEC Lands
Local Parks, Easements and Land Trusts
Cemetery
Miles
0 1 2 4 6 8

Map 12

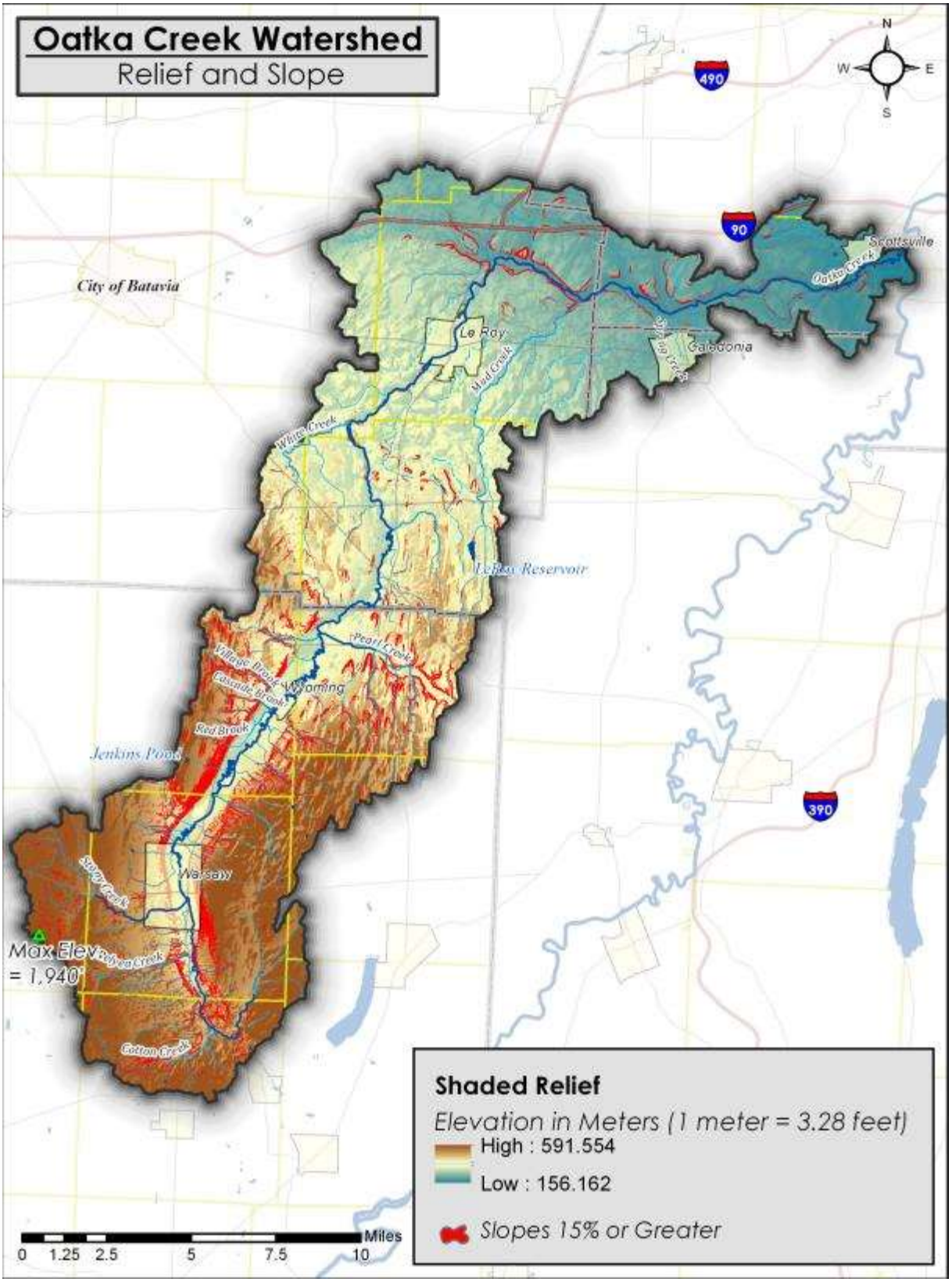

Oatka Creek Watershed
Roads, Bridges and Rail Lines
N
S
E
W
CSX Transportation, Inc
490
19
383
90
Scottsville
City of Batavia
5
Le Roy
Caledonia
Mud Creek
White Creek
20
Oatka Reservoir
Pearl Creek
Wyoming
63
Red Brook
Jenkins Pond
390
Warsaw
20A
Stony Creek
Rebrea Creek
Cotton Creek
Genesee & Wyoming Railroad
Bridge Crossing Stream
Railroad
Expressways
NYS Routes
County/Local Roads
Miles
0
1.5
3
6
9
12

Map 13

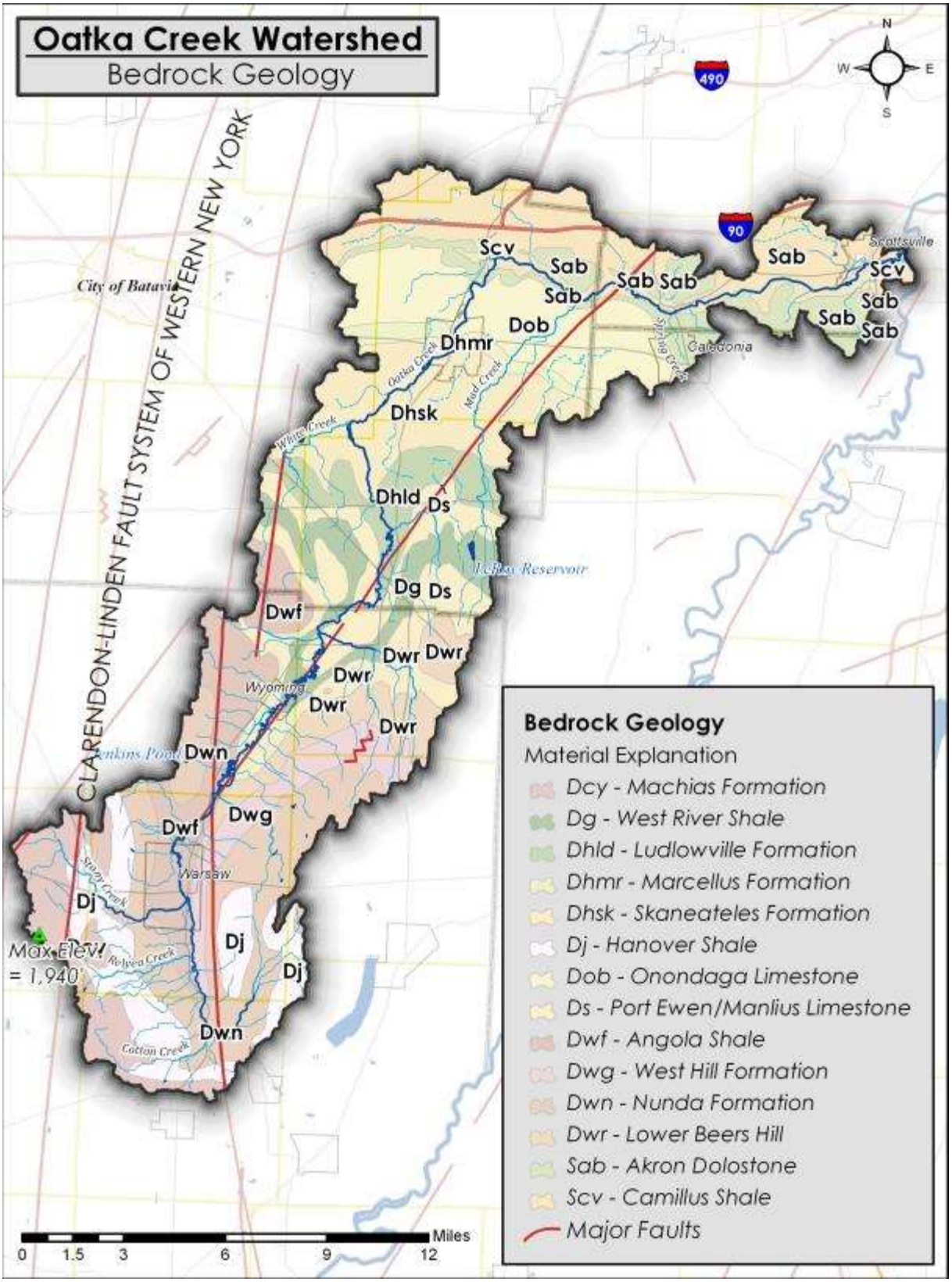

Oatka Creek Watershed
2006 Landcover
N
W
E
S
City of Batavia
Le Roy
Caledonia
Scottsville
Oatka Creek
Mud Creek
White Creek
LeRoy Reservoir
Pearl Creek
Village Brook
Cascade Brook
Wyoming
Red Brook
Jenkins Pond
Warsaw
Sloan Creek
Rebecca Creek
Cotton Creek
Land Cover Classification
Barren Land
Cultivated Crops
Deciduous Forest
Developed, High Intensity
Developed, Low Intensity
Developed, Medium Intensity
Developed, Open Space
Emergent Herbaceuous Wetlands
Evergreen Forest
Hay/Pasture
Herbaceuous
Mixed Forest
Open Water
Shrub/Scrub
Woody Wetlands
0
1.5
3
6
9
12

]

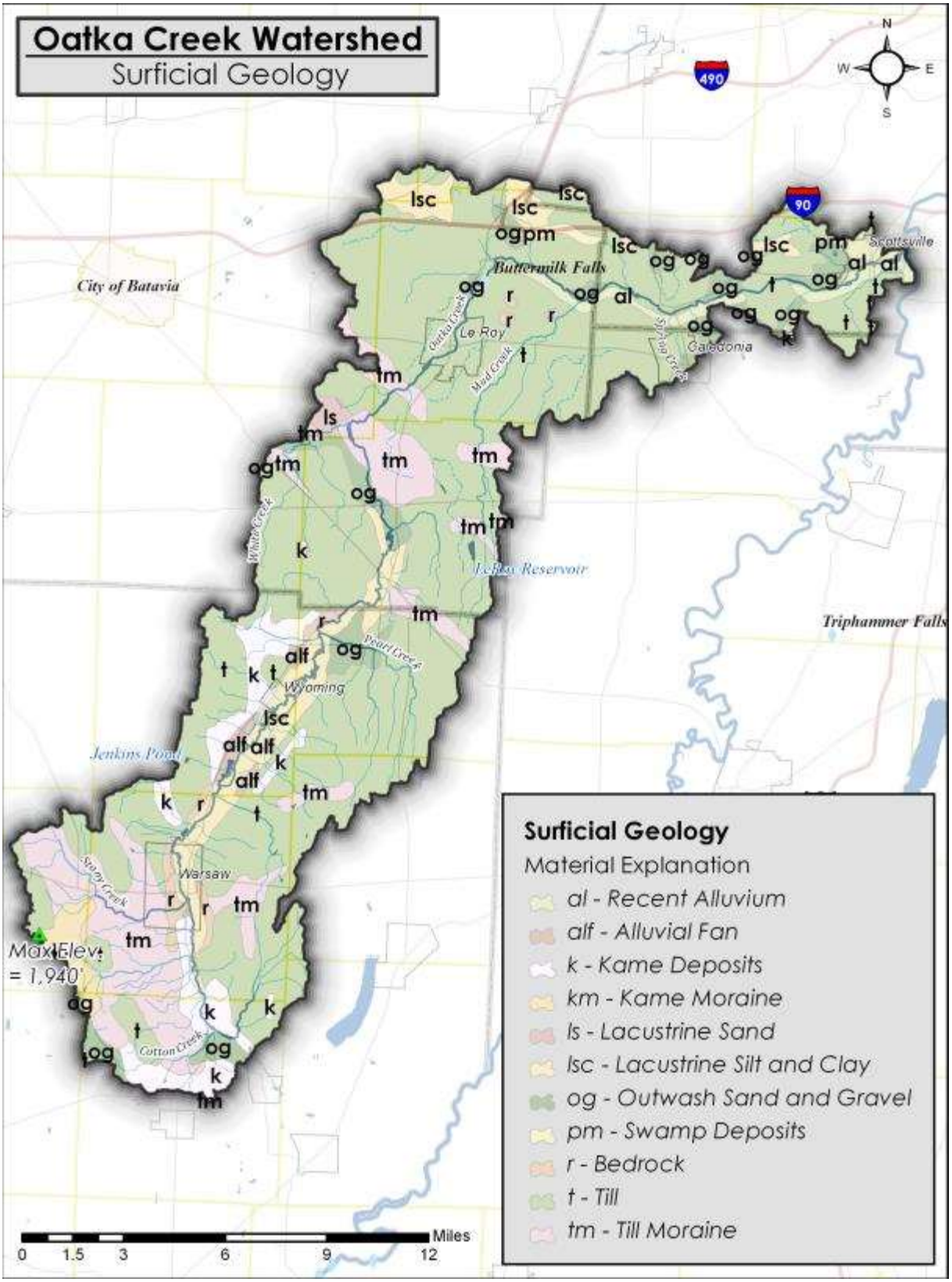
Map 14


Oatka Creek Watershed
Relief and Slope
N
W
E
S
490
90
390
City of Batavia
Le Roy
Scottsville
Oatka Creek
Mud Creek
White Creek
Caledonia
Oatka Reservoir
Pearl Creek
Village Brook
Cascade Brook
Red Brook
Jenkins Pond
Warsaw
Spring Creek
Max Elev = 1,940'
Cotton Creek
Shaded Relief
Elevation in Meters (1 meter = 3.28 feet)
High : 591.554
Low : 156.162
Slopes 15% or Greater
Miles
0 1.25 2.5 5 7.5 10

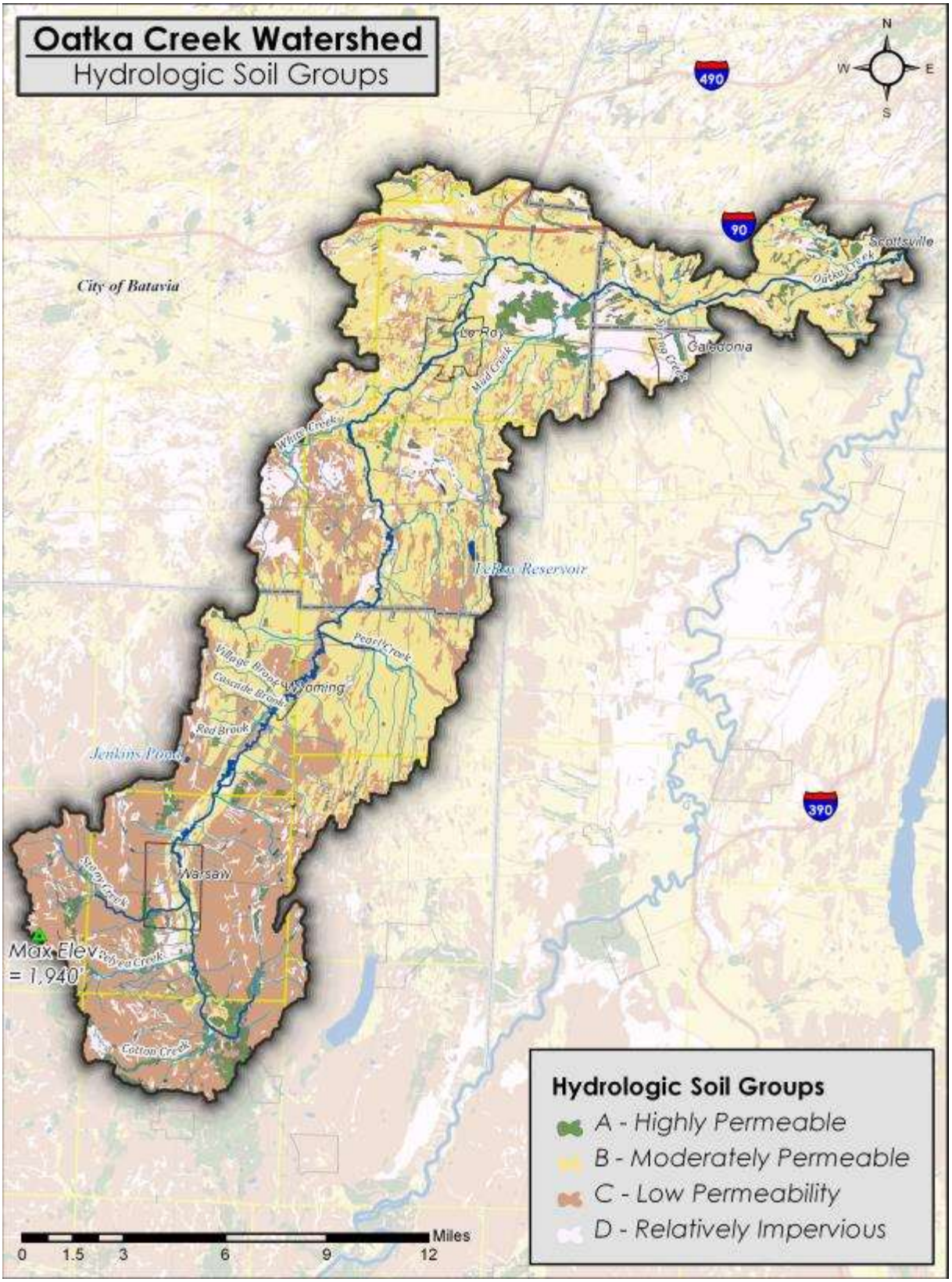
Map 15


Oatka Creek Watershed
Bedrock Geology
N
W
E
S
490
90
CLARENDON-LINDEN FAULT SYSTEM OF WESTERN NEW YORK
City of Batavia
Scottsville
Caledonia
Oatka Creek
Mud Creek
White Creek
Wyoming
Warsaw
Stony Creek
Rolyea Creek
Cotton Creek
Max. Elev. = 1,940'
Scv
Sab
Dob
Dhmr
Dhsk
Dhld
Ds
Dg
Dwf
Dwr
Dwn
Dwg
Dj
Miles
0
1.5
3
6
9
12
Bedrock Geology
Material Explanation
Dcy - Machias Formation
Dg - West River Shale
Dhld - Ludlowville Formation
Dhmr - Marcellus Formation
Dhsk - Skaneateles Formation
Dj - Hanover Shale
Dob - Onondaga Limestone
Ds - Port Ewen/Manlius Limestone
Dwf - Angola Shale
Dwg - West Hill Formation
Dwn - Nunda Formation
Dwr - Lower Beers Hill
Sab - Akron Dolostone
Scv - Camillus Shale
Major Faults

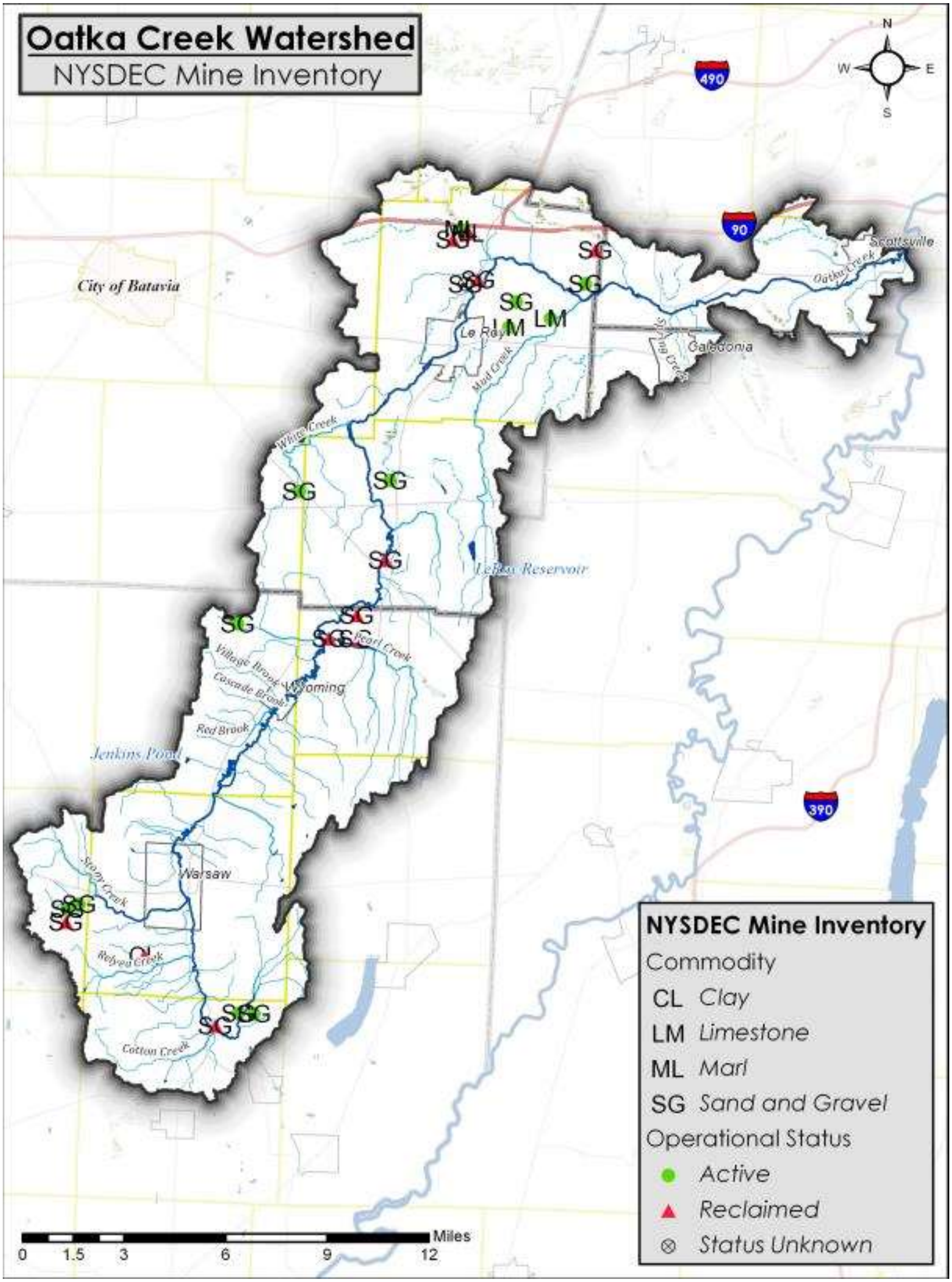
Map 16


Oatka Creek Watershed
Surficial Geology
N
W
E
S
490
90
City of Batavia
Le Roy
Caledonia
Scottsville
Buttermilk Falls
Mud Creek
Oatka Creek
White Creek
Pearl Creek
Wyoming
Warsaw
Jenkins Pond
Triphammer Falls
Max Elev.
= 1,940'
Miles
0
1.5
3
6
9
12
Surficial Geology
Material Explanation
al - Recent Alluvium
alf - Alluvial Fan
k - Kame Deposits
km - Kame Moraine
ls - Lacustrine Sand
lsc - Lacustrine Silt and Clay
og - Outwash Sand and Gravel
pm - Swamp Deposits
r - Bedrock
t - Till
tm - Till Moraine

Map 17


Oatka Creek Watershed
Hydrologic Soil Groups
N
W
E
S
490
90
390
City of Batavia
Le Roy
Caledonia
Scottsville
Oatka Creek
Mud Creek
White Creek
Pearl Creek
Cascade Brook
Red Brook
Jenkins Pond
Warsaw
Stony Creek
Max Elev = 1,940'
Cotton Creek
Miles
0 1.5 3 6 9 12
Hydrologic Soil Groups
A - Highly Permeable
B - Moderately Permeable
C - Low Permeability
D - Relatively Impervious

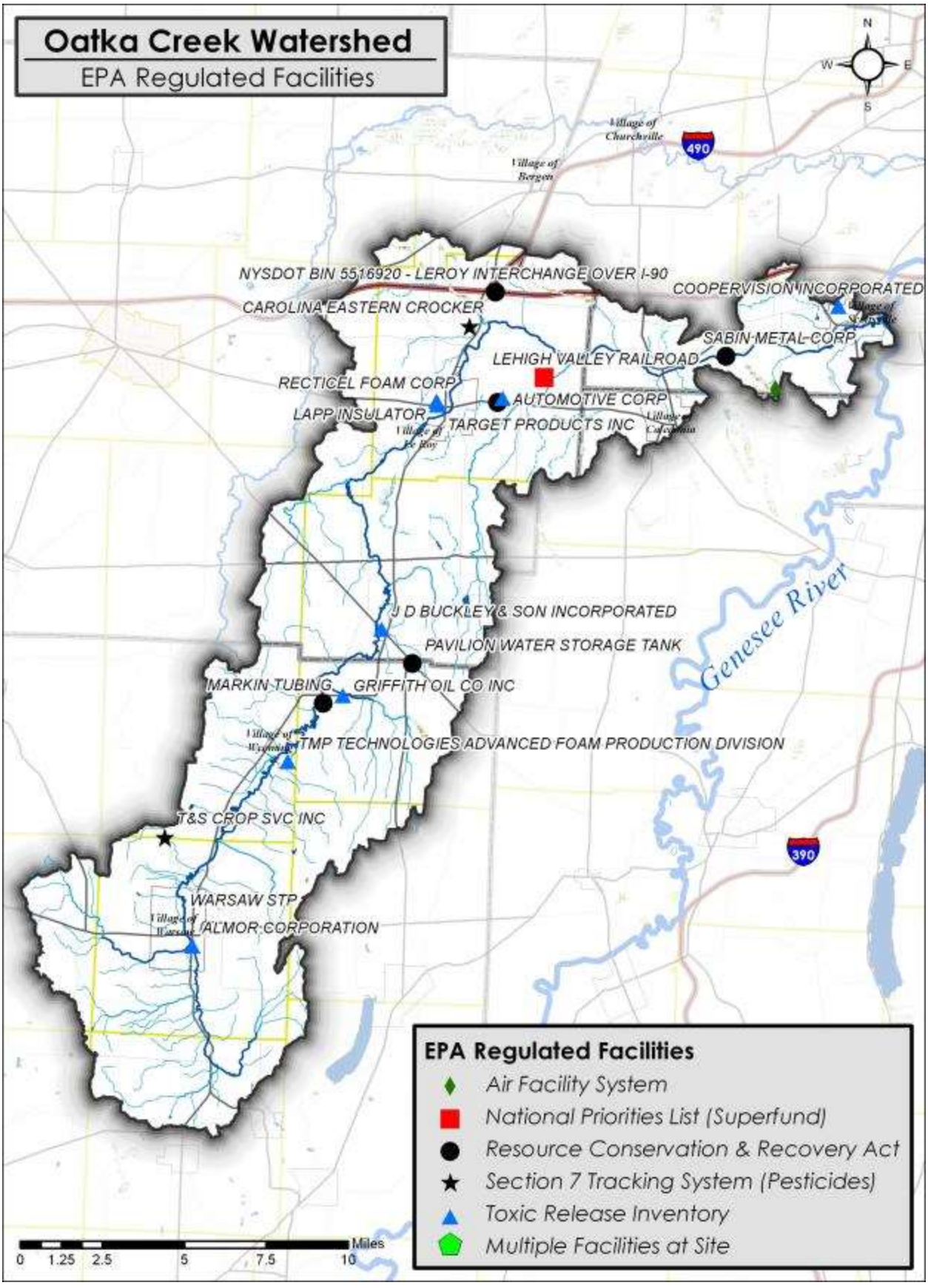
Map 18


Oatka Creek Watershed
NYSDEC Mine Inventory
City of Batavia
Le Roy
Caledonia
Scottsville
Oatka Creek
Mud Creek
Spring Creek
White Creek
LeRoy Reservoir
Pearl Creek
Village Brook
Cascade Brook
Wyoming
Red Brook
Jenkins Pond
Warsaw
Stony Creek
Relyea Creek
Cotton Creek
490
90
390
N
S
E
W
SG
LM
ML
CL
NYSDEC Mine Inventory
Commodity
CL Clay
LM Limestone
ML Marl
SG Sand and Gravel
Operational Status
Active
Reclaimed
Status Unknown
Miles
0 1.5 3 6 9 12

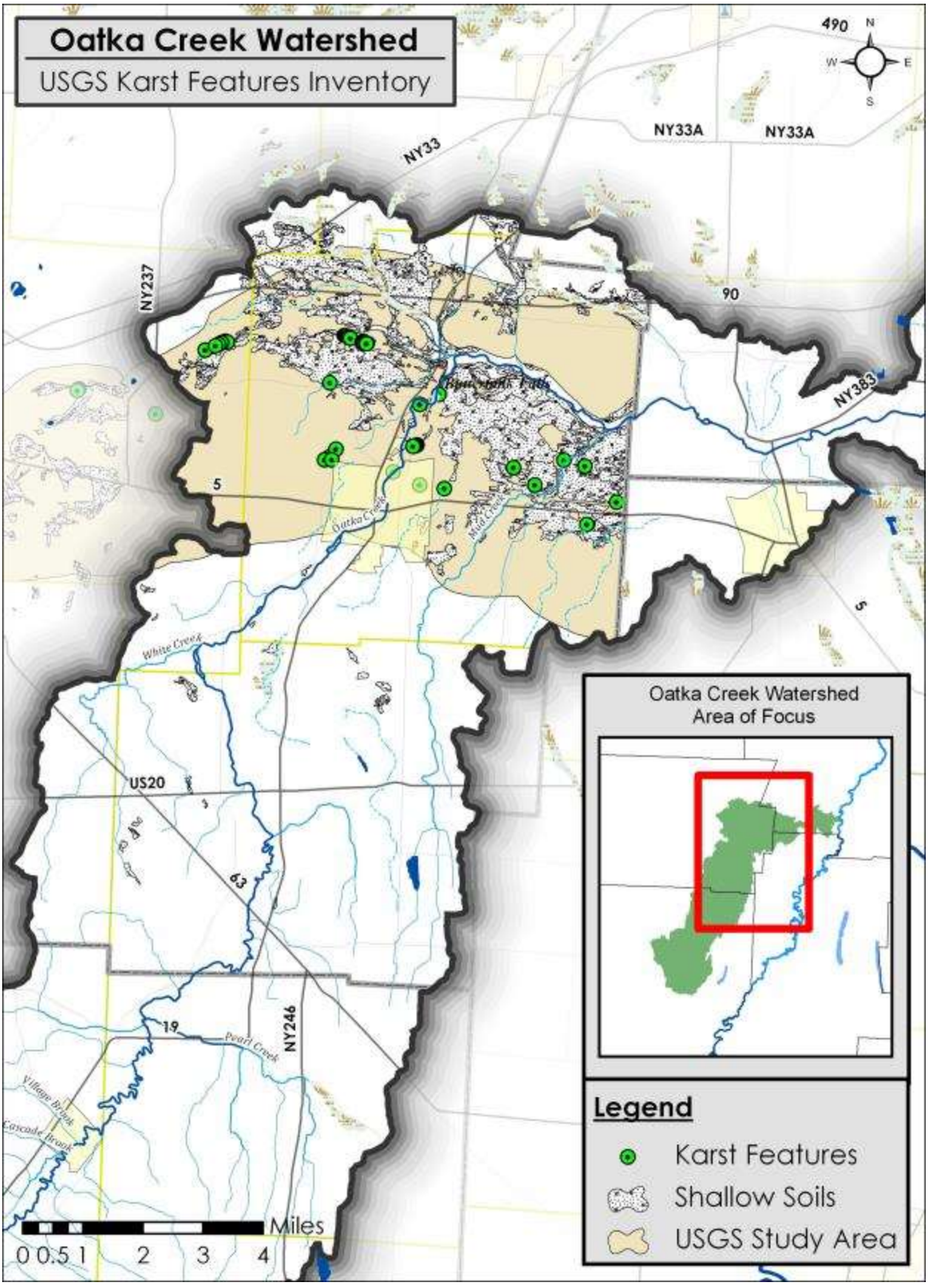
Map 19


Oatka Creek Watershed
NYSDEC SPDES Points
N
W
E
S
490
90
390
NY0020133
Scottsville
City of Batavia
NY0030546
NY0035432
Caledonia
NY0000779
NY0247308
Oatka Creek
White Creek
NY0247197
Letchworth Reservoir
NY0084689
Village Brook
Wyoming
Cascade Brook
Red Brook
Jenkins Pond
NY0021504
Warsaw
Spring Creek
Rebyea Creek
Cotton Creek
Refer to Section 3.8.1 for more informatin on these sites and the NY State Pollution Discharge Elimination System.
Miles
0
1.5
3
6
9
12
SPDES Discharge Point

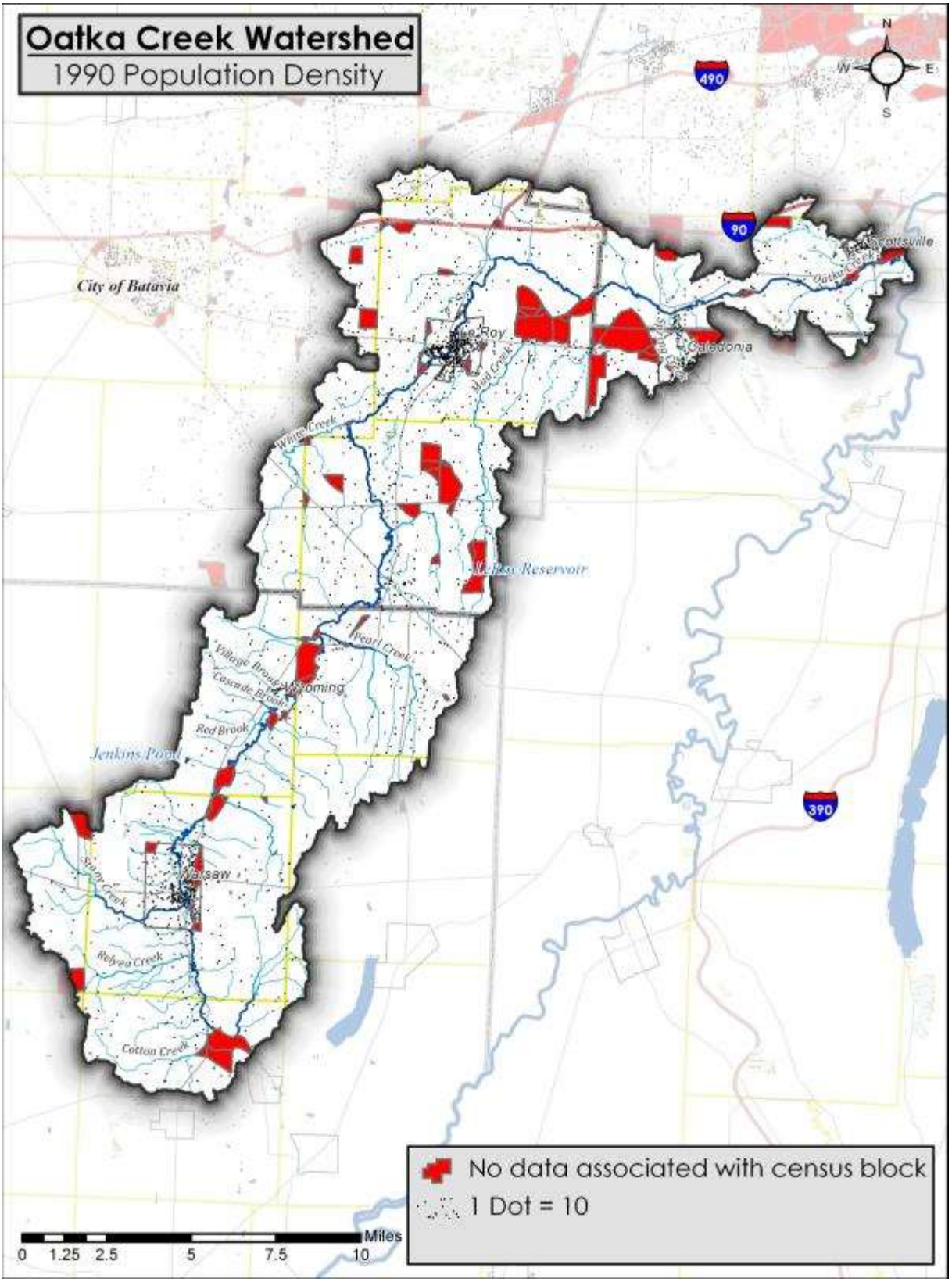
Map 20


Oatka Creek Watershed
EPA Regulated Facilities
N
W
E
S
Village of Churchville
Village of Bergen
490
NYSDOT BIN 5516920 - LEROY INTERCHANGE OVER I-90
COOPERVISION INCORPORATED
CAROLINA EASTERN CROCKER
SABIN METAL CORP
LEHIGH VALLEY RAILROAD
RECTICEL FOAM CORP
AUTOMOTIVE CORP
LAPP INSULATOR
TARGET PRODUCTS INC
Village of Le Roy
Village of Caledonia
J D BUCKLEY & SON INCORPORATED
PAVILION WATER STORAGE TANK
Genesee River
MARKIN TUBING
GRIFFITH OIL CO INC
Village of Warsaw
TMP TECHNOLOGIES ADVANCED FOAM PRODUCTION DIVISION
T&S CROP SVC INC
390
WARSAW STP
Village of Warsaw
ALMOR CORPORATION
EPA Regulated Facilities
Air Facility System
National Priorities List (Superfund)
Resource Conservation & Recovery Act
Section 7 Tracking System (Pesticides)
Toxic Release Inventory
Multiple Facilities at Site
Miles
0 1.25 2.5 5 7.5 10

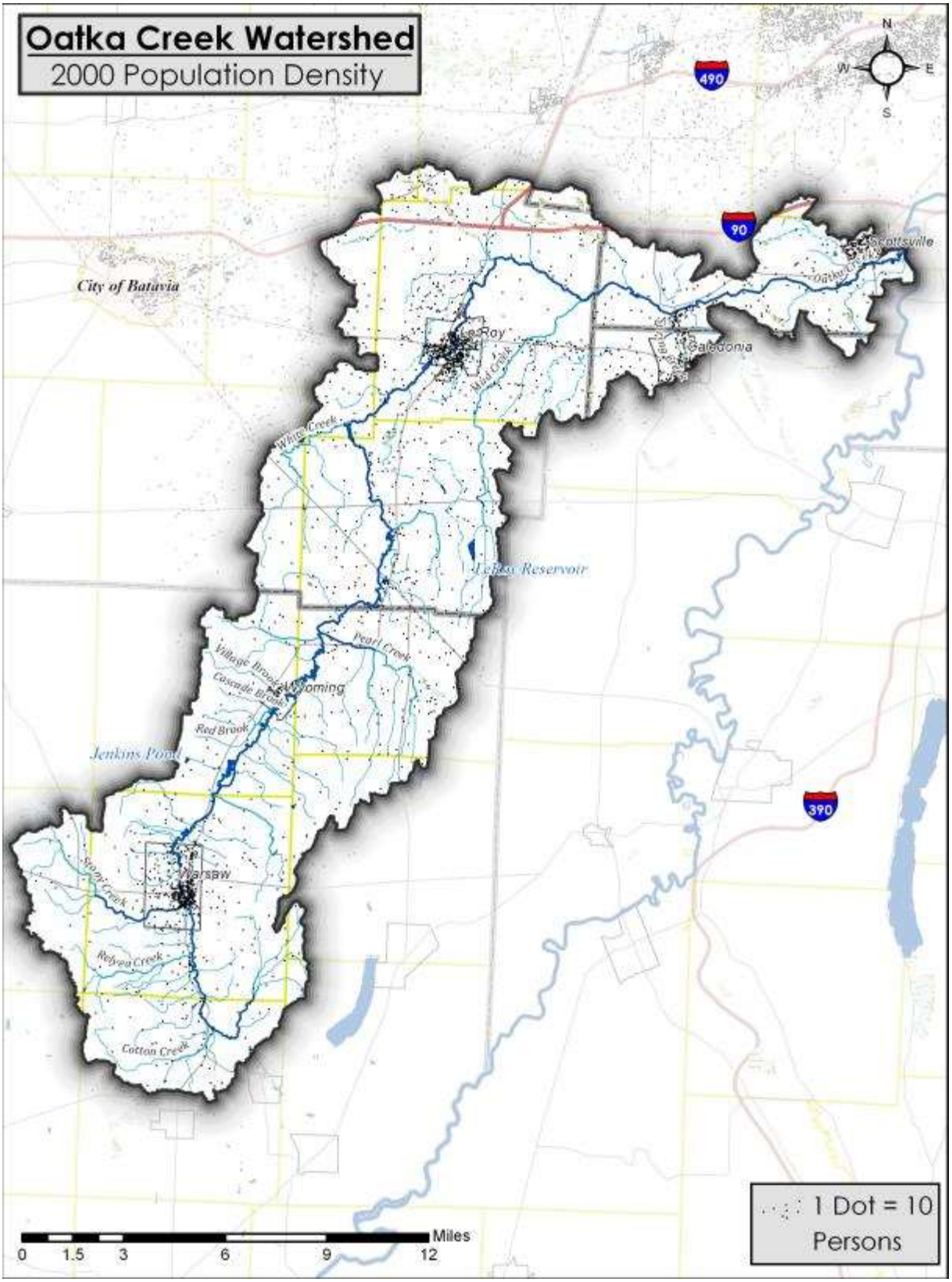
Map 21


Oatka Creek Watershed
USGS Karst Features Inventory
490
N
W
E
S
NY33A
NY33A
NY33
NY237
90
NY383
5
Oatka Creek
Mud Creek
White Creek
US20
63
19
Pearl Creek
NY246
Village Brook
Cascade Brook
Miles
0 0.5 1 2 3 4
Oatka Creek Watershed
Area of Focus
Legend
Karst Features
Shallow Soils
USGS Study Area

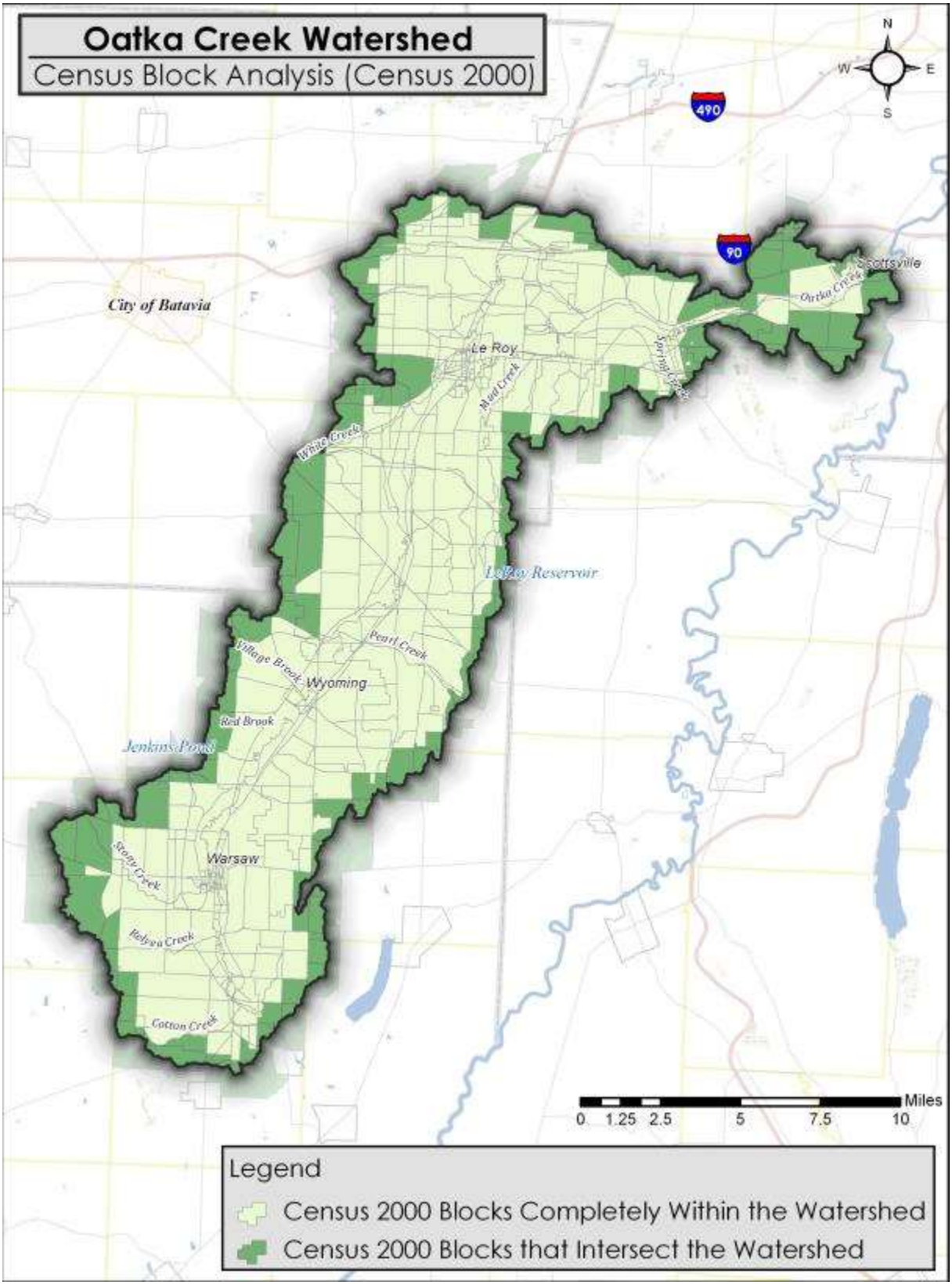
Map 22


Oatka Creek Watershed
1990 Population Density
N
W
E
S
490
90
390
City of Batavia
Le Roy
Caledonia
Mud Creek
White Creek
Oatka Creek
Scottsville
Pearl Creek
Village Brook
Cascade Brook
Red Brook
Jenkins Pond
Warsaw
Spring Creek
Rebyea Creek
Cotton Creek
No data associated with census block
1 Dot = 10
Miles
0 1.25 2.5 5 7.5 10

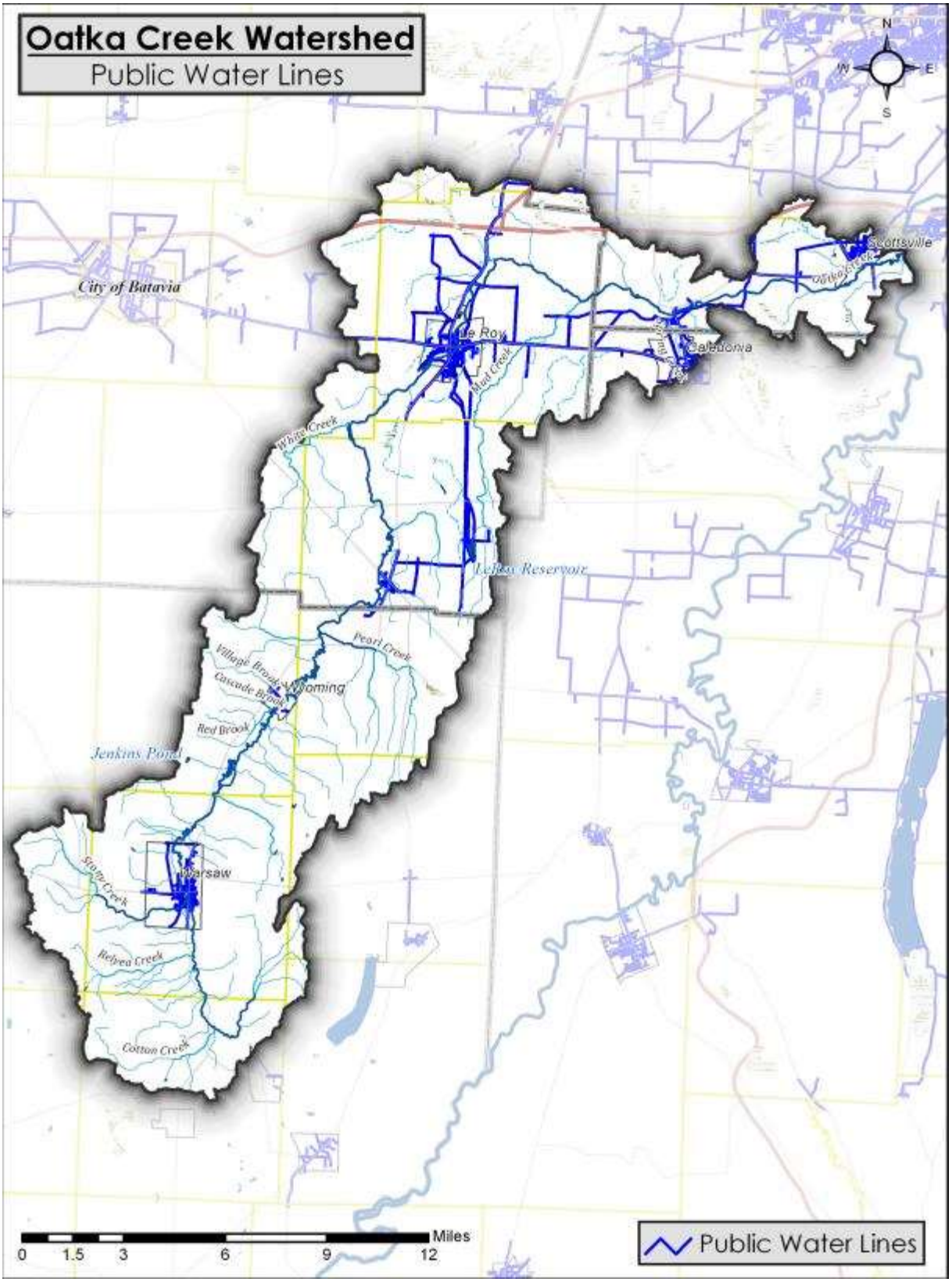
Map 23


Oatka Creek Watershed
2000 Population Density
N
W
E
S
490
90
390
City of Batavia
LeRoy
Caledonia
Scottsville
Oatka Creek
Mud Creek
White Creek
Pearl Creek
Village Brook
Cascade Brook
Red Brook
Jenkins Pond
Stony Creek
Reboea Creek
Cotton Creek
Miles
0
1.5
3
6
9
12
1 Dot = 10 Persons

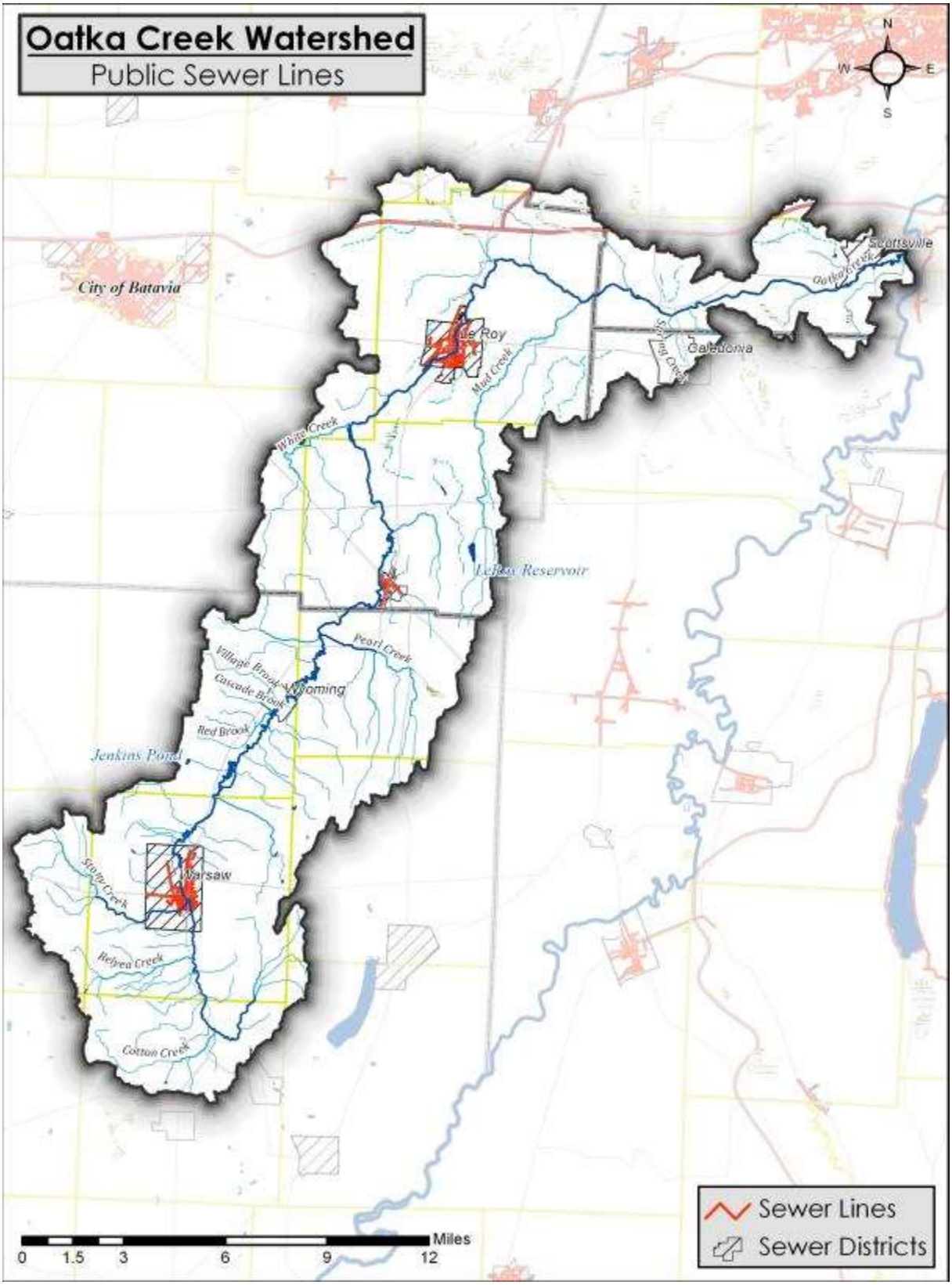
Map 24


Oatka Creek Watershed
Census Block Analysis (Census 2000)
N
W
E
S
490
90
City of Batavia
Le Roy
Mud Creek
White Creek
Oatka Creek
Scottsville
Pearl Creek
Village Brook
Wyoming
Red Brook
Jenkins Pond
Warsaw
Stony Creek
Rolyea Creek
Cotton Creek
0 1.25 2.5 5 7.5 10
Miles
Legend
Census 2000 Blocks Completely Within the Watershed
Census 2000 Blocks that Intersect the Watershed

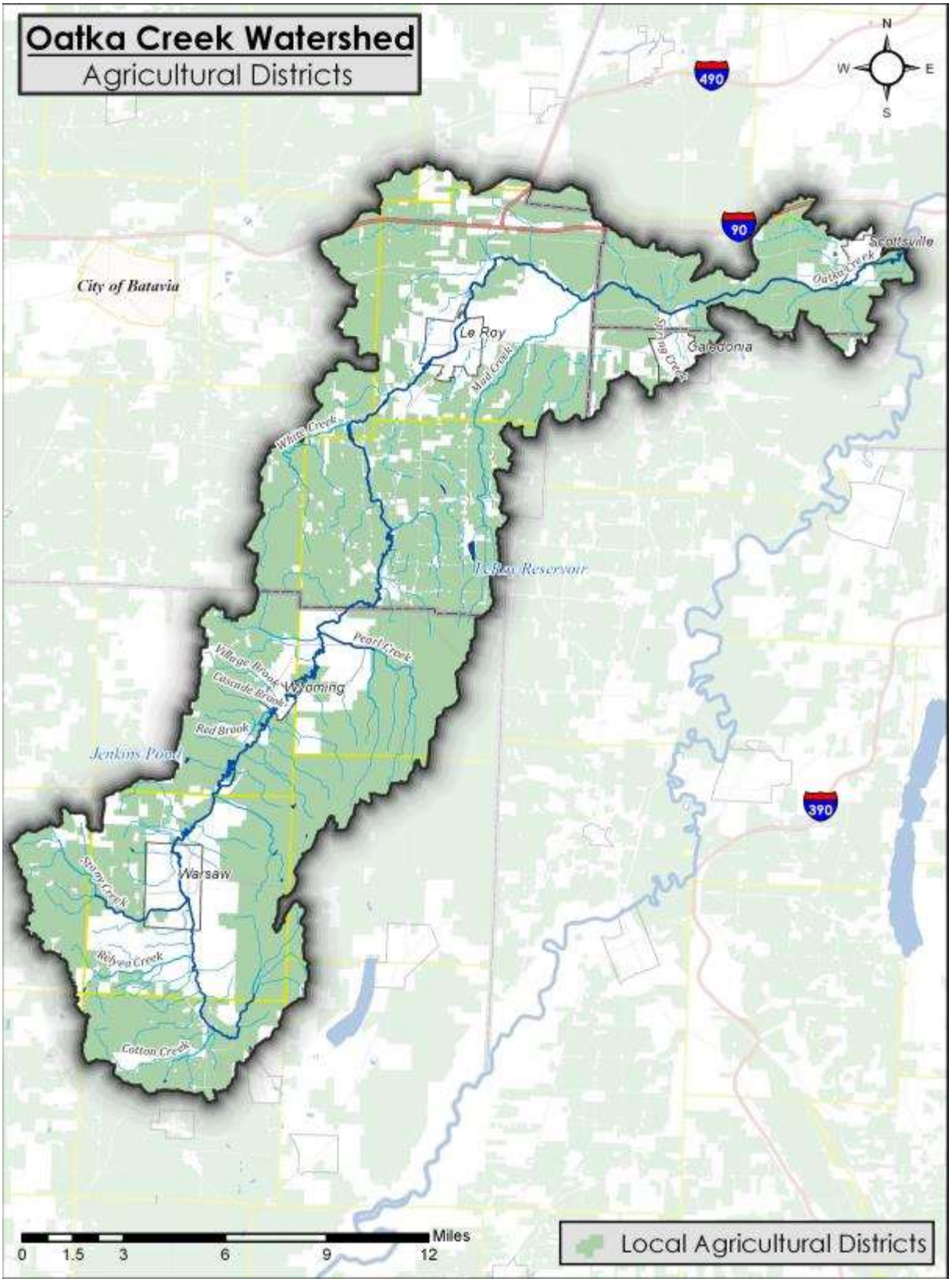
Map 25


Oatka Creek Watershed
Public Water Lines
N
W
E
S
City of Batavia
Scottsville
Caledonia
Mud Creek
White Creek
Oatka Creek
Oatka Reservoir
Peart Creek
Village Brook
Cascade Brook
Wyoming
Red Brook
Jenkins Pond
Warsaw
Stage Creek
Rebrea Creek
Cotton Creek
0 1.5 3 6 9 12
Miles
Public Water Lines

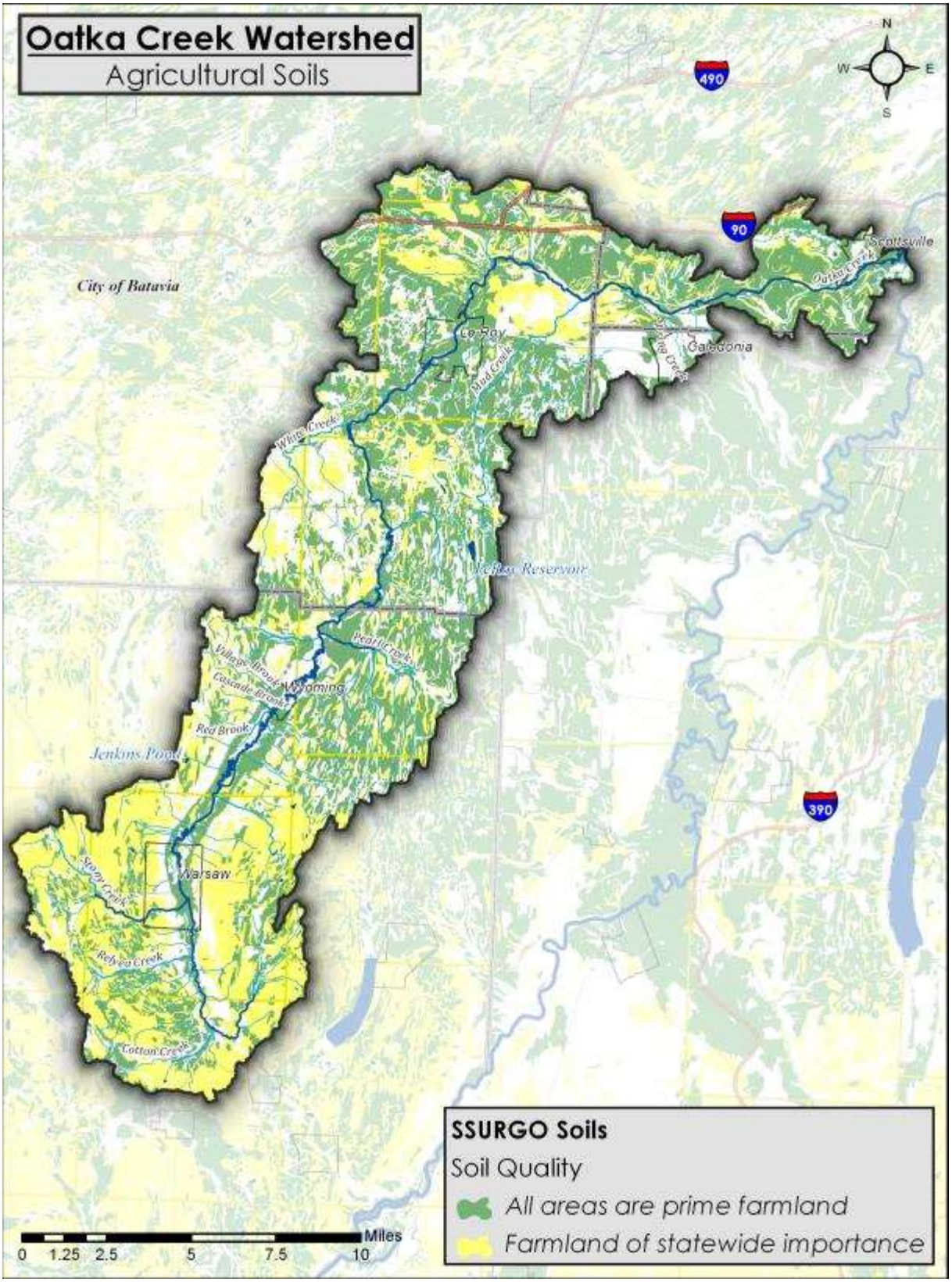
Map 26


Oatka Creek Watershed
Public Sewer Lines
N
W
E
S
City of Batavia
Le Roy
Caledonia
Scottsville
Oatka Creek
Mud Creek
White Creek
Stirling Creek
Leiby Reservoir
Pearl Creek
Village Brook
Cascade Brook
Wyoming
Red Brook
Jenkins Pond
Warsaw
Stony Creek
Relyea Creek
Cotton Creek
Miles
0
1.5
3
6
9
12
Sewer Lines
Sewer Districts

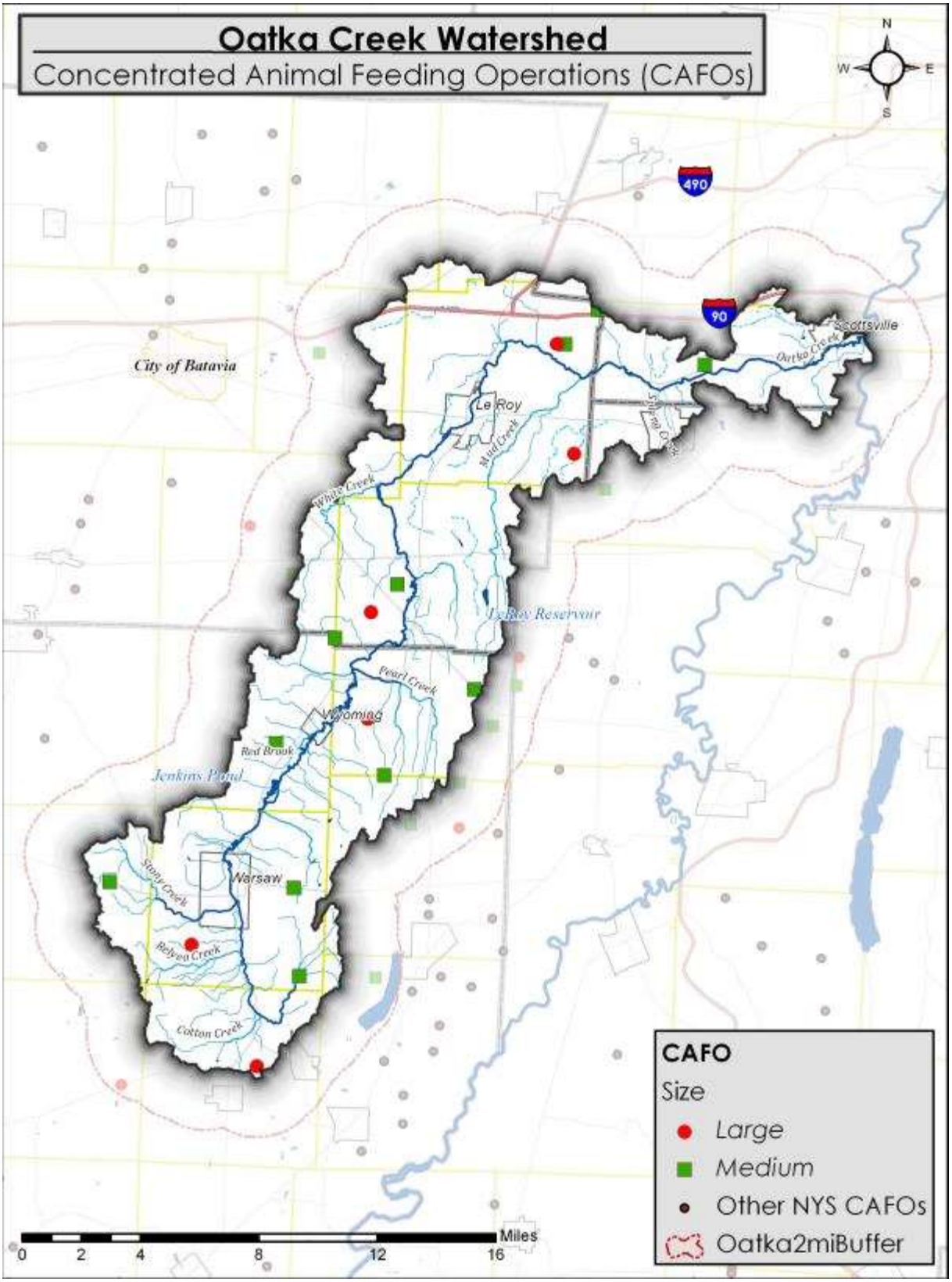
Map 27


Oatka Creek Watershed
Agricultural Districts
N
W
E
S
490
90
390
City of Batavia
Le Roy
Mud Creek
White Creek
Scottsville
Oatka Creek
Caledonia
Silver Lake Outlet
Pearl Creek
Village Brook
Cascade Brook
Warsaw
Red Brook
Jenkins Pond
Stony Creek
Relyea Creek
Cotton Creek
Miles
0
1.5
3
6
9
12
Local Agricultural Districts

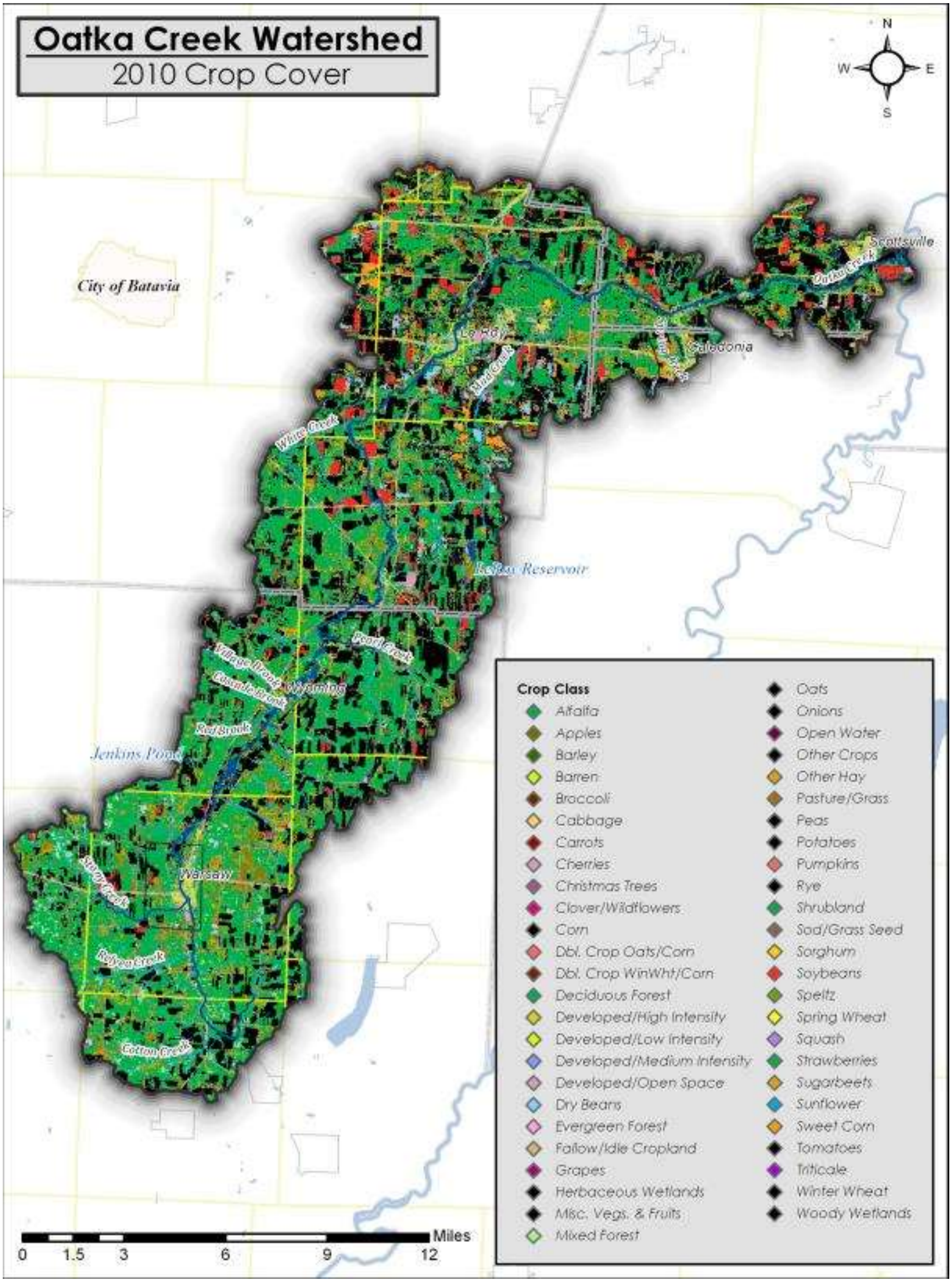
Map 28


Oatka Creek Watershed
Agricultural Soils
N
W
E
S
490
90
390
City of Batavia
Le Roy
Caledonia
Scottsville
Oatka Creek
Mud Creek
White Creek
Pearl Creek
Village Brook
Wyoming
Cascade Brook
Red Brook
Jenkins Pond
Warsaw
Spoor Creek
Rebyea Creek
Cotton Creek
Miles
0 1.25 2.5 5 7.5 10
SSURGO Soils
Soil Quality
All areas are prime farmland
Farmland of statewide importance

Map 29


Oatka Creek Watershed
Concentrated Animal Feeding Operations (CAFOs)
N
W
E
S
490
90
City of Batavia
Le Roy
Mud Creek
White Creek
Le Roy Reservoir
Pearl Creek
Wyoming
Red Brook
Jenkins Pond
Warsaw
Stony Creek
Rebyea Creek
Cotton Creek
Scottsville
Oatka Creek
Silver Creek
CAFO
Size
Large
Medium
Other NYS CAFOs
Oatka2miBuffer
Miles
0
2
4
8
12
16

Map 30


Oatka Creek Watershed
2010 Crop Cover
N
W
E
S
City of Batavia
Scottsville
Oatka Creek
Le Roy
Caledonia
White Creek
LeRoy Reservoir
Pearl Creek
Village Brook
Wyoming
Red Brook
Jenkins Pond
Warsaw
Relyea Creek
Cotton Creek
Crop Class
Alfalfa
Apples
Barley
Barren
Broccoli
Cabbage
Carrots
Cherries
Christmas Trees
Clover/Wildflowers
Corn
Dbl. Crop Oats/Corn
Dbl. Crop WinWht/Corn
Deciduous Forest
Developed/High Intensity
Developed/Low Intensity
Developed/Medium Intensity
Developed/Open Space
Dry Beans
Evergreen Forest
Fallow/Idle Cropland
Grapes
Herbaceous Wetlands
Misc. Vegs. & Fruits
Mixed Forest
Oats
Onions
Open Water
Other Crops
Other Hay
Pasture/Grass
Peas
Potatoes
Pumpkins
Rye
Shrubland
Sod/Grass Seed
Sorghum
Soybeans
Speltz
Spring Wheat
Squash
Strawberries
Sugarbeets
Sunflower
Sweet Corn
Tomatoes
Triticale
Winter Wheat
Woody Wetlands
Miles
0 1.5 3 6 9 12

Maps and GIS Data Sources

Map 1: Oatka Creek Watershed Hydrology
National Hydrography Dataset. http://nhd.usgs.gov/

Map 2: USGS HUC 12 Watershed Boundaries
National Hydrography Dataset. http://nhd.usgs.gov/

Map 3: Hydrologic Watersheds
Hydrologic subwatershed boundaries were drawn digitically utilizing the catchment boundaries included in the National Hydrography Dataset noted above. Individual catchments were selected and categorized based on their respective subwatershed drainage area. Some subwatershed boundaries may be subject to error due to the presence of isolated flowlines in the NHD (i.e. streams that do not connect to the larger drainage network).

Map 4: NYS Classification of Waters
This data set provides the water quality classifications of New York State's lakes, rivers, streams and ponds, collectively referred to as water bodies. All water bodies in the state are provided a water quality classification based on existing, or expected best usage, of each water body or water body segment. Under New York State's Environmental Conservation Law (ECL), Title 5 of Article 15, certain waters of the state are protected on the basis of their classification. Streams and small water bodies located in the course of a stream that are designated as C (T) or higher (i.e., C (TS), B, or A) are collectively referred to as "protected streams."

Map 5: NYS Regulated Freshwater Wetlands
Freshwater Wetlands (DEC; NAD83) Coverages (wetlands boundary datasets) are published by county, and are updated as amendments occur, or as errors in the data are discovered and corrected. For the most recent updates to coverages by county, visit the Cornell University Geospatial Information Repository at http://cugir.mannlib.cornell.edu/ .

Publication dates of county wetlands coverages are as follows:
Genesee County (November 30, 1998)
Monroe County (September 24, 2008)
Livingston County (November 30, 1998)
Wyoming County (November 30, 1998)

Map 6: US Fish and Wildlife Service National Wetlands Inventory
The U.S. Fish and Wildlife Service is the principal Federal agency that provides information to the public on the extent and status of the Nation's wetlands. The agency has developed a series of topical maps to show wetlands and deepwater habitats. This geospatial information is used by Federal, State, and local agencies, academic institutions, and private industry for management, research, policy development, education and planning activities. Digital GIS data can be viewed and downloaded at http://www.fws.gov/wetlands/

Map 7: Floodplains
Digital Flood Insurance Rate Map for Monroe County obtained from the Federal Emergency Management Agency's (FEMA) Map Service Center http://www.fema.gov/. . All other flood information derived from local sources, including:

- Genesee County Department of Planning.
- Orleans County Soil and Water Conservation District (originally created by G/FLRPC)
- Wyoming County Soil and Water Conservation District

Map 8: Active River Area
Active River Area developed by The Nature Conservancy. ARA GIS data layer provided by and reprinted with permission from The Central and Western New York chapter office.

Map 9: NYS Inventory of Dams

This dataset is used to show the location of dams in New York State's inventory of dams, and lists selected attributes of each dam. GIS data available for download at http://www.nysgis.state.ny.us/gisdata/inventories/details.cfm?DSID=1130

Map 10: Unconsolidated Aquifers

These aquifers are those in upstate NY that consist of sand and gravel and yield large supplies of water to wells. Bedrock aquifers, although significant in some areas, are not addressed here. Source data is 1:250,000, same scale as the NYS Geological Survey surficial and bedrock geology maps on which they were based. Together these maps form a consistent set of geologic and groundwater maps for use in regional management of the groundwater resources of the State. GIS data available for download from http://www.nysgis.state.ny.us/gisdata/inventories/details.cfm?DSID=1141

Map 11: Public Lands and Recreation Trails

Public lands data compiled from multiple sources under the Genesee/Finger Lakes Regional Planning Council Finger Lakes Open Lands Conservation Project (2010). Project overview available online from http://gflrpc.org/Publications/FLOLCP/index.htm.

Sources include:

Genesee County Planning Department

- Genesee County Tax Parcel Boundaries (2010)

Livingston County Planning Department

- Livingston County Tax Parcel Boundaries (2010)

Monroe County

- Monroe County Tax Parcel Boundaries (2010)

Wyoming County Assessor's Office

- Wyoming County Tax Parcel Boundaries (2010)

NYS Department of Environmental Conservation:

- DEC Lands (2010)
- Public Fishing Rights (2010)
- Public Fishing Stream Parking Areas

NYS Office of Parks, Recreation & Historic Preservation

- New York State Historic Sites and Park Boundary
- State-funded Snowmobile Trails

Genesee Transportation Council

- Regional Trails Inventory

Map 12: Roads, Bridges and Railways

Bridge data includes vector point file of bridges that carry or cross a public road. Bridge ID Number (BIN) attribute used to identify each bridge. Statewide coverage. UTM NAD 83 Zone 18. Copyright 2001 by NYS Dept of Transportation. Railway lines are a vector line file of active and inactive railroad lines. UTM NAD 83 Zone 18. Copyright 2001 by NYS Dept of Transportation.

Map 13: 2006 National Land Cover Database

Homer, C. C. Huang, L. Yang, B. Wylie and M. Coan. 2004. Development of a 2001 National Landcover Database for the United States. Photogrammetric Engineering and Remote Sensing, Vol. 70, No. 7, July 2004, pp. 829-840.

The 2006 National Land Cover Dataset is available through the USGS at http://www.mrlc.gov/nlcd06_data.php

Map 14: Relief and Slope

Information derived from USGS 10 meter resolution Digital Elevation Models (DEMs). DEMs consist of a raster grid of regularly spaced elevation values that have been primarily derived from the USGS topographic map series. Available for download at http://www.nysgis.state.ny.us/gisdata/inventories/details.cfm?DSID=817

Map 15: Bedrock Geology

NYS Museum. NYS Geological Survey: Bedrock Attributes. GIS data available from http://www.nysgis.state.ny.us/gisdata/inventories/member.cfm?organizationID=558

Map 16: Surficial Geology

NYS Museum. NYS Geological Survey: Surficial Geology. GIS data available from http://www.nysgis.state.ny.us/gisdata/inventories/member.cfm?organizationID=558

Map 17: Hydrologic Soil Groups

Hydrologic Soil Group derrived from NRCS Soil Survey Geographic Database (SSURGO) data for each county in the study area. GIS data available by county from http://datagateway.nrcs.usda.gov/. Hydrologic soil group attributes were generated utilizing the ssurgoImport.xls utility.

Map 18: Active and Inactive Mines

Downloadable Mining Database. [Online] In New York State Department of Environmental Conservation. Retrieved 2/3/11 from http://www.dec.ny.gov/lands/5374.html

Map 19: NY State Pollution Discharge Elimination System Point Discharge Locations

The purpose of the State Pollutant Discharge Elimination System (SPDES) Program is to protect human Health and the environment. The SPDES permit program in the Department's Division of Water regulates municipal and industrial wastewater treatment facilities that discharge directly into navigable waters. GIS data layer depicted was updated April 2009 and is available at http://www.nysgis.state.ny.us/gisdata/inventories/details.cfm?DSID=1010

Map 20: US EPA Regulated Facilities

To improve public health and the environment, the EPA collects information about facilities or sites subject to environmental regulation. GIS data is available for download from http://www.epa.gov/enviro/geo_data.html Information on the following programs active within the Oatka Creek watershed are illustrated:

- Superfund National Priorities List (NPL)
- RCRAInfo - EPA and State Treatment, Storage, Disposal facilities
- Toxic Release Inventory System - All reported years including the just released 2009 data
- RCRAInfo - Large Quantity Generators (LQG)
- Air Facility System (AFS) - Major discharges of air pollutants
- RCRAInfo - Corrective Actions
- RMP - Risk Management Plan
- SSTS - Section Seven Tracking System (Pesticides)
- ACRES - Brownfields Properties

Map 21: USGS Karst Features Inventory

Shapefiles Associated with the following study:
Reddy, J.E., and Kappel, W.M., 2010, Comiplation of existing hydrogeologic and geospatial data for the assessment of focused recharge to the carbonate-rock aquifer in Genesee County, New York: U.S. Geological Survey Scientific Investigations Map 3132, 17 p., 20 sheets, at http://pubs.usgs.gov/sim/3132/.

Map 22: 1990 Census Population Density

Boundary file: http://arcdata.esri.com/data/tiger2000/tiger_statelayer.cfm
Population Data: http://data.nhgis.org/nhgis/tables.do. Minnesota Population Center. *National Historical Geographic Information System: Pre-release Version 0.1*. Minneapolis, MN: University of Minnesota 2004.

Map 23 2000 Census Population Density

Boundary and population data obtained from http://arcdata.esri.com/data/tiger2000/tiger_statelayer.cfm

Map 24: Census Block Analysis

Boundary data obtained from http://arcdata.esri.com/data/tiger2000/tiger_statelayer.cfm

Map 25: Public Water Lines

Water line data compiled from multiple sources under the Genesee/Finger Lakes Regional Planning Council *Finger Lakes Open Lands Conservation Project* (2010). Project overview available online from http://gflrpc.org/Publications/FLOLCP/index.htm.

Map 26: Public Sewer Lines

Sewer line data compiled from multiple sources under the Genesee/Finger Lakes Regional Planning Council Finger Lakes Open Lands Conservation Project (2010). Project overview available online from http://gflrpc.org/Publications/FLOLCP/index.htm.

Map 27: Agricultural Districts

Map illustrates polygon coverages representing generalized geographic boundaries of lands under the protection of NYS Agricultural District Law, as administered by the New York State Department of Agriculture and Markets. Data sets should not be used for legal jurisdictional determinations without consulting associated metadata. 2010. GIS data available from http://cugir.mannlib.cornell.edu/datatheme.jsp?id=2

Publication date of geospatial data depicted in map:

Genesee County:	March 11, 2010
Monroe County:	March 11, 2010
Livingston County:	February 13, 2009
Wyoming County:	February 13, 2009

Map 28: Agricultural Soils

Hydrologic Soil Group derrived from NRCS Soil Survey Geographic Database (SSURGO) data for each county in the study area. GIS data available by county from http://datagateway.nrcs.usda.gov/. Attributes listed under soil quality were sorted according to agricultural suitability listed in the Legend.

Map 29: Concentrated Animal Feeding Operations

Provided by the New York State Department of Environmental Conservation.

Map 30: USDA-NASS 2009 Crop Cover

U.S. Department of Agriculture, National Agricultural Statistics Service (NASS), Research and Development Division, Geospatial Information Branch, Spatial Analysis Research Section (SARS). Available for download through the USDA NRCS Geospatial Gateway: http://datagateway.nrcs.usda.gov/

Note that printing resolution at this scale does not adequately capture raster cell distribution throughout the watershed. A smaller scale is required in order to fully reveal crop distribution of the 30 x 30m raster cells.

Additional GIS Source information:

Climate – Rain

Processed Annual Precipitation. USDA/NRCS - National Cartography & Geospatial Center. Vector dataset provides derived average annual precipitation according to a model using point precipitation and elevation data for the 30-year period of 1971-2000.

Climate – Temperature

Processed Annual Average Temperature. USDA/NRCS - National Cartography & Geospatial Center. Vector dataset provides derived average annual temperature according to a model using point temperature data for the 30-year period of 1971-2000.

Ecozones

Derrived from US EPA Western Ecology Division. http://www.epa.gov/wed/pages/ecoregions.htm

Build Out Analysis Methodology

1. This analysis reviewed the potential for future residential growth only in locations that were pre-determined to have a high potential for future residential growth.

2. Determine "high growth" towns for analysis by reviewing the following data sources and noting salient trends:

A) 5 Year residential permit average
B) Population % change 2000-2009(est.)
C) Availability of public water utilizing the 2008 G/FLRPC public water GIS files
D) Villages were excluded from this analysis

3. Within selected "high growth" towns, determine the zoning districts for further analysis

A) Identify Residential, Agricultural, and Agricultural/Residential zones in selected municipalities that are at least partially within the watershed and have access to public water. Zones that have water lines intersecting them at any point are considered to have access to public water.
B) Excluded Mobile Home Park Zones
C) Excluded Mixed Use/PUD zones; it is extremely difficult to determine how these zones will ultimately be developed if a proposal is submitted.
D) Zones must be at least partially within the watershed for further consideration

4. Determine bulk regulations for identified zoning districts

A) Bulk Regulations refer to the minimum and maximum standards for lot sizes and address geometric and structural issues such as building setbacks and building height.
B) The bulk regulations were reviewed in an effort to establish the typical single family residential lot size in each selected zone.
    a. This study excluded the potential for multi-family buildings/lots given the vast multitude of potential scenarios that these options would create for each zoning district

4. Determine total land area open to potential development

A) Zones that meet all of the aforementioned criteria will be extracted and clipped by watershed boundary for further analysis
    a. This study will only analyze the area of zoning districts that fall within the boundary of the Oatka Creek watershed
B) Among zones remaining for future consideration, consider bulk regulations and RPS parcel data to determine if those zones have adequate vacant property to accommodate new development. "Developable" parcels are those that meet the following criteria:
    a. Parcels identified as "vacant" residential property in RPS records
    b. Large lots were reviewed using aerial photography and included for further analysis if they were either farms or had significant land in open space. Lots with 1, 2, or 3 family structures were considered if they were 10 acres in size or larger because it is assumed that these would be large enough to be subdivided without affecting existing structures or residences
    c. All agricultural properties were considered as "vacant" properties open to future residential development.
        i. While agricultural use is in many cases are protected or specifically zoned "agricultural" in order to preserve such use, the property could feasibly be sold or re-zoned in the future

for the purposes of residential development and are therefore considered for further analysis

d. Zones must have enough vacant property to allow for minimum lot size development in order to qualify for further build out analysis. Minimum lot sizes are determined by reviewing bulk regulations for the zone.

C) Determine the total "developable" land area for each identified zoning district
   a. was established for each zoning district. All vacant property determined to qualify for potential future development was summed to arrive at A raw figure of total area in square feet

5. Determine potential constraints to development within each zone

A) Constraints to development were examined only on parcels considered developable, and subtracted from the amount of total developable land.
B) In several instances zones were deleted from further analysis because constraints prevented them from having any parcels large enough to build on.
C) Environmental constraints include:
   a. NYS Regulated Freshwater Wetlands (+100ft buffer)
   b. Surface water (lakes, ponds, streams, creeks, rivers, + a standard 50ft buffer area)
   c. Land area that has a slope great than 15% based on GIS 30 meter Digital Elevation Model analysis
D) In addition, a standard deduction of 25% from the remaining land area open for development would be reduced to accommodate for anticipated infrastructure (such as roads, sidewalks, power lines, stormwater facilities, etc.), natural features (including poor soils), and irregularly-shaped parcel boundaries. (this is in accordance with the Monroe County Department of Transportation study "Ballantyne Corridor Study" (2005)).
E) Land area within the identified 100-year flood zone was not considered to be a constraint. In all towns, 100 year flood zones were considered open to new development with proper precautions and approval. In some instances, towns have identified locations of high flood risk and zoned accordingly; these zoning districts were therefore removed from analysis early on in the build out study.
F) Additional park, recreation or open space requirements. Some towns have provisions that require or "may" require a certain amount of land to be set aside for these purposes. These standards are generally not specific in nature and left to the discretion of the local planning or regulatory body. A percentage in an amount deemed appropriate based on the local regulation would be further deduced from the land area available for development.
G) Lots already developed will be identified through aerial imagery and subtracted

6. Final calculation of potential land available for development.

A) Each zone will have a customized series of calculations performed in order to determine the estimated land area open to potential residential development. This is generally determined by conducting the following steps in Excel.
B) Environmental constraints (see 5.C) are subtracted from the total gross land open to development
C) 25% standard reduction is applied to this figure (see 5.D)
D) If necessary, a specific percentage of land area assumed necessary for parks, recreation or open space is then applied based on language in the code (see 5.F)
E) Lots already developed subtracted
F) A figure estimating the net land area available for development is determined within each zone

7. Assuming a specific rate of growth and development, determine when the zone within the watershed will become "built-out."

A) The minimum lot size for each zone is established under bulk regulations; this figure will be divided into the net land area available for development in order to determine a general estimate of the number of new residential lots that the zone can accommodate.
B) The average number of residential permits issued in the town in a five-year period is used to determine the rate of development

C) The estimated remaining number of years until build out occurs is determined by dividing the estimated number of lots that the zone can accommodate by the number of building permits issued annually (5 year average)

Total Population of Towns in the Oatka Creek Watershed (includes population of villages and cities within)								
Municipality	Population 1980[99]	Population 1990[100]	Population 2000[101]	Population 2010[102]	*Percent Change*			
					1980-1990	*1990-2000*	*2000-2009*	***1980-2009***
Town of Bergen	2,568	2,794	3,182	3,120	9%	14%	-2%	**21%**
Town of Bethany	1,876	1,808	1,760	1,765	-4%	-3%	0.3%	**-6%**
Town of Byron	2,242	2,345	2,493	2,369	5%	6%	-5%	**6%**
Town of Caledonia	4,034	4,441	4,567	4,255	10%	3%	-7%	**5%**
Town of Castile	2,865	3,042	2,873	2,906	6%	-6%	1%	**1%**
Town of Covington	1,075	1,266	1,357	1,232	18%	7%	-9%	**15%**
Town of Gainesville	2,133	2,288	2,333	2,182	7%	2%	-6%	**2%**
Town of LeRoy	8,019	8,176	7,790	7,641	2%	-5%	-2%	**-5%**
Town of Middlebury	1,561	1,532	1,508	1,441	-2%	-2%	6%	**2%**
Town of Pavilion	2,375	2,327	2,467	2,495	-2%	6%	1%	**5%**
Town of Perry	5,437	5,353	6,654	4,616	-2%	24%	-31%	**-15%**
Town of Riga	4,309	5,114	5,437	5,590	19%	6%	3%	**30%**
Town of Stafford	2,508	2,593	2,409	2,459	3%	-7%	2%	**-2%**
Town of Warsaw	5,074	5,342	5,423	5,064	5%	2%	-7%	**0%**
Town of Wheatland	4,897	5,093	5,149	4,775	4%	1%	-7%	**-2%**
County Figures								
Genesee	59,400	60,060	60,370	60,079	1%	1%	-.0.5%	***1%***
Livingston	57,006	62,372	64,328	65,393	9%	3%	2%	***15%***
Monroe	702,238	713,968	735,343	744,344	2%	3%	1%	***6%***
Wyoming	39,895	42,507	43,424	42,155	7%	2%	-3%	***6%***
Totals	**897,035**	**920,753**	**903,465**	**937,191**	3%	*3%*	1%	***6%***

Population Projections, 2000 – 2040						
	2000	**2010**	**2020**	**2030**	**2040**	**% Change 2000 – 2040**
Town of Bergen	1,942	1,994	2,037	2,073	2,105	8%
Town of Bethany	1,760	1,772	1,782	1,791	1,798	2%
Town of Byron	2,493	2,547	2,591	2,629	2,661	7%
Town of Caledonia	2,240	2,309	2,366	2,414	2,456	10%
Town of Castile	1,051	1,031	1,015	1,001	989	-6%
Town of Covington	1,357	1,388	1,414	1,436	1,454	7%
Town of Gainesville	304	301	298	295	293	-4%
Town of Le Roy	3,328	3,402	3,463	3,515	3,560	7%
Town of Middlebury	995	1,005	1,012	1,018	1,024	3%
Town of Orangeville	1,301	1,340	1,372	1,399	1,423	9%
Town of Pavilion	2,467	2,512	2,549	2,581	2,608	6%
Town of Perry	3,168	3,240	3,299	3,349	3,392	7%
Town of Riga	3,550	3,655	3,742	3,816	3,880	9%
Town of Stafford	2,409	2,441	2,466	2,488	2,507	4%
Town of Warsaw	3,814	3,825	3,833	3,840	3,846	1%
Town of Wheatland	3021	3109	3181	3242	3295	9%

G/FLRPC Land Use Monitoring Report Figures, 2005 – 2010[103]							
	2005	2006	2007	2008	2009	2010	6 Year Average
Bergen	4	4	8	1	1	3	3.5
Bergen (Village)	0	0	0	0	0	0	0.0
Bethany	1	1	DNA	2	0	3	1.4
Byron	5	8	DNA	2	1	2	3.6
Caledonia	5	4	5	3	2	2	3.5
Caledonia (Village)	0	0	0	0	0	1	0.2
Castile	5	6	3	4	6	5	4.8
Covington	5	0	5	5	4	3	3.7
Gainesville	5	3	9	0	1	3	3.5
LeRoy	5	3	9	0	1	3	3.5
LeRoy (Village)	5	3	9	0	1	3	3.5
Middlebury	4	3	1	4	1	0	2.2
Orangeville	7	2	4	2	4	3	3.7
Pavilion	5	DNA	DNA	4	3	1	3.3
Perry	8	3	4	6	3	0	4.0
Riga	13	7	5	3	5	3	6.0
Scottsville (Village)	3	2	2	0	0	1	1.3
Stafford	9	5	5	3	1	0	3.8
Warsaw	10	6	3	0	1	2	3.7
Warsaw (Village)	0	0	0	0	0	0	0.0
Wheatland	12	4	3	5	4	1	4.8
Wyoming (Village)	0	0	0	2	4	1	1.2

DNA = Data Not Available
Figures are for permits issued for the construction of residential buildings (single – five family including mobile/mnfctd homes) in respective year. Permitted construction does not guarantee actual construction.

Data notes

[99] US Census Bureau. 1980 Census of Population, Detailed Population Characteristics of New York
[100] US Census Bureau. American FactfFinder. Data Set: 1990 Summary Tape File 1 - 100% data, Total Population.
[101] US Census Bureau. American FactfFinder. Data Set: 2000 Summary File 1100% data, Total Population.
[102] US Census Bureau. Census 2010, Summary File 1 General Profile 1: Persons by Race, Age, and Sex, Urban and Rural
[103] *Regional Land Use Monitoring*. [Online] In *Genesee/Finger Lakes Regional Planning Council*. Retrieved 1/2/11 from http://gflrpc.org/Publications/LandUseMonitoring.htm

2010 USDA-NASS Cropland Data Layer

Refer to http://www.nass.usda.gov/research/Cropland/SARS1a.htm

Unabridged 2010 Cropland Data Layer Analysis for the Oatka Creek Watershed

Crop/Land Cover	Acres	% Share of Watershed
Forest Categories Combined	**40,738.29**	**28.9%**
Deciduous Forest	*37,401.03*	*26.5%*
Mixed Forest	*2,666.07*	*1.9%*
Evergreen Forest	*671.19*	*0.5%*
Corn	**28,376.25**	**20.1%**
Alfalfa	**22,335.78**	**15.8%**
Other Hay	**10,836.19**	**7.7%**
Open Space Categories Combined	**8,940.72**	**6.3%**
Developed/Open Space	*6,214.82*	*4.4%*
Developed/Low Intensity	*2,082.06*	*1.5%*
Developed/Medium Intensity	*522.63*	*0.4%*
Developed/High Intensity	*121.21*	*0.1%*
Pasture/Grass	**5,562.32**	**3.9%**
Wetland Categories Combined	**5,139.77**	**3.6%**
Woody Wetlands	*4,653.83*	*3.3%*
Open Water	*259.98*	*0.2%*
Herbaceous Wetlands	*225.95*	*0.2%*
Other Cash Crops Combined	**5,099.51**	**3.6%**
Dry Beans	*1,916.15*	*1.4%*
Sweet Corn	*1,136.66*	*0.8%*
Peas	*953.63*	*0.7%*
Oats	*349.83*	*0.2%*
Rye	*259.09*	*0.2%*
Potatoes	*139.89*	*0.1%*
Cabbage	*49.15*	*0.03%*
Apples	*40.92*	*0.03%*
Sugarbeets	*37.36*	*0.03%*
Speltz	*31.58*	*0.02%*
Grapes	*29.36*	*0.02%*
Clover/Wildflowers	*28.47*	*0.02%*
Other Crops	*27.35*	*0.02%*
Barley	*23.35*	*0.02%*
Triticale	*19.35*	*0.01%*
Misc. Vegs. & Fruits	*14.90*	*0.01%*
Squash	*10.01*	*0.01%*
Onions	*9.12*	*0.01%*
Carrots	*5.34*	*0.004%*
Dbl. Crop WinWht/Corn	*5.34*	*0.004%*
Sorghum	*5.12*	*0.004%*
Christmas Trees	*3.56*	*0.003%*
Pumpkins	*2.00*	*0.001%*
Cauliflower	*0.44*	*0.0003%*
Sunflower	*0.22*	*0.0002%*
Sod/Grass Seed	*0.22*	*0.0002%*
Cherries	*0.22*	*0.0002%*
Garlic	*0.22*	*0.0002%*
Plums	*0.22*	*0.0002%*
Dbl. Crop Oats/Corn	*0.22*	*0.0002%*
Lettuce	*0.22*	*0.0002%*
Soybeans	**5,097.51**	**3.6%**
Shrub/Fallow/Idle Lands Combined	**4,808.18**	**3.4%**
Shrubland	*3,891.24*	*2.8%*
Fallow/Idle Cropland	*916.93*	*0.6%*
Winter Wheat	**4,056.48**	**2.9%**
Barren	**209.72**	**0.1%**

The 2001 National Land Cover Dataset is available through the USGS at
http://seamless.usgs.gov/data_availability.php?serviceid=Dataset_13

Homer, C. C. Huang, L. Yang, B. Wylie and M. Coan. 2004. Development of a 2001 National Landcover Database for the United States. Photogrammetric Engineering and Remote Sensing, Vol. 70, No. 7, July 2004, pp. 829-840.

2001 NLCD Categories:[104]

11 – Open Water: All areas of open water, generally with less than 25% cover of vegetation or soil.

21 – Developed, Open Space: Includes areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20 percent of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes

22 – Developed, Low Intensity: Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20-49 percent of total cover. These areas most commonly include single-family housing units.

23 – Developed, Medium Intensity: Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50-79 percent of the total cover. These areas most commonly include single-family housing units.

24 – Developed, High Intensity: Includes highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80 to100 percent of the total cover.

31 – Barren Land (Rock/Sand/Clay): Barren areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.

41 – Deciduous Forest: Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75 percent of the tree species shed foliage simultaneously in response to seasonal change.

42 – Evergreen Forest: Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75 percent of the tree species maintain their leaves all year. Canopy is never without green foliage.

43 – Mixed Forest: Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. Neither deciduous nor evergreen species are greater than 75 percent of total tree cover.

52 – Shrub/Scrub: Areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage or trees stunted from environmental conditions.

71 – Grassland/Herbaceous: Areas dominated by grammanoid or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.

81 – Pasture/Hay: Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20 percent of total vegetation.

82 – Cultivated Crops: Areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20 percent of total vegetation. This class also includes all land being actively tilled.

90 – Woody Wetlands: Areas where forest or shrubland vegetation accounts for greater than 20 percent of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

95 – Emergent Herbaceous Wetlands: Areas where perennial herbaceous vegetation accounts for greater than 80 percent of vegetative cover and the soil or substrate is periodically saturated with or covered with water

2006 NLCD Land Cover – Subwatersheds of Oatka Creek Watershed

	Headwaters		Pearl Creek		White Creek		Mud Creek		Village of LeRoy		Outlet	
NLCD Category	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**
11 - Open Water	33.58	0.1%	50.93	0.1%	12.23	0.0%	75.61	0.7%	63.38	0.3%	27.13	0.1%
21 - Developed, Open Space	915.82	3.7%	1,481.59	4.1%	1,244.97	4.9%	552.43	5.3%	902.92	4.9%	1,135.77	5.1%
22 - Developed, Low Intensity	135.44	0.5%	374.96	1.0%	305.79	1.2%	179.03	1.7%	703.66	3.8%	495.72	2.2%
23 - Developed, Medium Intensity	22.02	0.1%	89.40	0.2%	56.71	0.2%	38.92	0.4%	213.50	1.2%	133.44	0.6%
24 - Developed, High Intensity	0.89	0.0%	16.68	0.0%	5.12	0.0%	14.23	0.1%	70.28	0.4%	23.57	0.1%
31 - Barren Land	16.90	0.1%	23.57	0.1%	0.00	0.0%	358.95	3.4%	80.73	0.4%	41.37	0.2%
41 - Deciduous Forest	6,576.44	26.4%	6,854.21	18.9%	3,411.09	13.4%	1,459.35	14.0%	2,401.42	13.0%	2,632.27	11.7%
42 - Evergreen Forest	594.68	2.4%	91.63	0.3%	39.14	0.2%	18.24	0.2%	21.35	0.1%	54.71	0.2%
43 - Mixed Forest	1,735.35	7.0%	885.35	2.4%	760.59	3.0%	178.81	1.7%	374.51	2.0%	800.40	3.6%
52 - Shrub/Scrub	1,155.34	4.6%	1,858.33	5.1%	629.82	2.5%	523.52	5.0%	715.89	3.9%	781.27	3.5%
71 - Grass/Herbaceous	56.04	0.2%	123.21	0.3%	57.16	0.2%	54.93	0.5%	79.17	0.4%	109.42	0.5%
81 - Pasture Hay	7,435.10	29.8%	13,039.45	35.9%	9,376.83	36.9%	2,138.55	20.5%	5,593.23	30.3%	5,853.65	26.1%
82 - Cultivated Crops	5,595.68	22.4%	10,432.32	28.7%	8,057.37	31.7%	4,175.24	40.0%	6,060.48	32.8%	8,722.33	38.9%
90 - Woody Wetlands	623.82	2.5%	930.28	2.6%	1,329.25	5.2%	648.50	6.2%	1,122.65	6.1%	1,566.99	7.0%
95 - Emergent Herbaceous Wetlands	48.26	0.2%	56.71	0.2%	149.23	0.6%	26.46	0.3%	59.38	0.3%	67.61	0.3%
Total	24,945.36		36,308.63		25,435.30		10,442.77		18,462.55		22,445.64	

2006 NLCD Land Cover – 300' Riparian Buffer Analysis within Subwatersheds of Oatka Creek Watershed

	Headwaters		Pearl Creek		White Creek		Mud Creek		Village of LeRoy		Outlet	
NLCD Category	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**
11 - Open Water	20.0	0.5%	23.1	0.4%	10.0	0.3%	35.4	2.6%	44.3	2.9%	14.2	0.7%
21 - Developed, Open Space	173.2	4.3%	185.9	2.9%	135.4	4.2%	57.2	4.2%	74.1	4.9%	55.2	2.8%
22 - Developed, Low Intensity	28.7	0.7%	52.3	0.8%	30.9	1.0%	8.7	0.6%	50.9	3.4%	21.6	1.1%
23 - Developed, Medium Intensity	8.7	0.2%	16.2	0.3%	10.2	0.3%	1.1	0.1%	17.3	1.1%	5.6	0.3%
24 - Developed, High Intensity	0.2	0.0%	1.1	0.0%	1.8	0.1%		0.0%	2.2	0.1%	1.6	0.1%
31 - Barren Land	3.1	0.1%	8.5	0.1%		0.0%	0.2	0.0%		0.0%	0.2	0.0%
41 - Deciduous Forest	1,224.1	30.3%	1,793.6	28.3%	592.7	18.5%	209.9	15.3%	168.4	11.1%	258.9	13.2%
42 - Evergreen Forest	114.3	2.8%	9.8	0.2%	5.1	0.2%	1.1	0.1%	7.8	0.5%	10.5	0.5%
43 - Mixed Forest	374.1	9.3%	251.8	4.0%	247.7	7.7%	51.8	3.8%	103.0	6.8%	268.9	13.7%
52 - Shrub/Scrub	235.7	5.8%	297.3	4.7%	107.4	3.4%	87.8	6.4%	71.2	4.7%	59.2	3.0%
71 - Grass/Herbaceous	4.4	0.1%	16.0	0.3%	5.1	0.2%	6.2	0.5%	1.1	0.1%	8.9	0.5%
81 - Pasture Hay	1,047.9	26.0%	1,907.9	30.1%	971.6	30.4%	311.1	22.7%	295.1	19.5%	301.1	15.4%
82 - Cultivated Crops	515.3	12.8%	1,466.0	23.1%	490.4	15.3%	346.7	25.3%	324.5	21.5%	430.8	22.0%
90 - Woody Wetlands	260.2	6.4%	299.1	4.7%	518.8	16.2%	250.2	18.3%	326.9	21.6%	499.3	25.5%
95 - Emergent Herbaceous Wetlands	24.2	0.6%	16.5	0.3%	71.6	2.2%	1.3	0.1%	24.5	1.6%	24.5	1.2%
Total	4,034.2		6,345.1		3,198.9		1,368.8		1,511.2		1,960.2	

Data notes

[104] NLCD Class Definitions. [Online] In Multi-Resolution Land Characteristics Consortium. Retrieved 12/13/10 from http://www.mrlc.gov/nlcd_definitions.php

2007 Census of Agriculture

Refer to
http://www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_2_County_Level/New_York/st36_2_008_008.pdf

		Genesee	Livingston	Monroe	Orleans	Wyoming
2007 size of farm:						
1 to 9 acres	Farms	40	47	78	52	50
	Acres	214	227	384	235	214
10 to 49 acres	Farms	159	206	243	159	185
	Acres	4,061	5,865	6,233	4,560	4,985
50 to 69 acres	Farms	69	74	46	70	58
	Acres	4,029	4,208	2,676	4,037	3,354
70 to 99 acres	Farms	60	96	45	48	72
	Acres	5,049	8,095	3,646	4,109	6,082
100 to 139 acres	Farms	38	66	54	44	92
	Acres	4,611	7,593	6,263	5,037	10,563
140 to 179 acres	Farms	21	47	13	32	54
	Acres	3,360	7,524	2,031	5,092	8,649
180 to 219 acres	Farms	30	46	8	36	26
	Acres	5,876	9,110	1,566	7,202	5,180
220 to 259 acres	Farms	12	31	10	18	21
	Acres	2,876	7,210	2,306	4,337	5,107
260 to 499 acres	Farms	53	77	22	47	97
	Acres	18,453	27,711	7,820	16,245	34,639
500 to 999 acres	Farms	28	45	30	18	61
	Acres	20,430	32,361	20,475	13,464	41,865
1,000 to 1,999 acres	Farms	26	34	17	18	29
	Acres	34,350	44,843	23,189	22,698	39,038
2,000 acres or more	Farms	15	23	19	12	16
	Acres	80,230	67,668	56,452	52,748	58,352
2002 size of farm:						
1 to 9 acres	Farms	41	42	98	29	41
	Acres	217	207	469	148	199
10 to 49 acres	Farms	185	218	278	142	177
	Acres	4,542	6,543	6,610	4,184	4,678
50 to 69 acres	Farms	46	86	64	79	62
	Acres	2,638	4,923	3,709	4,561	3,514
70 to 99 acres	Farms	56	75	36	48	53
	Acres	4,829	6,279	3,029	3,927	4,459
100 to 139 acres	Farms	44	101	39	43	78
	Acres	5,136	11,573	4,610	4,923	8,993
140 to 179 acres	Farms	27	38	13	22	50
	Acres	4,262	5,909	2,051	3,434	7,920
180 to 219 acres	Farms	32	40	11	29	36
	Acres	6,373	7,700	2,169	5,785	7,050
220 to 259 acres	Farms	15	20	4	17	41
	Acres	3,640	4,743	925	4,014	9,612
260 to 499 acres	Farms	61	78	28	41	134
	Acres	21,338	28,294	10,923	14,813	45,978
500 to 999 acres	Farms	36	51	34	28	57
	Acres	25,007	35,066	24,490	20,245	38,428
1,000 to 1,999 acres	Farms	25	30	21	14	24
	Acres	33,725	41,982	30,818	18,116	33,197
2,000 acres or more	Farms	12	22	5	12	14
	Acres	65,663	56,277	16,758	48,797	51,289

Dowling, Carolyn Magdalyn Renz, Andrew Hunt and Robert Poreda. *The Geochemistry of Oatka Creek, New York State*. Department of Earth and Environmental Sciences University of Rochester. 2001.

Genesee/Finger Lakes Regional Planning Council. *Genesee River Basin Action Strategy*. 2004.

Genesee/Finger Lakes Regional Planning Council, LU Engineers. *Controlling Sediment in the Black and Oatka Creek Watersheds, Task II: Identification and Analysis of the Riparian Corridor in the Black and Oatka Creek Watersheds*. 2005.

Genesee/Finger Lakes Regional Planning Council. *Controlling Sediment in the Black and Oatka Creek Watersheds, Task III: Municipal Law Review and Analysis*. 2006.

Makarewicz, Joseph C. and Theodore W. Lewis. *Segment Analysis of Oatka Creek: The Location of Sources of Pollution, Wyoming and Genesee Counties*. Dept. of Environmental Science and Biology: SUNY College at Brockport, 2004.

New York State Department of Environmental Conservation. *Genesee County Stressed Segment Analysis*. 1981.

New York State Department of Environmental Conservation. Division of Water. *The 1996 Priority Waterbodies List for the Genesee River Basin*. 1996.

New York State Department of Environmental Conservation. Division of Water. *The 2001 Genesee River Basin Waterbody Inventory and Priority Waterbodies List*. 2003.

New York State Department of Environmental Conservation. Division of Water. Bureau of Water Assessment and Management. *Rotating Integrated Basin Studies Water Quality Assessment Program – The Genesee River Drainage Basin, Sampling Years 1999 – 2000*. 2004.

Sutton, W. *Biological Monitoring of Oatka Creek in Upstate NY*. (in cooperation with the DEC) 1995.

Sutton, W. *Biological Stream Assessment of Spring Creek*. (in cooperation with the DEC) 1995.

Sutton, W. *A 1997 Five Year Follow-up Biological Monitoring Assessment of Oatka and Spring Creeks in Upstate NY*. (in cooperation with the DEC) 1999.

Sutton, W. *A 1997 Five Year Follow up Biological Monitoring Assessment of Oatka and Spring Creeks in Upstate New York*. (in cooperation with the DEC) 1999.

Sutton, W. *A 2002 Ten Year Follow-up Biological Monitoring Assessment of Oatka and Spring Creeks in Upstate New York*. (in cooperation with the DEC) 2002.

Tatakis, T. *Watershed Evaluation and Management for Lakes LeRoy and LaGrange*. 1990.

Tatakis, Timothy A. *The Oatka Creek Watershed State of the Basin Report*. Department of Biology: Monroe Community College, 2002.

REGULATORY AND PROGRAMMATIC ENVIRONMENT REPORT

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1.0 Introduction

1.1 Introduction

The *Oatka Creek Regulatory and Programmatic Environment Report* is the third component of the comprehensive *Oatka Creek Watershed Management Plan*. This includes:

- Evaluation of government and non-government roles:
  - Descriptions of local, county, regional, state, and federal organizations that have an impact on water quality in the watershed
- Analysis of local laws, plans, programs, and practices affecting the watershed:
  - Assessment of local laws, plans, programs, and practices based on water quality best management practices (BMPs);
  - Recommendations for priority additions or changes to local laws, plans, programs, and practices.

In addition to the *Regulatory and Programmatic Environment Report*, additional project components together comprise the overall strategy to protect and restore water quality within the Oatka Creek Watershed. These include:

- A characterization of the watershed and its constituent subwatersheds, land use and land cover, demographics, natural resources, and infrastructure;
- An evaluation of existing water quality data, run-off characteristics, and pollutant loadings;
- A community education and outreach program on water quality and watershed protection issues;
- Identification of management strategies and prioritization of projects and other actions for watershed protection and restoration; and
- An implementation strategy, including the identification of watershed-wide and site-specific projects and other actions necessary to protect and restore water quality.

Portions of this report are based on existing reports and studies such as *Controlling Sediment in the Black and Oatka Creek Watersheds*[1] and *Protecting Water Resources through Local Controls and Practices*.[2]

SECTION 1.0 ENDNOTES

[1] Genesee/Finger Lakes Regional Planning Council. *Controlling Sediment in the Black and Oatka Creek Watersheds,* 2006. http://www.gflrpc.org/Publications/ControllingSediment/Assessment/FinalReport.pdf

[2] Genesee/Finger Lakes Regional Planning Council. *Protecting Water Resources through Local Controls and Practices: An Assessment Manual for New York Municipalities*, 2006. http://www.gflrpc.org/Publications/LocalLaws/Manual/Protecting_Water_Resources.pdf

2.0 Roles and Responsibilities of Governmental and Non-Governmental Agencies

This section provides an overview of various groups – both governmental and non-governmental at the local, county, regional, state, and federal level – that have an effect on water quality in the watershed. This includes descriptions of organizational roles and responsibilities as well as information on some of their major programs.

Information was gathered from a variety of sources including agency websites and the *Protecting Water Resources through Local Controls and Practices*[3] report. Additional information was obtained from a draft of the *Healthy Niagara: Niagara River Watershed Plan, Watershed Organizations and Agencies involved in Watershed Planning & Protection*.[4] Information pertaining to agency roles and responsibilities was excerpted from the *Characterization* report in order to produce a comprehensive review of agencies for this report.

2.1 Federal Government Agencies

2.1.1 US Army Corps of Engineers (USACE)[5]

The US Army Corps of Engineers plays a significant role in planning and building water resource improvements. The USACE stated vision is to "Provide vital public engineering services in peace and war to strengthen our Nation's security, energize the economy, and reduce risks from disasters." USACE regulates construction and other work in navigable waterways under Section 10 of the Rivers and Harbors Act of 1899, and has authority over the discharge of dredged or fill material into the "waters of the United States" (a term which includes wetlands and all other aquatic areas) under Section 404 of the Federal Water Pollution Control Act Amendments of 1972 (PL 92500, the "Clean Water Act"). Under these laws, those who seek to carry out such work must first receive a permit from the Corps. Other significant areas regarding the Corps' role in planning and building water resource improvements include recreation, emergency response and recovery, flood control and floodplain management, navigation, erosion and shore protection, hydrologic modeling, hydropower and water supply management.

2.1.2 US Geologic Survey (USGS)[6]

A division of the US Department of the Interior, the USGS focuses on research in the natural sciences with emphasis on subjects such as climate and land use change, core science systems, ecosystems, energy, minerals and environmental health, natural hazards, science quality and integrity and water.

2.1.3 Federal Emergency Management Agency (FEMA)[7]

A division of the US Department of Homeland Security, FEMA's mission is to support citizens and first responders to build, sustain, and improve capability to prepare for, protect against, respond to, recover from, and mitigate all hazards. Responsibilities include floodplain management, flood hazard mapping, and administration of the National Flood Insurance Program.

2.1.4 Environmental Protection Agency (EPA)

The EPA's primary mission is to protect human health and the environment. EPA's FY 2011-2015 Strategic Plan identifies five strategic goals to guide the Agency's work:

- Taking Action on Climate Change and Improving Air Quality;

- Protecting America's Waters;
- Cleaning Up Communities and Advancing Sustainable Development;
- Ensuring the Safety of Chemicals and Preventing Pollution; and
- Enforcing Environmental Laws.

The EPA enforces the Clean Water Act, the Safe Drinking Water Act, and a number of other important environmental regulations.[8] The Clean Water Act requires states to classify waters according to their best uses and to adopt water quality standards that support those uses. Section 404 of the Clean Water Act requires that anyone interested in depositing dredged or fill material into waters of the United States, including wetlands, must receive authorization for such activities. The US Army Corps of Engineers (USACE) has been assigned responsibility for administering the Section 404 permitting process.

The Safe Drinking Water Act protects public health by regulating the nation's public drinking water supply. The law requires many actions that help protect public health and drinking water, including rivers, lakes, reservoirs, springs, groundwater wells, and other sources.

While the EPA is the primary federal body enforcing regulations such as the Endangered Species Act, the Clean Air Act, and the Clean Water Act, enforcement of these regulations is generally delegated to the New York State Department of Environmental Conservation. The EPA provides significant sources of funding to be used by the responsible state agencies for enforcement and implementation of federal laws and regulations.[9]

2.1.4.1 National Pollutant Discharge Elimination Systems Permit (NPDES)

Under the Clean Water Act, the National Pollutant Discharge Elimination System permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. In New York State, this program is administered by the NYSDEC and is referred to as the State Pollutant Discharge Elimination System (SPDES). The US EPA, in conjunction with state and local authorities, monitors pollution levels in the nation's water and provide status and trend information on compliance and other issues.

2.1.4.2 EPA Regulated Facilities

To improve public health and the environment, the EPA collects information about facilities or sites subject to environmental regulation.[10] For a list of facilities in the watershed, see Section 4.8.3 of the *Oatka Creek Watershed Characterization Report*.[11]

2.1.5 USDA Natural Resources Conservation Service (NRCS)[12]

A division of the US Department of Agriculture, the NRCS works with landowners through conservation planning and assistance designed to benefit the soil, water, air, plants, and animals that result in productive lands and healthy ecosystems. Services include technical assistance to farmers regarding water quality and erosion control issues, preparation of Comprehensive Nutrient Management Plans, Agricultural Conservation Plans, the Conservation Reserve Program, and the Wetlands Reserve Program.

The Resource Conservation and Development (RC&D) program is one that helps communities improve their economies through the wise use of natural resources. The purpose of the RC&D program is to improve the capability of state, tribal and local units of government and local nonprofit organizations in rural areas to plan, develop and carry out programs for resource conservation and development. The NRCS provides administrative support for the RC&D program including office space and staff.[13]

2.1.6 US Fish and Wildlife Service[14]

The US Fish and Wildlife Service is a bureau within the Department of the Interior. Its mission is working with others to conserve, protect and enhance fish, wildlife and plants and their habitats for the continuing benefit of the American people. Among its key functions, the Service enforces Federal wildlife laws, protects endangered species, manages migratory birds, restores nationally significant fisheries, and conserves and restores wildlife habitat such as wetlands.

2.1.7 Great Lakes Commission[15]

The Great Lakes Commission is a public agency established by the Great Lakes Basin Compact in 1955 to help its Member states and provinces speak with a unified voice and collectively fulfill their vision for a healthy, vibrant Great Lakes - St. Lawrence River region. The Commission houses a wide variety of action-oriented programs intended to address specific concerns related to regional coordination and management of natural resources.

2.2 New York State Agencies

2.2.1 NYS Department of State, Office of Planning & Development[16]

NYSDOS Office of Planning & Development helps protect and enhance coastal and inland water resources and encourage appropriate land use. The Office also works in partnership with local governments in preparation of Local Waterfront Revitalization Programs (LWRP), which serve as comprehensive land and water use plans, as well as intermunicipal watershed management plans which identify problems, threats and opportunities for achieving long lasting improvements in water quality as well as establishing priorities for action. Financial assistance for the preparation and implementation of such programs and plans is available through the Environmental Protection Fund (EPF).[17]

This Oatka Creek Watershed Management Plan is being developed for the New York State Department of State Office of Planning & Development with funds provided under Title 11 of the Environmental Protection Act Local Waterfront Revitalization Program.

Additional DOS functions include implementing the State's Waterfront Revitalization of Coastal Areas and Inland Waterways Act, planning and technical assistance for redevelopment of brownfields, abandoned buildings and deteriorated urban waterfronts, protecting water quality through intermunicipal watershed planning, as well as investing in improvements to waterfront areas through state and federal grant programs.

2.2.2 NYS Department of Environmental Conservation (NYSDEC)[18]

NYSDEC exists to "conserve, improve, and protect New York State's natural resources and environment, and control water, land and air pollution, in order to enhance the health, safety and welfare of the people of the state and their overall economic and social well-being."[19] The NYSDEC plays a major role in a diverse array of watershed planning and management issues, including regulatory, chemical and pollution control, dam safety, management of public lands and waters, wetlands protection, mining and reclamation, and the protection and management of animals, plants, aquatic life and associated habitats. NYSDEC has numerous departments and programs, some of which are described below.

2.2.2.1 NYSDEC Division of Environmental Permits

The Division of Environmental Permits manages UPA (Uniform Procedures Act) permits, intended to protect air, water, mineral and biological resources. The Division also oversees implementation of the State Environmental Quality Review Act (SEQR), and assists other agencies with SEQR requirements.[20] Agencies proposing projects that require SEQR must identify and mitigate any significant environmental impacts of the project or activity proposed.[21]

2.2.2.2 NYSDEC Division of Water[22]

DEC's Division of Water protects and conserves the water resources of New York State through a wide range of programs and activities. Water quality standards contain the classification system for New York State surface and ground waters. The standards and guidance values for surface water and groundwater quality and groundwater effluent limitations are included in these regulations, including the State Pollution Discharge Elimination System (SPDES).

2.2.2.3 NYSDEC Protection of Waters Program

The Protection of Waters program was developed by NYSDEC to create and enforce regulations to protect lakes rivers streams and ponds from undesirable activities, and is an implementation strategy of the Article 15 of the NYS Environmental Conservation Law.

The Protection of Waters Regulatory Program regulates five different categories of activities:

- Disturbance of bed or banks of a protected stream or other watercourse.
- Construction, reconstruction or repair of dams and other impoundment structures.
- Construction, reconstruction or expansion of docking and mooring facilities.
- Excavation or placement of fill in navigable waters and their adjacent and contiguous wetlands.
- Water quality certification for placing fill or undertaking activities resulting in a discharge of waters of the United States.

A class is given to each waterway or segment based on its best use. The level of protection often relates to this classification. Classifications include:

- AA or A – Source of drinking water
- B – swimming/recreation but not drinking water
- C – fisheries and non-contact activities
- D – lowest classification

2.2.2.4 NYSDEC Freshwater Wetlands

The DEC has classified regulated freshwater wetlands according to their respective function, values and benefits. Wetlands may be Class I, II, III or IV. Class I wetlands are the most valuable and are subject to the most stringent standards. A wetland must be 12.4 acres or larger for protection under the Freshwater Wetlands Act. Smaller wetlands may be protected when the NYSDEC Commissioner determines they have unusual local importance in providing one or more wetland functions. The wetland buffer zone, an adjacent area that extends 100 feet from the wetland boundary, may also be regulated.

2.2.2.5 NYSDEC Priority Waterbodies List (PWL)

The Priority Waterbodies List is required by Section 303(d) of the federal Clean Water Act and is a section of the 305(b) Water Quality Report written by NYSDEC and provided to the United States Environmental Protection Agency (USEPA). The PWL identifies waters that have one or more uses that are not fully supported or are threatened by conditions or practices that could lead to declining water quality. The PWL is used as a basis for water program management.

The existing NYSDEC Routine Statewide Monitoring and Assessment Program includes Rotating Integrated Basin Studies (RIBS) of rivers and streams, Lake Classification and Inventory (LCI), and groundwater sampling program. Recommend restoration of the five-year cycle for NYSDEC's Routine Statewide Monitoring and Assessment Programs and updated Waterbody Inventory and Priority Waterbody Lists (WI/PWL). The most recent Genesee River Basin Waterbody Inventory/Priority Waterbodies List Report was issued in March 2003.

2.2.2.6 NYSDEC Division of Fish, Wildlife and Marine Resources[23]

DEC's Division of Fish, Wildlife and Marine Resources is made up of the Bureau of Fisheries, Bureau of Habitat, Bureau of Marine Resources, Bureau of Wildlife, and Bureau of Fish & Wildlife Services. Some of their responsibilities include providing information to the public about hunting and fishing, and issuing licenses.

2.2.2.7 NYSDEC Division of Lands and Forests

This DEC Division manages more than four million acres of state owned land and conservation easements including all State Forests as well as the Adirondack and Catskill Forest Preserves. The Division also administers the Saratoga Tree Nursery and programs for forest health, urban and community forestry, forest products use, and provides assistance to private forest land owners.[24]

2.2.2.8 NYSDEC Spill Incidents Database[25]

The NYSDEC maintains a database of chemical and petroleum spills that have been reported to the Department since 1978.

2.2.2.9 NYSDEC Hazardous Waste Sites

The NYSDEC Division of Environmental Remediation maintains a database of sites being addressed under one of the Division's remedial programs – State Superfund, Brownfield Cleanup, Environmental Restoration and Voluntary Cleanup. This database also includes the Registry of Inactive Hazardous Waste Disposal Sites and information on Institutional and Engineering Controls in New York State. For more information, see section 3.8.4 of the *Oatka Creek Watershed Characterization Report*.[26]

2.2.2.10 State Pollution Discharge Elimination System (SPDES)[27]

SPDES is New York State's version of the National Pollutant Discharge Elimination System (NPDES) permit program. The goal is to limit pollution of lakes, streams and rivers by runoff from construction sites and developed areas using a SPDES permit (State Pollutant Discharge Elimination System). SPDES has been approved by the US EPA for the control of wastewater and stormwater discharges in accordance with the Clean Water Act. SPDES goes further than

what's required by the Clean Water Act as it controls point source discharges to groundwater as well as surface waters. A list of permitted SPDES discharge points that are present in the watershed are provided in Table 4.21 of the *Oatka Creek Watershed Characterization Report*.[28]

SPDES General Construction Permit

The state has issued two non-industrial Stormwater Management General Permits under SPDES: one for construction site operators and one for regulated localities. The NYS General Permit for Construction Activities is required for any construction activity that will disturb land one acre or more in size.[29] Before commencing construction activity, the owner or operator of a construction project that will involve soil disturbance of one or more acres must obtain coverage under the Permit for Stormwater Discharges from Construction Activity. The permit is intended to reduce impacts to area waterbodies from sediment runoff. This is achieved in part through the development of a Stormwater Pollution Prevention Plan (SWPPP) as well as strict compliance and enforcement standards.

For information on General Permits issued in the watershed between 2003 and 2010, see Section 4.8.2 of the *Oatka Creek Watershed Characterization Report*.[30]

Concentrated Animal Feeding Operations (CAFOs)

The general trend occurring in United States agriculture over the past half century has been a reduction in small, family-operated farms and consolidation into larger, more centralized operations. The Concentrated Animal Feeding Operation (CAFO) is a direct reflection of that trend and represents an economy of scale in agricultural commodity production. CAFOs are defined as lots or facilities where animals are stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period; they are categorized as either "large" or "medium" sized operations based on the numbers of animals confined.[31] CAFOs that discharge to waters of New York State are regulated by the NYSDEC under the authority of the Clean Water Act through the New York State Pollution Discharge Elimination System (SPDES).[32]

See Section 4.73 of the *Oatka Creek Watershed Characterization Report Characterization*[33] for a list of medium and large CAFOs located in or near the watershed.

2.2.3 NYS Department of Health (NYSDOH)[34]

NYSDOH tracks environmental health data and trends; oversees the delivery of drinking water in coordination with the EPA, addresses pathogens and other sources of contamination in public sources of drinking water; coordinates emergency preparedness and response for water systems; and provides financing mechanisms to help protect and expand public water systems.

2.2.4 NYS Department of Agriculture & Markets – Agricultural Environmental Management (AEM)[35]

Agricultural Environmental Management (AEM) is an incentive-based, voluntary program, that helps farmers make cost-effective and science-based decisions to meet business objectives, and protect and conserve natural resources. The program partners Farmers and local AEM resource professionals to work together to develop AEM plans.[36] AEM techniques include educating farmers on different agricultural best management practices, their effect on the environment and implementation strategies. Assistance is also given to farmers to help understand regulations (such as CAFO regulations) and stay in compliance.[37]

The SWCDs coordinate the AEM program in the watershed, based on county AEM strategic plans which are updated every five years.

2.2.5 NYS Office of Emergency Management (NYSOEM)[38]

NYSOEM is responsible for coordinating State agencies to protect communities, the economy, and the environment from disasters and emergencies. OEM provides technical assistance to communities to prepare for hazard events and prevent/reduce the impacts of disasters through its programs such as: hazard identification, loss prevention, planning, training, operational response to emergencies, technical support, and disaster recovery assistance. OEM also partners with the Federal Emergency Management Agency (FEMA) to administer a number of hazard planning, mitigation, and recovery grants.

2.2.6 NYS Department of Transportation (NYSDOT)[39]

NYSDOT is responsible for transportation policy and implementation in New York State, coordinating and assisting in the development and operation of transportation facilities and services for highways, railroads, mass transit systems, ports, waterways, and airports through efforts at 11 regional offices covering the state.

2.2.7 NYS Energy Research and Development Authority (NYSERDA)[40]

NYSERDA is a public benefit corporation responsible for reducing statewide energy consumption, promoting the use of renewable energy sources, and protecting the environment. NYSERDA's programs and services provide a vehicle for the State to work collaboratively with businesses, academic institutions, industry, the federal government, environmental community, public interest groups, energy buyers, and utilities. Through these collaborations, NYSERDA seeks to develop a diversified energy supply portfolio, improve market mechanisms, and facilitate the introduction and adoption of advanced energy technologies, particularly renewables, to plan for and respond to uncertainties in the energy markets.

2.3 Regional Agencies

2.3.1 Oatka Creek Watershed Committee[41]

The Oatka Creek Watershed Committee is a not-for-profit organization whose mission in part is to "facilitate the development of a watershed management plan for use by municipalities, stakeholders and individuals for the conservation and protection of the Oatka Creek watershed." [42] The Committee was formed in 1998 with the support and direction of the Rochester Area Community Foundation (RACF), and was established as a stand-alone organization consisting of a wide variety of stakeholders and agency members. It was incorporated in January of 2002, and remains an active participant in planning efforts for the watershed. In addition, the OCWC website is used as a repository for information related to watershed planning activities taking place in and around the watershed, serving as an important tool for information dissemination and tracking progress.

2.3.2 Finger Lakes/Lake Ontario Watershed Protection Alliance (FL-LOWPA)

FL-LOWPA is comprised of county representatives from multiple disciplines and agencies, including Soil and Water Conservation Districts, Planning and Health Departments, and Water Quality Management Agencies. Governed by a Water Resources Board made up of appointees from its member counties, FL-LOWPA's purpose is to protect and enhance water resources by promoting the sharing of information, data, ideas, and resources pertaining to the management of watersheds in New York's Lake Ontario Basin;

fostering dynamic and collaborative watershed management programs and partnerships; and emphasizing a holistic, ecosystem-based approach to water quality improvement and protection.[43]

A major tenet of FL-LOWPA is grassroots programming. Water quality problems are defined and solutions are developed and implemented at the local level. Through participation in the Alliance, member counties develop a more regional perspective that informs local programming and encourages cooperation.

2.3.3 Genesee/Finger Lakes Regional Planning Council (G/FLRPC)

Regional Planning Councils are established pursuant to New York State General Municipal Law to address regional issues and assist with local planning efforts. The Genesee/Finger Lakes Regional Planning Council supports watershed planning in the Oatka Creek watershed directly through the acquisition of funding sources for specific projects as well as indirectly through its ongoing land use and water resources planning projects that are active across its nine-county region. These programs encompass a variety of services which advance the overall goal of protecting and improving water quality and quantity. As a regional agency, G/FLRPC is able to effectively examine and coordinate water resource issues at a watershed scale.

2.3.4 Genesee/Transportation Council (GTC)

Genesee Transportation Council is the designated Metropolitan Planning Organization (MPO) responsible for transportation policy, planning, and investment decision making in the Genesee-Finger Lakes Region. The U.S. Department of Transportation (USDOT) requires every metropolitan area with a population of over 50,000 to have a designated MPO to qualify for the receipt of federal highway and transit funds. These highway funds can be a significant share of funding for transportation improvement projects in the watershed, such as road and bridge maintenance or construction. All GTC activities are responsive to mandates and guidelines including, but not limited to, the Americans with Disabilities Act, Clean Air Act Amendments of 1990, Title VI of the Civil Rights Act of 1964, and environmental justice considerations.

2.3.5 The Nature Conservancy (TNC)[44]

The TNC's mission is to preserve the plants, animals and natural communities that represent the diversity of life by protecting the lands and waters they need to survive. Their Central & Western New York Chapter works in eight priority conservation landscapes. They have protected nearly 100,000 acres of landscapes throughout Central and Western New York.[45]

2.3.6 Western New York Land Conservancy (WNYLC)[46]

The Western New York Land Conservancy is a non-profit land trust devoted to long term conservation of important natural lands including farms, scenic areas and habitats. WNYLC has protected over 4,300 acres of land in their eight county target area.

2.3.7 Center for Environmental Information (CEI)[47]

The Center for Environmental Initiatives is a non-profit organization that works for environmental protection and enhanced quality of life. CEI educates and builds partnerships with stakeholders, and works to identify environmental issues, and develop potential solutions through projects and initiatives.

2.3.8 Academic Institutions

Regional academic institutions have played an important role in watershed planning and management in the watershed. Independent research conducted by environmental science, geology, biology and other similar departments at regional colleges and universities has significantly advanced the knowledge base within the watershed. SUNY Brockport, SUNY Geneseo, Genesee Community College, Buffalo State College, the State University at Buffalo, Rochester Institute of Technology, University of Rochester, and Cornell University have each focused research effort and expertise specifically on the Oatka Creek watershed over time. Academic institutions will continue to be important watershed stakeholders playing a vital role in information gathering and analysis.

2.3.8.1 State University of New York at Brockport

SUNY Brockport is very active in the watershed, conducting various water quality and quantity monitoring studies in support of a variety of short- and long-term projects and programs. Among them are Dale Pettenski's *Oatka Creek Water Quality Assessment: Identifying Point and Nonpoint Sources of Pollution with Application of the SWAT Model*[48] and the *Oatka Creek Watershed State of the Basin Report*, produced by an interdisciplinary team in 2002.

2.3.8.2 Cornell Cooperative Extension[49]

Cornell Cooperative Extension (CCE) extends Cornell's land-grant programs to every county in the state. They seek to conserve and ensure the quality of water supplies, promote environmental stewardship and community, agricultural and residential environmental enhancement, and enhance science education. CCE can be an important collaborator with water quality research, education and outreach.

2.3.8.3 NYS Water Resources Institute at Cornell University[50]

The New York State legislature established the New York State Water Resources Institute at Cornell University in 1987 to address critical problems of water resource quality and management. The WRI's mission is to connect the water research and water management communities. They undertake specific projects in support of state agencies, particularly the development of assessment methodologies and criteria for guidance or standards for use in management and regulatory programs, including technical and scientific consultation with and briefings for state agencies concerned with water resources management and regulatory affairs. The WRI Water Infrastructure Annotated Reference List is attached as Appendix B.

2.4 County Governments

County governments have a large stake in the management of watershed resources. Protecting the public's health and safety through flood and hazard management and the maintenance or monitoring of regional water quality are important responsibilities that a number of county departments and divisions share. Flood monitoring and control also has direct implications for the protection of public infrastructure, such as roads, bridges and other forms of public property which may cross or lie within a floodway.

2.4.1 County Health Departments

County Health Departments manage and regulate county sanitary codes and are responsible for on-site wastewater treatment systems. Sanitary codes vary by county, thus some have more strict regulation, inspection and enforcement than others.

2.4.2 County Water Quality Coordinating Committees (WQCC)

WQCCs identify water quality problems, identify funding opportunities, and create and implement programs to reduce nonpoint source water pollution and improve water quality and water resources. The committees are made up of county and municipal representatives as well as agencies and organizations related to water quality.

2.4.3 Stormwater Coalition of Monroe County[51]

Since 2000, stormwater management efforts in Monroe County associated with state and federal stormwater regulations have been administered cooperatively by the Stormwater Coalition of Monroe County. The Coalition consists of 29 municipal entities throughout Monroe County. The Coalition implements a wide range of projects and programs that reduce stormwater pollution including public education, training for municipal employees, and assistance with stormwater system mapping.

2.4.4 County Soil and Water Conservation Districts (SWCDs)

Soil and Water Conservation Districts (SWCDs) within each county play a critical role in the management of natural resources and agricultural activities in the watershed. SWCD activities are guided through the leadership of the New York State Soil and Water Conservation Committee which works closely with the New York State Department of Agriculture & Markets. The mission of the New York State Soil and Water Conservation Committee is to develop and oversee implementation of an effective soil and water conservation and agricultural nonpoint source water quality program for the State of New York that is implemented primarily through county Soil and Water Conservation Districts.[52]

The County SWCDs implement a number of local conservation and agricultural nonpoint source pollution control programs. One of these is the Agricultural Environmental Management (AEM) program, which consists of planning and implementation of agricultural Best Management Practices (BMPs) on local farms. SWCDs in the watershed also played an important role in applying for funding and implementing projects related to erosion and sediment reduction, streambank remediation, and nonpoint source pollution control.

2.4.5 County Planning Departments and County Planning Boards

Counties can affect land use on a more limited basis through County Planning Board review of certain municipal zoning and development actions that may have countywide impacts. These reviews, conducted pursuant to Section 239 of New York State General Municipal Law, are often referred to as "239 reviews." [53] County Planning departments usually act as staff to the County Planning Boards, and also offer technical assistance and information regarding land use and related planning issues to municipalities.

2.5 Local Government

In New York State, municipalities have significant land use powers that can be used to effectively address a wide variety of environmental issues. The comprehensive plan, zoning, and a host of tools such as site plan review, subdivision regulation, erosion and sediment control ordinances, and special use permits can be used separately or in combination to produce the desired environmental outcomes in a community.[54] We address these tools in the Section 4: Recommended Regulatory Tools and Best Management Practices.

SECTION 2.0 ENDNOTES

[3] Genesee/Finger Lakes Regional Planning Council. *Protecting Water Resources through Local Controls and Practices: An Assessment Manual for New York Municipalities*. 2006. http://www.gflrpc.org/Publications/LocalLaws/Manual/Protecting_Water_Resources.pdf
[4] Buffalo Niagara Riverkeeper. *Healthy Niagara: Niagara River Watershed Plan, Watershed Organizations and Agencies involved in Watershed Planning & Protection*. Unpublished Draft, 2013.
[5] www.usace.army.mil
[6] http://water.usgs.gov
[7] http://www.fema.gov
[8] US EPA. Fiscal Year 2011-2015 EPA Strategic Plan, Achieving Our Vision. September 30, 2010. http://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1008YOS.PDF
[9] Buffalo Niagara Riverkeeper. *Healthy Niagara: Niagara River Watershed Plan, Watershed Organizations and Agencies involved in Watershed Planning & Protection*. Unpublished Draft. 2013
[10] http://www.epa.gov/enviro/index.html.
[11] Genesee/Finger Lakes Regional Planning Council. *Oatka Creek Watershed Characterization*. 2011. http://www.gflrpc.org/Publications/BlackOatka/Characterization/OatkaCreekWatershed/Chap4.pdf
[12] www.nrcs.usda.gov.
[13] Ibid.
[14] www.fws.gov.
[15] http://www.glc.org.
[16] http://www.dos.ny.gov/opd
[17] Genesee/Finger Lakes Regional Planning Council. *Protecting Water Resources through Local Controls and Practices: An Assessment Manual for New York Municipalities*. 2006. http://www.gflrpc.org/Publications/LocalLaws/Manual/Protecting_Water_Resources.pdf
[18] www.dec.state.ny.us.
[19] Department of Environmental Conservation. *About DEC*. http://www.dec.ny.gov/24.html
[20] Department of Environmental Conservation. *Division of Environmental Permits*. http://www.dec.ny.gov/about/642.html
[21] Department of Environmental Conservation. SEQR Environmental Impact Assessment in New York State. http://www.dec.ny.gov/permits/357.html
[22] Protection of Waters Program, http://www.dec.ny.gov/permits/6042.html
[23] Department of Environmental Conservation. Division of Fish, Wildlife and Marine Resource. http://www.dec.ny.gov/about/634.html
[24] Buffalo Niagara Riverkeeper. *Healthy Niagara: Niagara River Watershed Plan, Watershed Organizations and Agencies involved in Watershed Planning & Protection*. Unpublished Draft. 2013.
[25] http://www.dec.ny.gov/cfmx/extapps/derexternal/index.cfm?pageid=2.
[26] Genesee/Finger Lakes Regional Planning Council. *Oatka Creek Watershed Characterization*. 2011. http://www.gflrpc.org/Publications/BlackOatka/Characterization/OatkaCreekWatershed/Chap4.pdf

[27] State Pollution Discharge Elimination System. [Online]. In *New York State Department of Environmental Conservation*. Retrieved 8/3/11 from http://www.dec.ny.gov/permits/6054.html
[28] Genesee/Finger Lakes Regional Planning Council. *Oatka Creek Watershed Characterization*. 2011. p. 68 http://www.gflrpc.org/Publications/BlackOatka/Characterization/OatkaCreekWatershed/Chap4.pdf
[29] New York State Department of Environmental Conservation. *Stormwater Permit for Construction Activity*. http://www.dec.ny.gov/chemical/43133.html
[30] Genesee/Finger Lakes Regional Planning Council. *Oatka Creek Watershed Characterization*. 2011. http://www.gflrpc.org/Publications/BlackOatka/Characterization/OatkaCreekWatershed/Chap4.pdf
[31] See *§ 122.23.b* under *Part 122—EPA Administered Permit Programs*. [Online] In *US EPA*. Retrieved 8/3/11 from http://www.epa.gov/npdes/regulations/cafo_final_rule2008_comp.pdf.
[32] *Concentrated Animal Feeding Operations (CAFO) - Final Rule*. [Online] In *US EPA*. Retrieved 8/3/11 from http://cfpub.epa.gov/npdes/afo/cafofinalrule.cfm. See also *Permits for Concentrated Animal Feeding Operations (CAFOs)*. [Online] In *New York State Department of Environmental Conservation*. Retrieved 8/3/11 from http://www.dec.ny.gov/permits/6285.html
[33] Genesee/Finger Lakes Regional Planning Council. *Oatka Creek Watershed Characterization*. 2011. http://www.gflrpc.org/Publications/BlackOatka/Characterization/OatkaCreekWatershed/Chap4.pdf
[34] http://www.health.ny.gov.
[35] http://www.nys-soilandwater.org/aem/
[36] *Agriculture Environmental Management*. [Online] In *New York State Soil and Water Conservation Committee*. Retrieved 1/2/11 from http://www.agmkt.state.ny.us/soilwater/aem/.
[37] *Agriculture Environmental Management – AEM Core Concepts*. [Online] http://www.agriculture.ny.gov/SoilWater/aem/aemcc.html
[38] New York State Division of Homeland Security and Emergency Services. Office of Emergency Management. http://www.dhses.ny.gov/oem/
[39] New York State Department of Transportation https://www.dot.ny.gov/index
[40] New York State Energy Research and Development Authority http://www.nyserda.ny.gov/
[41] http://www.oatka.org.
[42] *About Us*. [Online] In *Oatka Creek Watershed Committe*e. Retrieved 12/23/10 from www.oatka.org/aboutus.php
[43] *About Us*. [Online] In *Finger Lakes-Lake Ontario Watershed Protection Alliance*. Retrieved 2/3/11 from http://www.fllowpa.org/about.html
[44] www.nature.org/cwny.
[45] Buffalo Niagara Riverkeeper. *Healthy Niagara: Niagara River Watershed Plan, Watershed Organizations and Agencies involved in Watershed Planning & Protection*. Unpublished Draft. 2013
[46] Western New York Land Conservancy. http://www.wnylc.org/
[47] Center for Environmental Initiatives. http://ceinfo.org/
[48] Pettenski, Dale Matthew. *Oatka Creek Water Quality Assessment: Identifying Point and Nonpoint Sources of Pollution with Application of the SWAT Model (2012)*. Environmental Science and Biology Theses. Paper 38. http://digitalcommons.brockport.edu/env_theses/38
[49] http://cce.cornell.edu.
[50] http://wri.eas.cornell.edu.
[51] http://www.monroecounty.gov/des-stormwater-coalition
[52] *What We Do*. [Online] In *New York State Soil and Water Conservation Committe*e. Retrieved 12/14/10 from http://www.nys-soilandwater.org/about_us/what_we_do.html
[53] Genesee/Finger Lakes Regional Planning Council. *Protecting Water Resources through Local Controls and Practices: An Assessment Manual for New York Municipalities*. 2006. http://www.gflrpc.org/Publications/LocalLaws/Manual/Protecting_Water_Resources.pdf
[54] *Ibid*.

3.0 Inventory of Local Laws, Plans, Programs, and Practices

3.1 Method

This section provides an inventory of laws, plans, programs, and practices in effect in counties and municipalities in the Oatka Creek watershed. The assessment is intended to determine gaps between present laws/practices and model best management practices (BMPs) and is an update of the 2006 Controlling Sediment in the Black and Oatka Creek Watersheds project for NYSDOS. The original assessment was used as a framework in order to utilize some existing information that was unchanged, and to make updates based on new or updated laws and practices where applicable. Original BMPs were edited slightly to be more focused and concise.

3.1.1 Municipalities

The Oatka Creek watershed overlaps portions of four counties and 25 municipalities, seven of which account for less than 1% of the total watershed area. Table 3.1 lists each municipality that has land area within the Oatka Creek watershed, listed in ascending order.

Table 3.1: Municipal Watershed Acreage[55]

Municipality	County	Watershed Acres	Percent Share of Watershed	Percent of Municipality within Watershed
Town of York	*Livingston*	*0.006*	*0.000004%*	*0.00002%*
Gainesville Village	*Wyoming*	*6.2*	*0.004%*	*0.03%*
Town of Wethersfield	*Wyoming*	*44*	*0.03%*	*0.2%*
*Town of Chili**	*Monroe*	*247*	*0.18%*	*0.97%*
Wyoming Village	Wyoming	431	0.31%	100%
Town of Castile	*Wyoming*	*452*	*0.33%*	*2%*
Town of Byron*	Genesee	530	0.38%	3%
Scottsville Village	Monroe	538	0.39%	86%
Town of Riga*	Monroe	552	0.40%	3%
Town of Bergen*	Genesee	881	0.64%	5%
Caledonia Village	Livingston	957	0.69%	70%
LeRoy Village	Genesee	1,719	1.24%	100%
Warsaw Village	Wyoming	2,647	1.92%	100%
Town of Caledonia	Livingston	2,735	1.98%	10%
Town of Bethany*	Genesee	3,493	2.53%	15%
Town of Perry	Wyoming	4,422	3.20%	20%
Town of Orangeville	Wyoming	4,673	3.38%	20%
Town of Stafford*	Genesee	4,776	3.46%	24%
Town of Gainesville	Wyoming	8,334	6.04%	38%
Town of Middlebury*	Wyoming	10,900	7.89%	49%
Town of Wheatland*	Monroe	12,469	9.03%	65%
Town of Covington	Wyoming	12,812	9.28%	76%
Town of Warsaw	Wyoming	19,514	14%	97%
Town of Pavilion	Genesee	20,124	15%	88%
Town of LeRoy	Genesee	24,836	18%	98%
Total Acreage		**138,092**	**100%**	**--**

Municipalities that have less than 2% of their total land area within the watershed are listed in italics; these are excluded from detailed analysis in this report. Several towns have miniscule portions of their municipal boundaries within Oatka Creek. These locales receive limited analysis and focus within the scope of this watershed planning project.

Figure 3.1: Municipalities of the Oatka Creek Watershed

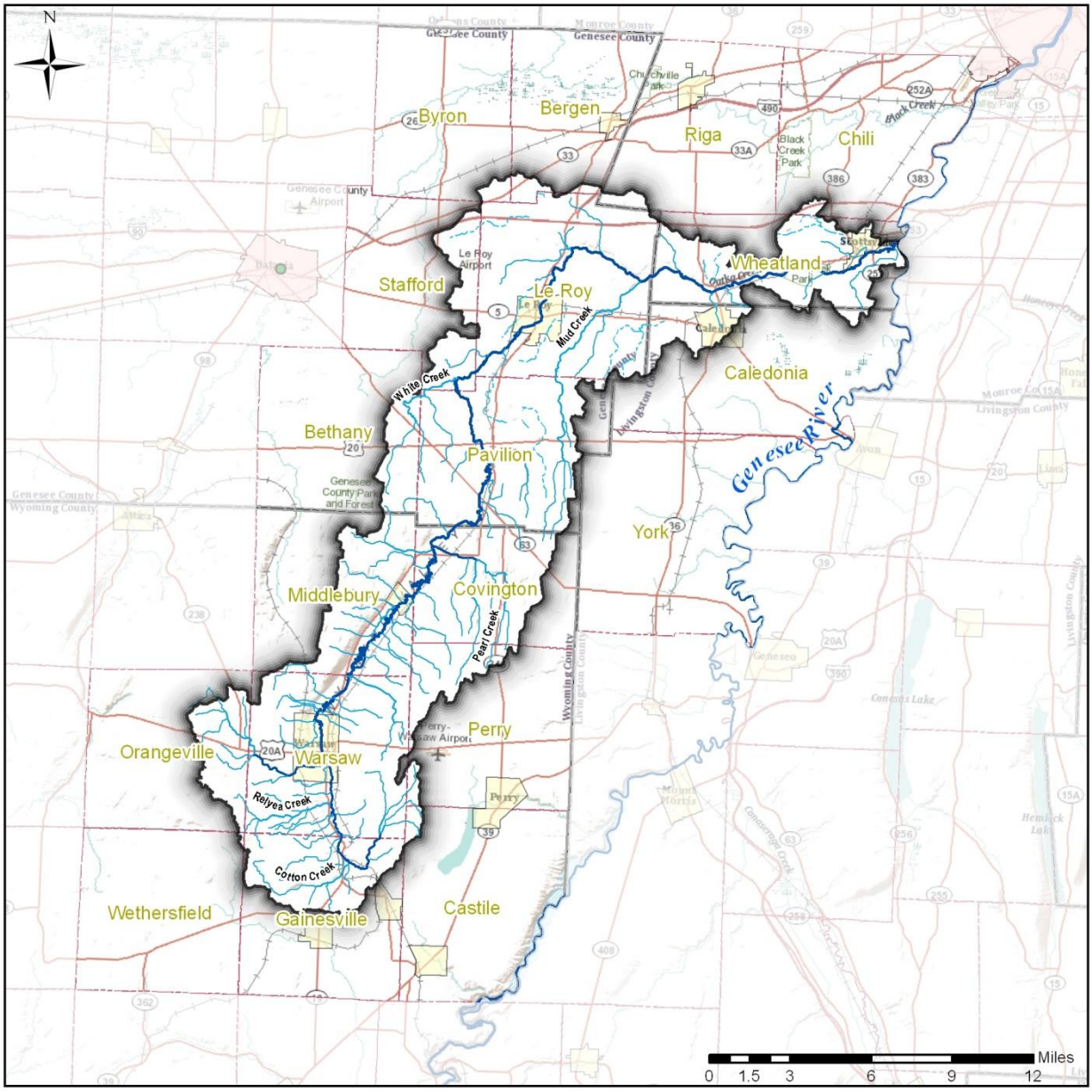


Table 3.2: Spatial Distribution of the Oatka Creek Watershed by County

	Percentage of the Oatka Creek Watershed in the County	Percentage of the County Within the Oatka Creek Watershed
Genesee County	40.8%	26.1%
Livingston County	2.7%	1.3%
Monroe County	10.0%	4.8%
Wyoming County	46.5%	24.7%

3.2 Updated Inventory of Local Laws, Plans, Programs and Practices

Information for this section was gathered from a variety of sources including municipal laws, organizational websites, interviews and correspondence with representatives from municipalities, counties, and organizations involved in water quality.

Counties and municipalities were contacted in order to determine if new or updated laws or plans were in place since the existing assessment. The majority of municipalities had changes to their local laws/plans. Some existing laws that had not been updated were also reviewed to strengthen the existing assessment in certain places. See attached Appendix A for a complete matrix of assessments for each county and municipality in the watershed.

Below is a list of the types of laws and plans that were included in the assessment.

- Zoning laws
- Site plan review
- Subdivision regulations
- Planned unit developments (PUDs)
- Excavation and fill regulations
- Drainage and watercourse regulations
- Stormwater management regulations/plans
- Construction regulations for stormwater management
- Post construction regulations for stormwater management
- Illicit discharge laws
- Animal waste storage facility laws
- Erosion and sediment control laws
- Flood damage prevention laws
- Floodplain overlay regulations
- Wetlands regulations
- Sanitary codes
- Utility (water and sewer) regulations
- Comprehensive/Master plans
- Open space plans
- Smart growth plans
- Agriculture/farmland protection plans

BMPs related to practices and programs were updated through online research, interviews and information provided from:

- County Planners

- County Highway Departments
- County SWCDs
- County Health Departments
- County Water Quality Coordinating Committees (WQCC)
- Wyoming County Water Resources Coordinating Committee
- Cornell Cooperative Extension
- GLOW Region Solid Waste Management Committee (Genesee, Livingston, Orleans, Wyoming)
- Finger Lakes Lake Ontario Watershed Protection Alliance (FLLOWPA)
- Stormwater Coalition of Monroe County
- Water Education Collaborative
- Monroe County Department of Environmental Services
- Oatka Creek Watershed Committee
- Municipal Highway Departments

As summarized in Table 3.3 below, Genesee, Wyoming, and Monroe Counties each has its own farmland and agricultural protection plan in place. Farmland and agricultural protection plans are created pursuant to 1 NYCRR Part 372 of the New York State Agriculture and Markets Law. Such plans are required to include a statement of the county's goals with respect to agricultural and farmland protection, identify any lands or areas that are proposed to be protected, and describe the strategies intended to be used by the county to promote the maintenance of lands in active agricultural use.

Table 3.3 also provides a brief overview of the role of county health departments in monitoring of onsite wastewater treatment systems (septic systems). Sections 347 and 308 of NYS Public Health Law give county boards of health the authority to enact regulations for protection of public health. Each county within the study area has a department of health which performs or requires new onsite wastewater treatment system inspections at the time of new construction; Genesee, Orleans, and Wyoming Counties require inspections at the time of property transfer as well. It is important to note, however, that the specific requirements associated with individual inspection of on-site septic systems vary significantly from county to county.

Table 3.3: Summary of Selected County Plans and Regulations

	Farmland and Agricultural Protection Plan	Dept. of Health Onsite Wastewater Treatment System Inspection		Hazard Mitigation Plan
		Inspection for new construction	*Inspection at time of refinance or property transfer*	
Genesee County	2002	Yes	Yes*	Yes
Livingston County	2006	Yes	Yes	Yes
Monroe County	1999	Yes	Recommended[56]	Yes
Wyoming County	2005	Yes	Yes	Yes

**For refinancing, inspections are typically performed upon request from the lending institution*

Each county has developed a multi-jurisdictional "all-hazard" mitigation plan which operates under a five-year mandatory review cycle.[57] These plans typically include a detailed characterization of natural and man-made hazards in the county (such as flooding risk or hazard materials risk); a risk assessment that describes potential losses associated with the hazards; a set of goals, objectives, strategies and actions

that will guide the county's hazard mitigation activities; and a detailed plan for implementing and monitoring the plan.

A full review and comparison of county inspection procedures is included in Section 5 of this report.

3.2.1 Municipal Plans and Regulations

As illustrated in Table 3.4 below, an inventory of the local regulatory environment indicated that each municipality within the watershed has zoning and some form of comprehensive plan in place. The majority of municipalities have a host of additional supplemental regulations in place that are intended to lessen the impacts of land development on the natural environment or to decrease risks to the health and safety of residents. Many of these have been updated since the last review in 2006.

As with county plans and regulations, a more in-depth review and analysis of the local regulatory environment will take place under subsequent tasks associated with this watershed planning project in an effort to identify and elucidate the effectiveness of these local laws with respect to water quality and natural resource protection.

Table 3.4: Summary of Local Land Use Regulations Among Primary Municipalities in the Oatka Creek Watershed[58]

	Comprehensive Plan	Zoning	Site Plan Review	Subdivision Law	Provisions for Planned Unit or Cluster Dev't	Erosion/ Sediment Control Law	Flood Damage Prevention
Town of Bergen*	1996	1983 (e-code)	Yes	Yes	Yes	Yes	Yes
Town of Bethany*	2008	2008	Yes	Yes	Yes	Yes	Yes
Town of Byron*	1993 (under revision)	2013	Yes	Yes	Yes	Yes (see General Provisions)	Yes
Town of Caledonia	1964	1994 (ecode)	Yes	Yes	Yes	No	Yes
Village of Caledonia	2003	1999	Yes	Yes	Yes	unk	unk
Town of Castile	1967	1996	Yes	No (section reserved)	Yes	No (section reserved)	unk
Town of Covington	2006	2007	Yes	Yes	Yes	No (plat review by SWCD)	Yes
Town of Gainesville	1995 (within zoning)	2004	No	No	No	No	Yes
Town of LeRoy	2002	1999	Yes	Yes	Yes	No	Yes
Village of LeRoy	2001	1990	Yes	Yes	Yes	No	Yes
Town of Middlebury*	2009 (within zoning)	2009	Yes	No	Yes	No	Yes
Town of Orangeville	2009	2009 (online)	Yes	No	Yes	Yes	Yes
Town of Pavilion	2003	2006	Yes	Yes	Yes	No	Yes
Town of Perry	1969	2000	Yes	Yes	Yes	No	Yes
Town of Riga	2008	2008	Yes	Yes	Yes	Yes	Yes

		(ecode)					
Village of Scottsville	2004	2008	Yes	Yes	No	No	Yes
Town of Stafford*	2009	2009 (e-code)	Yes	Yes	Yes	No	Yes
Town of Warsaw	2004 (within zoning)	2004	Yes	Yes	Yes	No	Yes
Village of Warsaw	1994	1995	Yes	Yes	Yes	No	Yes
Town of Wheatland*	2004	2008 (e-code)	Yes	Yes	Yes	Yes	Yes
Village of Wyoming	None	1994	Yes	No	Yes	No	Yes

SECTION 3.0 ENDNOTES

[55] Municipalities that have less than 1% of their total land area within the watershed are listed in italics; these are excluded from detailed analysis in this report. The City of Batavia is also listed in italics as nearly all stormwater that falls within city limits has been engineered to flow into the Tonawanda Creek watershed. The City will therefore receive limited analysis and focus within the scope of this watershed planning project. 1 acre = 43, 560 sq. ft = 0.0015625 sq. miles; town acreage calculations exclude area of villages & cities within.

[56] Monroe County DOH recommends an 8-part series of checks at time of property transfer and further emphasizes the need to apply strict scrutiny on a case-by-case basis.

[57] Federal authorization to prepare a countywide all-hazard mitigation plan comes from the Disaster Mitigation Act of 2000 and 44 CFR (Code of Federal Regulations, Title 44). These regulations provide a mandate directing local governments to assess the potential dangers posed by natural hazards to their communities and propose cost effective means of reducing/eliminating the threats posed by those hazards. Hazard mitigation planning programs are strongly encouraged and supported by the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1974, known as the Stafford Act (PL 93-288, as amended) and New York State Executive Law Article 2B: State and Local Natural and Man-Made Disaster Preparedness.

[58] Year indicates the year that the law was originally adopted; amendments have often been made since this date. "Ecodes" are those made available online through the General Code website. General Code is an independent, for-profit service; it is assumed that the municipality provides the company with appropriate updates to their code on a regular basis. An entry of 'unk' indicates that the municipality's code was not available in its entirety at the time of review; it is therefore unknown whether the component exists. Municipalities listed as a "Regulated MS4" are required to have an erosion and sediment control law in place as per State and Federal law.

4.0 Recommended Regulatory Tools and Best Management Practices

Recommended regulations and practices discussed in this section are based upon a number of sources of best management practices (BMPs) and models, along with the information collected in the Assessment. The Assessment was used both to determine gaps in certain municipal laws and programs and to find good examples in others.

4.1 Methodology

Recommendations were based on gaps present in the Assessment as well as priority water quality issues in the watershed. Information to base these recommendations on was gathered from a number of local, state, and national resources, including the Center for Environmental Information's Lake Ontario Basin TMDL Project.

Priority focus areas included:

- Development-related land use tools – zoning, site plan review, subdivision regulations (amount of vegetation, impervious surfaces, etc.)
- Stormwater regulations, including MS4 regulations and suggestions for non-MS4s
- Stream corridor protections
- Riparian buffers – vegetated areas, additional setbacks
- Floodplain protections and increased restrictions on use and site changes
- Wetlands
- Agricultural issues – setbacks, manure storage, etc.
- Erosion and sediment

Our intent is to build on the reviews in *Controlling Sediment in the Black and Oatka Creek Watersheds: Municipal Law Review and Analysis*. Recommendations are given for all municipalities that were reviewed as a set of next steps that can be taken. These are based on priority issues and do not include every possible way to improve water quality. Many BMPs and recommendations are applicable to more than one county or municipality; as such, these are included throughout this section. Detailed recommendations specific to counties and municipalities, respectively, are based on their unique assessments and needs and located in Section 5: Recommendations for Local Laws, Plans, Programs, and Practices.

4.2 Land Use Tools

The Constitution of the State of New York specifies that the primary authority for guiding community planning and development is vested in cities, towns and villages. This authority is commonly referred to as "home rule" and is implemented locally through the creation of comprehensive plans, zoning, site plan review, and subdivision standards. Counties are also vested with certain powers and capacities to guide development and act as a steward of resources within its borders.

These building blocks of land use control and planning also help establish water quality controls, either directly or indirectly.

4.2.1 Comprehensive Plans

Comprehensive plans are strategic documents that set out the broad goals and vision of a community. The plan should reflect current conditions and issues of the municipality, where the community would like to be, and how to reach those goals. The plan should be developed with widespread citizen input and put in writing by the land use decision makers in a community (planning board, zoning board of appeals, conservation board, code enforcement officer, planner, municipal board, and elected officials). While the planning board or planning department staff may prepare the plan, by law the comprehensive plan must be adopted by the local legislative body after public hearing.

A comprehensive plan should identify the type and intensity of development to be accommodated. A comprehensive plan which is too generalized may not serve to effectively guide future development. Municipalities should ensure that their comprehensive plans – at minimum – list watershed management and related topics such as water quality, stormwater management, and erosion and sediment control as municipal priorities. Prioritizing these issues is a good starting point, and justifies the need to expand related local laws and practices.

Some communities in New York may not have comprehensive land use planning processes; for those that do, there is often no link between the land use plan and water quality protection and planning. Water is currently regulated through a patchwork of federal and state laws, yet the future of water resource management will likely require a more holistic approach to how we deal with drinking water, wastewater and stormwater runoff. Communities should seek initial funding to update their comprehensive plan in order to be eligible for a host of water-related programs – which consider smart growth, green infrastructure, and sustainability in funding decisions – regardless of MS4 status. For assistance in developing a comprehensive plan, see *Protecting Water Resources through Local Controls and Practices* Appendix E1.[59]

4.2.2 Zoning

To help make the leap from planning to zoning to implementation and enforcement, zoning laws should concisely implement the purpose and intent laid out in the comprehensive plan. Zoning can regulate the use, form, siting, and character of development on individual land parcels. Zoning is most effective in preventing future issues with development or harmful uses. While an existing use or form is generally grandfathered, after the use or building is abandoned for a certain amount of time new regulations would be enforceable. Nonconforming use is lost through abandonment, typically defined by local zoning law. These regulations also have power to prevent a property owner from expanding a use or building when they are non-conforming in the new zone.

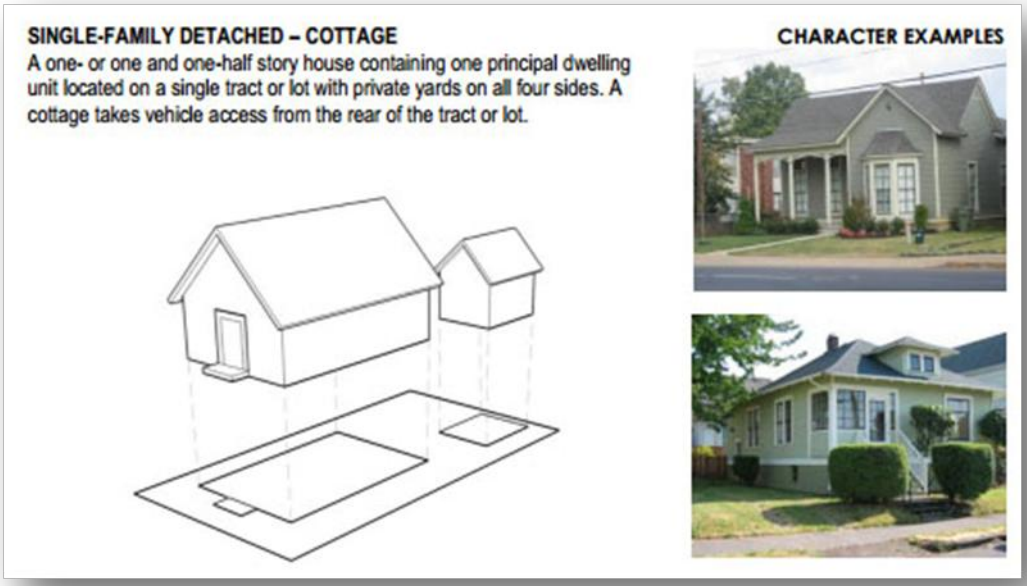
Encouraging development within or adjacent to already developed areas limits the amount of required infrastructure expansion and often results in the preservation of open space in outer lying areas. Zoning for adaptive reuse development encourages the redevelopment of vacant or underutilized structures. Consider increasing the allowable uses in a zone or zoning by form rather than use. One way to accomplish this is to allow for Mixed-Use zoning, especially in village downtowns and infill areas.

Consider the costs of not implementing these practices; smart growth saves an average of 38 percent on upfront costs for new construction of roads, sewers, water lines and other infrastructure.[60] These measures save municipalities an average of 10 percent on police, ambulance, and fire service costs and generates 10 times more tax revenue per acre than conventional suburban development. The geographical configuration of a community and the way streets are connected significantly affect public service

delivery. Smart growth patterns can reduce costs simply by reducing the miles service vehicles must drive. The savings on services in rural areas are much higher, perhaps as much as 75 to 80 percent.[61]

A form-based zoning code can be limited to verifiable building form characteristics such as setbacks, yard types, building height and massing, frontage size and lot coverage. For example, a municipality can mandate that all buildings be of a similar height to fit in with the character of a neighborhood without exhaustive architectural design standards such as the size of windows or facade details.[62]

Including graphics, such as the following example of expected development form and character, help make zoning easier for everyone to use and understand:



4.2.2.1 Overlay Districts

An overlay district is a zoning technique that selects natural or cultural areas of the municipality based on criteria such as main street retail areas, historic districts, scenic views, steep slopes, wetlands, woodlots, or riparian areas. As the name suggests, these districts overlay the underlying zoning designation (such as commercial, residential, etc.). The underlying zoning, and all of its regulations, remain in place. The overlay district simply adds another set of regulation processes to help protect sensitive areas.

An Environmental Protection Overlay District (EPOD) could be utilized to restrict uses with large impacts on the water. This could also include development setbacks, vegetative buffers, etc. Current allowable uses should be grandfathered in to the law as still allowable. As non-conforming uses are abandoned, properties will be required to comply with the buffer regulations. These non-conforming grandfathered uses will come into compliance over time.

Active River Areas

River health depends on a wide array of processes that require dynamic interaction between the water and land through which it flows. The areas of dynamic connection and interaction provide a frame of reference from which to conserve, restore and manage river systems. The active river

area framework offers a more holistic vision of a river than solely considering the river channel as it exists in one place at one particular point in time. Rather, the river becomes those lands within which the river interacts both frequently and occasionally. The active river area (ARA), therefore, is a critical zone in which watershed restoration and protection efforts should be focused.

The Nature Conservancy developed this approach to address river health in areas directly adjacent to streams. The ARA framework can be used as a tool to inform conservation, restoration and management of riparian areas and entire watersheds.[63] Municipalities should utilize the Active River Area method to determine the area of land most important to target to protect water quality through practices and programs. Many of the regulatory tools and best management practices outlined here could be targeted toward the active river area. The Active River Area can be prioritized in laws and practices, such as a zoning overlay district based on the five components of the ARA: material contribution areas; the meander belt; floodplains; terraces; and riparian wetlands.

Map 7 (Appendix A-15) of the *Oatka Creek Watershed Characterization Report*[64] illustrates the active river area throughout the Oatka Creek watershed; further research into the precise delineation of and intactness of these lands is recommended.

4.2.3 Site Plan Review

Site plan review addresses the layout and design of development on a single parcel of land. It is commonly considered supplemental to other land development guidance controls and is usually included within a community's zoning law. Yet it is a critical planning tool for identifying and addressing drainage, erosion control, amount of impervious cover, vegetation, and other stormwater mitigation measures. This is often the easiest place to add watershed protections because the law and review system are usually already in place, and just need to be expanded slightly. The site plan review process allows for greater municipal scrutiny and application of intent for certain land uses and/or structures. Some examples of intent may include:

- Promoting environmental sustainability in new development and redevelopment
- Preserving and enhancing neighborhood character
- Achieving compatibility with adjacent development and uses
- Improving the design, function, aesthetics, and safety of development projects and the overall visual and aesthetic quality of the city/town/village
- Mitigating potentially negative impacts on drainage and the landscape
- Removing or reducing minimum parking requirements, reducing the size of parking spaces, and developing parking lot design standards that include grass areas, filter strips, bioswales, and other types of biofilers for capturing runoff
- Encouraging creative shared parking options between uses with non-competing peak use periods[65]
- Limited site plan reviews for small projects can be conducted at an administrative level by a staff planner or zoning code administrator
- Site plan approvals conditional on other permits and approvals, such as Stormwater Pollution Prevention Plans (SWPPP) and building permits

A site plan should show the existing and proposed conditions, including topography, vegetation, drainage, floodplains, marshes, wetlands, and waterways; open spaces, walkways, means of ingress and egress, utility services, landscaping, structures and signs, lighting and screening devices; submitted along with

building plans, elevations and building materials; and any other information that may be reasonably required to allow an informed decision to be made by a planning board.

One approach that begins to address the integration of sustainable policies with proposed development is the concept of Better Site Design (BSD). Better site design incorporates non-structural and natural approaches to future development projects to minimize effects on watersheds by conserving natural areas, reducing impervious cover and improve application of stormwater treatment. The DEC's Handbook on Better Site Design[66] includes easy-to-follow tables and checklist for applying these practices. Green Infrastructure, also known as Low Impact Development, such as Bioswales (roadside ditches) and bioretention areas (sunken gardens), French drains (retention trenches) and brick and cobblestone streets (pervious pavers) are old technologies given new life. Some of the best practices in Green Infrastructure were developed by the USDA's Soil Conservation Service in the wake of the Great American Dust Bowl.[67]

New residential development guidelines for the design, planting, and maintenance of trees may include certification by a Registered Landscape Architect and the use of structural soils, such as CU-Soil™, which helps trees get established and grow to fuller crowns while also assisting in stormwater management. A number of relevant publications are available from the Urban Horticulture Institute at Cornell University.[68]

Site plan review should include:

- Preservation of open space, natural features, vegetation and trees
- Landscape elements, including grass areas, filter strips, and bioswales
- Live plant materials and maintenance schedule, including protection of existing mature vegetation, especially trees over eight inches DBH (diameter-breast-height)
- Percentage of open space based on the size of the development parcel(s)
- Minimization of impervious surfaces and the use of permeable materials such as porous asphalt and structural soil
- Plan compliance with New York Standards and Specifications for Erosion and Sediment Control especially Appendix G – Sample Checklist for reviewing Erosion & Sediment Control Plans[69]
- Construction plan, including haul route, staging area, and runoff management strategy

Development should be limited in key areas such as riparian buffers, wetlands, floodplains, Active River Areas, etc. The Board should seek advice from County SWCD, especially on proposals disturbing over one acre, as well as those located near sensitive areas such as steep slopes, high erosion areas, wetlands, floodplains, etc. Input from County Environmental Management Councils (EMCs) and municipal Conservation Advisory Councils (CACs) and Conservation Boards can assist with taking inventory of natural features of the landscape to identify those locations that are important to preserve and protect. A thorough urban/suburban site plan review model can be found in the City of Ithaca[70]; a rural model can be found in the Town of Ithaca.[71]

4.2.4 Subdivision of Land

Subdivision regulations control the manner by which land is divided into smaller parcels of land. While zoning and subdivision control are entirely separate and distinct parts of the planning implementation process; used together they result in well-ordered, environmentally-aware development. Subdivision regulations ensure that when development occurs, streets, lots, open space and infrastructure are adequately designed and the municipality's land use objectives are met. Aspects of subdivision regulation that many municipalities find useful include: distinction between major and minor subdivision; timeline

for subdivision of land; a three-stage process (conceptual plan, preliminary plan, final plan) for review; and the ability for the municipality to charge the applicant for expenses incurred as a result of retaining outside consultants.

These and other features should be integrated into a concise, easy-to-understand subdivision law. Used correctly, the subdivision law is a key tool used to implement the objectives of the comprehensive plan. Subdivision regulations can be used to limit the negative impacts development can have on waterbodies before during and after the construction period. Approval can be contingent on additional requirements such as:

- Preservation of natural features, trees, and vegetation
- Conservation of imperiled species, ecological communities, and unique natural areas
- Agricultural land conservation
- Floodplain avoidance
- Minimization of the creation of impervious areas / encourage permeable surfaces
- Limit parking footprint to no more than 20% of the total development footprint area for all new off-street surface parking facilities, with no individual surface parking lot larger than 2 acres[72]
- Pre-construction, construction, and post-construction
- Site protections to minimize erosion and runoff (retaining vegetation, sediment fencing, etc.)
- Clustered subdivision

Under Section 278 of New York State Town Law, towns have the authority to mandate clustered subdivisions. A subdivision is considered a cluster subdivision when lots and dwelling units are clustered closer together than in a conventional subdivision; open space is created on the remainder of the property without increasing density for the tract as a whole. This can be an effective way to preserve open space, while not reducing the total number of development units. Clustered subdivisions allow developers to reduce minimum lot sizes and increase density if they preserve an appropriate portion of the proposed development as open space, identified by important agricultural soils, water bodies, and conservation of open space. They allow for a range of lot sizes, building densities, and housing choices to accommodate a variety of age and income groups. Clustered development also has fiscal benefits; clustering requires less road and sewer infrastructure and lowers ongoing public safety operations and maintenance costs. For subdivisions from a few acres up to 320 acres (1/2 square mile) in size, municipalities may consider adopting the LEED for Neighborhood Development (LEED-ND) Standard to holistically tie together development siting, street design, development of pedestrian linkages, stormwater management, green infrastructure and building design, and other performance standards. These standards can be applied to infill development as well. The 2013 *Technical Guidance Manual for Sustainable Neighborhoods* is available from the US Green Building Council.[73]

4.3 Stormwater and Erosion Management

Once water runs off of private property, it tends to become the problem of the municipality. Roads, buildings, parking, sidewalks, and driveways all increase runoff from rain events and snow melt. Stormwater runoff contains pollutants such as nutrients, pathogens, sediment, toxic contaminants, and oil and grease. Water quality problems generated by these pollutants have resulted with waterbodies such as lakes and streams having impaired or stressed uses. Impervious surfaces such as roofs, driveways, and parking lots may be regulated by municipalities through zoning and subdivision regulations and the site plan review process. In addition, poorly designed or maintained public drainage infrastructure (such as ditches) can cause erosion, which leads to sedimentation of waterways. Not only a significant cause of

nonpoint source pollution, sedimentation can increase costs to municipalities in terms of ditch and storm drain cleaning.

To address these local concerns, federal stormwater regulations commonly known as "Stormwater Phase II" require "urbanized area" municipalities to develop a Small Municipal Separate Storm Sewer System (MS4) management program. To prevent harmful pollutants from being washed or dumped into an MS4, operators must obtain a NPDES (National Pollutant Discharge Elimination System) permit and develop a stormwater management program. Pursuant to Section 402 of the Clean Water Act, stormwater discharges from certain construction activities are unlawful unless they are authorized by a NPDES permit or by a state permit program. New York's SPDES (State Pollutant Discharge Elimination System) is a NPDES-approved program with permits issued in accordance with New York's Environmental Conservation Law. Municipalities can use the EPA's MS4 maps to determine whether their jurisdiction is located in the 2010 urbanized area where the MS4 program would apply.[74]

MS4 municipalities should continue strict implementation and enforcement of Stormwater Phase II requirements as a top priority. Any municipalities not currently in compliance should make this their top priority. Listed below are the six minimum control measures (MCMs) that operators of regulated small MS4s must incorporate into stormwater management programs:

- MCM 1: Public Education and Outreach
- MCM 2: Public Involvement and Participation
- MCM 3: Illicit Discharge Detection and Elimination
- MCM 4: Construction Site Runoff Control
- MCM 5: Post-Construction Runoff Control
- MCM 6: Pollution Prevention and Good Housekeeping

Municipalities are encouraged to participate in the Stormwater Coalition of Monroe County to foster the sharing of ideas. Ensure coordination between the Municipality and the County Soil and Water Conservation District for advice and recommendations on certain project proposals. Identify which group will be responsible for implementation of each minimum measure (Municipality, SWCD, etc.)

The New York State Smart Growth Public Infrastructure Policy Act (the Act) of 2010 requires the New York State Environmental Facilities Corporation (EFC) to determine that infrastructure projects meet relevant smart growth criteria in order to provide Clean Water State Revolving Fund financial assistance. Public infrastructure projects cannot use the CWSRF for land, including right-of-ways, unless that land is integral to the wastewater treatment process. Percolation of stormwater through the soil matrix is essential to the operation of green infrastructure practices, many of which can be conveniently located in public right-of-ways. This utilization of soil and plants in a right-of-way to clean and infiltrate stormwater allows the land in that right-of-way becomes integral to the treatment process and thus could be eligible for CWSRF funding.[75]

A Note for Non-MS4 Communities

Non-urbanized areas that are not required to follow MS4 Stormwater Phase II requirements should consider working toward voluntary compliance with some or all of the minimum measures to better manage stormwater and its potential effects. In many areas this work is already occurring through SWCDs and other groups though public outreach, education, and participation. Other strides could be made through adoption (or strengthening) local laws related to illicit discharge and runoff (MCMs 3, 4,

and 5). A Sample Local Law for Stormwater Management and Erosion & Sediment Control prepared by NYSDEC is available in Appendix C.

More information sharing and collaboration between counties, municipalities, water quality groups and interested citizens could be beneficial. The Rural Stormwater Coalition (made up of Southern Tier Central Regional Planning, DEC, Chemung, Schuyler, and Steuben County agencies and non-MS4 municipalities) leverages funding through grants to create and distribute educational materials and conduct a variety of training programs for code enforcement officers, planning boards, zoning boards, highway departments, contractors, and the general public.

4.3.1 Public Education and Outreach

It is important to target the right groups for education opportunities to make efficient use of often scarce resources. It can be effective to aim and customize education and outreach strategies for different groups. Some groups can receive advanced training depending on their background, while others may benefit from brief introductory information. Three types of groups that might be considered for different outreach strategies could be government employees and decision makers, stakeholder groups, and the general public.

One of the biggest aims of the program is outreach: improving awareness of stormwater pollution sources and educating the public on how pollution gets into local waters. A 2005 report by the National Environmental Education & Training Foundation, *Environmental Literacy in America*[76], found that a large percentage of the public does not understand that runoff from agricultural land, roads, and lawns, is now the most common source of water pollution; nearly half of Americans believes industry still accounts for most water pollution. Many people don't recognize the fact that storm drains are connected directly to waterways or just don't think about it during their normal routine.

4.3.1.1 Government Employees and Decision Makers

This group includes planning and zoning boards, town/village boards, as well as code enforcement officers, zoning officers, highway department, public works employees and planners. Appointed and elected officials and employees should be trained both on the importance of improving water quality and the ways that they can have a positive effect through the use of their zoning code, approval of site plans and subdivisions, etc. Training is available on these and other topics at Genesee/Finger Lakes Regional Planning Council's Local Government Workshops. Held in the fall and spring each year, these events helps fulfill state law requiring training for local planning officials. Training is also available on a regular basis from the Department of State, as well as through counties, associations, and private entities.

In municipalities throughout New York, Conservation Advisory Councils (CACs) and Boards (CABs) serve as important advisory bodies to town boards, planning boards, and zoning boards of appeals. By providing a scientific perspective on site plan review, comprehensive plans, environmental ordinances, open space protection, and biodiversity conservation, CACs contribute to the preservation and improvement of the natural environment and quality of life for residents. Article 12-F, Section 239-x and 239-y of the State of New York General Municipal Law details how a city, town, or village can create a Conservation Advisory Council or Conservation Board to advise on the development, management, and protection of its natural resources and act as an environmental liaison to the public.

Employees such as highway department workers or code enforcement officials should receive education specific to their positions and should help further their knowledge of local laws and practices and why they are important to protecting the environment and water quality. Local Code Enforcement should coordinate and partner with SWCDs regarding inspecting requirements and enforcement; even if it's not the code enforcement officer's duty, they should be aware of regulations to report issues that they notice

County Soil and Water Conservation District employees often have a much greater depth of understanding of watershed issues, but additional advanced training related to best management practices and water quality implementation strategies can be very beneficial, especially since these groups are often involved in educating the other groups. Monroe County SWCD offers 4-hour E&SC courses for certain contractors (Trained Contractor) and certain Qualified Inspectors in addition to the Western New York Stormwater Management Training Series (offered in 2012 and 2013).

4.3.1.2 Stakeholder Groups

Groups that have a specific interest or mission related to water quality should be targeted for education. Expanding citizen stewardship becomes easier when tapping into the network of groups that work toward improved local management of water resources. Watershed committees, Water Quality Coordinating Committees (WQCCs), county Environmental Management Councils (EMCs), municipal Conservation Advisory Councils (CACs) and Conservation Boards, lake associations and other environmental groups usually already have a general understanding of issues and can be excellent at disseminating information to the general public. These groups are often filled with volunteers who are willing to strategize ways to educate others such as organizing outreach materials, attending and speaking at events and just generally sharing information with others. These organizations can facilitate education and public involvement activities that foster a citizen-based watershed ethic:

- SWCDs
- WQCCs
- Volunteer citizen educators
- Watershed Groups
- Region, County, and Municipal Planners
- Cornell Cooperative Extension

4.3.1.3 Public Educational Materials and Strategies

It is important to educate the public on issues that are affecting water quality and alert them of simple things they can do to positively affect certain water quality issues. Many people may be willing to make small changes if they knew their actions could have a positive impact on the environment and water quality. The public may also support municipal and county expenditures on programs and practices if they understood the importance of protecting water quality.

Targeting the public geographically is one option. The population of residents within a close geographic area of

waterbodies can be a very important group to reach out to. The actions of these residents have the biggest direct impact on water quality due to their close proximity to the water body. This group may be more receptive toward water quality improvement concepts because they may appreciate the water body's recreational or aesthetic value and may benefit directly from it, and could, depending on the issue, relate water quality issues to their property value. This group should be targeted for education on simple household BMPs like those included in the H2O Hero campaign such as the use of or disposal of fertilizers, paints, pet waste, as well as septic system maintenance.[77] For example, information could be provided to restaurants on the effects of grease clogging storm drains and to auto garages on the effects of dumping used oil into storm drains.

Effective outreach materials are also interesting and accessible to children and included in places traditionally used for education. The Water Education Collaborative's H2O Hero campaign accomplishes this through information sharing with the Seneca Park Zoo, Rochester Museum and Science Center, and in school education programs. The H20 Hero could be marketed more extensively in existing target markets and by expanded into new markets. The design of materials, website, and general outreach method has already been created so municipalities and groups outside of the current service area should look to utilize this method rather than starting from scratch.

Targeting key places that are important to protect for distribution of education materials can also be an effective strategy. Storm drain labeling is a good example of this method and is one of the H20 Hero campaign strategies. The storm drain markers inform residents that "anything that goes down a storm drain goes directly into a water body without being treated."[78] Placing recreational guides and outreach materials at parks and in kiosks along waterbodies can help connect recreational groups using the water and adjacent land such as boaters, marina owners, paddlers, and fishing and hiking groups. Setting up a booth at a water or park cleanup event can be effective in targeting people who are both interested in the health of the environment and are also willing to volunteer their time to make a difference.

4.3.2 Public Participation and Involvement

Make sure a system is in place for the public to report any issues they see; this will help to point inspections and enforcement in the right direction. Evaluate potential expansion of monitoring efforts, such as monitoring and assessments for bacteria and emerging contaminants of concern.

4.3.2.1 Adopt a Storm Drain

"Adopt a Storm Drain" programs encourage individuals or groups to keep storm drains free of debris and to monitor what is entering local waterways through storm drains. A natural progression of the H2O Hero campaign could be the recruitment of volunteer web developers and municipal information technology professionals to develop a real-time, mobile civic engagement platform to send reports on storm drains. Developed using open source software,[79] mobile reporting empowers residents to identify civic issues and report them right from their smartphone to the appropriate authority (SWCDs, town/city hall, etc.) for quick resolution. This allows government to use technology to save time and money plus improve accountability to those they govern; this acts as a positive, collaborative platform for real action. A number of municipalities have implemented this for public infrastructure; for instance, Boston's Adopt a Hydrant program[80] allows users to adopt a fire hydrant to shovel out after it snows.

4.3.3 Illicit Discharge Detection and Elimination

Illicit discharges enter the system through either direct connections (e.g., wastewater piping either mistakenly or deliberately connected to the storm drains) or indirect connections (e.g., infiltration into the MS4 leaching from septic systems, spills collected by drain outlets, or paint or used oil dumped directly into a drain). These untreated discharges contribute high levels of pollutants, including heavy metals, toxins, oil and grease, solvents, nutrients, viruses, and bacteria to waterbodies. Pollutant levels from these illicit discharges are high enough to significantly degrade receiving water quality and threaten aquatic, wildlife, and human health.

For MS4 communities, the first step in designing a program to publicize and facilitate public reporting of illicit discharges is to implement an ordinance or other regulatory mechanism that prohibits non-stormwater discharges into the MS4. It should also outline appropriate enforcement procedures and actions, including a plan to detect and address non-stormwater discharges, including illegal dumping, into the MS4 and education of public employees, businesses, and the general public about the hazards associated with illegal discharges and improper disposal of waste.

4.3.3.1 On-Site Wastewater Treatment Systems (OWTS)

The number one source of nonpoint source pollution in New York State is on-site wastewater treatment systems.[81] The Center for Environmental Information's Water Quality Restoration Strategy reported the results of a two-year investigation which modeled sources of phosphorus to the stream and recommended the most cost-effective watershed changes to remove the current impairment and restore water quality.

Fortunately, septic system repairs are a lower-cost measure that can make a significant impact on water quality and health in this watershed. Over the last twenty years, technological advances have increased the level of treatment but also the complexity of design and operation. New York State Department of Health's (NYSDOH) Administrative Rules and Regulations for the design of residential onsite wastewater treatment systems (OWTS) apply to systems discharging residential wastewater flows of 1,000 gallons per day or less from year-round and seasonal dwellings.[82] New York State Department of Environmental Conservation (NYSDEC) standards under 6 NYCRR Part 750 applies to private, commercial, institutional, and residential wastewater system flows of over 1,000 gallons per day.[83] Each agency's standards have similar OWTS design options for residential OWTSs; however, for residential systems discharging over 1,000 gallons per day, NYSDEC's design standards and applicable permits apply.

Countywide and Watershed Methods

All of the Counties that make up the watershed have some regulations regarding onsite wastewater treatment systems, but many could be strengthened and improved. Details specific to each county can be found in within Section 5.0 of this report. Best practices, such as regular inspections, should be stated directly in law. Sewage disposal system failures can manifest in a number of ways over time and those failures can be very difficult to detect because the system is buried. Standard inspections, which are typically non-invasive, are not necessarily thorough enough to ensure that the system is functioning properly.

A model Onsite Wastewater Treatment Law[84] was prepared by the Ontario County Planning Department. It includes requirements for inspection and permitting before construction or repair of OWTS. The Department of Health inspects and investigates when there are questions of public health

and/or nuisances, and can require remediation. When public sewers are available and accessible, the commissioner may require properties with existing OWTS to abandon use and connect to public sewers. Setbacks of 200 feet from public drinking water sources are required for OWTS as well as storage of other unsanitary and or offensive materials.

Municipal Method

Counties may not have the capacity to take on the additional responsibility that comes with strengthening the onsite wastewater treatment regulations in their Sanitary Codes. Municipalities can take on this role by creating a local Onsite Wastewater Treatment Law. The most important portions to include would be setting an inspection schedule and the requirement to repair, update, and replace systems that are failing. Permits should not be transferrable to different parties; rather, inspection and permitting should be done at property transfer. Additional updates could include the requirement to connect to public sewers when possible. These could vary depending on which county the municipality is located in, and what regulations/practices are already in place.

While most regulation of OWTS traditionally occurs at the state and county level, municipalities can also enact regulations to help mitigate some of the associated risks through their building permit and certificate of occupancy regulations.[85] The Town of Huron, New York, Septic Law, Local Law 1-2013,[86] written by environmental engineer and land use attorney Alan Knauf, can be easily calibrated for another New York State municipality. Huron, a community on Sodus Bay, requires specific controls for the design of private wastewater systems installed in the town's designated coastal zone and sets an inspection timetable for residential and commercial septic inspections; this ordinance can be found attached in Appendix D.

Important regulations to have in a septic law:

- Mandatory inspections at set time intervals or at certain specified points in time such as change of ownership, change in use or intensity of use
- Required compliance and or upgrades for failed inspection
- Requirement to connect to public sewers if available within a given distance
- Implement an onsite wastewater management system inspection program

The Canandaigua Lake Watershed Inspection Program

The Canandaigua Lake Watershed Commission is an organization of the five municipalities – the City of Canandaigua, the Town of Gorham, the Village of Rushville, Village of Palmyra, and the Village of Newark – that withdraw and sell water from Canandaigua Lake. The Canandaigua Lake Watershed has over 4,200 OWTS that emit an estimated 1 million gallons of effluent into the soils of the watershed daily.[87] Together they've instituted a Lake Watershed Inspection Program that employs an inspector to conduct deep hole and percolation tests for OWTS placement, consultations for new construction and repairs of systems, reviews of building plans for suitability of OWTS, and inspections at the time of property deed transfer, and investigations of violations. They transmit the results of their Onsite Wastewater System Inspection Report[88] to the State Department of Health.[89]

Keuka Watershed Improvement Cooperative (KWIC)[90]

The collaborative method and inspection system used by KWIC joins the efforts of municipal officials from eight Keuka Lake towns and villages – Hammondsport, Penn Yan, Barrington, Jerusalem, Milo, Pulteney, Urbana, and Wayne – to ensure uniform regulations and enforcement of wastewater systems to protect the purity of the lake. KWIC was formed through an inter-municipal

agreement in 1993 after more than a decade of discussion and debate and is widely considered to be a model of cooperation and pro-active wastewater management.

Two other collaborative models are Schuyler County's Lamoka-Waneta Lakes Wastewater Treatment Inspection Program, and the Otsego Lake Onsite Wastewater Management Program.[91] The New York Onsite Wastewater Treatment Training Network (OTN)[92] offers training on system design and maintenance, technological advances in OWTS and continuing education credits for engineers, architects, code enforcement officers, and wastewater operators.

4.3.4 Construction Site Runoff Control

Sediment runoff from construction sites is typically 10 to 20 times greater than those of agricultural lands, and 1,000 to 2,000 times greater than those of forest lands.[93] During a short period of time, construction sites can contribute more sediment to streams than can be deposited naturally during several decades.

To assist municipalities in implementing methods for protecting water quality, New York State Department of Environmental Conservation released updated *Specifications for Erosion and Sediment Control* in 2005.[94] This manual, known as 'The Blue Book,' should be used by site developers in preparing their erosion and sediment control plans and by local municipalities in preparing and implementing their soil erosion and sediment control programs. It includes a number of excellent models, including an Erosion and Sediment Control Plan for Small Homesite Construction,[95] Example Erosion and Sediment Control Plan,[96] and a Sample Checklist for reviewing Erosion & Sediment Control Plans.[97] Requiring developers to think about stormwater protections results in better site planning and lessens the likelihood of problems that need to be mitigated by the municipality or other property owners.

Pollutants commonly discharged from construction sites include:

- Sediment
- Solid and sanitary wastes
- Phosphorus and Nitrogen
- Pesticides
- Oil and grease
- Concrete truck washout
- Construction chemicals and debris

The SPDES general permit for Construction Activity[98] was updated in 2010 (valid through 2015) and is required for projects disturbing over one acre of land. Ensure that requirements are being followed for projects disturbing over one acre of land. Include requirements in site plan review and subdivision approval process.

Many municipalities count on SWCD to inspect upon their request, but code enforcement officials need to be educated in stormwater practices, and familiar with construction permits and plans in order to know when to request assistance from the SWCD. In addition, code enforcement officials spend a great deal of time in the field, thus understanding stormwater regulations would help them notice any violations or issues that could be reported to SWCD or DEC. Code Enforcement Officers should ensure that construction sites:

- Have dumpsters or other containers for debris and solid waste

- Store hazardous materials or waste fluids away from receiving waters and catch basins
- With areas for refueling of vehicles or equipment on-site are bermed or away from receiving waters and storm drains
- Properly install concrete truck washouts away from receiving waters and storm drains
- Identify and stabilize critical areas of protection and all exposed soil areas

The Stormwater Toolbox[99], developed by the Rural Stormwater Coalition and distributed to each Southern Tier county in 2008, can be a great resource for non-MS4 communities. It includes packets of information for distribution to developers of small construction sites for which a state stormwater permit is required and explains the how sections of the New York Building Code and Property Maintenance Codes, respectively, apply to stormwater drainage. A local Construction Stormwater Pollution Prevention and Erosion and Sediment Control Ordinance developed by the Town of Parma is available at the end of this report in Appendix E.

4.3.5 Erosion and Sediment Control Regulations

Soil erosion is the removal of soil by water, wind, ice, or gravity and it is largely influenced by season and topography but also to what degree it's covered by vegetation. Erosion is a problem during runoff events, particularly intense rainfall. Counties and municipalities may adopt laws pertaining to erosion and sediment control in accordance with MCMs 5 & 6. An Erosion and Sediment Control Model Ordinance geared towards counties in New York State is found in *Protecting Water Resources through Local Controls and Practices* Appendix E6.[100]

Site Plan Review is a good point in the development process to review a project's Erosion and Sediment Control plan, which should incorporate practices such as phasing, seeding, grading, mulching, filter socks, stabilized site entrances, preservation of existing vegetation, and other best management practices to control erosion and sedimentation during construction. The Erosion and Sediment Control plan must show how the project team intends to:

- Preserve vegetation and mark clearing limits
- Protect vegetation during construction
- Establish and delineate construction access
- Control flow rates
- Install sediment controls
- Stabilize soils, including providing erosion control protection to a temporary critical area for an interim period
- Protect slopes
- Stabilize channels and outlets

- Control pollutants
- Control dewatering

4.3.5.1 Riparian Buffers

Protecting riparian areas – those adjacent to waterbodies, wetlands, and flood plains – is critical to water quality. The land area directly adjacent to streams is considered to be among the most dynamic and sensitive components of a watershed. A riparian buffer is a special type of vegetated area along a stream, wetland, or shoreline where development is restricted or prohibited. Its primary function is to protect and physically separate a stream, lake, coastal shoreline or wetland from polluted stormwater discharges from future disturbance or encroachment. If properly designed, a buffer can provide stormwater management functions, can act as a right-of-way during floods, and can sustain the integrity of water resource ecosystems and habitats.

A stream with a riparian buffer, surrounded by tree cover and vegetation, benefits from both the cooling effects from the tree canopy overhead and the bank stabilization from tree roots and other types of plant cover. Detritus from surrounding plants also contribute to the stream as a source of nutrition and habitat for a variety of animals and organisms. Conversely, streams surrounded by impervious, hard, non-vegetative cover or agricultural cover will likely experience greater soil loss and more impacts from nonpoint source pollution. Stream buffers have financial benefits as well: they minimize property damage, reduce municipal investment, increase property values, and reduce maintenance costs.[101]

According to the EPA's Aquatic Buffer Model Ordinance[102]:

Buffers adjacent to stream systems and coastal areas provide numerous environmental protection and resource management benefits that can include the following:

1. Restoring and maintaining the chemical, physical, and biological integrity of the water resources
2. Removing pollutants delivered from urban stormwater
3. Reducing erosion and sediment entering the stream
4. Stabilizing stream banks
5. Providing infiltration of stormwater runoff
6. Maintaining base flow of streams
7. Contributing the organic matter that is a source of food and energy for the aquatic ecosystem
8. Providing tree canopy to shade streams and promote desirable aquatic organisms
9. Providing riparian wildlife habitat
10. Furnishing scenic value and recreational opportunity

Table 4.1: 2006 NLCD Land Cover – 300' Riparian Buffer Analysis within Subwatersheds of Oatka Creek Watershed

	Headwaters		Pearl Creek		White Creek		Mud Creek		Village of LeRoy		Outlet	
NLCD Category	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
11 - Open Water	20.0	0.5%	23.1	0.4%	10.0	0.3%	35.4	2.6%	44.3	2.9%	14.2	0.7%
21 - Developed, Open Space	173.2	4.3%	185.9	2.9%	135.4	4.2%	57.2	4.2%	74.1	4.9%	55.2	2.8%
22 - Developed, Low Intensity	28.7	0.7%	52.3	0.8%	30.9	1.0%	8.7	0.6%	50.9	3.4%	21.6	1.1%
23 - Developed, Medium Intensity	8.7	0.2%	16.2	0.3%	10.2	0.3%	1.1	0.1%	17.3	1.1%	5.6	0.3%

24 - Developed, High Intensity	0.2	0.0%	1.1	0.0%	1.8	0.1%		0.0%	2.2	0.1%	1.6	0.1%
31 - Barren Land	3.1	0.1%	8.5	0.1%		0.0%	0.2	0.0%		0.0%	0.2	0.0%
41 - Deciduous Forest	1,224.1	30.3%	1,793.6	28.3%	592.7	18.5%	209.9	15.3%	168.4	11.1%	258.9	13.2%
42 - Evergreen Forest	114.3	2.8%	9.8	0.2%	5.1	0.2%	1.1	0.1%	7.8	0.5%	10.5	0.5%
43 - Mixed Forest	374.1	9.3%	251.8	4.0%	247.7	7.7%	51.8	3.8%	103.0	6.8%	268.9	13.7%
52 - Shrub/Scrub	235.7	5.8%	297.3	4.7%	107.4	3.4%	87.8	6.4%	71.2	4.7%	59.2	3.0%
71 - Grass/Herbaceous	4.4	0.1%	16.0	0.3%	5.1	0.2%	6.2	0.5%	1.1	0.1%	8.9	0.5%
81 - Pasture Hay	1,047.9	26.0%	1,907.9	30.1%	971.6	30.4%	311.1	22.7%	295.1	19.5%	301.1	15.4%
82 - Cultivated Crops	515.3	12.8%	1,466.0	23.1%	490.4	15.3%	346.7	25.3%	324.5	21.5%	430.8	22.0%
90 - Woody Wetlands	260.2	6.4%	299.1	4.7%	518.8	16.2%	250.2	18.3%	326.9	21.6%	499.3	25.5%
95 - Emergent Herbaceous Wetlands	24.2	0.6%	16.5	0.3%	71.6	2.2%	1.3	0.1%	24.5	1.6%	24.5	1.2%
Total	4,034.2		6,345.1		3,198.9		1,368.8		1,511.2		1,960.2	

Substantial research has been conducted on the effective size of buffers, particularly related to water quality considerations, to assist planners in developing scientifically sound minimum buffer widths.[103] Recommendations for appropriate buffers widths vary based on the management goal; there is no ideal buffer that is applicable in all circumstances. Buffer sizes should be significantly larger if the intent is to protect ecological functions, such as providing wildlife habitat and supporting species diversity in addition to water quality functions.

Larger, more restrictive buffers are most beneficial to water quality, but there are other factors that prevent a direct correlation between buffer size and percentage of pollutant reduction entering streams. Soil characteristics, hydrology, and types of vegetation also affect how effective a buffer will be in filtering pollutants. In general the most effective buffers are those that are applied to all streams, are at least 100 feet wide and consist of natural forest vegetation.[104] Municipalities should determine what size and types of buffers work in their community and enact these. At minimum, small buffers (approximately 30 feet), can still have a major effect on water quality. More information pertaining to buffer effectiveness related to width, soil type, buffer type, etc. - especially related to nitrogen removal - can be found in the EPA Study *Riparian Buffer Width, Vegetative Cover, and Nitrogen Removal Effectiveness: A Review of Current Science and Regulations*.[105]

As illustrated in the *Oatka Creek Watershed Characterization*, the Oatka Creek watershed has watershed has streams that range in order from 1 (first order/smallest streams) to 4. As shown in the map below, the Oatka Creek becomes a fourth order stream very high up within the watershed in the Village of Warsaw. in the Town of Byron and shortly thereafter becomes a forth order stream in the Town of Bergen and remains so when it meets the Genesee River, which itself is a sixth-order river at this junction.

Table 4.2: Recommended Buffer Widths by Stream Order

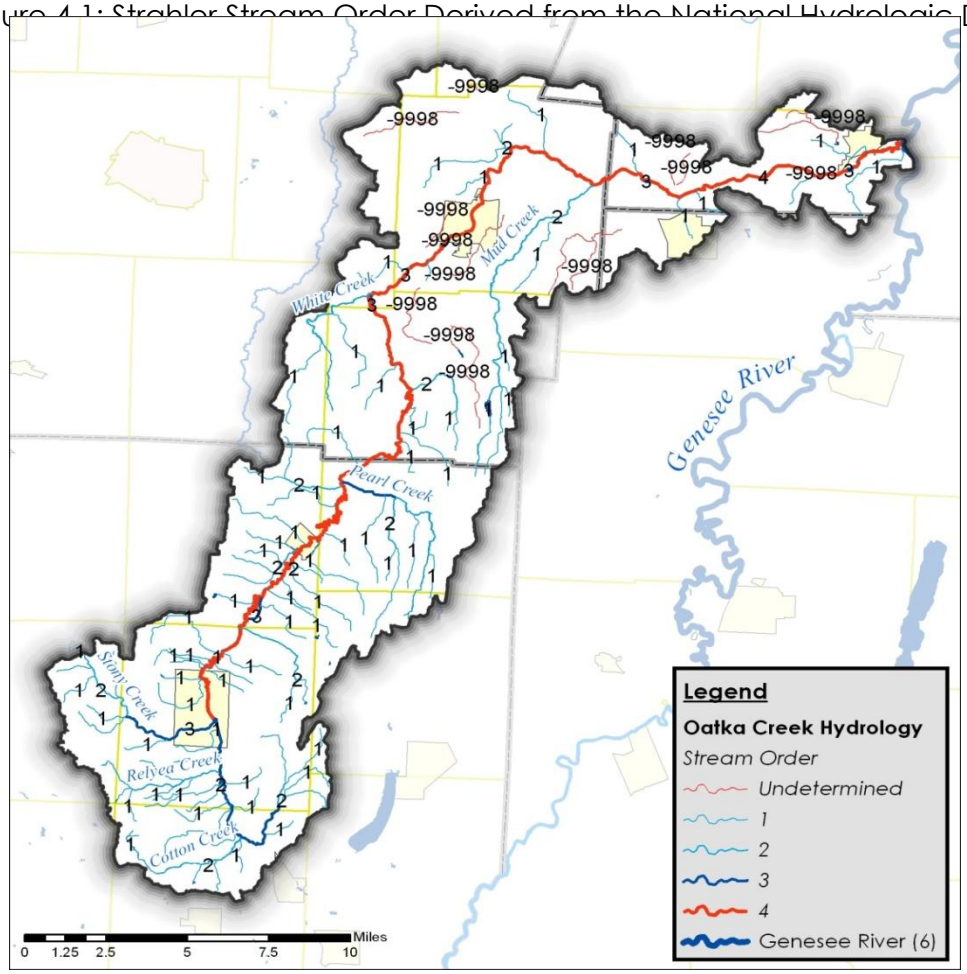
Stream Order	Stream Classification		
	(Sensitive Streams)	(Restorable Streams)	(Impacted Streams)
1	75 feet	60 feet	50 feet
2	125 feet	100 feet	75 feet
3+	150 feet	125 feet	100 feet

Notes:

1. Stream order refers to a classification system for stream networks, where low order (e.g., 1st and 2nd order) are smaller streams and high order are progressively larger streams. When two 1st order streams meet, they become a 2nd order stream, and so on.
2. Stream classification refers to the condition or quality of the stream. Stream classification may already exist in a community or can be initially determined using certain indicators such as watershed impervious cover.
3. Buffer widths are total widths measured from top of active channel bank.
4. Widths may be expanded to include site-specific considerations, such as steep slopes (e.g., >15%), flood zones, critical habitat, etc.

Adapted from City of Lenexa, KS: Successful Implementation of Riparian Buffer Programs. Stormwater Magazine. Nov/Dec 2006 issue.

Figure 4.1: Strahler Stream Order Derived from the National Hydrologic Dataset



Though it is recommended that preference be given to variable-width buffers, based on stream classification and topographic index, uniform widths are easier to enforce and require less time and expertise to administer. The latter approach to creating riparian buffers is to have a three-tiered buffer system, with the most restrictive buffer adjacent to the water body, and a second less restrictive buffer beyond that.

The inner buffer, adjacent to the water body, should be vegetated. This consists of an area of land within a set distance, such as 75 feet, from each bank of the waterway and would be intended to remain in a natural state (natural vegetation, mix of forested vegetation and natural grasses (un-mowed)). Some planting may be beneficial in areas that need to be restored to their natural state. Strict regulations should be placed on the allowable uses on this land, and development would be prohibited. An outer buffer could also be created with few vegetation requirements and would restrict most structures from being built but allow some uses while still restricting others. Another option for this second buffer would be to allow more uses with stricter regulations regarding stormwater, runoff, erosion, etc. Allowable uses could include flood control or recreation.[106]

Another method recommended by NYSDEC's 2010 Stormwater Management Design Manual,[107] is a three buffer system. Essentially the vegetated buffer above would be split into two buffers, a more restrictive one adjacent to the stream (minimum of 25ft) with very few allowable uses such as flood control or footpaths, and another vegetated buffer (minimum of 25ft) with a few more allowable uses such as recreation and less restrictive vegetation requirements. The outer buffer similarly restricts structures, but allows more uses.

Methods

Like other land use regulations, there are a number of different places to incorporate Riparian Buffers into local law:

- Environmental Protection Overlay Districts – Buffer zones may be created as EPODs and designated on the municipal zoning map. Like other zoning districts, allowable uses and restrictions may also be included.
- Setbacks – Regulations on development could be included as part of the bulk zoning regulations of the appropriate zones. Example: Structures must be at least 150 feet from the top of a stream bank, maintained with native vegetation.
- Site Plan Review – This can include native vegetation, clearing or grading, and tree conservation requirements for site plan approval. If municipalities do not wish to create restrictive Riparian Buffers, the Site Plan Review process is one place where they can try to encourage retention of vegetation. Many municipalities encourage retaining trees and natural vegetation as much as possible during development. This could be strengthened by specifying this practice within 50 to 100 of feet of stream banks, depending on stream order and whether the site is a greenfield or infill.
- Subdivision Law – Buffer regulations can be mandatory in order to get a subdivision approval. If municipalities do not wish to create restrictive riparian buffers, at minimum they should use their Subdivision Law to give their planning boards the ability to encourage retention of natural vegetation especially adjacent to waterbodies. Example: Town of Batavia-Subdivision of Land: IV Sec 2.E.2: "To the fullest extent possible, all existing trees and shrubbery shall be conserved." Simply adding "especially on properties adjacent to or

within 50 feet of streams" could be an effective way to prioritize these areas related to this review requirement.

Perceptions include concerns about private property rights, complaints about pests and nuisances, and additional costs to local governments due to implementation, regulation, and enforcement of a buffer program. A riparian buffer that includes the 100-year floodplain may also eliminate the need for expensive flood controls.

4.3.5.2 Floodplains

Floodplains act as a check valve for streams; they allow water to be slowed down, to dissipate energy after a rainstorm or snow melt. They spread out the stream's energy and allow water to soak into aquifers. The original analysis of the 100-year base flood elevation developed for the *Oatka Creek Watershed Characterization Report* indicated that 4.4% of the total land areas within the Oatka Creek watershed are within this zone, known as a Special Flood Hazard Area (SFHA). The Oatka Creek Outlet subwatershed has the highest concentration of lands in the 100-year floodplain, with 1,655 acres accounting for 7.4% of the total subwatershed area. Full results of this analysis are provided in Table 4.3 below:

Table 4.3: Analysis of 100-Year Flood Zone in the Oatka Creek Watershed

Subwatershed	Acres at or below 100-year flood elevation	% of Subwatershed Area	% of Oatka Creek Watershed Area
Oatka Creek Headwaters	289.56	1.2%	0.2%
Pearl Creek	1,818.05	5.0%	1.3%
White Creek	1,045.58	4.1%	0.8%
Mud Creek	316.07	3.0%	0.2%
Village of LeRoy	934.74	5.1%	0.7%
Oatka Creek Outlet	1,655.14	7.4%	1.2%
Oatka Creek	**6,059.14**	**4.4%**	**--**

Flood Insurance Rate Maps (FIRM) are produced by the Federal Emergency Management Agency and provide the official record of special flood hazard areas. While paper FIRMs are generally available online for every community in the Oatka Creek watershed, corresponding digital GIS data pertaining to the flood boundary is not available for every Oatka Creek watershed community through state or federal agencies. Information provided by FEMA has been combined with information created by local offices and agencies in an effort to create a comprehensive picture of the 100-year flood zone across the entire Oatka Creek watershed.

Basic Flood Regulations

Flood regulations play an important role in protecting water quality, through limiting and regulating certain types of development and uses within the floodplain. Improper regulation of the flood zone could in turn increasing flooding, flood damage, and erosion, and has a negative effect on water quality through pollutants and sedimentation.

All of the municipalities within the watershed are included in FEMA's National Flood Insurance Program (NFIP) and have at least the minimum flood regulations and maps in place. These include

restrictions on land use and what types of structures can be built in the flood zone as well as first floor elevation requirements and other flood proofing requirements for structures. The National Flood Insurance Program (NFIP) is a federal program that enables property owners to purchase affordable flood insurance. The NFIP uses the 100-year flood as the standard on which to base its regulations. This is a national standard used by virtually every Federal and most state agencies (including New York State) in the administration of their programs as they relate to floodplains. The technical and engineering methods involved in determining the magnitude of these floods are well established. A 100-year flood is an event estimated to have a one percent chance of occurring each year. Yet a flood of this magnitude could occur more or less frequently than once every 100 years. FEMA boundaries are important, not just because they indicate areas where insurance is federally mandated, but also because these boundaries communicate risk to a homeowner or community.

Designation of a floodplain manager is not only a requirement but also an effective way to ensure that at least one person is responsible for ensuring flood regulations are being followed and that developers and municipal boards understand them. Enforcement is often the biggest issue with flood plain regulations and the possibility that they are not being used in land use decision making and development approval. Most of these regulations in the watershed date back to the early 1980's and it may be easy for them to be overlooked by representatives in municipalities that are not used to having much development in the floodplain.

Improved Flood Regulations

Most municipalities could benefit from strengthening their floodplain regulations as many are simply based on minimum standards. Strengthening regulations can help municipalities to be eligible for the Community Rating System (CRS) of the National Flood Insurance Program. Residents in CRS communities receive a discount on their flood insurance. NYSDEC's Model Local Law for Flood Damage Prevention includes Optional Additional Language[108] to strengthen some of the basic flood requirements; see attached Appendix F. Legal addendums such as Compensatory Storage, Repetitive Damage, Cumulative Substantial Improvement, Critical Facilities, and Areas Behind Levees or below High Hazard Dams, bolster basic flood regulations.

Local communities are encouraged to provide an extra margin of safety by requiring structures to be elevated above the base flood elevation. Flood insurance for a house built two or more feet above the base flood elevation will cost about half as much as for a house built to the base flood elevation. Flood insurance for a house built just a foot below the base flood elevation will cost about four times more than for a house built to the base flood elevation. All municipalities should update their flood regulations to comply with NYS Building Code requirements (the lowest elevated floor in an A zone (special flood hazard area) is elevated to or above the base flood elevation (BFE), plus two feet above base flood elevation). This is known as freeboard: the height of watertight surface between a building above a given level of stream, lake, or river.

Another way to improve floodplain laws is to limit the allowable land uses within a floodplain. Preventing some agricultural operations in the floodplain is also possible. The Town of Castile does not allow animal waste storage facilities in areas of special flood hazard unless certain precautions are taken such as the creation of dikes or levees. Another option to improve flood regulations is to limit fill in flood zones. For example, the Town of Byron restricts fill in flood areas as fill brought into a flood zone has the potential to change the boundaries of the flood zone.

Methods

Some floodplain regulations were created as a standalone law. This option is acceptable, but it may be more beneficial to incorporate them directly into the municipality's zoning law, increasing the visibility of floodplain regulations in the community bringing them to the direct attention of planning/zoning board members. Flood ordinances are most effective when also integrated with site plan review, environmental quality review (SEQRA), and subdivision review. Similarly, flood zones should be incorporated into zoning maps. Bringing flood regulations out into the forefront exposes them to more people and will also help to influence their update when zoning laws are reviewed and updated.

A flood EPOD may prohibit the following without a variance or special permit:

- construction or operation of onsite-wastewater
- new structures, including parking lots
- mining, filling, grading, paving, excavation or drilling operations

If historical settlement patterns offer no feasible alternative for development, a licensed professional engineer or architect should develop or review structural design, specifications, and plans for construction and must certify that the design and methods of construction are in accordance with accepted standards of practice to floodproof the structure. The Towns of Brighton, Irondequoit, Mendon, and Riga have both a floodplain zoning ordinance (EPOD) and a standalone flood damage prevention ordinance.

4.3.5.3 Wetlands

There are significant wetlands in the Oatka Creek watershed, particularly in the northern half of the watershed where a post-glacial lake once existed, likely contributing to the wetlands occupying the landscape there today. Wetlands are places where saturation with water is the dominant factor determining both the nature of soil development and the types of plant and animal communities living in the soil and on its surface.[109] Freshwater wetlands commonly include shrub or forested swamps, marshes, bogs, and fens, and many lie along rivers and streams in the floodplain riparian zone. Wetlands serve a number of important functions within a watershed, including filtering sediment, chemical detoxification, nutrient removal, flood protection, shoreline stabilization, ground water recharge, stream flow maintenance, and wildlife and fisheries habitat. Wetlands are arguably among the most productive and economically valuable ecosystems in the world.

The US Army Corps of Engineers evaluates permit applications for essentially all construction activities that occur in the nation's waters, including Federal wetlands. Under the NYS Freshwater Wetlands Act, NYSDEC regulates wetlands 12.4 acres (5 hectares) or larger. Most New York State Freshwater Wetlands have been surveyed by the DEC – for most counties, the original wetland maps were completed and filed between 1984 and 1986 – and many are in the process of being re-surveyed. What can and should be done with a wetland can be subject to a broad range of interpretation and enforcement. A good deal depends upon the ability of federal, state, and local agencies to understand the context of wetlands within a watershed or subwatershed.

Municipalities should place extra emphasis on protecting wetlands. Wetland regulations in place at the state and federal level should be reviewed and understood by and local decision makers such as planning boards to ensure that property owners have submitted information and are allowed to proceed with projects based on state and federal approval when needed. Municipalities should also

strictly adhere to any local review and/or regulations in place regarding wetlands. Municipal officials such as planning board members, and code enforcement officers should be familiar with local regulations and prioritize the protection of wetlands in their project review approval and enforcement duties. County Environmental Management Councils and municipal Conservation Boards or Advisory Councils can be a great resource for information on unique natural areas such as wetlands.

Beyond the protection of wetlands areas themselves, municipalities should enact wetland buffers and regulations at the local level. Protection of the areas surrounding wetlands improves the functions of the wetland. This table from the *Planner's Guide to Wetland Buffers for Local Governments*[110] gives a general estimate of the distances where vegetated non-disturbance type buffers begin to be effective and the point where they are no longer needed to be effective by function. The actual effectiveness of these types of restrictive buffers varies case by case depending on the location, surrounding land uses, topography, soil type, buffer characteristics, watershed characteristics, etc.

Table 4.4: Recommended Buffer Widths by Wetland Function

Wetland Function	Special Features	Recommended Minimum Width (feet)
Sediment Reduction	Slopes (5-15%) and/or functionally valuable wetland	100
	Shallow slopes (<5%) or low quality wetland	50
	Slopes over 15%	Consider buffer width additions with each 1% increase of slope (e.g., 10 feet for each 1% of slope greater than 15%)
Phosphorus Reduction	Steep slope	100
	Shallow slope	50
Nitrogen (Nitrate) Reduction	Focus on shallow groundwater flow	100
Biological Contaminant and Pesticide Reduction	N/A	50
Wildlife Habitat and Corridor Protection	Unthreatened species	100
	Rare, threatened, and endangered species	200-300
	Maintenance of species diversity	50 in rural area 100 in urban area
Flood Control	N/A	Variable, depending on elevation of flood waters and potential damages

Adapted from: Center of Watershed Protection and United States Environmental Protection Agency. Wetlands and Watersheds: Adapting Watershed Tools to Protect Wetlands. United States Environmental Protection Agency, 2005.

Buffers often take the form of either areas where either additional review and approval are needed for disturbance or areas with specific restrictions regarding disturbances, land use, development, land cover, etc.; or a combination of both. Examples of buffer regulations/review concepts could include:

- Vegetation requirements
- Restrictions on use – permitted uses, non-permitted uses, uses permitted with approval, etc.
- Restrictions on fill
- Setback requirements from wetlands or wetland buffers for structures, development, certain land uses, etc.
- Classification of buffers to determine which are high priority to protect
- Requirement of a permit for disturbance/use including a review and approval process
- Multiple buffers – vegetated buffer, use/disturbance restriction buffer, buffer area requiring review/permit approval, structural setback (buffer), etc.
- A determination of which wetlands will have buffers[111]
- All wetlands and waters
- Specific types of wetlands (Federal, State, Non-Federal/State regulated, those of a specific size)
- Those within stream and river corridors, floodways, riparian buffers, or adjacent areas
- Specific identified and mapped wetlands
- A varying degree of regulation based on site – size, location, surrounding land uses, slope, soil type, etc.

To some extent, larger, more vegetated, and more restrictive wetland buffers are more effective,[112] but municipalities must determine what balance to strike between the buffer size and restrictions and other competing needs and interests.

4.4 Agriculture

Land use within the Oatka Creek watershed is largely devoted to agricultural uses, encompassing more than half of the total land use. This is nearly double the land area of the next highest land use type (property designated as residential accounts for 23% of the watershed). Farming can have a negative effect on water quality through erosion of crop land, sedimentation, and runoff contaminated with fertilizers or animal wastes. These effects can be mitigated through best management practices, and regulations in some cases. BMPs and regulations can be expensive to farm owners; focusing on areas closest to waterways is the most effective strategy for improving water quality and limiting hardship to farmers.

Many municipalities within the Oatka Creek watershed have strong representation by the farming community on local planning, zoning, and conservation boards. These bodies seek to balance quality of life issues of the entire community while considering the functions that are necessary to run a profitable agricultural business, all while meeting the obligations of federal, state and applicable local laws. The advancement of sound agricultural practices within the local farming community have been incrementally applied on local farms by a variety of agencies – in particular, local branches of the Natural Resources Conservation Service (NRCS, a service of the United States Department of Agriculture), county Cornell Cooperative Extension offices, and county Soil and Water Conservation District offices. This voluntary, gradual approach to implementing environmental BMPs has been successful, as evidenced by the growing

number of farming operations participating in programs like Agricultural Environmental Management and other USDA-sponsored conservation programs.

4.4.1 Land Use Tools for Agriculture

Counties and towns can proactively support local agriculture, particularly through right-to-farm laws, property tax reduction, purchase and transfer of development rights programs, and agricultural and farmland protection plans. Yet the land use tools described in Section 4.2 – comprehensive plans, zoning, subdivision ordinances – are equally important, as towns have primary land use and decision-making authority and these may be applied to farm operations in agricultural districts. For example, a town that wishes to prevent animal waste from entering water bodies may regulate the siting of barnyards (heavy use area) adjacent to a stream and require animals to be fenced out of the stream with all runoff addressed with an appropriate collection and treatment system according to Natural Resource Conservation Service standards. Locales known for their commitment to agriculture, such as Batavia, Bethany, LeRoy, Pavilion, Stafford, Castile, Covington, Gainesville, Middlebury, Orangeville, Perry, and Warsaw all have enabling legislation to this effect.

Yet the Commissioner of the Department of Agriculture and Markets can intervene when local governments enact laws that *unreasonably* restrict farm operations in agricultural districts. Town boards and county legislators should understand whether a local ordinance is unreasonable by the standard of state Agricultural Districts Law.[1] At the least, an ordinance should be clear, free of vague language that could be interpreted to impinge on the rights of farmers, and should be thoroughly vetted so that no particular farmer is unduly restricted by the proposed change. The best approach is an ordinance consistent with DEC standards that balances the need to uphold public health and safety alongside the needs of farmers to bring food to New York's table.

Generally, construction of on-farm buildings and the use of land for agricultural purposes should not be subject to site plan review, special use permits, or non-conforming use requirements when conducted in a state-certified agricultural district. The Department of Agriculture and Markets has developed a model streamlined site plan review process, available within *Guidelines for Review of Local Zoning and Planning Laws;*[113] the guide is a useful tool for understanding the limits of zoning and planning laws in agricultural districts. Questions concerning review of local laws should be directed to the Commissioner's office, preferably during the potential legislation's drafting stage.[114]

Two additional resources aimed at local planners and officials – *Planning for Agriculture in New York: A Toolkit for Towns and Counties*,[115] published by the American Farmland Trust in 2011, and the Department of State's James A. Coon Local Government Technical Series' *Local Laws and Agricultural Districts: How Do They Relate?*,[116] updated in May 2013 – also contain extensive information for local decision makers.

4.4.2 Agricultural Environmental Management (AEM)

Agricultural Environmental Management (AEM) is a voluntary program adopted by New York State to help farmers make common-sense, cost-effective and evidence-based decisions to help meet business objectives while protecting and conserving natural resources. A five-tiered process, from inventory to plan implementation, customizes best management practices to a particular farm; virtually identical farm operations in different locations may have entirely different environmental

[1] New York State Agriculture and Markets Law (AML) §305-a.

concerns. The result is a coordinated approach to implementing agricultural conservation practices that make a meaningful improvement to the health and stability of the natural environment. AEM is coordinated by county Soil and Water Conservation Districts in each of the four Oatka Creek watershed counties. AEM priorities are detailed in county AEM strategic plans which are updated on a five-year cycle. The plans prioritize actions by specific watersheds within the county based on local water quality concerns and input from a local advisory committee.

4.4.2.1 Participation and Outreach

While there are few farmers who have not had received at least some information on AEM, local stakeholders and municipal officials may be unaware of the AEM program. To encourage participation:

- Update mailing lists and collect all AEM data from previous years for focus watershed year
- Contact all landowner/farmers in via letters and follow-up phone calls to generate interest in a free, confidential AEM Risk Assessment
- Follow up with past participants of AEM in focus watershed to update information and encourage farms to move forward in tiered process
- Schedule outreach and education presentations and look for new opportunities to collaborate and form new partnerships.
- Conduct meetings with farmers as requested to complete tiered worksheets, including Tier 3 conservation plans.
- Prepare any Tier 3's for farmers interested in pursuing funding through agricultural nonpoint source grant program.
- Apply for agricultural nonpoint source grants and seek additional funding through other programs such as EQIP to implement high priority practices on farms in priority watersheds.
- Staff should attend AEM and any relevant trainings or updates as scheduled.
- Encourage ABMP field trials and demonstrations of new agricultural environmental technologies
- Incorporating AEM practices into local law where possible (ex: location of barnyards, additional drainage/runoff considerations in Site Plan Review)

4.4.1.2 Vegetated Buffers

Vegetative buffers on agricultural land are a cost-effective way to reduce phosphorus in Oatka Creek. Ag buffer strips could be located between crops, at the edge of crop fields or bordering waterbodies.

All existing agricultural uses should be grandfathered and allowed to continue their use if in place at the time of

adoption, but beyond that, municipalities have the option of allowing new agricultural land uses to be exempt from buffer regulations in the future, or requiring compliance. Neither the Tompkins County Model or Ithaca Model exempt agricultural uses in order to prevent the negative effects of runoff from future agricultural land which could include fertilizers, animal wastes and soil from erosion. The EPA Model suggests making farms with an approved Natural Resource Conservation Service Conservation Plan exempt from this type of law. Voluntary Agricultural Environmental Management techniques are often used to help farmers limit their effects on water quality in place of regulation. Conservation Tillage, Stripcropping, Ag-to-Forest Land Conversion, Ag-to-Wetland Conversion, Nutrient Management, Grazing Land Management, Terraces/Diversions, Streambank Protection, Barnyard Management, and Cropland Management are all strategies for supporting a healthy creek.

Table 4.5: Estimates of Percentage of Black Creek and Oatka Creek Watershed AEM Farms Using the Following BMPs [117]

BMPs	Genesee	Monroe
Conservation Tillage	30%	70%
Stripcropping	15%	45%
Ag-to-Forest Land Conversion	1%	10%
Ag-to-Wetland Conversion	5%	10%
Nutrient Management	45%	65%
Grazing Land Management	10%	35%
Terraces/Diversions	5%	55%
Streambank Protection	48%	40%
Barnyard Management	43%	50%
Cropland Management*	50%	75%

Specific data not available for Wyoming and Livingston Counties

4.4.2 Concentrated Animal Feeding Operations (CAFOs)

Small, family-operated farms have been consolidated into larger, more centralized operations known as Concentrated Animal Feeding Operations (CAFO), reflecting a trend towards economy of scale in agricultural commodity production. CAFOs are defined as lots or facilities where animals are stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period; they are categorized as either "large" or "medium" based on the numbers of animals confined.[118] CAFOs that discharge to waters of New York State are regulated by the DEC under the authority of the Clean Water Act through the New York State Pollution Discharge Elimination System (SPDES) (refer to Section 2.2.2.10 for more information on the SPDES program).[119] Intermittent, sporadic, even occasional flows to waters may be the norm for many CAFOs, but they are nonetheless discharges prohibited under the CWA.

Seventeen Concentrated Animal Feeding Operations (CAFOs) are located within the Oatka Creek watershed – 11 medium and six large. An additional seven CAFOs are located within a mile of the Oatka Creek watershed boundary. Identification of CAFOs near the watershed border is an important consideration, as manure spreading often takes place across large areas associated with the farm operation.

4.4.3 Alternative Energy Strategies

In aquatic ecosystems, phosphorous is usually the limiting nutrient for plant growth. This means that excessive amounts of phosphorous in a system can lead to an abundant supply of vegetation and low dissolved oxygen for fish. Manure from dairy cows contains approximately 2 lbs of phosphorus (and 13 lbs of nitrogen) per wet ton; 1,200 cows in a milking herd (a large CAFO) generate around 69 tons of manure every day.[120] Farms across the country have begun converting this manure into electricity via anaerobic methane digestion.

Soil and Water Conservation Districts lead the charge in enabling the development of anaerobic digesters with funding through NYSERDA, the USDA Rural Development program, EPA's AgSTAR program, USDA NRCS grants, and the NYS Department of Agriculture & Markets. Small-scale projects typically do not yet benefit from economies of scale; digester cost per head of cattle tends to be prohibitively high since dairy manure is not a particularly energy dense feedstock. Yet co-digestion alongside food waste increases separation efficiency and digestate balance. Several states, including Vermont, Massachusetts, California, and Connecticut have banned food waste from going to landfills and this trend is likely to continue. Digested effluent can be sold as a crop fertilizer and as animal bedding. Excess power may be sold to NYSEG under a power purchase agreement; that option is being explored for the greater Rochester market.[121]

NYSERDA's Agriculture Energy Efficiency Program (AEEP) also offers assistance in identifying and implementing electric and natural gas energy efficiency measures to eligible farms and on-farm producers, including orchards, dairies, greenhouses, vegetables, vineyards, grain dryers, and poultry farms.

4.5 Highway Department Practices

Paved development has the highest coefficient of runoff, and thus highway departments have a very important role in preserving roadway longevity and watershed quality. Many highway problems are drainage related. Roads and highways have the potential to generate and contribute substantial amounts of eroded material and other pollutants into local waterbodies. Specific contaminants associated with road runoff include sediment, oils and grease, heavy metals, garbage/debris, and road salts, as well as fertilizers, pesticides and herbicides applied to roadside facilities or spilled on or near roads. Hydrologically-connected roads – roads that are designed to contribute surface flow directly to a drainage channel – have the greatest potential to deliver road-derived contaminants to streams. New roads can also be a vector to human encroachment on the natural landscape and, in combination with other public services, can induce new development outside of traditional population centers.

A 2010 Paul Smith's College report on the effects and costs of road de-icing in the Adirondacks[122] details a series of best management practices for winter maintenance, including a salt management plan, development of an anti-icing strategy, and precision application techniques. To produce a high level of service at a modest cost, at pavement temperatures above 25ºF, Road Salt (NaCl) is probably the most cost effective choice, but at lower temperatures other chloride based deicers may be more cost effective.

4.5.1 Roads and Highways

Highway departments should follow NYS DOT design and guidance documents and manuals such as the NYS DOT Highway Design Manual,[123] the NYS DOT Environmental Manual,[124] and the Southern Tier Central Regional Planning *Highway Superintendents Roads and Water Quality Handbook*.[125]

4.5.2 Bridges and Culverts

Bridges present a number of additional risks to hydrologic function. In some cases, the bridge itself creates a direct connection between the roadway and stream if the bridge drain is not diverted to an on-land treatment facility (generally ground infiltration or retention). Bridges and culverts, if built too small, can restrict and concentrate stream flow, thereby creating or accelerating stream bank erosion and stream incision. When not properly maintained or designed, bridges and culverts will cause debris accumulation and contribute to upstream flooding and possible property damage. Bridges and culverts also have the potential to restrict wildlife passage and fish movement if not properly designed and maintained. Conversely, bridge crossings also offer excellent opportunities for recreational access to rivers and streams, a possibility that should be considered during any necessary construction or repair of such facilities.

SECTION 4.0 ENDNOTES

[59] Genesee/Finger Lakes Regional Planning Council. *Protecting Water Resources through Local Controls and Practices: An Assessment Manual for New York Municipalities*, 2006. http://www.gflrpc.org/Publications/LocalLaws/Manual/AppendixE1.pdf

[60] Smart Growth America. *Building Better Budgets: A National Examination of the Fiscal Benefits of Smart Growth Development*. May 2013. p. 4. http://www.smartgrowthamerica.org/documents/building-better-budgets.pdf.

[61] *Ibid*. p. 5.

[62] Sitkowski, Robert J. and Joel Russell, "Form and Substance: What New York Land Use Lawyers Need to Know about Form-Based Land Development Regulations," New York Zoning Law and Practice Report, Vol. 8 (3): Sep/Oct 2007. http://www.joelrussell.com/articles/Form-based%20Codes%20NY%20article%20(final).pdf

[63] Smith, Mark P., Roy Schiff, Arlene Olivero, and James MacBroom. T*he Active River Area: A Conservation Framework for Protecting Rivers and Streams*. The Nature Conservancy: April 2008. pp 1

[64] http://www.gflrpc.org/Publications/BlackOatka/Characterization/OatkaCreekWatershed/AppendixA.pdf

[65] NYS Stormwater Design Manual, 5-40 – 5-41….(table of parking sizes in 5-41)

[66] NYSDEC Division of Water. April 2008. "Better Site Design." http://www.dec.ny.gov/docs/water_pdf/bsdcomplete.pdf

[67] US Department of Agriculture Soil Conservation Service. June 1954. Agriculture Handbook No. 61. *A Manual on Conservation of Soil and Water*. http://naldc.nal.usda.gov/download/CAT87210574/PDF

[68] http://www.hort.cornell.edu/uhi/outreach/

[69] New York Standards and Specifications for Erosion and Sediment Controls, DEC, August, 2005. http://www.dec.ny.gov/chemical/29066.html

[70] City of Ithaca, New York Code Chapter 276: Site Plan Review, http://ecode360.com/8392737

[71] Town of Ithaca, New York Code Chapter 270: Zoning, Article XXIII: Site Plan Review and Approval Procedures, http://ecode360.com/8662406

[72] USGBC LEED for Neighborhood Development Technical Guidance Manual, 2013. "Section 2.12: Reduced Off-Street Parking Spaces." P. 55-56 http://www.usgbc.org/sites/default/files/Technical%20Guid.%20Man.%20for%20Sust.%20Neighborhoods_2012_Part%20A_1f_web.pdf

[73] USGBC LEED for Neighborhood Development Technical Guidance Manual, 2013. http://www.usgbc.org/sites/default/files/Technical%20Guid.%20Man.%20for%20Sust.%20Neighborhoods_2012_Part%20A_1f_web.pdf

[74] EPA MS4 Maps, Rochester, New York, updated May 22, 2012. http://www2.census.gov/geo/maps/dc10map/UAUC_RefMap/ua/ua75664_rochester_ny/

[75] US EPA. 2008. Fact Sheet: Green Infrastructure Approaches to Managing Wet Weather with Clean Water State Revolving Funds. http://www.epa.gov/owm/cwfinance/cwsrf/green_if.pdf

[76] Coyle, Kevin. http://www.neefusa.org/pdf/ELR2005.pdf environmental Literacy in America: What Ten Years of NEETF/Roper
Research and Related Studies Say About Environmental Literacy in the U.S. September 2005

[77] http://www.h2ohero.org

[78] http://www.h2ohero.org/landing/downloads/WEC%20Brochure.pdf

[79] http://commons.codeforamerica.org/
[80] http://adoptahydrant.org/
[81] Protecting Water Resources Through Local Controls and Practices, pg. 24
[82] http://www.health.ny.gov/environmental/water/drinking/wastewater_treatment_systems/docs/design_handbook.pdf
[83] http://www.dec.ny.gov/docs/water_pdf/dsgnstd2012intwwts.pdf
[84] Ontario County Planning Department http://www.gflrpc.org/Publications/LocalLaws/Manual/AppendixE10.pdf
[85] Protecting Water Resources Through Local Controls and Practices, pg. 24
[86] Town of Huron Septic Law, 2013. http://townofhuron.org/content/Generic/View/23:field=documents:/content/Documents/File/176.pdf
[87] http://www.neiwpcc.org/npsconference/11-presentations/Barden_NPS_2011.pdf
[88] http://www.ontswcd.com/Forms/SystemInspectionRequestForm.html
[89] http://www.health.ny.gov/forms/doh-359.pdf
[90] http://keukawatershed.com
[91] Waterfield, Holly. Otsego Lake Watershed Management Plan, Onsite Wastewater Management Program, SUNY Oneonta Biological Field Station.
[92] http://otnny.org/
[93] Montana Department of Environmental Quality, Water Protection Bureau. "Storm Water Discharges Associated with Construction Activity." http://www.deq.mt.gov/wqinfo/mpdes/stormwaterconstruction.mcpx
[94] New York State Department of Environmental Conservation, *New York Standards and Specification for Erosion and Sediment Control*, 2005. http://www.dec.ny.gov/chemical/29066.html
[95] http://www.dec.ny.gov/docs/water_pdf/appendixeesc.pdf
[96] http://www.dec.ny.gov/docs/water_pdf/appendixf1.pdf
[97] http://www.dec.ny.gov/docs/water_pdf/appendixgh.pdf
[98] http://www.dec.ny.gov/docs/water_pdf/gpsconspmt10.pdf SPDES General Permit for Stormwater Discharges for Construction Activity, effective January 29, 2010 through January 28, 2015.
[99] Southern Tier Central Regional Planning Council, Stormwater Toolbox. http://www.stcplanning.org/index.asp?pageId=128
[100] Genesee/Finger Lakes Regional Planning Council. *Protecting Water Resources through Local Controls and Practices: An Assessment Manual for New York Municipalities*, 2006. http://www.gflrpc.org/Publications/LocalLaws/Manual/AppendixE6.pdf
[101] Tompkins County Planning Department. "Enhancing Water Resources in Tompkins County: Benefits of Riparian Areas and Stream Buffers."
[102] EPA, Aquatic Buffer Model Ordinance, 9.19.2002, http://water.epa.gov/polwaste/nps/mol1.cfm
[103] Environmental Law Institute. "Conservation Thresholds for Land Use Planners." 2003. http://www.sonoraninstitute.org/images/stories/pdfs/Recommended_Reading/2011MorongoBasinWorkshopResources/conservationthresholds_forplanners_2003environmentallawinstitute.pdf
[104] EPA, Riparian Buffer Width, Vegetative Cover, and Nitrogen Removal Effectiveness: A Review of Current Science and Regulations, October 2005, http://permanent.access.gpo.gov/lps120964/600R05118.pdf Pg3
[105] EPA, Riparian Buffer Width, Vegetative Cover, and Nitrogen Removal Effectiveness: A Review of Current Science and Regulations, October 2005, http://permanent.access.gpo.gov/lps120964/600R05118.pdf
[106] Tompkins County New York Model Stream Buffer Ordinance, April 2009, Section 5.1.1 http://www.tompkins-co.org/planning/Water%20Resources/documents/Tompkins_Co_Model_Stream_Buffer_Ordinance04-09.pdf
[107] NYS DEC, New York State Stormwater Management Design Manual, August 2010, http://www.dec.ny.gov/chemical/29072.html, Chapter 5
[108] NYSDEC Model Local Law for Flood Damage Prevention with Optional Additional Language. http://www.schohariecounty-ny.gov/CountyWebSite/EmergencyManagement/NYSDEC-OptionalLanguage.pdf
[109] *Classification of Wetlands and Deepwater Habitats of the United States*. [Online] In *US EPA*. Retrieved 12/23/10 from http://www.fws.gov/wetlands/_documents/gNSDI/ClassificationWetlandsDeepwaterHabitatsUS.pdf
[110] Planners Guide to Wetland Buffers for Local Governments, Environmental Law Institute, March 2008, Washington D.C.
[111] Planners Guide to Wetland Buffers for Local Governments, Environmental Law Institute, March 2008, Washington D.C. pg. 5-6

[112] Planners Guide to Wetland Buffers for Local Governments, Environmental Law Institute, March 2008, Washington D.C.
[113] http://www.agriculture.ny.gov/AP/agservices/guidancedocuments/305-aZoningGuidelines.pdf
[114] http://www.agriculture.ny.gov/AP/agservices/agdistricts.html
[115] American Farmland Trust. Planning for Agriculture in New York: A Toolkit for Towns and Counties. 2011. http://www.farmland.org/documents/PlanningforAgriculturePDF.pdf
[116] http://www.dos.ny.gov/lg/publications/Local_Laws_and_Agricultural_Districts.pdf
[117] Statistics provided by Monroe and Genesee Soil and Water Conservation Districts.
[118] See *§ 122.23.b* under *Part 122—EPA Administered Permit Programs*. [Online] In *US EPA*. Retrieved 8/3/11 from http://www.epa.gov/npdes/regulations/cafo_final_rule2008_comp.pdf.
[119] *Concentrated Animal Feeding Operations (CAFO) - Final Rule*. [Online] In *US EPA*. Retrieved 8/3/11 from http://cfpub.epa.gov/npdes/afo/cafofinalrule.cfm. See also *Permits for Concentrated Animal Feeding Operations (CAFOs)*. [Online] In *New York State Department of Environmental Conservation*. Retrieved 8/3/11 from http://www.dec.ny.gov/permits/6285.html
[120] Q. Wang, E. Thompson, R. Parsons, G. Rogers, and D. Dunn. "Economic feasibility of converting cow manure to electricity: A case study of the CVPS Cow Power program in Vermont." *J. Dairy Sci*. 94 :4937–4949. doi: 10.3168/jds.2010-4124
[121] Finger Lakes Regional Sustainability Plan. May 2013. P. 46. http://sustainable-fingerlakes.org/wp-content/uploads/2013/01/FLRSP-Final-Plan.pdf
[122] Kelting, Daniel and Corey Laxson, Review of Effects and Costs of Road De-icing with Recommendations for Winter Road Management in the Adirondack Park, February 2010. Adirondack Watershed Institute Report # AWI2010-01, http://www.paulsmiths.edu/awi/files/Road_Deicing.pdf
[123] https://www.dot.ny.gov/divisions/engineering/design/dqab/hdm
[124] https://www.dot.ny.gov/divisions/engineering/environmental-analysis/manuals-and-guidance/epm
[125] http://www.stcplanning.org/index.asp?pageId=130

5.0 Recommendations for Local Laws, Plans, Programs, and Practices

5.1 Recommendations

Many of the gaps in local laws and practices across the watershed are similar. This section attempts to tailor recommendations to each specific municipality based on the Assessment, but also refers back to recommendations in section 4 that are applicable to multiple municipalities. These recommendations should be used as a starting point to help municipalities and counties focus in on what recommendations are their top priorities, and then determine what additional information is needed, and what steps need to be taken toward implementation.

The inclusion of some recommendations in this section that are standardized will hopefully facilitate the sharing of information between counties and municipalities; one of the strongest recommendations is to increase collaboration between groups. Water quality management is a regional issue and thus collaboration and standardization of strategies can be beneficial to all. Sharing of knowledge and expertise can also be financially beneficial; for example, two groups can share the cost of a joint training session, or neighboring municipalities can adopt the same model regulation. Collaboration and standardization can make initial efforts more efficient and allow groups to focus on implementation work. Shared practice allows for better design, better maintenance, and economic incentives that can deliver higher performance and lower cost.

5.1.1 Monroe County

Recommendations for Future Action by Local Officials:

- **Continue to prioritize and expand AEM Program** – As detailed in the Monroe County Soil and Water Conservation District's Agricultural Environmental Management (AEM) Strategic Plan 2009-2014, released in April 2011, continue to apply for funding to bring farms and farmers into the tier 1 (inventory) and tier 2 (assessment) through AEM Base Funding as well as funding for tier 3 (planning) and tier 4 (BMP implementation) through the Agricultural Nonpoint Source Abatement and Control Program.[126] Refer to Section 4.4.1 for more details.
- **Update Onsite Wastewater Treatment System regulations and handbook –** Monroe County Sanitary Code Article IIA, Chapter 569 (Private Sewage Disposal Systems)[127] allows construction of new and/or the alteration or repair of any existing residential on-site systems with a permit. However, Monroe County DOH only issues recommendations for inspections at property transfers. As the last update to the County's Private Sewage Disposal Systems law was in 1974 and the last revision to the Individual Sewage Disposal Handbook was in 1992, we recommend updating the law and handbook to reflect the latest technological advancements in systems design, engineering, and testing; to require inspection/permit renewal and subsequent repair when necessary at property transfer; to set a minimum inspection schedule timeframe including a tiered inspection schedule prioritizes the inspection of systems in closer proximity to the creek, systems located in more porous soils, and older systems; and to create setbacks from waterbodies, not just drinking water sources. See Section 4.3.3.1 for further details.

- **Continue stormwater best management practices** – SWCD conducts construction site and construction permit inspections at the request of municipalities. They also respond to requests for technical assistance including MS4 & Construction SPDES Permit assistance, SWPPP Review, construction site complaints, stormwater pond assistance, and MS4 audit assistance upon municipal request. SWCD encourages use of indigenous plants, and has an annual plant sale. CCE conducts education programs relating to water, proper fertilizing, and nutrient runoff from gardens and lawns, and youth programs relating to water quality. Monroe County EcoPark provides residents with a location to dispose of, or recycle certain items including household hazardous waste materials. Maintain program and expand hours and satellite pickup locations where possible.
- **Continue stream monitoring and protection best practices –** SWCD has assisted municipalities in stream bank protection though resloping and installation of vegetation, willow stakes, vegetated rip rap, and toe deflector stones to redirect water to the center of the creek channel, and have also cleared debris from waterways. They also encourage municipalities and residents to vegetate streambanks, discourage mowing to the edge of the stream banks, and have held workshops on erosion and sediment control. The Community Water Watch Program facilitates stream monitoring by volunteers and is sponsored and administered by Monroe County DOH.
- **Continue education and outreach efforts** – Stormwater Coalition of Monroe County conducts water quality and resource conservation related public outreach, programs, distribution of materials; they also conduct the H2O Hero education campaign, and does OWTS outreach/education with residents.

5.1.1.1 Town of Chili

Chili is one of the three regulated MS4s in the Oatka Creek watershed and is the most urbanized community within the case study area, experiencing significant suburban expansion in recent years in the northern and northeastern sections of town. Chili local laws are generally strong in addressing priority water quality issues. Most of the major issues included in the previous review of local laws have been addressed through Chili's Zoning Code, Subdivision Review Standards, standalone stormwater laws, and have also been identified in the Comprehensive Plan. Chili also has stormwater management regulations and practices in place.

Past recommendations for Chili from the *Controlling Sediment in the Black and Oatka Creek* project have included the creation of local laws related to Phase II stormwater compliance, and since the last assessment, three laws have been created that address many water quality issues (Illicit Discharge Law, Construction Site Stormwater Pollution Prevention Law, and the Post Construction Stormwater Pollution Prevention Law). The town has done some work related to on-site wastewater treatment by reviewing septic plans during site plan review and encouraging properties to connect to municipal water and sewer where possible. Much of the focus for the town now should be on the enforcement of these laws, and other water quality related regulations in their zoning code. The following recommendations can further assist with the protection of the Oatka Creek watershed as well as the implementation of the six categories outlined in the *2030 Comprehensive Plan*.

Land Use Documents Reviewed:

- ***Zoning***. From the Code of the Town of Chili. 2006-2010 Updates.

- ***Site Plan Review***. From the Code of the Town of Chili. 2008.
- ***Subdivision of Land***. From the Code of the Town of Chili. 2008.
- ***Flood Damage Prevention***. From the Code of the Town of Chili. 2008.
- ***Comprehensive Plan – 2030***, Adopted November 2, 2011.
- ***Construction Site Stormwater Pollution Prevention and Sediment Control***. Local Law No. 3-2007.
- ***Illicit Discharge Connections***. Local Law No. 4-2007.
- ***Post-Construction Stormwater Pollution Prevention***. Local Law No. 5-2007.

Previously Reviewed:

- ***Subdivision of Land***. From the Code of the Town of Chili. October 1999.
- ***Chapter 115: Zoning***. From the Code of the Town of Chili. June 2000.

Recommendations for Future Action by Local Officials:

- **Create riparian buffers –** The lack of riparian buffers is the biggest gap in Chili's local laws related to water quality. Riparian buffers and similar protections can be very effective tools in protecting water quality, preventing erosion and sedimentation, reducing nonpoint source pollution, etc. The current zoning law specifically prevents excavation closer than 50 feet from a stream, but an actual buffer area with vegetation requirements and use restrictions should be created. Refer to Section 4.3.5.1 for recommendations and models.
- **Strengthen floodplain regulations** – Chili appears to have no restrictions on agriculture in the floodway. The town might want to look into regulating future farm practices such as the location of manure pits and barnyards, while grandfathering current agricultural uses. Review the list of optional flood regulation additions created by DEC in Appendix F to see some potential options; also see Section 4.3.5.2 for more details.
- **Strengthen onsite wastewater treatment regulations** – We recommended that the County strengthen its Sanitary Code to improve on-site wastewater treatment regulations especially regarding required inspections, connection to public water/sewer and setbacks (potentially from waterways, wetlands and floodplains). The Town of Chili may also consider these regulations to be included in local law. See Section 4.3.3.1 for further details.
- **Adopt clustered development regulations –** Chili's master plan recommends adopting cluster development regulations. Consider adopting the LEED for Neighborhood Development (LEED-ND) Standard to assist with selection of suitable lands, street design, development of pedestrian linkages, green infrastructure and building design, and other performance standards as needed. See Section 4.2.4.

5.1.1.2 Town of Riga

Past recommendations for Riga from the *Controlling Sediment in the Black and Oatka Creek* project included updating the comprehensive plan to emphasize the protection of water resources and importance of watershed planning efforts. Since the last assessment, the comprehensive plan has been updated and several laws have been passed that address water quality issues, including a flood prevention law and an Environmental Protection Overlay District establishing riparian buffers.

The Town Code also empowers the Planning Board to use conservation easements. Much of the focus for the town now should be on the enforcement of these laws, and other water quality related regulations in their zoning code. As mentioned in the comprehensive plan, the Village of Churchville

and Town of Riga should consider creating a single unified zoning code to help with consistent use districts, building form and scale, and buffering requirements.

Land Use Documents Reviewed:

- ***Churchville/Riga Comprehensive Plan***. Adopted September 10, 2008.
- ***Chapter 51***: ***Flood Damage Prevention***. From the Code of the Town of Riga. Local Law 2-2008.
- ***Chapter 72, Article III***: Private Sewage Disposal. From the Code of the Town of Riga.

Previously Reviewed:

- ***Chapter 81: Subdivision of Land.*** Code of the Town of Riga. 1997.
- ***Chapter 95: Zoning.*** Code of the Town of Riga. 2000.

Recommendations for Future Action by Local Officials:

- **Onsite wastewater treatment regulations** – We recommended that the County strengthen its Sanitary Code to improve on-site wastewater treatment regulations especially regarding required inspections, connection to public water/sewer and setbacks (potentially from waterways, wetlands and floodplains). The Town of Riga may also consider these regulations to be included in local law. See Section 4.3.3.1 for further details.
- **Floodplain regulations** – Update chapter 95-23 B (1) of the FPO Floodplain Overlay District section to reflect the newest Flood Insurance Rate Map (FIRM) dated August 28, 2008. Review the list of optional flood regulation additions created by DEC in Appendix F to see some potential options; also see Section 4.3.5.2 for more details.
- **Public participation and involvement –** The Comprehensive Plan encourages both The Town and Village to work closely with the Black Creek Watershed Coalition (BCWC) in order to protect the creek and its watershed. We also encourage joint participation with the Oatka Creek Watershed Committee.

5.1.1.3 Village of Scottsville

As explained in the 2006 Municipal Law Review, the Town of Scottsville's land use control regulations revealed a number of important best management practices already in use. Floodplain management, drainage reports for new developments, and the identification of sensitive soils were among BMPs in place. The joint Wheatland/Scottsville Comprehensive Plan also sets a clear vision for land preservation efforts, particularly around established woodlots and natural areas. The plan cites the mutual desire among town and village residents to see "innovative design practices" and "natural design themes" implemented in new developments. The goal of mapping and protection of environmentally sensitive areas in the future is also cited in the plan.

Land Use Documents Reviewed:

- ***Chapter 90: Zoning, Section 11: Flood Damage Prevention***. 1988, updated 2008 by Local Law 7-2008.

Previously Reviewed:

- ***Code of the Village of Scottsville.*** 2005.
- ***Wheatland/Scottsville Joint Comprehensive Plan: 2004—2024.*** 2004.

Recommendations for Future Action by Local Officials:

- **Continue public participation and involvement –** The Comprehensive Plan encourages land preservation efforts both The Town of Wheatland and Village of Scottsville in order to protect the creek and its watershed.
- **Update subdivision regulations –** Consider adopting the LEED for Neighborhood Development (LEED-ND) Standard to assist with selection of suitable lands, street design, development of pedestrian linkages, green infrastructure and building design, and other performance standards as needed. See Section 4.2.4.
- **Create riparian buffers –** A buffer area with vegetation requirements and use/development restrictions should be created. Riparian buffers and similar protections can be very effective tools in protecting water quality, preventing erosion and sedimentation, reducing nonpoint source pollution, etc. Refer to Section 4.3.5.1 for buffer recommendations and models.
- **Strengthen floodplain regulations** – Review the list of optional flood regulation additions created by DEC in Appendix F to see some potential options; also see Section 4.3.5.2 for more details.

5.1.1.4 Town of Wheatland

As explained in the 2006 Municipal Law Review, the Town of Wheatland's land use control regulations revealed a number of important best management practices already in use. Floodplain management, drainage reports for new developments, and the identification of sensitive soils were among BMPs in place. The joint Wheatland/Scottsville Comprehensive Plan also sets a clear vision for land preservation efforts, particularly around established woodlots and natural areas. The plan cites the mutual desire among town and village residents to see "innovative design practices" and "natural design themes" implemented in new developments. The goal of mapping and protection of environmentally sensitive areas in the future is also cited in the plan.

Land Use Documents Reviewed:

- ***Chapter 130: Zoning, Section 8: Flood Damage Prevention***. 1978, 1988, updated 2008 by Local Law 3-2008.

Previously Reviewed:

- ***Chapter 82: Subdivision of Land.*** From the Code of the Town of Wheatland. March 1999.
- ***Chapter 98: Zoning.*** From the Code of the Town of Wheatland. December 1999.
- ***Wheatland/Scottsville Joint Comprehensive Plan: 2004 - 2024.*** 2004.

Recommendations for Future Action by Local Officials:

- **Continue public participation and involvement –** The Comprehensive Plan encourages land preservation efforts both The Town of Wheatland and Village of Scottsville in order to protect the creek and its watershed.
- **Update subdivision regulations –** Consider adopting the LEED for Neighborhood Development (LEED-ND) Standard to assist with selection of suitable lands, street design, development of pedestrian linkages, green infrastructure and building design, and other performance standards as needed. See Section 4.2.4.
- **Create riparian buffers –** A buffer area with vegetation requirements and use/development restrictions should be created. Riparian buffers and similar protections can be very effective tools in protecting water quality, preventing erosion and sedimentation, reducing nonpoint source pollution, etc. Refer to Section 4.3.5.1 for buffer recommendations and models.

- **Strengthen floodplain regulations** – Review the list of optional flood regulation additions created by DEC in Appendix F to see some potential options; also see Section 4.3.5.2 for more details.

5.2.1 Genesee County

Recommendations for Future Action by Local Officials:

- **Continue to prioritize and expand AEM Program** – As detailed in the Genesee County Soil and Water Conservation District's 2013 Annual Report[128], continue to apply for funding to bring farms and farmers into the tier 1 (inventory) and tier 2 (assessment) through AEM Base Funding as well as funding for tier 3 (planning) and tier 4 (BMP implementation) through the Agricultural Nonpoint Source Abatement and Control Program.[129] Refer to Section 4.4.1 for more details
- **Update Onsite Wastewater Treatment System regulations –** Regulations regarding on-site wastewater treatment systems in Genesee County could be strengthened. Currently the Genesee County Sanitary Code[130] requires inspections/permits to construct, alter, repair or extend systems. Permits/inspections are not required at property transfer; some permits can simply be transferred to new property owners. Inspections often occur at this time based on requests from lenders issuing financing or refinancing. As of 2011, the Health Department conducts inspections when there are complaints and upon written request. We recommend updating the code to reflect the latest technological advancements in systems design, engineering, and testing. Require inspection/permit renewal and subsequent repair when necessary at property transfer. Set a minimum inspection schedule timeframe; a tiered inspection schedule prioritizes the inspection of systems in closer proximity to the creek, systems located in more porous soils, and older systems. Create setbacks from waterbodies, not just drinking water sources. See Section 4.3.3.1 for further details.
- **Encourage public participation and involvement –** Establish an Environmental Management Council, a volunteer advisory board to the county legislature enabled under Article 47 of the New York State Environmental Conservation Law. EMCs advise the county legislature on matters affecting the preservation, development, and use of the natural features of the county that have a bearing on environmental quality; they also serve as a link between the government and the public.
- **Expand collection of Household Hazardous Wastes**. The GLOW Region Solid Waste Management Committee has a Household Hazardous Waste collection program that is held once a year and rotates between Genesee, Livingston and Wyoming Counties. Increasing the number of collections and the number of collection sites would make participation more convenient and would likely increase the number of participants and total waste collection. Currently people have the choice of either waiting up to three years for collection within their own county; or waiting up to one year and driving to another county.

5.2.1.1 Town of Bergen

Land Use Documents Reviewed: N/A

Previously Reviewed:

- ***Town of Bergen, Village of Bergen Comprehensive Plan 2015.*** April 1996.

- ***Town of Bergen Zoning Law.*** Adopted 9/25/83.
- ***Town of Bergen Land Subdivision Regulations.*** Approved 3/24/69; revised 9/5/91.
- ***Town of Bergen Stormwater Management and Erosion Control Law.*** Date unknown

Recommendations for Future Action by Local Officials:

- **Revise comprehensive plan** – revise comprehensive plan to emphasize the protection of local water resources and recognizing the importance of watershed planning efforts within the Oatka and Black Creek watersheds and other neighboring watersheds within the municipality.
- **Develop stormwater management ordinance** – develop a local law that works in conjunction with existing zoning, site plan and/or subdivision ordinances; it should account for topography and soil type and require retaining and protection of trees and other natural vegetation on and near disturbed sites to minimize erosion. Such a law would require developers to prepare a Stormwater Pollution Prevention Plan and submit it to the relevant local board as part of the process for new development. See Section 4.3 for details.
- **Develop green infrastructure standards** – Consider opportunities to retrofit existing properties with new facilities, such as stormwater detention/retention ponds; also attempt natural conveyance restoration wherever possible. Continue ditch maintenance using best management practices, maintaining vegetative buffers near waterbodies, lining sensitive areas with rip rap and seeding disturbed areas immediately after are recommended practices. See Section 4.2.3 for more information.
- **Strengthen onsite wastewater treatment regulations** – We recommended that the County strengthen its Sanitary Code to improve on-site wastewater treatment regulations especially regarding required inspections, connection to public water/sewer and setbacks (potentially from waterways, wetlands and floodplains). The Town of Bergen could also consider these regulations to be included in local law. See Section 4.3.3.1 for further details.
- **Create riparian buffers –** Riparian buffers and similar protections can be very effective tools in protecting water quality, preventing erosion and sedimentation, reducing nonpoint source pollution, etc. The current zoning law specifically prevents excavation closer than 50 feet from a stream, but an actual buffer area with vegetation requirements and use restrictions should be created. Refer to Section 4.3.5.1 for buffer recommendations and models.
- **Continue education and outreach** – to area farmers by the Genesee County SWCD and CCE regarding agricultural best management practices and the various federal and state incentive programs available for implementation. Support education and outreach (mailings, brochures, etc.) to individuals whose lands are adjacent to Oatka Creek segments or contain contributing tributaries. Recommended focus areas include nonpoint source pollution, riparian rights and landowner responsibilities, setbacks, floodplain protection and other stream maintenance BMPs. See section 4.3.1 for details.
- **Update subdivision regulations –** Consider adopting the LEED for Neighborhood Development (LEED-ND) Standard to assist with selection of suitable lands, street design, development of pedestrian linkages, green infrastructure and building design, and other performance standards as needed. See Section 4.2.4.
- **Strengthen floodplain regulations** – Review the list of optional flood regulation additions created by DEC in Appendix F to see some potential options; also see Section 4.3.5.2 for more details.

5.2.1.2 Town of Bethany

Past recommendations for Bethany from the *Controlling Sediment in the Black and Oatka Creek* project have included updating the comprehensive plan and zoning code to emphasize the protection of water resources and importance of watershed planning efforts. Since the last assessment, the comprehensive plan and zoning ordinances were updated to reflect these additions.

Land Use Documents Reviewed:

- ***Town of Bethany Comprehensive Plan.*** Updated 2008.
- ***Town of Bethany Zoning Law.*** Amended 2008.

Previously Reviewed:

- ***Town of Bethany Comprehensive Plan.*** Adopted April,1996.
- ***Town of Bethany Comprehensive Emergency Management Plan.*** Adopted April 20, 2002.
- ***Town of Bethany Zoning Law.*** Adopted June 19, 1985; amended through October 11, 2004.
- ***Town of Bethany Stormwater Management and Erosion Control Law.*** 1994.
- ***Town of Bethany Flood Damage Prevention Law.*** 1989.

Recommendations for Future Action by Local Officials:

- **Develop onsite wastewater treatment regulations** – We recommended that the County strengthen its Sanitary Code to improve on-site wastewater treatment regulations especially regarding required inspections, connection to public water/sewer and setbacks (potentially from waterways, wetlands and floodplains). As all residents in Bethany have private septic systems, the Town could also consider these regulations to be included in local law. See Section 4.3.3.1 for further details.
- **Develop green infrastructure standards** – Consider opportunities to retrofit existing properties with new facilities, such as stormwater detention/retention ponds; also attempt natural conveyance restoration wherever possible. Continue ditch maintenance using best management practices, maintaining vegetative buffers near waterbodies, lining sensitive areas with rip rap and seeding disturbed areas immediately after are recommended practices. See Section 4.2.3 for more information.
- **Continue education and outreach** – to area farmers by the Genesee County SWCD and CCE regarding agricultural best management practices and the various federal and state incentive programs available for implementation. Support education and outreach (mailings, brochures, etc.) to individuals whose lands are adjacent to Oatka Creek segments or contain contributing tributaries. Recommended focus areas include nonpoint source pollution, riparian rights and landowner responsibilities, setbacks, floodplain protection and other stream maintenance BMPs. See section 4.3.1 for details.
- **Create riparian buffers –** The zoning law suggests that stream corridors should be delineated and that the corridor should act as the minimum set back to development. This corridor should be delineated as a buffer area with vegetation requirements and use. Riparian buffers and similar protections can be very effective tools in protecting water quality, preventing erosion and sedimentation, reducing nonpoint source pollution, etc. Refer to Section 4.3.5.1 for recommendations and models.
- **Strengthen floodplain regulations** – Review the list of optional flood regulation additions created by DEC in Appendix F to see some potential options; also see Section 4.3.5.2 for more details.

5.2.1.3 Town of Byron

As explained in the 2006 Municipal Law Review, the Town of Byron's land use control regulations revealed a number of important best management practices already in use.

Land Use Documents Reviewed:

- ***Zoning Law of the Town of Byron.*** 2013.

Previously Reviewed:

- ***Official Zoning Ordinance: Town of Byron***. April 23, 1997
- ***Town of Byron Land Subdivision Regulations***. 6/19/91
- ***Town of Byron Comprehensive Plan***. 10/13/93

Recommendations for Future Action by Local Officials:

- **Amend new zoning ordinance** – to provide guidance to Planning Board in Site Plan Review. See Section 4.2.3 for more details.
- **Revise comprehensive plan** – revise comprehensive plan to emphasize the protection of local water resources and recognizing the importance of watershed planning efforts within the Oatka and Black Creek watersheds and other neighboring watersheds within the municipality.
- **Develop stormwater management ordinance** – develop a local law that works in conjunction with existing zoning, site plan and/or subdivision ordinances. Such a law would require developers to prepare a Stormwater Pollution Prevention Plan and submit it to the relevant local board as part of the process for new development. See Section 4.3 for details.
- **Develop green infrastructure standards** – Consider opportunities to retrofit existing properties with new facilities, such as stormwater detention/retention ponds; also attempt natural conveyance restoration wherever possible. Continue ditch maintenance using best management practices, maintaining vegetative buffers near waterbodies, lining sensitive areas with rip rap and seeding disturbed areas immediately after are recommended practices. See Section 4.2.3 for more information.
- **Develop onsite wastewater treatment regulations** – We recommended that the County strengthen its Sanitary Code to improve on-site wastewater treatment regulations especially regarding required inspections, connection to public water/sewer and setbacks (potentially from waterways, wetlands and floodplains). The Town of Byron could also consider these regulations to be included in local law. See Section 4.3.3.1 for further details.
- **Create/Improve riparian buffers –** While structures are not allowed within 50ft of streams, an actual buffer area with vegetation requirements and use/development restrictions should be created. Riparian buffers and similar protections can be very effective tools in protecting water quality, preventing erosion and sedimentation, reducing nonpoint source pollution, etc. The current zoning law specifically prevents excavation closer than 50 feet from a stream, but an actual buffer area with vegetation requirements and use restrictions should be created. Refer to Section 4.3.5.1 for buffer recommendations and models.
- **Continue education and outreach** – to area farmers by the Genesee County SWCD and CCE regarding agricultural best management practices and the various federal and state incentive programs available for implementation. Support education and outreach (mailings, brochures, etc.) to individuals whose lands are adjacent to Oatka Creek segments or contain contributing tributaries. Recommended focus areas include nonpoint source pollution, riparian rights and landowner

responsibilities, setbacks, floodplain protection and other stream maintenance BMPs. See section 4.3.1 for details.

- **Update subdivision regulations –** Consider adopting the LEED for Neighborhood Development (LEED-ND) Standard to assist with selection of suitable lands, street design, development of pedestrian linkages, green infrastructure and building design, and other performance standards as needed. See Section 4.2.4.
- **Strengthen floodplain regulations** – Review the list of optional flood regulation additions created by DEC in Appendix F to see some potential options; also see Section 4.3.5.2 for more details.

5.2.1.4 Town of LeRoy

Land Use Documents Reviewed:

- ***Agriculture and Farmland Protection Plan,*** 2010.
- ***Site Plan Review Guidelines***, 1996.
- ***Planned Unit Development***, 1999.
- ***Chapter 165: Flood Ordinance***, 1999.

Previously Reviewed:

- ***Chapter 135: Subdivision of Land.*** From the Code of the Town of LeRoy. 1989.
- ***Chapter 165: Zoning Regulations.*** From the Code of the Town of LeRoy. July 1999.

Recommendations for Future Action by Local Officials:

- **Develop stormwater management ordinance** – develop a local law that works in conjunction with existing zoning, site plan and/or subdivision ordinances. Such a law would require developers to prepare a Stormwater Pollution Prevention Plan and submit it to the relevant local board as part of the process for new development. See Section 4.3 for details.
- **Develop green infrastructure standards** – Consider opportunities to retrofit existing properties with new facilities, such as stormwater detention/retention ponds; also attempt natural conveyance restoration wherever possible. Continue ditch maintenance using best management practices, maintaining vegetative buffers near waterbodies, lining sensitive areas with rip rap and seeding disturbed areas immediately after are recommended practices. See Section 4.2.3 for more information.
- **Onsite wastewater treatment regulations** – We recommended that Genesee County strengthen its Sanitary Code to improve on-site wastewater treatment regulations especially regarding required inspections, connection to public water/sewer and setbacks (potentially from waterways, wetlands and floodplains). The Town of LeRoy could also consider these regulations to be included in local law. See Section 4.3.3.1 for further details.
- **Continue education and outreach** – to area farmers by the Genesee County SWCD and CCE regarding agricultural best management practices and the various federal and state incentive programs available for implementation. Support education and outreach (mailings, brochures, etc.) to individuals whose lands are adjacent to Oatka Creek segments or contain contributing tributaries. Recommended focus areas include nonpoint source pollution, riparian rights and landowner responsibilities, setbacks, floodplain protection and other stream maintenance BMPs. See section 4.3.1 for details.
- **Create riparian buffers –** The Town's Agriculture Plan's Design and Operation Standards recommends instituting 15 foot minimum setbacks. A buffer area with vegetation requirements and use/development restrictions should be created. Riparian buffers and similar protections can

be very effective tools in protecting water quality, preventing erosion and sedimentation, reducing nonpoint source pollution, etc. A buffer (or overlay) including vegetation requirements should be created. Refer to Section 4.3.5.1 for recommendations and models.

- **Strengthen floodplain regulations** – Review the list of optional flood regulation additions created by DEC in Appendix F to see some potential options; also see Section 4.3.5.2 for more details.
- **Update subdivision regulations –** Consider adopting the LEED for Neighborhood Development (LEED-ND) Standard to assist with selection of suitable lands, street design, development of pedestrian linkages, green infrastructure and building design, and other performance standards as needed. See Section 4.2.4.

5.2.1.5 Village of LeRoy

Land Use Documents Reviewed:

- ***Site Plan Review Guidelines***, 1990.
- ***Planned Unit Development***, 1990.
- ***Flood Ordinance***, 1993.

Previously Reviewed:

- ***Village of LeRoy Comprehensive Plan.*** March, 2001.
- ***Chapter 50: Subdivision Regulations.*** From the Code of the Village of LeRoy. 1972.
- ***Chapter 215: Zoning Regulations.*** From the Code of the Village of LeRoy, circa 1990.

Recommendations for Future Action by Local Officials:

- **Revise comprehensive plan** – Update comprehensive plan, including an emphasis on the protection of local water resources and recognizing the importance of watershed planning efforts within the Oatka Creek watershed and other neighboring watersheds within the municipality.
- **Develop stormwater management ordinance** – develop a local law that works in conjunction with existing zoning, site plan and/or subdivision ordinances. Such a law would require developers to prepare a Stormwater Pollution Prevention Plan and submit it to the relevant local board as part of the process for new development. See Section 4.3 for details.
- **Develop green infrastructure standards** – Consider opportunities to retrofit existing properties with new facilities, such as stormwater detention/retention ponds; also attempt natural conveyance restoration wherever possible. Continue ditch maintenance using best management practices, maintaining vegetative buffers near waterbodies, lining sensitive areas with rip rap and seeding disturbed areas immediately after are recommended practices. See Section 4.2.3 for more information.
- **Onsite wastewater treatment regulations** – We recommended that Genesee County strengthen its Sanitary Code to improve on-site wastewater treatment regulations especially regarding required inspections, connection to public water/sewer and setbacks (potentially from waterways, wetlands and floodplains). The Village of LeRoy could also consider these regulations to be included in local law. See Section 4.3.3.1 for further details.
- **Continue education and outreach** – to area farmers by the Genesee County SWCD and CCE regarding agricultural best management practices and the various federal and state incentive programs available for implementation. Support education and outreach (mailings, brochures, etc.) to individuals whose lands are adjacent to Oatka Creek segments or contain contributing

tributaries. Recommended focus areas include nonpoint source pollution, riparian rights and landowner responsibilities, setbacks, floodplain protection and other stream maintenance BMPs. See section 4.3.1 for details.

- **Create riparian buffers –** A buffer area with vegetation requirements and use/development restrictions should be created. Riparian buffers and similar protections can be very effective tools in protecting water quality, preventing erosion and sedimentation, reducing nonpoint source pollution, etc. A buffer (or overlay) including vegetation requirements should be created. Refer to Section 4.3.5.1 for recommendations and models.
- **Strengthen floodplain regulations** – Review the list of optional flood regulation additions created by DEC in Appendix F to see some potential options; also see Section 4.3.5.2 for more details.
- **Update subdivision regulations –** Consider adopting the LEED for Neighborhood Development (LEED-ND) Standard to assist with selection of suitable lands, street design, development of pedestrian linkages, green infrastructure and building design, and other performance standards as needed. See Section 4.2.4.

5.2.1.6 Town of Pavilion

Land Use Documents Reviewed:

- ***Town of Pavilion Comprehensive Plan***, 2002.
- ***Town of Pavilion Zoning Ordinance***. Adopted May 1990; amended 2006.
- ***Site Plan Review.*** 2006.
- ***Planned Unit Development***, 2006.
- ***Flood Ordinance***, 2006.

Previously Reviewed:

- ***Town of Pavilion Land Subdivision Regulations.*** 1991.
- ***Town of Pavilion Zoning Ordinance***. Adopted May 1990; amended through April 1995.

Recommendations for Future Action by Local Officials:

- **Revise comprehensive plan** – Update comprehensive plan, including an emphasis on the protection of local water resources and recognizing the importance of watershed planning efforts within the Oatka Creek watershed and other neighboring watersheds within the municipality.
- **Onsite wastewater treatment regulations** – We recommended that Genesee County strengthen its Sanitary Code to improve on-site wastewater treatment regulations especially regarding required inspections, connection to public water/sewer and setbacks (potentially from waterways, wetlands and floodplains). The Town of Pavilion could also consider these regulations to be included in local law. See Section 4.3.3.1 for further details.
- **Continue education and outreach** – to area farmers by the Genesee County SWCD and CCE regarding agricultural best management practices and the various federal and state incentive programs available for implementation. Support education and outreach (mailings, brochures, etc.) to individuals whose lands are adjacent to Oatka Creek segments or contain contributing tributaries. Recommended focus areas include nonpoint source pollution, riparian rights and landowner responsibilities, setbacks, floodplain protection and other stream maintenance BMPs. See section 4.3.1 for details.
- **Create riparian buffers –** The comprehensive plan recommends instituting environmental overlays along the major streams to limit development and agricultural use. A buffer area with

vegetation requirements and use/development restrictions should be created. Riparian buffers and similar protections can be very effective tools in protecting water quality, preventing erosion and sedimentation, reducing nonpoint source pollution, etc. A buffer (or overlay) including vegetation requirements should be created. Refer to Section 4.3.5.1 for recommendations and models.

- **Strengthen floodplain regulations** – Review the list of optional flood regulation additions created by DEC in Appendix F to see some potential options; also see Section 4.3.5.2 for more details.
- **Update subdivision regulations –** Referring proposals to the SWCD is a good practice. Consider also adopting the LEED for Neighborhood Development (LEED-ND) Standard to assist with selection of suitable lands, street design, development of pedestrian linkages, green infrastructure and building design, and other performance standards as needed. See Section 4.2.4.

5.2.1.7 Town of Stafford

Land Use Documents Reviewed:

- ***Comprehensive Plan.*** 2/07, revised 7/09.
- ***Town of Stafford Zoning Law.*** Amended 11/9/09.

Previously Reviewed:

- ***Town of Stafford Zoning Law.*** Adopted 1987; amended through December 1998.

Recommendations for Future Action by Local Officials:

- **Onsite wastewater treatment regulations** – We recommended that Genesee County strengthen its Sanitary Code to improve on-site wastewater treatment regulations especially regarding required inspections, connection to public water/sewer and setbacks (potentially from waterways, wetlands and floodplains). The Town of Stafford could also consider these regulations to be included in local law. See Section 4.3.3.1 for further details.
- **Continue education and outreach** – to area farmers by the Genesee County SWCD and CCE regarding agricultural best management practices and the various federal and state incentive programs available for implementation. Support education and outreach (mailings, brochures, etc.) to individuals whose lands are adjacent to Oatka Creek segments or contain contributing tributaries. Recommended focus areas include nonpoint source pollution, riparian rights and landowner responsibilities, setbacks, floodplain protection and other stream maintenance BMPs. See section 4.3.1 for details.
- **Create riparian buffers –** The comprehensive plan recommends instituting environmental overlays along the major streams to limit development and agricultural use. A buffer area with vegetation requirements and use/development restrictions should be created. Riparian buffers and similar protections can be very effective tools in protecting water quality, preventing erosion and sedimentation, reducing nonpoint source pollution, etc. A buffer (or overlay) including vegetation requirements should be created. Refer to Section 4.3.5.1 for recommendations and models.
- **Strengthen floodplain regulations** – Review the list of optional flood regulation additions created by DEC in Appendix F to see some potential options; also see Section 4.3.5.2 for more details.

5.3.1 Livingston County

- **Continue to prioritize and expand AEM Program** – As detailed in the Livingston County Soil and Water Conservation District's Agricultural Environmental Management (AEM) Five-Year Strategic Plan, continue to apply for funding to bring farms and farmers into the tier 1 (inventory) and tier 2 (assessment) through AEM Base Funding as well as funding for tier 3 (planning) and tier 4 (BMP implementation) through the Agricultural Nonpoint Source Abatement and Control Program.[131] Refer to Section 4.4.1 for more details.
- **Update Onsite Wastewater Treatment System regulations –** The County has a good foundation for OWTS, updated in 2011 (Article II – Sewage Treatment – Individual Systems), through inspection and permitting required before construction or repair of OWTS inspection and investigations when there are questions of public health and/or nuisances; requirement to connect when public sewers are available and accessible. There is no mention of inspection or re-permitting and subsequent repair/remediation required during a property transfer or minimum setbacks from waterbodies. We recommend updating the law to reflect the latest technological advancements in systems design, engineering, and testing; to require inspection/permit renewal and subsequent repair when necessary at property transfer; to set a minimum inspection schedule timeframe including a tiered inspection schedule prioritizes the inspection of systems in closer proximity to the creek, systems located in more porous soils, and older systems; and to create setbacks from waterbodies, not just drinking water sources. See Section 4.3.3.1 for further details.

5.3.1.1 Town of Caledonia

Land Use Documents Reviewed: N/A

Previously Reviewed:

- ***Chapter 113: Subdivision of Land.*** From the Code of the Town of Caledonia. 1994.
- ***Chapter 130: Zoning.*** From the Code of the Town of Caledonia. 1994.
- ***The Comprehensive Plan for the Town and Village of Caledonia.*** Volumes 1 and 2; 1964.

Recommendations for Future Action by Local Officials:

- **Revise comprehensive plan** – Update comprehensive plan, including an emphasis on the protection of local water resources and recognizing the importance of watershed planning efforts within the Oatka Creek watershed and other neighboring watersheds within the municipality.
- **Update Land Conservation District ordinance** – Develop a local law that works in conjunction with existing zoning ordinances; it should: account for topography and soil type; require retaining and protection of trees and other natural vegetation on and near disturbed sites to minimize erosion; stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching; and maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction. Such a law would require developers to prepare a Stormwater Pollution Prevention Plan and submit it to the relevant local board as part of the process for new development. See Section 4.3 for details.
- **Develop green infrastructure standards** – Consider opportunities to retrofit existing properties with new facilities, such as stormwater detention/retention ponds; also attempt natural conveyance restoration wherever possible. Continue ditch maintenance using best management practices, maintaining vegetative buffers near waterbodies, lining sensitive areas with rip rap and

seeding disturbed areas immediately after are recommended practices. See Section 4.2.3 for more information.

- **Develop onsite wastewater treatment regulations** – We recommended that the County strengthen its Sanitary Code to improve on-site wastewater treatment regulations especially regarding required inspections, connection to public water/sewer and setbacks (potentially from waterways, wetlands and floodplains). The Town of Caledonia could also consider these regulations to be included in local law. See Section 4.3.3.1 for further details.
- **Create riparian buffers –** Riparian buffers and similar protections can be very effective tools in protecting water quality, preventing erosion and sedimentation, reducing nonpoint source pollution, etc. The current zoning law specifically prevents excavation closer than 50 feet from a stream, but an actual buffer area with vegetation requirements and use restrictions should be created. Refer to Section 4.3.5.1 for buffer recommendations and models.
- **Continue education and outreach** – to area farmers by the Wyoming County SWCD and CCE regarding agricultural best management practices and the various federal and state incentive programs available for implementation. Support education and outreach (mailings, brochures, etc.) to individuals whose lands are adjacent to Oatka Creek segments or contain contributing tributaries. Recommended focus areas include nonpoint source pollution, riparian rights and landowner responsibilities, setbacks, floodplain protection and other stream maintenance BMPs. See section 4.3.1 for details.
- **Strengthen floodplain regulations** – Review the list of optional flood regulation additions created by DEC in Appendix F to see some potential options; also see Section 4.3.5.2 for more details.
- **Update subdivision regulations –** Consider adopting the LEED for Neighborhood Development (LEED-ND) Standard to assist with selection of suitable lands, street design, development of pedestrian linkages, green infrastructure and building design, and other performance standards as needed. See Section 4.2.4.

5.3.1.2 Village of Caledonia

Land Use Documents Reviewed: N/A

Previously Reviewed:

- ***Chapter 186: Subdivision of Land.*** From the Code of the Village of Caledonia. 1995.
- ***Chapter 215: Zoning.*** From the Code of the Village of Caledonia. August 1999.
- ***Sustaining Our Viability into the Future***: Village of Caledonia Comprehensive Strategic Plan. 2003.

Recommendations for Future Action by Local Officials:

- **Revise comprehensive plan** – Update comprehensive plan, including an emphasis on the protection of local water resources and recognizing the importance of watershed planning efforts within the Oatka Creek watershed and other neighboring watersheds within the municipality.
- **Update Land Conservation District ordinance** – Develop a local law that works in conjunction with existing zoning ordinances; it should: account for topography and soil type; require retaining and protection of trees and other natural vegetation on and near disturbed sites to minimize erosion; stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching; and maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction. Such a law would require

developers to prepare a Stormwater Pollution Prevention Plan and submit it to the relevant local board as part of the process for new development. See Section 4.3 for details.

- **Develop green infrastructure standards** – Consider opportunities to retrofit existing properties with new facilities, such as stormwater detention/retention ponds; also attempt natural conveyance restoration wherever possible. Continue ditch maintenance using best management practices, maintaining vegetative buffers near waterbodies, lining sensitive areas with rip rap and seeding disturbed areas immediately after are recommended practices. See Section 4.2.3 for more information.
- **Develop onsite wastewater treatment regulations** – We recommended that the County strengthen its Sanitary Code to improve on-site wastewater treatment regulations especially regarding required inspections, connection to public water/sewer and setbacks (potentially from waterways, wetlands and floodplains). The Village of Caledonia could also consider these regulations to be included in local law. See Section 4.3.3.1 for further details.
- **Create riparian buffers –** Riparian buffers and similar protections can be very effective tools in protecting water quality, preventing erosion and sedimentation, reducing nonpoint source pollution, etc. The current zoning law specifically prevents excavation closer than 50 feet from a stream, but an actual buffer area with vegetation requirements and use restrictions should be created. Refer to Section 4.3.5.1 for buffer recommendations and models.
- **Continue education and outreach** – to area farmers by the Wyoming County SWCD and CCE regarding agricultural best management practices and the various federal and state incentive programs available for implementation. Support education and outreach (mailings, brochures, etc.) to individuals whose lands are adjacent to Oatka Creek segments or contain contributing tributaries. Recommended focus areas include nonpoint source pollution, riparian rights and landowner responsibilities, setbacks, floodplain protection and other stream maintenance BMPs. See section 4.3.1 for details.
- **Strengthen floodplain regulations** – Review the list of optional flood regulation additions created by DEC in Appendix F to see some potential options; also see Section 4.3.5.2 for more details.
- **Update subdivision regulations –** Consider adopting the LEED for Neighborhood Development (LEED-ND) Standard to assist with selection of suitable lands, street design, development of pedestrian linkages, green infrastructure and building design, and other performance standards as needed. See Section 4.2.4.

5.4.1 Wyoming County

- **Continue to prioritize and expand AEM Program** – As detailed in the Wyoming County Soil and Water Conservation District's 2013 Annual Report[132], continue to apply for funding to bring farms and farmers into the tier 1 (inventory) and tier 2 (assessment) through AEM Base Funding as well as funding for tier 3 (planning) and tier 4 (BMP implementation) through the Agricultural Nonpoint Source Abatement and Control Program.[133] Refer to Section 4.4.1 for more details.
- **Update onsite wastewater treatment systems regulations** – Regulations regarding on-site wastewater treatment systems in Wyoming County could be strengthened. Currently, the Wyoming County Sanitary Code requires inspections/permits to construct, alter, repair or extend system and at property transfer. We recommend updating the law to reflect the latest technological advancements in systems design, engineering, and testing; to set a minimum inspection schedule timeframe, including a tiered inspection schedule prioritizes the inspection of

systems in closer proximity to the creek, systems located in more porous soils, and older systems; and to create setbacks from waterbodies and drinking water sources. See Section 4.3.3.1 for further details.

- **Public Participation and Involvement –** Consider establishing an Environmental Management Council, a volunteer advisory board to the county legislature enabled under Article 47 of the New York State Environmental Conservation Law. EMCs advise the county legislature on matters affecting the preservation, development, and use of the natural features of the county that have a bearing on environmental quality; they also serve as a link between the government and the public. See section 4.3.1.1 for further details.
- **Expand collection of Household Hazardous Wastes**. The GLOW Region Solid Waste Management Committee has a Household Hazardous Waste collection program that is held once a year and rotates between Genesee, Livingston and Wyoming Counties. Increasing the number of collections and the number of collection sites would make participation more convenient and would likely increase the number of participants and total waste collection. Currently people have the choice of either waiting up to three years for collection within their own county; or waiting up to one year and driving to another county.

5.4.1.1 Town of Covington

Land Use Documents Reviewed:

- ***Town of Covington Zoning Ordinance***, 2007.

Previously Reviewed:

- ***Town of Covington Index of Local Laws, 1971 – 2005.***
    - *Includes Town of Covington Zoning and Subdivision Regulations*

Recommendations for Future Action by Local Officials:

- **Draft a comprehensive plan** – Draft a comprehensive plan emphasizing the protection of local water resources and recognizing the importance of watershed planning efforts within the Oatka Creek watershed and other neighboring watersheds within the municipality.
- **Develop stormwater management ordinance** – Develop a local law that works in conjunction with existing zoning ordinances; it should: account for topography and soil type; require retaining and protection of trees and other natural vegetation on and near disturbed sites to minimize erosion; stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching; and maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction. Such a law would require developers to prepare a Stormwater Pollution Prevention Plan and submit it to the relevant local board as part of the process for new development. See Section 4.3 for details.
- **Develop green infrastructure standards** – Consider opportunities to retrofit existing properties with new facilities, such as stormwater detention/retention ponds; also attempt natural conveyance restoration wherever possible. Continue ditch maintenance using best management practices, maintaining vegetative buffers near waterbodies, lining sensitive areas with rip rap and seeding disturbed areas immediately after are recommended practices. See Section 4.2.3 for more information.
- **Develop onsite wastewater treatment regulations** – We recommended that the County strengthen its Sanitary Code to improve on-site wastewater treatment regulations especially

regarding required inspections, connection to public water/sewer and setbacks (potentially from waterways, wetlands and floodplains). The Town of Covington could also consider these regulations to be included in local law. See Section 4.3.3.1 for further details.

- **Create riparian buffers –** While structures are not allowed within 50ft of streams, an actual buffer area with vegetation requirements and use restrictions should be created. Riparian buffers and similar protections can be very effective tools in protecting water quality, preventing erosion and sedimentation, reducing nonpoint source pollution, etc. Refer to Section 4.3.5.1 for buffer recommendations and models.
- **Continue education and outreach** – to area farmers by the Wyoming County SWCD and CCE regarding agricultural best management practices and the various federal and state incentive programs available for implementation. Support education and outreach (mailings, brochures, etc.) to individuals whose lands are adjacent to Oatka Creek segments or contain contributing tributaries. Recommended focus areas include nonpoint source pollution, riparian rights and landowner responsibilities, setbacks, floodplain protection and other stream maintenance BMPs. See section 4.3.1 for details.
- **Strengthen floodplain regulations** – Review the list of optional flood regulation additions created by DEC in Appendix F to see some potential options; also see Section 4.3.5.2 for more details.
- **Update subdivision regulations –** Consider adopting the LEED for Neighborhood Development (LEED-ND) Standard to assist with selection of suitable lands, street design, development of pedestrian linkages, green infrastructure and building design, and other performance standards as needed. See Section 4.2.4.

5.4.1.2 Town of Gainesville

Land Use Documents Reviewed: N/A

Previously Reviewed:

- ***Zoning Ordinance, Town of Gainesville, County of Wyoming, State of New York***. March 13, 1995. Updated 2004; includes Article IX, Comprehensive Plan.
- ***Flood Damage Prevention Local Law.*** Town of Gainesville Local Law No. 2-1983.

Recommendations for Future Action by Local Officials:

- **Revise comprehensive plan** – Update comprehensive plan, including an emphasis on the protection of local water resources and recognizing the importance of watershed planning efforts within the Oatka Creek watershed and other neighboring watersheds within the municipality.
- **Develop stormwater management ordinance** – Develop a local law that works in conjunction with existing zoning ordinances; it should: account for topography and soil type; require retaining and protection of trees and other natural vegetation on and near disturbed sites to minimize erosion; stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching; and maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction. Such a law would require developers to prepare a Stormwater Pollution Prevention Plan and submit it to the relevant local board as part of the process for new development. See Section 4.3 for details.
- **Develop green infrastructure standards** – Consider opportunities to retrofit existing properties with new facilities, such as stormwater detention/retention ponds; also attempt natural conveyance restoration wherever possible. Continue ditch maintenance using best management

practices, maintaining vegetative buffers near waterbodies, lining sensitive areas with rip rap and seeding disturbed areas immediately after are recommended practices. See Section 4.2.3 for more information.

- **Develop onsite wastewater treatment regulations** – We recommended that the County strengthen its Sanitary Code to improve on-site wastewater treatment regulations especially regarding required inspections, connection to public water/sewer and setbacks (potentially from waterways, wetlands and floodplains). The Town of Gainesville could also consider these regulations to be included in local law. See Section 4.3.3.1 for further details.
- **Create riparian buffers –** Riparian buffers and similar protections can be very effective tools in protecting water quality, preventing erosion and sedimentation, reducing nonpoint source pollution, etc. The current zoning law specifically prevents excavation closer than 50 feet from a stream, but an actual buffer area with vegetation requirements and use restrictions should be created. Refer to Section 4.3.5.1 for buffer recommendations and models.
- **Continue education and outreach** – to area farmers by the Wyoming County SWCD and CCE regarding agricultural best management practices and the various federal and state incentive programs available for implementation. Support education and outreach (mailings, brochures, etc.) to individuals whose lands are adjacent to Oatka Creek segments or contain contributing tributaries. Recommended focus areas include nonpoint source pollution, riparian rights and landowner responsibilities, setbacks, floodplain protection and other stream maintenance BMPs. See section 4.3.1 for details.
- **Strengthen floodplain regulations** – Review the list of optional flood regulation additions created by DEC in Appendix F to see some potential options; also see Section 4.3.5.2 for more details.

5.4.1.3 Town of Orangeville

Past recommendations for Orangeville from the *Controlling Sediment in the Black and Oatka Creek* project have included updating the comprehensive plan and zoning code to emphasize the protection of water resources and importance of watershed planning efforts. Since the last assessment, the comprehensive plan and zoning ordinances were updated to reflect these additions.

Land Use Documents Reviewed:

- ***Zoning Ordinance, Town of Gainesville.*** Updated September 2009; includes Article XIII, Comprehensive Plan.

Previously Reviewed:

- ***Town of Orangeville Zoning Ordinance***. 1964.
- ***Amendments related to building permits and agricultural districts***. 1979.

Recommendations for Future Action by Local Officials:

- **Develop stormwater management ordinance** – Stormwater management is only briefly mentioned in zoning. Integrate stormwater practices into existing zoning ordinance; it should: account for topography and soil type; require retaining and protection of trees and other natural vegetation on and near disturbed sites to minimize erosion; stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching; and maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction. See Section 4.3 for details.

- **Develop green infrastructure standards** – Consider opportunities to retrofit existing properties with new facilities, such as stormwater detention/retention ponds; also attempt natural conveyance restoration wherever possible. Continue ditch maintenance using best management practices, maintaining vegetative buffers near waterbodies, lining sensitive areas with rip rap and seeding disturbed areas immediately after are recommended practices. See Section 4.2.3 for more information.
- **Develop onsite wastewater treatment regulations** – We recommended that the County strengthen its Sanitary Code to improve on-site wastewater treatment regulations especially regarding required inspections, connection to public water/sewer and setbacks (potentially from waterways, wetlands and floodplains). The Town of Orangeville could also consider these regulations to be included in local law. See Section 4.3.3.1 for further details.
- **Create riparian buffers –** While structures are not allowed within 50ft of streams, an actual buffer area with vegetation requirements and use restrictions should be created. Riparian buffers and similar protections can be very effective tools in protecting water quality, preventing erosion and sedimentation, reducing nonpoint source pollution, etc. The current zoning law specifically prevents excavation closer than 100 feet from a stream, but an actual buffer area with vegetation requirements and use restrictions should be created. Refer to Section 4.3.5.1 for buffer recommendations and models.
- **Continue education and outreach** – to area farmers by the Wyoming County SWCD and CCE regarding agricultural best management practices and the various federal and state incentive programs available for implementation. Support education and outreach (mailings, brochures, etc.) to individuals whose lands are adjacent to Oatka Creek segments or contain contributing tributaries. Recommended focus areas include nonpoint source pollution, riparian rights and landowner responsibilities, setbacks, floodplain protection and other stream maintenance BMPs. See section 4.3.1 for details.
- **Strengthen floodplain regulations** – Review the list of optional flood regulation additions created by DEC in Appendix F to see some potential options; also see Section 4.3.5.2 for more details.

5.4.1.4 Town of Perry

Land Use Documents Reviewed: N/A

Previously Reviewed:

- ***A Comprehensive Master Plan for the Town and Village of Perry.*** 1969.
- ***Town of Perry Zoning Regulations***. December 2, 2000.

Recommendations for Future Action by Local Officials:

- **Revise comprehensive plan** – Update comprehensive plan, including an emphasis on the protection of local water resources and recognizing the importance of watershed planning efforts within the Oatka Creek watershed and other neighboring watersheds within the municipality.
- **Develop stormwater management ordinance** – Develop a local law that works in conjunction with existing zoning ordinances; it should: account for topography and soil type; require retaining and protection of trees and other natural vegetation on and near disturbed sites to minimize erosion; stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching; and maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants

entering waterbodies prior to, during and after construction. Such a law would require developers to prepare a Stormwater Pollution Prevention Plan and submit it to the relevant local board as part of the process for new development. See Section 4.3 for details.

- **Develop green infrastructure standards** – Consider opportunities to retrofit existing properties with new facilities, such as stormwater detention/retention ponds; also attempt natural conveyance restoration wherever possible. Continue ditch maintenance using best management practices, maintaining vegetative buffers near waterbodies, lining sensitive areas with rip rap and seeding disturbed areas immediately after are recommended practices. See Section 4.2.3 for more information.
- **Develop onsite wastewater treatment regulations** – We recommended that the County strengthen its Sanitary Code to improve on-site wastewater treatment regulations especially regarding required inspections, connection to public water/sewer and setbacks (potentially from waterways, wetlands and floodplains). The Town of Perry could also consider these regulations to be included in local law. See Section 4.3.3.1 for further details.
- **Continue education and outreach** – to area farmers by the Wyoming County SWCD and CCE regarding agricultural best management practices and the various federal and state incentive programs available for implementation. Support education and outreach (mailings, brochures, etc.) to individuals whose lands are adjacent to Oatka Creek segments or contain contributing tributaries. Recommended focus areas include nonpoint source pollution, riparian rights and landowner responsibilities, setbacks, floodplain protection and other stream maintenance BMPs. See section 4.3.1 for details.
- **Strengthen floodplain regulations** – Floodplain regulation should be reviewed to determine improvements. Review the list of optional flood regulation additions created by DEC in Appendix F to see some potential options; also see Section 4.3.5.2 for more details.

5.4.1.5 Town of Middlebury

Land Use Documents Reviewed:

- ***Animal Waste Storage Facility Law***. Local Law 1-2007.

Previously Reviewed:

- ***Zoning Ordinance, Town of Middlebury, Wyoming County, New York***. October 1988, amended 1991, 1993, and 1996.

Recommendations for Future Action by Local Officials:

- **Draft a comprehensive plan** – Draft a comprehensive plan emphasizing the protection of local water resources and recognizing the importance of watershed planning efforts within the Oatka and Black Creek watersheds and other neighboring watersheds within the municipality.
- **Develop stormwater management ordinance** – Stormwater management is only briefly mentioned in zoning. Develop a local law that works in conjunction with existing zoning ordinances; it should: account for topography and soil type; require retaining and protection of trees and other natural vegetation on and near disturbed sites to minimize erosion; stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching; and maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction. Such a law would require developers to

prepare a Stormwater Pollution Prevention Plan and submit it to the relevant local board as part of the process for new development. See Section 4.3 for details.

- **Develop green infrastructure standards** – Consider opportunities to retrofit existing properties with new facilities, such as stormwater detention/retention ponds; also attempt natural conveyance restoration wherever possible. Continue ditch maintenance using best management practices, maintaining vegetative buffers near waterbodies, lining sensitive areas with rip rap and seeding disturbed areas immediately after are recommended practices. See Section 4.2.3 for more information.
- **Develop onsite wastewater treatment regulations** – We recommended that the County strengthen its Sanitary Code to improve on-site wastewater treatment regulations especially regarding required inspections, connection to public water/sewer and setbacks (potentially from waterways, wetlands and floodplains). The Town of Middlebury could also consider these regulations to be included in local law. See Section 4.3.3.1 for further details.
- **Create riparian buffers –** While structures are not allowed within 50ft of streams, an actual buffer area with vegetation requirements and use restrictions should be created. Riparian buffers and similar protections can be very effective tools in protecting water quality, preventing erosion and sedimentation, reducing nonpoint source pollution, etc. The current zoning law specifically prevents excavation closer than 50 feet from a stream, but an actual buffer area with vegetation requirements and use restrictions should be created. Refer to Section 4.3.5.1 for buffer recommendations and models.
- **Continue education and outreach** – to area farmers by the Wyoming County SWCD and CCE regarding agricultural best management practices and the various federal and state incentive programs available for implementation. Support education and outreach (mailings, brochures, etc.) to individuals whose lands are adjacent to Oatka Creek segments or contain contributing tributaries. Recommended focus areas include nonpoint source pollution, riparian rights and landowner responsibilities, setbacks, floodplain protection and other stream maintenance BMPs. See section 4.3.1 for details.
- **Strengthen floodplain regulations** – While Middlebury is not yet an NFIP community, they are in the process of being accepted to the program and do have floodplain regulations in their Zoning Code. Floodplain regulation should be reviewed to determine improvements. Review the list of optional flood regulation additions created by DEC in Appendix F to see some potential options; also see Section 4.3.5.2 for more details.

5.4.1.6 Town of Warsaw

Land Use Documents Reviewed: N/A

Previously Reviewed:

- ***Subdivision Regulations.*** Town of Warsaw. November 1988.
- ***Zoning Ordinance.*** Town of Warsaw. September 1998, amended 2004.
    - Includes *Appendix B: Town Master Plan Land Use Goals and Policies*

Recommendations for Future Action by Local Officials:

- **Draft a comprehensive plan** – Draft a comprehensive plan emphasizing the protection of local water resources and recognizing the importance of watershed planning efforts within the Oatka Creek watershed and other neighboring watersheds within the municipality.
- **Develop stormwater management ordinance** – Develop a local law that works in conjunction with existing zoning ordinances; it should: account for topography and soil type; require retaining

and protection of trees and other natural vegetation on and near disturbed sites to minimize erosion; stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching; and maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction. Such a law would require developers to prepare a Stormwater Pollution Prevention Plan and submit it to the relevant local board as part of the process for new development. See Section 4.3 for details.

- **Develop green infrastructure standards** – Consider opportunities to retrofit existing properties with new facilities, such as stormwater detention/retention ponds; also attempt natural conveyance restoration wherever possible. Continue ditch maintenance using best management practices, maintaining vegetative buffers near waterbodies, lining sensitive areas with rip rap and seeding disturbed areas immediately after are recommended practices. See Section 4.2.3 for more information.
- **Develop onsite wastewater treatment regulations** – We recommended that the County strengthen its Sanitary Code to improve on-site wastewater treatment regulations especially regarding required inspections, connection to public water/sewer and setbacks (potentially from waterways, wetlands and floodplains). The Town of Warsaw could also consider these regulations to be included in local law. See Section 4.3.3.1 for further details.
- **Create riparian buffers –** While structures are not allowed within 50ft of streams, an actual buffer area with vegetation requirements and use restrictions should be created. Riparian buffers and similar protections can be very effective tools in protecting water quality, preventing erosion and sedimentation, reducing nonpoint source pollution, etc. Refer to Section 4.3.5.1 for buffer recommendations and models.
- **Continue education and outreach** – to area farmers by the Wyoming County SWCD and CCE regarding agricultural best management practices and the various federal and state incentive programs available for implementation. Support education and outreach (mailings, brochures, etc.) to individuals whose lands are adjacent to Oatka Creek segments or contain contributing tributaries. Recommended focus areas include nonpoint source pollution, riparian rights and landowner responsibilities, setbacks, floodplain protection and other stream maintenance BMPs. See section 4.3.1 for details.
- **Strengthen floodplain regulations** –Floodplain regulation should be reviewed to determine improvements. Review the list of optional flood regulation additions created by DEC in Appendix F to see some potential options; also see Section 4.3.5.2 for more details.
- **Update subdivision regulations –** Consider adopting the LEED for Neighborhood Development (LEED-ND) Standard to assist with selection of suitable lands, street design, development of pedestrian linkages, green infrastructure and building design, and other performance standards as needed. See Section 4.2.4.

5.4.1.7 Village of Warsaw

Land Use Documents Reviewed: N/A

Previously Reviewed:

- ***Comprehensive Plan.*** Village of Warsaw, Wyoming County, New York. October 1994.
- ***Chapter 133: Subdivision of Land.*** From the Code of the Village of Warsaw. March 1995.
- ***Chapter 163: Zoning.*** From the Code of the Village of Warsaw. 1995.

Recommendations for Future Action by Local Officials:

- **Draft a comprehensive plan** – Draft a comprehensive plan emphasizing the protection of local water resources and recognizing the importance of watershed planning efforts within the Oatka Creek watershed and other neighboring watersheds within the municipality.
- **Develop stormwater management ordinance** – Develop a local law that works in conjunction with existing zoning ordinances; it should: account for topography and soil type; require retaining and protection of trees and other natural vegetation on and near disturbed sites to minimize erosion; stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching; and maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction. See Section 4.3 for details.
- **Develop green infrastructure standards** – Consider opportunities to retrofit existing properties with new facilities, such as stormwater detention/retention ponds; also attempt natural conveyance restoration wherever possible. Continue ditch maintenance using best management practices, maintaining vegetative buffers near waterbodies, lining sensitive areas with rip rap and seeding disturbed areas immediately after are recommended practices. See Section 4.2.3 for more information.
- **Develop onsite wastewater treatment regulations** – We recommended that the County strengthen its Sanitary Code to improve on-site wastewater treatment regulations especially regarding required inspections, connection to public water/sewer and setbacks (potentially from waterways, wetlands and floodplains). The Village of Warsaw could also consider these regulations to be included in local law. See Section 4.3.3.1 for further details.
- **Create riparian buffers –** While structures are not allowed within 50ft of streams, an actual buffer area with vegetation requirements and use restrictions should be created. Riparian buffers and similar protections can be very effective tools in protecting water quality, preventing erosion and sedimentation, reducing nonpoint source pollution, etc. Refer to Section 4.3.5.1 for buffer recommendations and models.
- **Continue education and outreach** – to area farmers by the Wyoming County SWCD and CCE regarding agricultural best management practices and the various federal and state incentive programs available for implementation. Support education and outreach (mailings, brochures, etc.) to individuals whose lands are adjacent to Oatka Creek segments or contain contributing tributaries. Recommended focus areas include nonpoint source pollution, riparian rights and landowner responsibilities, setbacks, floodplain protection and other stream maintenance BMPs. See section 4.3.1 for details.
- **Strengthen floodplain regulations** –Floodplain regulation should be reviewed to determine improvements. Review the list of optional flood regulation additions created by DEC in Appendix F to see some potential options; also see Section 4.3.5.2 for more details.
- **Update subdivision regulations –** Consider adopting the LEED for Neighborhood Development (LEED-ND) Standard to assist with selection of suitable lands, street design, development of pedestrian linkages, green infrastructure and building design, and other performance standards as needed. See Section 4.2.4.

5.4.1.8 Village of Wyoming

Land Use Documents Reviewed:

- ***Zoning.*** From the Code of the Village of Wyoming. 1994.

Previously Reviewed: N/A

Recommendations for Future Action by Local Officials:

- **Draft comprehensive plan** – Draft comprehensive plan, including an emphasis on the protection of local water resources and recognizing the importance of watershed planning efforts within the Oatka Creek watershed and other neighboring watersheds within the municipality.
- **Develop stormwater management ordinance** – Develop a local law that works in conjunction with existing zoning ordinances; it should: account for topography and soil type; require retaining and protection of trees and other natural vegetation on and near disturbed sites to minimize erosion; stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching; and maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction. The current zoning law is missing these standards. See Section 4.3 for details.
- **Develop green infrastructure standards** – Consider opportunities to retrofit existing properties with new facilities, such as stormwater detention/retention ponds; also attempt natural conveyance restoration wherever possible. Continue ditch maintenance using best management practices, maintaining vegetative buffers near waterbodies, lining sensitive areas with rip rap and seeding disturbed areas immediately after are recommended practices. See Section 4.2.3 for more information.
- **Develop onsite wastewater treatment regulations** – We recommended that the County strengthen its Sanitary Code to improve on-site wastewater treatment regulations especially regarding required inspections, connection to public water/sewer and setbacks (potentially from waterways, wetlands and floodplains). The Village of Wyoming could also consider these regulations to be included in local law. See Section 4.3.3.1 for further details.
- **Create riparian buffers –** A buffer area with vegetation requirements and use/development restrictions should be created. Riparian buffers and similar protections can be very effective tools in protecting water quality, preventing erosion and sedimentation, reducing nonpoint source pollution, etc. Refer to Section 4.3.5.1 for buffer recommendations and models.
- **Continue education and outreach** – to area farmers by the Wyoming County SWCD and CCE regarding agricultural best management practices and the various federal and state incentive programs available for implementation. Support education and outreach (mailings, brochures, etc.) to individuals whose lands are adjacent to Oatka Creek segments or contain contributing tributaries. Recommended focus areas include nonpoint source pollution, riparian rights and landowner responsibilities, setbacks, floodplain protection and other stream maintenance BMPs. See section 4.3.1 for details.
- **Strengthen floodplain regulations** – The floodplain map shows where it is located in the village, but standards are unclear. Floodplain regulation should be reviewed to determine improvements. Review the list of optional flood regulation additions created by DEC in Appendix F to see some potential options; also see Section 4.3.5.2 for more details.

SECTION 5.0 ENDNOTES

[126] AEM Agricultural Nonpoint Source Abatement and Control Grant Program Guidance Manual, Dec 2007. http://www.agriculture.ny.gov/soilwater/aem/forms/Guidance%20Manual.pdf
[127] http://www2.monroecounty.gov/files/health/eh/OnsiteSewage/ArtIIAPrivateSewage.pdf
[128] http://www.wcswcd.org/images/uploads/2012_Wyoming_County_SWCD_Annual_Report.pdf
[129] AEM Agricultural Nonpoint Source Abatement and Control Grant Program Guidance Manual, Dec 2007. http://www.agriculture.ny.gov/soilwater/aem/forms/Guidance%20Manual.pdf
[130] http://www.co.genesee.ny.us/docs/health/septicwaterguidelines.pdf
[131] AEM Agricultural Nonpoint Source Abatement and Control Grant Program Guidance Manual, Dec 2007. http://www.agriculture.ny.gov/soilwater/aem/forms/Guidance%20Manual.pdf
[132] http://www.wcswcd.org/images/uploads/2012_Wyoming_County_SWCD_Annual_Report.pdf
[133] AEM Agricultural Nonpoint Source Abatement and Control Grant Program Guidance Manual, Dec 2007. http://www.agriculture.ny.gov/soilwater/aem/forms/Guidance%20Manual.pdf

6.0 Conclusion

Counties and municipalities should review both the general and specific recommendations and determine which recommendations are possible to enact based on public support, and which there is capacity to enforce. If some recommendations are not feasible, less restrictive actions may still have a positive impact on water quality. While taking steps towards protecting the watershed can potentially be expensive, county and municipal decision makers should consider the short term as well as long term costs associated with taking no action. Mitigating problems that could have been prevented can have huge costs. Other potential money could be lost if water/environmental quality deteriorates and reduces the desire for people to live in and visit an area; this in turn could have an effect on property values and tax revenues. In some cases, local laws can be relatively inexpensive to create or amend and have little to no increased enforcement effort. Sometimes the cost burden can be shifted to the person or group potentially affecting water quality, such as a property developer.

Many recommendations can fit within different parts of municipal code; determine what method works best for your municipality (i.e., site plan review vs a chapter in zoning). Many laws can be cost-effective if they are incorporated into existing processes such as site plan review or if they take the form of restrictions present at or before the point of approval rather than after. Use this document as a guide to start making changes. Though many subjects will need additional research and review, it is not necessary for a municipality to spend a lot of money to have someone write them a law from scratch. Municipalities should review model laws, and laws from other municipalities, and can use different portions that they like. Municipalities can use the Assessment tables to look for other municipal laws that address the topic of concern.

The recommendations in Sections 4 and 5 are ideal options for protecting water quality in the watershed, but can be difficult to enact or enforce. Enacting some of these regulations may be unpopular if residents or businesses think they infringe too much on their property rights, or cost them money. It's not sufficient to just have regulations pertaining to water quality in local law; regulations need to be enforced and fully understood by parties intended to use them in decision making such as planning boards, and code enforcement officers. Before creating or expanding regulations, municipalities should consider if there is sufficient enforcement capacity. When considering recommendations that require increased enforcement, counties and municipalities should consider enforcement costs, and determine where funding may come from. Enforcement recommendations may also be difficult due to lack of funding. In these instances it is recommended to focus on which recommendations are both high priority and possible to implement. Small changes still have the potential to have an impact

The final section of the Oatka Creek Watershed Plan will take these recommendations and recommendations from other sections and attempt to identify which groups could take the lead in implementation and potential funding sources.

Appendices

APPENDIX A: TABLE

APPENDIX B: ANNOTATED REFERENCE LIST, NEW YORK WATER RESOURCES INSTITUTE (2013); http://wri.eas.cornell.edu/Infrastructure_References.pdf

APPENDIX C: SAMPLE LOCAL LAW FOR STORMWATER MANAGEMENT AND EROSION & SEDIMENT CONTROL (REVISED 3/06); http://www.dec.ny.gov/docs/water_pdf/localaw06.pdf

APPENDIX D: TOWN OF HURON SEPTIC LAW (3/11/13); http://townofhuron.org/content/Generic/View/23:field=documents;/content/Documents/File/176.pdf

APPENDIX E: CONSTRUCTION STORMWATER POLLUTION PREVENTION AND EROSION AND SEDIMENT CONTROL ORDINANCE; http://www.parmany.org/pdf/building/stormwater/Final-Construction-Ordinance.pdf

APPENDIX F: NYSDEC OPTIONAL ADDITIONAL LANGUAGE: MODEL LOCAL LAW FOR FLOOD DAMAGE PREVENTION; http://www.schohariecounty-ny.gov/CountyWebSite/EmergencyManagement/NYSDEC-OptionalLanguage.pdf

Appendix A
Municipal Tables

		Bergen - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 1: Development		
1-01	Identify retrofit opportunities for existing development - ex: retention/detention areas, stormwater ponds, construction of wastewater treatment systems to replace older septic systems		
1-02	Encourage homeowners to place compost piles away from waterbodies and roadways		
1-03	Encourage proper use and disposal of lawn and other household chemicals (res., com., indus., rec., uses etc.)		
1-04	Storm drain/curb stenciling/labeling		
1-05	Encourage volunteer programs		
1-06	Encourage the use of indigenous plants		
1-07	Develop outreach programs targeted at water quality management. Target training for contractors, developers, inspectors and zoning and planning officials.	C.P. Chapter 2, Section II. C. 4 - Program in place to monitor stormwater runoff. Enables the town to make needed repairs or improvements.	
1-08	Encourage proper control of pet wastes		
1-09	Enforcement details regarding stormwater regulations & requirements - responsibility, penalties, etc.	Stormwater Management and Erosion Control Law Section VIII, 1 - Stormwater management facilities maintained by an owner(s) shall have adequate easements to permit the Town of Bergen to inspect and, if necessary, to take corrective action should the owner(s) fail to properly maintain the system. C.P. Chapter 2, Section II. C. 4 - Program in place to monitor stormwater runoff. Enables the town to make needed repairs or improvements.	
1-10	Use of drainage districts		
1-11	Minimize the amount of land disturbed (including cut and fill) and the duration of disturbance	Stormwater Management and Erosion Control Law Section VII, 1,3 - No person, corporation, organization, or public agency can initiate or undertake any land clearing, land grading or earth moving activities. Cant alter, re-route, deepen, widen, enlarge or obstruct any drainage system.	
1-12	Preserve natural features and conform with the natural boundaries and alignment of waterbodies. Account for topography and soil type to minimize erosion. Limit grades of access roads.	Subdivision Law Article IV, Section 1. K - The street plan of a proposed subdivision shall bear a logical relationship to the topography of the property. C.P. Chapter 5, Section III. F - Promote residential development at densities compatible with the scale of the surrounding environment and consistent with the natural and physical environment. Subdivision Law Article IV, Section 7. G - The planning Board shall, wherever possible, preserve all natural features which add value to residential developments and to the community, such as water courses and falls. Stormwater Management and Erosion Control Law Section VII, 1,3 - No person corporation, organization, or public agency can initiate or undertake and land clearing, land grading or earth moving activities. Cant alter, re-route, deepen, widen, enlarge or obstruct any drainage system. Sec. VIII: No person, corporation, organization, or public agency initiating development which requires a permit may…without first preparing a Stormwater Management and Erosion Control Plan…	
1-13	Retain and protect trees and other natural vegetation on and near disturbed sites. Require tree surveys and/or cutting plans.	Subdivision Law Article IV, Section 7. G - No tree with a diameter of 8 inches or more, shall be removed.	
1-14	Minimize the creation of impervious areas [encourage permeable surface]	Stormwater Management and Erosion Control Law Section VII, 6 - Major developments (shopping centers, commercial facilities, etc.) or any development larger than 10,000 square feet are not eligible for stormwater plan waiver, thereby implying strict scrutiny	

		Bergen - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
1-15	Maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction	Stormwater Management and Erosion Control Law Section VII, 1,2 - Development cannot measurably increase or decrease the rate or volume surface water runoff. Cannot have a measurable adverse impact on a wetland, water course or waterbody. Sec. VIII: No person, corporation, organization, or public agency initiating development which requires a permit may…without first preparing a Stormwater Management and Erosion Control Plan…Subdivision Law Article IV, Section 6. A - Subdivider may be required by the Planning Board to carry away by pipe or open ditch any spring or surface water that may exist either previous to, or as a result of the subdivision. Subdivision Law Article IV, Section 6. C - Subdivider engineer shall also study the effect of each subdivision on the existing downstream drainage.	
1-16	Stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching - to protect exposed and critical areas during development. Complete a.s.a.p., include timeline.		Municipal ditches etc. hand seeding when necessary
1-17	Use appropriate solid and hazardous waste generation and disposal practices including source controls and recycling		
1-18	Ensure proper operation and maintenance of runoff management facilities	Stormwater Management and Erosion Control Law Section VIII, 1 - Stormwater management facilities maintained by an owner(s) shall have adequate easements to permit the Town of Bergen to inspect and, if necessary, to take corrective action should the owner(s) fail to properly maintain the system. 2: Stormwater management facilities may be dedicated to the Town for maintenance...	
1-19	Encourage cluster development/conservation subdivisions		
1-20	Implement Federal/State Stormwater (SPDES) Phase II requirements including MS4 (when applicable) and Construction Permits as well as Municipal and Industrial Discharge Permits		
1-21	Discourage development in flood plain and/or development below base flood elevation	Flood Damage Prevention Law - Ch275- Permit required. Areas of special flood hazard require minimum heights above base flood elevation for residential and nonresidential (or special flood proofing for nonresidential). No development allowed in floodway unless a technical evaluation demonstrates that such encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge. Subdivision Law Article IV, Section 6. D - Land subject to flooding or land deemed by the Planning Board to be uninhabitable shall not be platted for residential occupancy, or for such other uses as may increase danger to health, life, or aggravate flood hazard	
	Section 2: Forestry and Agriculture		
	Forestry - if applicable		
2-01	Consider site restoration. Consider potential water quality impacts when selecting silviculture system (yarding system, site preparation, pesticides employment, etc.)		
2-02	Have specialists (geologist, soil scientist, geotechnical engineer, wildland hydrologist) review plans in high erosion hazard areas		
2-03	Consider Harvesting practices and preplan harvest areas - ex: operation season, skid trails/access on stable soils, avoiding-steep gradients/multiple stream crossings/poor drainage areas, etc.		
	Agriculture		

		Bergen - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
2-04	Implement the Agricultural Environmental Management (AEM) program		
2-05	Ensure Concentrated Animal Feeding Operations (CAFO) regulations and permits are being followed and Comprehensive Nutrition Management Plans are being used. (combined with below) (ADD NEW ROUND OF FUNDING)(any other animal waste one for non cafes?)		
2-06	Implement barnyard runoff controls.		
2-07	Discourage grazing in environmentally sensitive areas (e.g. up to creek banks)		
2-08	Use of agricultural protection such as Agricultural Districts, agricultural preservation ordinances and practices, right to farm laws, and Agricultural and Farmland Protection Plans	C.P. Chapter 2, Section II. F - Agricultural Districts. ; County Agricultural and Farmland Protection Plan under production.	
	Section 3: Waterways and Wetlands		
	Waterways		
3-01	Control in stream sedimentation, clear debris. Schedule inspections of sediment control measures for maintenance/repair.	Stormwater Management and Erosion Control Law Section VIII, 1 - Stormwater management facilities maintained by an owner(s) shall have adequate easements to permit the Town of Bergen to inspect and, if necessary, to take corrective action should the owner(s) fail to properly maintain the system. 2: Stormwater management facilities may be dedicated to the Town for maintenance...	
3-02	Establish riparian buffers		
3-03	Prevent animal wastes from entering waterbodies. Ex: animal control ordinances and/or practices that pertain to animal waste disposal		
3-04	Protect stream banks - vegetative stabilization-maintain/add vegetation(before using structural measures); indirect nonstructural-ex: regulate nearby irrigation, rerouting overbank drainage; direct structural-ex: revetments and bulkheads; indirect structural-ex: deflecting channel flow dikes		
3-05	Use setbacks to minimize disturbance of land adjacent to stream banks and shorelines		
3-06	Prevent discharges to waterbodies in amounts that would adversely affect the taste, color or odor of the waters, or would impair the waters for their best usages	C.P. Chapter 2, Section II. E - New York State Department of Environmental Conservation regulates development, in accordance with the provisions of Article 15 of ECL.	
	Wetlands and Riparian Area Management and Restoration		
3-07	Prioritize wetlands and riparian areas and their non-point source (nps) control potential	C.P. Chapter 2, Section II. D. 1 - Protected by the State Department of Environmental Conservation (DEC). Development within wetland areas is restricted and regulated by the U.S. Department of Interior and the Fish and Wildlife Service.	
3-08	Identify wetlands and riparian areas with significant nps control potential especially when implementing nps management practices.	C.P. Chapter 2, Section II. D. 1 - Protected by the State Department of Environmental Conservation (DEC). Development within wetland areas is restricted and regulated by the U.S. Department of Interior and the Fish and Wildlife Service.	
3-09	Include considerations/regulations to protect wetlands, ex: permitting, licensing, wetlands certification and non-regulatory nps pollution activities. Prevent adverse impacts to wetland functions that affect nps pollution abatement from hydrologic changes, sedimentation, or contaminant, ex: pretreatment practices: vegetated systems, detention/retention basins		
	Section 4: Roads, Bridges, Public Rights of Way		

		Bergen - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
4-01	Conduct road, bridge are related drainage/stormwater structures inspection/maintenance (de-icing material usage and storage, pot-hole repair, bridge washing, scraping and painting, cleaning catch basins, etc.) according to best management practices		Practice: some basic BMPs are utilized by the department -- pesticides are not used. Visual inspection takes place for the few facilities within the town.
4-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) - according to best management practices		Practice: pesticides are not used by the department, vegetation retained where feasible/judged on a case by case basis; jurisdiction is relatively flat, however
4-03	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities		Practice: rarely needed; few problem areas within the town; road embankments and areas near culverts/ditches have been incrementally addressed with riprap
4-04	Incorporate alternatives to traditional de-icing practices, including adjusting mix rates, using non-salt and non-sand alternatives. Store in a enclosed areas with impervious floor.		Practice: According to G/FLRPC 2011 Salt Storage Survey - Enclosed Storage, Pavement Floor, Liquid Calcium Chloride
4-05	Target existing public holdings, such as parks, for removing unnecessary impervious surfaces		
4-06	Incorporate New York State Department of Transportation design and guidance documents, standard specifications, and procedural manuals (*Highway Design Manual, Environmental Procedures Manual,* Maintenance Guidelines, etc.) into local laws and operating procedures		
4-07	Participate in Cornell Local Roads Program activities and training		Practice: supervisor attends regularly
4-08	Target training programs at highway officials, contractors, construction workers, inspectors, zoning and planning officials		Practice
4-09	Culvert maintenance: Culverts are routinely inspected, maintained and resized when necessary so that they will remain unobstructed, allowing for the free flow of water during storm events. Blockages resulting from sedimentation, debris, excessive vegetation and structural failure are issues to be aware of.		Practice: facilities are inspected visually; problem areas are identified and scheduled for maintenance as necessary
	Section 5: Onsite Wastewater Treatment Systems		
5-01	Conduct regular inspections of OWTS at minimum at property transfer or within 1 year prior to transfer		
5-02	Institute setback guidelines		
5-04	Target outreach programs at homeowners, contractors and developers		
5-05	Require all properties with access to municipal service to connect.	Subdivision Law Article IV, Section 8. A - Connection between sewerage facilities is mandatory if the developed property is within 50 feet times the number of water usage units from the nearest sewer.	

		Bethany - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 1: Development		
1-01	Identify retrofit opportunities for existing development - ex: retention/detention areas, stormwater ponds, construction of wastewater treatment systems to replace older septic systems		
1-02	Encourage homeowners to place compost piles away from waterbodies and roadways		
1-03	Encourage proper use and disposal of lawn and other household chemicals (res., com., indus., rec., uses etc.)		
1-04	Storm drain/curb stenciling/labeling		
1-05	Encourage volunteer programs		
1-06	Encourage the use of indigenous plants		
1-07	Develop outreach programs targeted at water quality management. Target training for contractors, developers, inspectors and zoning and planning officials.		
1-08	Encourage proper control of pet wastes		
1-09	Enforcement details regarding stormwater regulations & requirements - responsibility, penalties, etc.	Stormwater Management and Erosion Control Plan, Sec. 8.1-a: Project Description: [must describe proposal, including project size, necessary improvements, location, etc.] Z.O. Art II Sec. 208.9 Performance Standards: …final responsibility for compliance with all environmental laws and regulations lies with the applicant.	
1-10	Use of drainage districts		
1-11	Minimize the amount of land disturbed (including cut and fill) and the duration of disturbance	Stormwater Management and Erosion Control Plan, Sec. 10: Performance Standards, 4G [in the event cut and fills are used, design drainage properly]	
1-12	Preserve natural features and conform with the natural boundaries and alignment of waterbodies. Account for topography and soil type to minimize erosion. Limit grades of access roads.	Stormwater Management and Erosion Control, Sec 3 Purpose c: maintain the integrity of stream geometry so as to sustain the hydrologic functions of streams… Comp Plan - Vision Statement - Preserve the natural environment. Goals and Policies - 5. Analyze sites in the context of other natural and cultural resources....The designation of future land uses is based on the physical features of the land. Sec. 8 Contents of Plan-Existing Conditions, b3: Obtain soils survey info. and detail within plan… Comp Plan - Existing Conditions - Soils - identifies soil types and if they are appropriate for Agriculture, Residential etc.	
1-13	Retain and protect trees and other natural vegetation on and near disturbed sites. Require tree surveys and/or cutting plans.	Stormwater Management and Erosion Control Plan, Sec. 10: Performance Standards, A: Existing vegetation shall be retained; D3: where protection of trees and/or vegetation is required, the location should be shown on the erosion control plan	
1-14	Minimize the creation of impervious areas [encourage permeable surface]		
1-15	Maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction	Stormwater Management and Erosion Control Plan, Sec. 8: Structure and Content of Plan: [must compare post-development conditions with pre-development conditions]. See also Sec. 8 II: Methodology for Comparison of Pre-Development with Post-Development Runoff [to be submitted in plan] Z.O. Sec. 208, Planning Board Powers and Duties, 2: Submission of Site Plan and Data: f) - Site plan data must include storm drainage facilities; J) - Site plan data must include a description of the proposed measures to control runoff and drainage from the site and when required by NYS DEC and/or SEQR process, a Storm Water Management and Erosion Control Plan.	
1-16	Stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching - to protect exposed and critical areas during development. Complete a.s.a.p., include timeline.	Stormwater Management and Erosion Control Plan, Sec. 8 IV: Erosion and Sediment Control, [parts A and B describe the facilities that must be developed, both temp. and permanent]. Z.O. Art. III Sec 301.10, Excavation: In any construction, open excavations shall be limited to a maximum of sixty days, with appropriate fencing, barricades or covering Stormwater Management and Erosion Control Plan, Sec. 10: Performance Standards, D5: [all sites should be seeded and mulched...immediately]	

		Bethany - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
1-17	Use appropriate solid and hazardous waste generation and disposal practices including source controls and recycling	Z.O. Art II Sec. 208, Planning Board- K - Site plan must include a description of the proposed generation, storage and/or disposal of hazardous material and/or hazardous wastes on-site.	
1-18	Ensure proper operation and maintenance of runoff management facilities	Stormwater Management and Erosion Control Plan. Sec. 8 V: Schedule and Maintenance, A and B: [an implementation schedule and long-term maintenance plan must be submitted in the plan]…See also Sec. 10D7, re: Maintenance	
1-19	Encourage cluster development/conservation subdivisions		
1-20	Implement Federal/State Stormwater (SPDES) Phase II requirements including MS4 (when applicable) and Construction Permits as well as Municipal and Industrial Discharge Permits	Z.O. pg. 22.J- Site plan data must include a description of the proposed measures to control runoff and drainage from the site and when required by NYS DEC and/or SEQR process, a Storm Water Management and Erosion Control Plan.	
1-21	Discourage development in flood plain and/or development below base flood elevation	Town of Bethany Flood Damage Prevention Law.	
	Section 2: Forestry and Agriculture		
	Forestry - if applicable		
2-01	Consider site restoration. Consider potential water quality impacts when selecting silviculture system (yarding system, site preparation, pesticides employment, etc.)		
2-02	Have specialists (geologist, soil scientist, geotechnical engineer, wildland hydrologist) review plans in high erosion hazard areas		
2-03	Consider Harvesting practices and preplan harvest areas - ex: operation season, skid trails/access on stable soils, avoiding-steep gradients/multiple stream crossings/poor drainage areas, etc.		
	Agriculture		
2-04	Implement the Agricultural Environmental Management (AEM) program		
2-05	Ensure Concentrated Animal Feeding Operations (CAFO) regulations and permits are being followed and Comprehensive Nutrition Management Plans are being used. (combined with below) (ADD NEW ROUND OF FUNDING)(any other animal waste one for non cafes?)		
2-06	Implement barnyard runoff controls.		
2-07	Discourage grazing in environmentally sensitive areas (e.g. up to creek banks)		
2-08	Use of agricultural protection such as Agricultural Districts, agricultural preservation ordinances and practices, right to farm laws, and Agricultural and Farmland Protection Plans	Z.O. pg.42. Section 306 - Agriculture Residential Districts are designed to preserve the Towns agriculture base and maintain its rural nature.; County Agricultural and Farmland Protection Plan under production. Comp Plan - Vision Statement - Maintain a strong agricultural economic base. Agriculture Section - Areas of prime farmland deserve strong protection from development. Comprehensive Park Plan for Genesee County Park and Forest in Bethany.	
	Section 3: Waterways and Wetlands		
	Waterways		
3-01	Control in stream sedimentation, clear debris. Schedule inspections of sediment control measures for maintenance/repair.	Stormwater Management and Erosion Control, Sec 3 Purpose d: control erosion and sedimentation so as to prevent its deposition in streams and other receiving water bodies; Sec. 8 V: Schedule and Maintenance, A and B: [an implementation schedule and long-term maintenance plan must be submitted in the plan];	
3-02	Establish riparian buffers		

		Bethany - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
3-03	Prevent animal wastes from entering waterbodies. Ex: animal control ordinances and/or practices that pertain to animal waste disposal	Z.O. Article VI Sec. 608, Animal Waste Storage Facilities: All proposals for installation and/or modification of animal waste storage facilities shall be submitted to the Genesee County Soil and Water Conservation District for their review and determination as to acceptability.;	
3-04	Protect stream banks - vegetative stabilization-maintain/add vegetation(before using structural measures); indirect nonstructural-ex: regulate nearby irrigation, rerouting overbank drainage; direct structural-ex: revetments and bulkheads; indirect structural-ex: deflecting channel flow dikes	Stormwater Management and Erosion Control Plan: [purpose and objectives of the plan]…to maintain the integrity of stream geometry so as to sustain the hydrologic functions of streams;	
3-05	Use setbacks to minimize disturbance of land adjacent to stream banks and shorelines	Stormwater Management and Erosion Control Law pg15 - Stream corridors should be delineated. Corridor should act as the minimum set back to development (Was a corridor delineated/established?)	
3-06	Prevent discharges to waterbodies in amounts that would adversely affect the taste, color or odor of the waters, or would impair the waters for their best usages	Stormwater Management and Erosion Control Plan. Sec. 10B [runoff shall not have substantial visible contrast relative to color, taste, odor, turbidity and sediment deposition…]	
	Wetlands and Riparian Area Management and Restoration		
3-07	Prioritize wetlands and riparian areas and their non-point source (nps) control potential	Stormwater Management and Erosion Control, Sec 3 Purpose f: facilitate the removal of pollutants in stormwater runoff as to perpetuate the natural biological functions of streams . Comp Plan - Existing Conditions - Wetlands - The most significant wetlands in Bethany are the substantial areas of class II wetland. These should be highlighted for preservation to protect the important hydrogeological, habitat, flood protection and open space functions they provide.	
3-08	Identify wetlands and riparian areas with significant nps control potential especially when implementing nps management practices.	Stormwater Management and Erosion Control, Sec 3 Purpose f: facilitate the removal of pollutants in stormwater runoff as to perpetuate the natural biological functions of streams. Comp Plan - Existing Conditions - The most significant wetlands in Bethany are the substantial areas of class II wetland. These should be highlighted for preservation to protect the important hydrogeological, habitat, flood protection and open space functions they provide.	
3-09	Include considerations/regulations to protect wetlands, ex: permitting, licensing, wetlands certification and non-regulatory nps pollution activities. Prevent adverse impacts to wetland functions that affect nps pollution abatement from hydrologic changes, sedimentation, or contaminant, ex: pretreatment practices: vegetated systems, detention/retention basins		
	Section 4: Roads, Bridges, Public Rights of Way		
4-01	Conduct road, bridge are related drainage/stormwater structures inspection/maintenance (de-icing material usage and storage, pot-hole repair, bridge washing, scraping and painting, cleaning catch basins, etc.) according to best management practices		
4-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) - according to best management practices		
4-03	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities		
4-04	Incorporate alternatives to traditional de-icing practices, including adjusting mix rates, using non-salt and non-sand alternatives. Store in a enclosed areas with impervious floor.		Practice: According to G/FLRPC 2011 Salt Storage Survey - 3 salt/ 1 sand ratio - enclosed storage on pavement floor
4-05	Target existing public holdings, such as parks, for removing unnecessary impervious surfaces		

		Bethany - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
4-06	Incorporate New York State Department of Transportation design and guidance documents, standard specifications, and procedural manuals (*Highway Design Manual, Environmental Procedures Manual,* Maintenance Guidelines, etc.) into local laws and operating procedures		
4-07	Participate in Cornell Local Roads Program activities and training		
4-08	Target training programs at highway officials, contractors, construction workers, inspectors, zoning and planning officials		
4-09	Culvert maintenance: Culverts are routinely inspected, maintained and resized when necessary so that they will remain unobstructed, allowing for the free flow of water during storm events. Blockages resulting from sedimentation, debris, excessive vegetation and structural failure are issues to be aware of.	Stormwater Management and Erosion Control Plan, Sec. 8 Contents of Plan-Existing Conditions, b4: Where applicable…Show culverts downstream of project and culvert size. Show existing easements for storm drains, sewers, and other utilities. Show the extent of the drainage area served by a man-made stormwater drainage network if that net work system is collecting runoff from outside of the natural drainage basin... See also Part c, Proposed Future Development Conditions (sections 1-4)	
	Section 5: Onsite Wastewater Treatment Systems		
5-01	Conduct regular inspections of OWTS at minimum at property transfer or within 1 year prior to transfer		
5-02	Institute setback guidelines		
5-04	Target outreach programs at homeowners, contractors and developers		
5-05	Require all properties with access to municipal service to connect.	Comp Plan - Public Utilities - All homes in Bethany have private water supply and sewage disposal systems.	

		Byron - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 1: Development		
1-01	Identify retrofit opportunities for existing development - ex: retention/detention areas, stormwater ponds, construction of wastewater treatment systems to replace older septic systems		
1-02	Encourage homeowners to place compost piles away from waterbodies and roadways		
1-03	Encourage proper use and disposal of lawn and other household chemicals (res., com., indus., rec., uses etc.)		
1-04	Storm drain/curb stenciling/labeling		
1-05	Encourage volunteer programs		
1-06	Encourage the use of indigenous plants		
1-07	Develop outreach programs targeted at water quality management. Target training for contractors, developers, inspectors and zoning and planning officials.		
1-08	Encourage proper control of pet wastes		
1-09	Enforcement details regarding stormwater regulations & requirements - responsibility, penalties, etc.		
1-10	Use of drainage districts		
1-11	Minimize the amount of land disturbed (including cut and fill) and the duration of disturbance	Z.O. Section 905, K. Floodways 1 - Any encroachment, including fill, shall be prohibited. Subdivision, Section 2-F.4: All surfaces, including hills or mounds of dirt, shall be removed and/or restored within six months of the time of the completion. Z.O. Section 1117, L - Road construction shall, at all times, minimize ground disturbances and vegetation cutting.	
1-12	Preserve natural features and conform with the natural boundaries and alignment of waterbodies. Account for topography and soil type to minimize erosion. Limit grades of access roads.	Z.O. Section 501, A - No structure shall be built within 50 feet of the bed of stream carrying water on an average of six months a year. Z.O. Section 501, B - No person shall strip, excavate, or otherwise remove topsoil. Z.O. Section 501, C - Natural features such as trees, brooks, drainage channels shall be preserved as best as possible. Z.O. Section 906, A. 1 - Prohibit development in Land Conservation District. No development in areas with special or unusual conditions of topography. Z.O. Section 1101, B.2 - [For Special Use Permits] The design of any building shall conform to the general character of the area. Z.O. Section 1117, J - Existing on-site vegetation shall be preserved to the maximum extent possible. L - Road construction shall, at all times, minimize ground disturbances and vegetation cutting.	
1-13	Retain and protect trees and other natural vegetation on and near disturbed sites. Require tree surveys and/or cutting plans.	Z.O. Section 501, C - Natural features such as trees, brooks, drainage channels shall be preserved as best as possible. Z.O. Section 1101, B.2 - No cutting of trees exceeding a height of 4 feet off the ground. Section 1117, L - Road construction shall, at all times, minimize ground disturbances and vegetation cutting.	
1-14	Minimize the creation of impervious areas [encourage permeable surface]		

		Byron - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
1-15	Maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction	Z.O. Section 502, P - All construction plans shall include storm water runoff drainage needs. Whenever possible, site grading shall direct water away from buildings and structures to the natural drainage way. Z.O. Section 1104, O - An adequate and comprehensive drainage system shall be provided to convey storm water runoff. F: All land which has been excavated must be rehabilitated in accordance with reclamation plans approved by the Planning Board as part of the site development plan review and approval process. P. The applicant shall include a plan for the control of soil erosion and excessive ground water seepage upon public roads, streams, or adjacent property.	
1-16	Stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching - to protect exposed and critical areas during development. Complete a.s.a.p., include timeline.	Zoning, Art. XI [Special Use Permit]; Sect. 1104 J: All topsoil and subsoil shall be stripped from the active excavation area and stockpiled and seeded for use in accordance with the restoration plan... O: An adequate and comprehensive drainage system shall be provided to convey stormwater runoff…Sediment control measures shall be installed to keep sediment damage, if any, totally within the applicant's property. P. The applicant shall include a plan for the control of soil erosion and excessive ground water seepage upon public roads, streams, or adjacent property.	Municipal practice
1-17	Use appropriate solid and hazardous waste generation and disposal practices including source controls and recycling		
1-18	Ensure proper operation and maintenance of runoff management facilities		Few facilities in place in the town, primarily culverts
1-19	Encourage cluster development/conservation subdivisions	Z.O. Section 1113, A - Cluster residential developments of one-family detached dwellings. C.P. Section III, A.1 - Construction of housing in clusters.	
1-20	Implement Federal/State Stormwater (SPDES) Phase II requirements including MS4 (when applicable) and Construction Permits as well as Municipal and Industrial Discharge Permits		
1-21	Discourage development in flood plain and/or development below base flood elevation	Z.O. Section 905, B. 1 - 5 - Restrict or prohibit uses in flood areas that are dangerous to health, safety, and property. No development that will further flood and erosion problems. Fill restricted. Ag allowed.	
	Section 2: Forestry and Agriculture		
	Forestry - if applicable		
2-01	Consider site restoration. Consider potential water quality impacts when selecting silviculture system (yarding system, site preparation, pesticides employment, etc.)		
2-02	Have specialists (geologist, soil scientist, geotechnical engineer, wildland hydrologist) review plans in high erosion hazard areas		
2-03	Consider Harvesting practices and preplan harvest areas - ex: operation season, skid trails/access on stable soils, avoiding-steep gradients/multiple stream crossings/poor drainage areas, etc.		
	Agriculture		
2-04	Implement the Agricultural Environmental Management (AEM) program		
2-05	Ensure Concentrated Animal Feeding Operations (CAFO) regulations and permits are being followed and Comprehensive Nutrition Management Plans are being used. (combined with below) (ADD NEW ROUND OF FUNDING)(any other animal waste one for non cafes?)		

		Byron - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
2-06	Implement barnyard runoff controls.		Recently Barnyard Runoff Management Systems and other operational BMPs were implemented on farms in Ogden(2), Wheatland(1), LeRoy(3), Pavilion(2), Byron(1), Warsaw(5), Covington(3), Orangeville(1), and Middlebury(1) through the Genesee River Implementation Grant project
2-07	Discourage grazing in environmentally sensitive areas (e.g. up to creek banks)		
2-08	Use of agricultural protection such as Agricultural Districts, agricultural preservation ordinances and practices, right to farm laws, and Agricultural and Farmland Protection Plans		
	Section 3: Waterways and Wetlands		
	Waterways		
3-01	Control in stream sedimentation, clear debris. Schedule inspections of sediment control measures for maintenance/repair.		
3-02	Establish riparian buffers		
3-03	Prevent animal wastes from entering waterbodies. Ex: animal control ordinances and/or practices that pertain to animal waste disposal		
3-04	Protect stream banks - vegetative stabilization-maintain/add vegetation(before using structural measures); indirect nonstructural-ex: regulate nearby irrigation, rerouting overbank drainage; direct structural-ex: revetments and bulkheads; indirect structural-ex: deflecting channel flow dikes		
3-05	Use setbacks to minimize disturbance of land adjacent to stream banks and shorelines	Z.O. Section 501, A - No structure shall be built within 50 feet of the bed of stream carrying water on an average of six months a year.	
3-06	Prevent discharges to waterbodies in amounts that would adversely affect the taste, color or odor of the waters, or would impair the waters for their best usages		
	Wetlands and Riparian Area Management and Restoration		
3-07	Prioritize wetlands and riparian areas and their non-point source (nps) control potential		
3-08	Identify wetlands and riparian areas with significant nps control potential especially when implementing nps management practices.		
3-09	Include considerations/regulations to protect wetlands, ex: permitting, licensing, wetlands certification and non-regulatory nps pollution activities. Prevent adverse impacts to wetland functions that affect nps pollution abatement from hydrologic changes, sedimentation, or contaminant, ex: pretreatment practices: vegetated systems, detention/retention basins		
	Section 4: Roads, Bridges, Public Rights of Way		
4-01	Conduct road, bridge are related drainage/stormwater structures inspection/maintenance (de-icing material usage and storage, pot-hole repair, bridge washing, scraping and painting, cleaning catch basins, etc.) according to best management practices		Practice: Basic BMPs are being used by the department; a new salt storage facility is being constructed in a addition to the one that is in place; stabilization of soils after disturbances occurs, etc. Generally, large areas of vegetation are not disturbed. With the exception of culverts, catch basins are the most common facility; most are relatively new and are monitored informally.

		Byron - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
4-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) - according to best management practices		Practice: chemicals are not used by the department for r.o.w. activities; generally, cleaning only takes place near culvert outlets; vegetation is retaining near receiving waterbodies
4-03	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities		Practice: culvert inlets and outlets where high-velocity flows are likely have been stabilized using riprap
4-04	Incorporate alternatives to traditional de-icing practices, including adjusting mix rates, using non-salt and non-sand alternatives. Store in a enclosed areas with impervious floor.		Practice: salt brine is currently being used by the department
4-05	Target existing public holdings, such as parks, for removing unnecessary impervious surfaces		
4-06	Incorporate New York State Department of Transportation design and guidance documents, standard specifications, and procedural manuals (*Highway Design Manual, Environmental Procedures Manual,* Maintenance Guidelines, etc.) into local laws and operating procedures		
4-07	Participate in Cornell Local Roads Program activities and training		Superintendent attends regularly
4-08	Target training programs at highway officials, contractors, construction workers, inspectors, zoning and planning officials		
4-09	Culvert maintenance: Culverts are routinely inspected, maintained and resized when necessary so that they will remain unobstructed, allowing for the free flow of water during storm events. Blockages resulting from sedimentation, debris, excessive vegetation and structural failure are issues to be aware of.		All of the problem culverts are known and carefully watches; as opportunities for their replacement arise, they are tended to
	Section 5: Onsite Wastewater Treatment Systems		
5-01	Conduct regular inspections of OWTS at minimum at property transfer or within 1 year prior to transfer		
5-02	Institute setback guidelines		
5-04	Target outreach programs at homeowners, contractors and developers		
5-05	Require all properties with access to municipal service to connect.	Z.O. Section 1112, Q.3 - Where public sewers are available, connection thereto shall be used exclusively. Subdivision Regulations, Art. V Sec. 1E; Wastewater Treatment Systems: All [systems] shall be installed in accordance with plans approved by the County Health Dept. ..Where a public wastewater treatment system is not available, an adequate private [system] shall be provided.	

2011-12 Laws/Practices		Caledonia - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 1: Development		
1-01	Identify retrofit opportunities for existing development - ex: retention/detention areas, stormwater ponds, construction of wastewater treatment systems to replace older septic systems…		
1-02	Encourage homeowners to place compost piles away from waterbodies and roadways.		
1-03	Encourage proper use and disposal of lawn and other household chemicals (res., com., indus., rec., uses etc.).		
1-04	Storm drain/curb stenciling/labeling program.		
1-05	Encourage volunteer programs.		
1-06	Encourage the use of indigenous plants in landscaping.		
1-07	Develop outreach programs targeted at water quality management. Target training for contractors, developers, inspectors and zoning and planning officials.		
1-08	Encourage proper control of pet wastes.		
1-09	Written details regarding enforcement of stormwater regulations & requirements - ex: responsibility, penalties, etc.		
1-10	Use of drainage districts.		
1-11	Minimize the amount of land disturbed (including cut and fill) and the duration of disturbance durring construction.		
1-12	Preserve natural features and conform with the natural boundaries and alignment of waterbodies durring development. Account for topography and soil type to minimize erosion. Limit grades of access roads.	Sub-113.24.E. - The Planning Board shall, wherever possible, establish the preservation of all natural features, such as large trees, watercourses, and wetlands. Sub-113.18.C(5) - Fitting of development plan to the topography and soils, so as to minimize the erosion potential. Z.O. 130.39 - The purpose of the Land Conservation District is to delineate those areas with special or unusual conditions of topography, drainage, floodplain or other natural conditions which serve their ecological purpose best in their natural state.	
1-13	Retain and protect trees and other natural vegetation on and near disturbed sites. Require tree surveys and/or cutting plans.	Sub-113.18.C(6) - Retention and protection of natural vegetation wherever possible. Sub-113.24.E - The Planning Board shall, wherever possible, establish the preservation of all natural features, such as large trees, watercourses, and wetlands...To the fullest extent possible, all existing trees and shrubbery shall be conserved by the subdivider. Z.O. 130-39 - The purpose of the Land Conservation District is to delineate those areas with special or unusual conditions of topography, drainage, floodplain or other natural conditions which serve their ecological purpose best in their natural state.	
1-14	Minimize the creation of impervious areas / encourage permeable surfaces.		
1-15	Maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction.	Sub-113.18.A.2(a) - Limit the rate of stormwater runoff from the project site to no more than the original or natural rate of runoff. Sub-113.18.A.2(b) - Limit to the maximum extent possible the pollution of existing surface and subsurface bodies of water via storm runoff. Sub-113.18.C(4) - Provisions for adequate drainage facilities to accommodate effectively the increased runoff caused by changed soil and surface conditions during and after development.	
1-16	Stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching - to protect exposed and critical areas during development. Timeline for completion.	Sub-113.18.C.(3) - Provisions for temporary vegetation and/or mulching to protect critical areas. Sub-113.24.E(1) - Topsoil moved during the course of construction shall be redistributed. Sub-113.18. C - The Planning Board shall require the developer to follow certain erosion control practices as it deems necessary.	
1-17	Use appropriate solid and hazardous waste generation and disposal practices including source controls and recycling.		
1-18	Ensure proper operation and maintenance of runoff management facilities.		
1-19	Encourage cluster development/conservation subdivisions.		
1-20	Implement Federal/State Stormwater (SPDES) Phase II requirements including MS4 (when applicable) and Construction Permits as well as Municipal and Industrial Discharge Permits		
1-21	Discourage development in flood plain and/or development below base flood elevation	Z.O. 130.39. - The purpose of the Land Conservation District is to delineate those areas with special or unusual conditions of topography, drainage, floodplain or other natural conditions which serve their ecological purpose best in their natural state. See Local Law #3-1994: Flood Damage Prevention Law.	

2011-12 Laws/Practices		Caledonia - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 2: Forestry and Agriculture		
	Forestry - if applicable		
2-01	Site restoration practices for forrestry sites. Consider potential water quality impacts when selecting silviculture system (yarding system, site preparation, pesticides employment, etc.)		
2-02	Have specialists (geologist, soil scientist, geotechnical engineer, wildland hydrologist) review plans in high erosion hazard areas.		
2-03	Consider Harvesting practices and preplan harvest areas - ex: operation season, skid trails/access on stable soils, avoiding-steep gradients/multiple stream crossings/poor drainage areas, etc.		
	Agriculture		
2-04	Implementation of the Agricultural Environmental Management (AEM) program.		
2-05	Ensure Concentrated Animal Feeding Operations (CAFO) regulations and permits are being followed and Comprehensive Nutrient Management Plans are being used.		
2-06	Implement barnyard runoff controls.		
2-07	Discourage grazing in environmentally sensitive areas (e.g. up to creek banks…)		
2-08	Use of agricultural protection such as agricultural districts, agricultural preservation ordinances and practices, right to farm laws, and agricultural and farmland protection plans		
	Section 3: Waterways, Wetlands and Riparian Area Management and Restoration		
	Waterways		
3-01	Control in stream sedimentation and/or clear debris. Schedule inspections of sediment control measures for maintenance/repair.		
3-02	Establish riparian buffers.		
3-03	Prevent animal wastes from entering waterbodies. Ex: animal control/animal waste disposal ordinances and/or practices.		
3-04	Protect stream banks - vegetative stabilization-maintain/add vegetation(before using structural measures); indirect nonstructural-ex: regulate nearby irrigation, rerouting overbank drainage; direct structural-ex: revetments and bulkheads; indirect structural-ex: deflecting channel flow dikes.		
3-05	Use setbacks to minimize disturbance of land adjacent to stream banks and shorelines.	Sub-113.24.E. - The Planning Board shall, wherever possible, establish the preservation of all natural features, such as large trees, watercourses, and wetlands. Z.O. 130-39 - The purpose of the Land Conservation District is to delineate those areas with special or unusual conditions of topography, drainage, floodplain or other natural conditions which serve their ecological purpose best in their natural state.	
3-06	Prevent discharges to waterbodies in amounts that would adversely affect the taste, color or odor of the waters, or would impair the waters for their best usages.		
	Wetlands		
3-07	Prioritize wetlands and riparian areas and their non-point source (nps) control potential.		
3-08	Identify wetlands and riparian areas with significant nps control potential especially when implementing nps management practices.		
3-09	Include considerations/regulations to protect wetlands, ex: permitting, licensing, wetlands certification and non-regulatory nps pollution activities. Prevent adverse impacts to wetland functions that affect nps pollution abatement from hydrologic changes, sedimentation, or contaminant, ex: pretreatment practices: vegetated systems, detention/retention basins...	Sub-113.24.E. - The Planning Board shall, wherever possible, establish the preservation of all natural features, such as...wetlands.... Z.O. 130.39. - The purpose of the Land Conservation District is to delineate those areas with special or unusual conditions of topography, drainage, floodplain or other natural conditions which serve their ecological purpose best in their natural state.	

2011-12 Laws/Practices		Caledonia - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 4: Roads, Bridges, Public Rights of Way		
4-01	Conduct road, bridge, and drainage/stormwater structure inspection and maintenance and procedures (de-icing material usage and storage, pot-hole repair, bridge washing, scraping and painting, cleaning catch basins, etc.) according to best management practices.		Basic BMPs conducted by the municipality example: road salt storage enclosed; chemical pesticides are rarely used, and only in certain spots; stabilization occurs immediately after sites are disturbed, etc. Inspection/Maintenance - report forms are filled out for each facility and kept on file.
4-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) - according to best management practices.		Chemical pesticides used to a very limited degree; stabilization (hand seeding) occurs immediately ditches are cleaned, etc.
4-03	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities.		Caledonia is very flat; in the few areas with slopes, rip rap has been installed to line areas that are likely to erode.
4-04	Incorporate alternatives to traditional de-icing practices including adjusting mix rates, using non-salt and non-sand alternatives. Store in a enclosed areas with impervious floor.		Salt that is purchased is pre-treated by supplier for more effective use and longevity; 100% straight-salt is used. According to G/FLRPC 2011 Salt Storage Survey - enclosed storage on pavement floor. According to G/FLRPC 2011 Salt Storage Survey - enclosed storage on concrete floor.
4-05	Target existing public holdings, such as parks, for removing unnecessary impervious surfaces.		
4-06	Incorporate New York State Department of Transportation design and guidance documents, standard specifications, and procedural manuals (*Highway Design Manual, Environmental Procedures Manual,* Maintenance Guidelines, etc.) into local laws and operating procedures.		
4-07	Participate in Cornell Local Roads Program activities and training.		Supervisor and staff attend.
4-08	Target training programs at highway officials, contractors, construction workers, inspectors, zoning and planning officials.		
4-09	Culvert maintenance: routinely inspected, maintained and resized when necessary so that they will remain unobstructed during storm events. Blockages resulting from sedimentation, debris, excessive vegetation and structural failure should be identified and mitigated.		Problem culverts are being rectified through routine inspection; addressing improperly-sized culverts throughout the town; forms filed out for each failing facility and kept on file.
	Section 5: Onsite Wastewater Treatment Systems		
5-01	Conduct regular inspections of septic/onsite wastewater treatment systems (OWTS), at minimum durring transfer of property or within 1 year prior to transfer.		
5-02	Institute setback guidelines		
5-04	Target OWTS outreach programs at homeowners, contractors and developers		
5-05	Require all properties with access to municipal sewer service to connect.		

2011-12 Laws/Practices		Caledonia - Village	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 1: Development		
1-01	Identify retrofit opportunities for existing development - ex: retention/detention areas, stormwater ponds, construction of wastewater treatment systems to replace older septic systems…		
1-02	Encourage homeowners to place compost piles away from waterbodies and roadways.		
1-03	Encourage proper use and disposal of lawn and other household chemicals (res., com., indus., rec., uses etc.).		
1-04	Storm drain/curb stenciling/labeling program.		
1-05	Encourage volunteer programs.		
1-06	Encourage the use of indigenous plants in landscaping.		Disease-resistant species and native species are chosen by municipality whenever possible.
1-07	Develop outreach programs targeted at water quality management. Target training for contractors, developers, inspectors and zoning and planning officials.		
1-08	Encourage proper control of pet wastes.		
1-09	Written details regarding enforcement of stormwater regulations & requirements - ex: responsibility, penalties, etc.		
1-10	Use of drainage districts.		
1-11	Minimize the amount of land disturbed (including cut and fill) and the duration of disturbance durring construction.		
1-12	Preserve natural features and conform with the natural boundaries and alignment of waterbodies durring development. Account for topography and soil type to minimize erosion. Limit grades of access roads.	Z.O. 215.39. - The purpose of the Land Conservation District is to delineate those areas with special or unusual conditions of topography, drainage, floodplain or other natural conditions which serve their ecological purpose best in their natural state. Sub-186.21.E. - The Planning Board, shall wherever possible, establish the preservation of natural features (such as trees and waterways etc.). Sub-186.21.C(1) - In cases where the planning board finds that due to topography, the land is not suitable for development, they may waiver development.	
1-13	Retain and protect trees and other natural vegetation on and near disturbed sites. Require tree surveys and/or cutting plans.	Z.O. 215.39. - The purpose of the Land Conservation District is to delineate those areas with special or unusual conditions of topography, drainage, floodplain or other natural conditions which serve their ecological purpose best in their natural state. Sub-186.21.E. - The Planning Board, shall wherever possible, establish the preservation of natural features (such as trees and waterways etc.).	
1-14	Minimize the creation of impervious areas / encourage permeable surfaces.		
1-15	Maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction.	Sub-186.20.A. - The subdivider may be required by the planning board to carry away surface water that may exist prior to or as a result of the subdivision.	
1-16	Stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching - to protect exposed and critical areas during development. Timeline for completion.		On municipal properties/projects, topsoil and seeding is done ASAP after land altering activities.
1-17	Use appropriate solid and hazardous waste generation and disposal practices including source controls and recycling.		Standard municipal operating procedure.
1-18	Ensure proper operation and maintenance of runoff management facilities.		Municipal facilities-limited number of facilities; all are easily maintained.
1-19	Encourage cluster development/conservation subdivisions.		
1-20	Implement Federal/State Stormwater (SPDES) Phase II requirements including MS4 (when applicable) and Construction Permits as well as Municipal and Industrial Discharge Permits		
1-21	Discourage development in flood plain and/or development below base flood elevation		
	Section 2: Forestry and Agriculture		
	Forestry - if applicable		
2-01	Site restoration practices for forrestry sites. Consider potential water quality impacts when selecting silviculture system (yarding system, site preparation, pesticides employment, etc.)		
2-02	Have specialists (geologist, soil scientist, geotechnical engineer, wildland hydrologist) review plans in high erosion hazard areas.		

2011-12 Laws/Practices		Caledonia - Village	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
2-03	Consider Harvesting practices and preplan harvest areas - ex: operation season, skid trails/access on stable soils, avoiding-steep gradients/multiple stream crossings/poor drainage areas, etc.		
	Agriculture		
2-04	Implementation of the Agricultural Environmental Management (AEM) program.		
2-05	Ensure Concentrated Animal Feeding Operations (CAFO) regulations and permits are being followed and Comprehensive Nutrient Management Plans are being used.		
2-06	Implement barnyard runoff controls.		
2-07	Discourage grazing in environmentally sensitive areas (e.g. up to creek banks…)		
2-08	Use of agricultural protection such as agricultural districts, agricultural preservation ordinances and practices, right to farm laws, and agricultural and farmland protection plans		Ag districts present.
	Section 3: Waterways, Wetlands and Riparian Area Management and Restoration		
	Waterways		
3-01	Control in stream sedimentation and/or clear debris. Schedule inspections of sediment control measures for maintenance/repair.		
3-02	Establish riparian buffers.		
3-03	Prevent animal wastes from entering waterbodies. Ex: animal control/animal waste disposal ordinances and/or practices.		
3-04	Protect stream banks - vegetative stabilization-maintain/add vegetation(before using structural measures); indirect nonstructural-ex: regulate nearby irrigation, rerouting overbank drainage; direct structural-ex: revetments and bulkheads; indirect structural-ex: deflecting channel flow dikes.		
3-05	Use setbacks to minimize disturbance of land adjacent to stream banks and shorelines.		
3-06	Prevent discharges to waterbodies in amounts that would adversely affect the taste, color or odor of the waters, or would impair the waters for their best usages.		
	Wetlands		
3-07	Prioritize wetlands and riparian areas and their non-point source (nps) control potential.		
3-08	Identify wetlands and riparian areas with significant nps control potential especially when implementing nps management practices.		
3-09	Include considerations/regulations to protect wetlands, ex: permitting, licensing, wetlands certification and non-regulatory nps pollution activities. Prevent adverse impacts to wetland functions that affect nps pollution abatement from hydrologic changes, sedimentation, or contaminant, ex: pretreatment practices: vegetated systems, detention/retention basins...		
	Section 4: Roads, Bridges, Public Rights of Way		
4-01	Conduct road, bridge, and drainage/stormwater structure inspection and maintenance and procedures (de-icing material usage and storage, pot-hole repair, bridge washing, scraping and painting, cleaning catch basins, etc.) according to best management practices.		The department has a very small jurisdiction, however several key BMPs are being practiced; limited salting, hydro seeding conducted when necessary, etc. Catch basins are vacuumed out regularly; only 3 culverts in the village; no other facilities.
4-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) - according to best management practices.		Limited area to be covered, including one ditch/intermittent stream; however, department approaches the area with sensitivity.
4-03	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities.		Does not apply: area is relatively flat and free of erosion issues.
4-04	Incorporate alternatives to traditional de-icing practices including adjusting mix rates, using non-salt and non-sand alternatives. Store in a enclosed areas with impervious floor.		Various alternatives have been testes and are currently used, including the additive 'Iceban'; otherwise, 100% salt is used in the village. According to G/FLRPC 2011 Salt Storage Survey - enclosed storage on concrete floor.
4-05	Target existing public holdings, such as parks, for removing unnecessary impervious surfaces.		

2011-12 Laws/Practices		Caledonia - Village	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
4-06	Incorporate New York State Department of Transportation design and guidance documents, standard specifications, and procedural manuals (*Highway Design Manual, Environmental Procedures Manual,* Maintenance Guidelines, etc.) into local laws and operating procedures.		Public works dept. is familiar with the documents.
4-07	Participate in Cornell Local Roads Program activities and training.		
4-08	Target training programs at highway officials, contractors, construction workers, inspectors, zoning and planning officials.		
4-09	Culvert maintenance: routinely inspected, maintained and resized when necessary so that they will remain unobstructed during storm events. Blockages resulting from sedimentation, debris, excessive vegetation and structural failure should be identified and mitigated.		3 culverts within the village limits; all are easily maintained.
Section 5: Onsite Wastewater Treatment Systems			
5-01	Conduct regular inspections of septic/onsite wastewater treatment systems (OWTS), at minimum durring transfer of property or within 1 year prior to transfer.		
5-02	Institute setback guidelines		
5-04	Target OWTS outreach programs at homeowners, contractors and developers		
5-05	Require all properties with access to municipal sewer service to connect.		

2011-12 Laws/Practices		Covington - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 1: Development		
1-01	Identify retrofit opportunities for existing development - ex: retention/detention areas, stormwater ponds, construction of wastewater treatment systems to replace older septic systems…		
1-02	Encourage homeowners to place compost piles away from waterbodies and roadways.		
1-03	Encourage proper use and disposal of lawn and other household chemicals (res., com., indus., rec., uses etc.).		
1-04	Storm drain/curb stenciling/labeling program.		
1-05	Encourage volunteer programs.		
1-06	Encourage the use of indigenous plants in landscaping.		
1-07	Develop outreach programs targeted at water quality management. Target training for contractors, developers, inspectors and zoning and planning officials.		
1-08	Encourage proper control of pet wastes.	Local Law 1.2001, Sec7 -…owners shall be responsible for the immediate cleanup an any excrement deposited by their animals…	
1-09	Written details regarding enforcement of stormwater regulations & requirements - ex: responsibility, penalties, etc.		
1-10	Use of drainage districts.		
1-11	Minimize the amount of land disturbed (including cut and fill) and the duration of disturbance durring construction.		
1-12	Preserve natural features and conform with the natural boundaries and alignment of waterbodies durring development. Account for topography and soil type to minimize erosion. Limit grades of access roads.	Z.O.V.501.C. - Whenever natural features such as trees, brooks, drainage channels and views interfere with the proposed use of property, the retention of the maximum amount of such features consistent with the intended use of the property shall be encouraged. Sub-IV.2 - Design Standards - (F) Preservation of Natural Features - 2. Where a subdivision is traversed by a natural lake, pond or stream, the boundaries or alignment of said watercourse shall be preserved… 3. Unique physical features such as historic landmarks and sites, rock outcroppings, hilltop lookouts, desirable natural contours, and similar features shall be preserved...	
1-13	Retain and protect trees and other natural vegetation on and near disturbed sites. Require tree surveys and/or cutting plans.	Sub.IV.2 - Design Standards - F. Preservation of Natural Features (6): No tree with a diameter of eight inches or more as measured three feet above the base of the trunk shall be removed unless the tree is within the right of way of a street... Z.O. Amendments III 306 D. Review of Site Plan 1. e. Adequacy of stormwater and drainage facilities. g. Adequacy, type and arrangement of trees, shrubs and other landscaping constituting a visual and/or noise buffer between the applicants and adjoining lands, including the maximum retention of existing vegetation.	
1-14	Minimize the creation of impervious areas / encourage permeable surfaces.		
1-15	Maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction.	Z.O. V.502(O): All construction plans shall include consideration of storm water drainage needs. Z.O. Amendment III.306.C. Site Plan Review - Application for Approval – requirement of v. grading and drainage plan, showing existing and proposed contours; x. Location, design and construction materials of all existing or proposed site improvements including drains, culverts, retaining walls and fences; D.1.e. - Review of Site Plan - Adequacy of stormwater and drainage facilities. Sub-IV.2(D) - Design Standards - The Planning Board shall refer all residential subdivision proposals to the W.C. SWCD and/or Town Engineer, for their review as to the acceptability of proposed drainage, erosion and sediment control measures both during construction phases and after completion.	
1-16	Stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching - to protect exposed and critical areas during development. Timeline for completion.	Sub-IV.2. - Design Standards - (F), Preservation of Natural Features (1): Topsoil moved during the course of construction shall be redistributed so as to provide a minimum depth of six inches of cover to all areas of the subdivision and shall be stabilized by seeding or planting. (4): All surfaces, including hills or mounds of dirt, shall be removed and/or restored within six months of the time of the completion. (D): The Planning Board shall refer all residential subdivision proposals to the W.C. SWCD and/or Town Engineer, for their review as to the acceptability of proposed drainage, erosion and sediment control measures both during construction phases and after completion.	
1-17	Use appropriate solid and hazardous waste generation and disposal practices including source controls and recycling.		
1-18	Ensure proper operation and maintenance of runoff management facilities.		
1-19	Encourage cluster development/conservation subdivisions.	Z.O. XI.1113 - Cluster Residential Development	
1-20	Implement Federal/State Stormwater (SPDES) Phase II requirements including MS4 (when applicable) and Construction Permits as well as Municipal and Industrial Discharge Permits		
1-21	Discourage development in flood plain and/or development below base flood elevation	Local Law 2-1983. A local law to adopt flood plain management measures. Local Law 2-1987: A local law for flood damage prevention.	

2011-12 Laws/Practices		Covington - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 2: Forestry and Agriculture		
	Forestry - if applicable		
2-01	Site restoration practices for forrestry sites. Consider potential water quality impacts when selecting silviculture system (yarding system, site preparation, pesticides employment, etc.)		
2-02	Have specialists (geologist, soil scientist, geotechnical engineer, wildland hydrologist) review plans in high erosion hazard areas.		
2-03	Consider Harvesting practices and preplan harvest areas - ex: operation season, skid trails/access on stable soils, avoiding-steep gradients/multiple stream crossings/poor drainage areas, etc.		
	Agriculture		
2-04	Implementation of the Agricultural Environmental Management (AEM) program.		
2-05	Ensure Concentrated Animal Feeding Operations (CAFO) regulations and permits are being followed and Comprehensive Nutrient Management Plans are being used.		
2-06	Implement barnyard runoff controls.		
2-07	Discourage grazing in environmentally sensitive areas (e.g. up to creek banks…)		
2-08	Use of agricultural protection such as agricultural districts, agricultural preservation ordinances and practices, right to farm laws, and agricultural and farmland protection plans	Ag. Districts Present; Z.O.IX.901 Agricultural District.	
	Section 3: Waterways, Wetlands and Riparian Area Management and Restoration		
	Waterways		
3-01	Control in stream sedimentation and/or clear debris. Schedule inspections of sediment control measures for maintenance/repair.		
3-02	Establish riparian buffers.		
3-03	Prevent animal wastes from entering waterbodies. Ex: animal control/animal waste disposal ordinances and/or practices.	Z.O.X.1006 - Animal Waste Storage Facilities: [details construction specifications, spreading practices, and NRCS approval, etc.].	
3-04	Protect stream banks - vegetative stabilization-maintain/add vegetation(before using structural measures); indirect nonstructural-ex: regulate nearby irrigation, rerouting overbank drainage; direct structural-ex: revetments and bulkheads; indirect structural-ex: deflecting channel flow dikes.		
3-05	Use setbacks to minimize disturbance of land adjacent to stream banks and shorelines.	Z.O. V.501.A - No structure shall be built within fifty feet of the bed of a stream…	
3-06	Prevent discharges to waterbodies in amounts that would adversely affect the taste, color or odor of the waters, or would impair the waters for their best usages.		
	Wetlands		
3-07	Prioritize wetlands and riparian areas and their non-point source (nps) control potential.		
3-08	Identify wetlands and riparian areas with significant nps control potential especially when implementing nps management practices.		
3-09	Include considerations/regulations to protect wetlands, ex: permitting, licensing, wetlands certification and non-regulatory nps pollution activities. Prevent adverse impacts to wetland functions that affect nps pollution abatement from hydrologic changes, sedimentation, or contaminant, ex: pretreatment practices: vegetated systems, detention/retention basins...		
	Section 4: Roads, Bridges, Public Rights of Way		
4-01	Conduct road, bridge, and drainage/stormwater structure inspection and maintenance and procedures (de-icing material usage and storage, pot-hole repair, bridge washing, scraping and painting, cleaning catch basins, etc.) according to best management practices.		
4-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) - according to best management practices.		

2011-12 Laws/Practices		Covington - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
4-03	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities.		
4-04	Incorporate alternatives to traditional de-icing practices including adjusting mix rates, using non-salt and non-sand alternatives. Store in a enclosed areas with impervious floor.		According to G/FLRPC 2011 Salt Storage Survey - 25% sand/ 75% salt, enclosed storage on pavement floor.
4-05	Target existing public holdings, such as parks, for removing unnecessary impervious surfaces.		
4-06	Incorporate New York State Department of Transportation design and guidance documents, standard specifications, and procedural manuals (*Highway Design Manual, Environmental Procedures Manual,* Maintenance Guidelines, etc.) into local laws and operating procedures.		
4-07	Participate in Cornell Local Roads Program activities and training.		
4-08	Target training programs at highway officials, contractors, construction workers, inspectors, zoning and planning officials.		
4-09	Culvert maintenance: routinely inspected, maintained and resized when necessary so that they will remain unobstructed during storm events. Blockages resulting from sedimentation, debris, excessive vegetation and structural failure should be identified and mitigated.		
	Section 5: Onsite Wastewater Treatment Systems		
5-01	Conduct regular inspections of septic/onsite wastewater treatment systems (OWTS), at minimum durring transfer of property or within 1 year prior to transfer.		
5-02	Institute setback guidelines		
5-04	Target OWTS outreach programs at homeowners, contractors and developers		
5-05	Require all properties with access to municipal sewer service to connect.		

2011-12 Laws/Practices		Gainesville - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 1: Development		
1-01	Identify retrofit opportunities for existing development - ex: retention/detention areas, stormwater ponds, construction of wastewater treatment systems to replace older septic systems…		
1-02	Encourage homeowners to place compost piles away from waterbodies and roadways.		
1-03	Encourage proper use and disposal of lawn and other household chemicals (res., com., indus., rec., uses etc.).		
1-04	Storm drain/curb stenciling/labeling program.		
1-05	Encourage volunteer programs.		
1-06	Encourage the use of indigenous plants in landscaping.		
1-07	Develop outreach programs targeted at water quality management. Target training for contractors, developers, inspectors and zoning and planning officials.		
1-08	Encourage proper control of pet wastes.		
1-09	Written details regarding enforcement of stormwater regulations & requirements - ex: responsibility, penalties, etc.		
1-10	Use of drainage districts.		
1-11	Minimize the amount of land disturbed (including cut and fill) and the duration of disturbance durring construction.		
1-12	Preserve natural features and conform with the natural boundaries and alignment of waterbodies durring development. Account for topography and soil type to minimize erosion. Limit grades of access roads.	C.P. IX.903.4. - Residential Policies - Residential construction should be strictly controlled in areas which are subject to flooding and characterized by steep slopes or soils which are unstable and subject to erosion.	
1-13	Retain and protect trees and other natural vegetation on and near disturbed sites. Require tree surveys and/or cutting plans.		
1-14	Minimize the creation of impervious areas / encourage permeable surfaces.		
1-15	Maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction.		
1-16	Stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching - to protect exposed and critical areas during development. Timeline for completion.		
1-17	Use appropriate solid and hazardous waste generation and disposal practices including source controls and recycling.		
1-18	Ensure proper operation and maintenance of runoff management facilities.		
1-19	Encourage cluster development/conservation subdivisions.		
1-20	Implement Federal/State Stormwater (SPDES) Phase II requirements including MS4 (when applicable) and Construction Permits as well as Municipal and Industrial Discharge Permits		
1-21	Discourage development in flood plain and/or development below base flood elevation	Local Law 2-1983: Flood Damage Prevention Local Law. See also Z.O. Section 301. E	
	Section 2: Forestry and Agriculture		
	Forestry - if applicable		
2-01	Site restoration practices for forrestry sites. Consider potential water quality impacts when selecting silviculture system (yarding system, site preparation, pesticides employment, etc.)		
2-02	Have specialists (geologist, soil scientist, geotechnical engineer, wildland hydrologist) review plans in high erosion hazard areas.		
2-03	Consider Harvesting practices and preplan harvest areas - ex: operation season, skid trails/access on stable soils, avoiding-steep gradients/multiple stream crossings/poor drainage areas, etc.		
	Agriculture		
2-04	Implementation of the Agricultural Environmental Management (AEM) program.		
2-05	Ensure Concentrated Animal Feeding Operations (CAFO) regulations and permits are being followed and Comprehensive Nutrient Management Plans are being used.		
2-06	Implement barnyard runoff controls.		
2-07	Discourage grazing in environmentally sensitive areas (e.g. up to creek banks…)		
2-08	Use of agricultural protection such as agricultural districts, agricultural preservation ordinances and practices, right to farm laws, and agricultural and farmland protection plans	Z.O. 312 - The Ag. Residential District is designed to preserve the Town's agricultural base and maintain its rural nature. C.P. IX.907 - Conservation and Open Space, parts 1-6: [Detailing the importance of open space and need for conservation of such spaces].	
	Section 3: Waterways, Wetlands and Riparian Area Management and Restoration		
	Waterways		
3-01	Control in stream sedimentation and/or clear debris. Schedule inspections of sediment control measures for maintenance/repair.		
3-02	Establish riparian buffers.		

2011-12 Laws/Practices		Gainesville - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
3-03	Prevent animal wastes from entering waterbodies. Ex: animal control/animal waste disposal ordinances and/or practices.	Z.O. 630-2 - Stabling of Farm Animals: Disposal of bedding, manure or other animal waste shall be in conformance with guidelines established by the US Soil Conservation Service and/or W.C. SWCD…an animal waste disposal plan may also be required.	
3-04	Protect stream banks - vegetative stabilization-maintain/add vegetation(before using structural measures); indirect nonstructural-ex: regulate nearby irrigation, rerouting overbank drainage; direct structural-ex: revetments and bulkheads; indirect structural-ex: deflecting channel flow dikes.		
3-05	Use setbacks to minimize disturbance of land adjacent to stream banks and shorelines.		
3-06	Prevent discharges to waterbodies in amounts that would adversely affect the taste, color or odor of the waters, or would impair the waters for their best usages.		
	Wetlands		
3-07	Prioritize wetlands and riparian areas and their non-point source (nps) control potential.		
3-08	Identify wetlands and riparian areas with significant nps control potential especially when implementing nps management practices.		
3-09	Include considerations/regulations to protect wetlands, ex: permitting, licensing, wetlands certification and non-regulatory nps pollution activities. Prevent adverse impacts to wetland functions that affect nps pollution abatement from hydrologic changes, sedimentation, or contaminant, ex: pretreatment practices: vegetated systems, detention/retention basins...		
	Section 4: Roads, Bridges, Public Rights of Way		
4-01	Conduct road, bridge, and drainage/stormwater structure inspection and maintenance and procedures (de-icing material usage and storage, pot-hole repair, bridge washing, scraping and painting, cleaning catch basins, etc.) according to best management practices.		
4-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) - according to best management practices.		
4-03	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities.		
4-04	Incorporate alternatives to traditional de-icing practices including adjusting mix rates, using non-salt and non-sand alternatives. Store in a enclosed areas with impervious floor.		According to G/FLRPC 2011 Salt Storage Survey - 2 sand/ 1 salt, enclosed storage on pavement floor.
4-05	Target existing public holdings, such as parks, for removing unnecessary impervious surfaces.		
4-06	Incorporate New York State Department of Transportation design and guidance documents, standard specifications, and procedural manuals (*Highway Design Manual, Environmental Procedures Manual,* Maintenance Guidelines, etc.) into local laws and operating procedures.		
4-07	Participate in Cornell Local Roads Program activities and training.		
4-08	Target training programs at highway officials, contractors, construction workers, inspectors, zoning and planning officials.		
4-09	Culvert maintenance: routinely inspected, maintained and resized when necessary so that they will remain unobstructed during storm events. Blockages resulting from sedimentation, debris, excessive vegetation and structural failure should be identified and mitigated.		
	Section 5: Onsite Wastewater Treatment Systems		
5-01	Conduct regular inspections of septic/onsite wastewater treatment systems (OWTS), at minimum durring transfer of property or within 1 year prior to transfer.		
5-02	Institute setback guidelines		
5-04	Target OWTS outreach programs at homeowners, contractors and developers		
5-05	Require all properties with access to municipal sewer service to connect.		

		Genesee County	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 1: Development		
1-01	Identify retrofit opportunities for existing development - ex: retention/detention areas, stormwater ponds, construction of wastewater treatment systems to replace older septic systems		
1-02	Encourage homeowners to place compost piles away from waterbodies and roadways		GLOW Composting Education Demonstration Sites set up with informational brochures
1-03	Encourage proper use and disposal of lawn and other household chemicals (res., com., indus., rec., uses etc.)		GLOW Region Solid Waste Management Committee, in cooperation with GLOW Region Soil and Water Conservation, Farm Bureau and Cornell Cooperative Extension offices - AG plastics container collection. Household Hazardous Waste programs held annually and rotates between Genesee, Livingston and Wyoming Counties. DEC - pesticide collection.
1-04	Storm drain/curb stenciling/labeling		Storm drains are relatively limited in rural towns
1-05	Encourage volunteer programs		Black Creek Watershed Coalition (BCWC), Oatka Creek Watershed Committee, and other volunteer groups in place
1-06	Encourage the use of indigenous plants		SWCD tree and shrub sale, occurs on an annual basis; hardy varieties of native species are provided to the public at low-cost
1-07	Develop outreach programs targeted at water quality management. Target training for contractors, developers, inspectors and zoning and planning officials.		Genesee County Planning: general training for planning boards for things like site plan review, etc. - including water quality concepts. CCE, SWCD and Black Creek Watershed Coalition and Oatka Creek Watershed Committee have been developing several distinct programs regarding water quality, including (but not limited to) septic system outreach, erosion and sediment control workshops, agricultural BMPs, watershed planning and household hazardous waste. SWCD: Envirothon - statewide program for students to lear about the environment (Genesee County is active in it). G/FLRPC conducts workshops with water quality sessions, and does education/outreach.
1-08	Encourage proper control of pet wastes		
1-09	Enforcement details regarding stormwater regulations & requirements - responsibility, penalties, etc.		
1-10	Use of drainage districts		
1-11	Minimize the amount of land disturbed (including cut and fill) and the duration of disturbance		
1-12	Preserve natural features and conform with the natural boundaries and alignment of waterbodies. Account for topography and soil type to minimize erosion. Limit grades of access roads.		County Planning Dept. and Planning Board: refer proposals to SWCD to review, All: encourage engineers to include stormwater considerations in site plans, review or recommend the creation of stormwater management plans and/or SWPPPs when appropriate or required.
1-13	Retain and protect trees and other natural vegetation on and near disturbed sites. Require tree surveys and/or cutting plans.		
1-14	Minimize the creation of impervious areas [encourage permeable surface]		Genesee County Planning: educates on the possibility of Rain Gardens, and porous sidewalks.
1-15	Maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction		County Planning Dept. and Planning Board: refer proposals to SWCD to review, All: encourage engineers to include stormwater considerations in site plans, review or recommend the creation of stormwater management plans and/or SWPPPs when appropriate or required.
1-16	Stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching - to protect exposed and critical areas during development. Complete a.s.a.p., include timeline.		

		Genesee County	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
1-17	Use appropriate solid and hazardous waste generation and disposal practices including source controls and recycling		
1-18	Ensure proper operation and maintenance of runoff management facilities		
1-19	Encourage cluster development/conservation subdivisions		
1-20	Implement Federal/State Stormwater (SPDES) Phase II requirements including MS4 (when applicable) and Construction Permits as well as Municipal and Industrial Discharge Permits		No MS4s within the County. General Permit for construction required anywhere 1 acre or more is disturbed and requires SWPPPs. Construction site and Construction Permit inspection conducted by the county SWCD at the request of NYSDEC or municipalities.
1-21	Discourage development in flood plain and/or development below base flood elevation	Development in flood plain discouraged in county smart growth plan.	Practice: Genesee County Planning: Online mapping resource for Flood Plain identification
	Section 2: Forestry and Agriculture		
	Forestry - if applicable		
2-01	Consider site restoration. Consider potential water quality impacts when selecting silviculture system (yarding system, site preparation, pesticides employment, etc.)		
2-02	Have specialists (geologist, soil scientist, geotechnical engineer, wildland hydrologist) review plans in high erosion hazard areas		
2-03	Consider Harvesting practices and preplan harvest areas - ex: operation season, skid trails/access on stable soils, avoiding-steep gradients/multiple stream crossings/poor drainage areas, etc.		SWCD: encourages good woodland management and proper harvesting techniques to maintain present and meet future needs in cooperation with NYSDEC state foresters, and the Genesee County Park and Forest; also, a display at the County Park is being considered that can describe different woodlot management approaches. Genesee County Park and Forest: in Bethany has a forest management plan which includes selective harvesting to improve health of forest
	Agriculture		
2-04	Implement the Agricultural Environmental Management (AEM) program		SWCD: Assist farmers in creating plans and implementing bmp recommendations. See county SWCD AEM Five Year Plan for more information. Recently Monroe County SWCD and Genesee County SWCD have been awarded a $1,119,928 Round 18 Ag NPS grant for the Oatka Creek Watershed Agricultural Nutrient Reduction Project by the NYS Agricultural Nonpoint Source Pollution Abatement & Control Program. The project will implement 36 bmps on 5 farms identified as priority projects in the AEM Tier 2 process. BMPs will include: Heavy Use Area Protection, Barn Roof Runoff Structures, Riparian Buffer Strips/Filter Strips, Waste Storage Facilities, Waste Transport Systems, Access Roads, Milk house Waste Collection Systems, etc.
2-05	Ensure Concentrated Animal Feeding Operations (CAFO) regulations and permits are being followed and Comprehensive Nutrition Management Plans are being used. (combined with below) (ADD NEW ROUND OF FUNDING)(any other animal waste one for non cafes?)		SWCD: See county SWCD AEM Five Year Plan. CAFOs are part of AEM. No regulation at the local level, more information and assistance. DEC is the main regulatory organization (state/fed program). CNMPs are encouraged through AEM planning. Implementation grants available (haven't received planning grants), larger farms hire consultants to create them. See also Round 18 Ag NPS grant above - implementation of AEM CAFO and CNMP regs/plans/recommendations. FLLOWPA funding awarded for CAFO work in the past.
2-06	Implement barnyard runoff controls.		SWCD: continuing to implement and apply for grant funds. See 2012 Ag Nutrient Reduction Project above - will include barnyard runoff controls
2-07	Discourage grazing in environmentally sensitive areas (e.g. up to creek banks)		SWCD: Discouraged during AEM planning. Can sometimes get farmers cost share money to convince them. EPF AG NPS Abatement grants can help discourage grazing in environmentally sensitive areas, and are used as one of the sources for AEM grants. Round 18 Ag NPS grant will include vegetative stream buffers

		Genesee County	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
2-08	Use of agricultural protection such as Agricultural Districts, agricultural preservation ordinances and practices, right to farm laws, and Agricultural and Farmland Protection Plans	Genesee County Smart Growth Plan, 2005 Review Report, page 7: Purpose of the plan is to minimize the impacts from additional growth and development that would otherwise occur as a result of the extension of water service. County Agricultural and Farmland Protection Plan. Comprehensive Park Plan for Genesee County Park and Forest in Bethany.	Practice: Genesee County Planning: Online mapping resource illustrates Ag Districts
	Section 3: Waterways and Wetlands		
	Waterways		
3-01	Control in stream sedimentation, clear debris. Schedule inspections of sediment control measures for maintenance/repair.		Practice of SWCD, always looking for opportunities to devise check dams; maintains several that are in operation. SWCD/Highway Dept.: have a hydro seeder to seed road ditches/banks and bridge abutments
3-02	Establish riparian buffers		SWCD: works in conjunction with land owners, farmers in particular, implementing federally-funded programs. A few buffers are in place. Round 18 Ag NPS grant will include vegetative stream buffers.
3-03	Prevent animal wastes from entering waterbodies. Ex: animal control ordinances and/or practices that pertain to animal waste disposal		Round 18 Ag NPS grant - all 5 farms will be implementing practices to prevent animal waste from entering waterbody. 4/5 are CAFO regulated. FLLOWPA funding awarded for CAFO work in the past.
3-04	Protect stream banks - vegetative stabilization-maintain/add vegetation(before using structural measures); indirect nonstructural-ex: regulate nearby irrigation, rerouting overbank drainage; direct structural-ex: revetments and bulkheads; indirect structural-ex: deflecting channel flow dikes		SWCD: has used vegetated systems, such as downed trees and logs, to stabilize severely eroded banks. FLLOWPA funding awarded for stabilization in the past. Also village of LeRoy has issues with eroding creek banks, especially at bends in the creek, some stabilization was done about 5 years ago installing rocks on Oatka Creek bank between rte. 18 and rte. 5. Only completed a portion, applied for more money to complete. Round 18 Ag NPS grant will include vegetative stream buffers.
3-05	Use setbacks to minimize disturbance of land adjacent to stream banks and shorelines		
3-06	Prevent discharges to waterbodies in amounts that would adversely affect the taste, color or odor of the waters, or would impair the waters for their best usages		
	Wetlands and Riparian Area Management and Restoration		
3-07	Prioritize wetlands and riparian areas and their non-point source (nps) control potential		SWCD: guiding principle of operations, as exemplified in efforts in the field (Wetland Reserve Program) as well as education and outreach programs. Genesee County Planning: Online mapping resource for wetland identification.
3-08	Identify wetlands and riparian areas with significant nps control potential especially when implementing nps management practices.		
3-09	Include considerations/regulations to protect wetlands, ex: permitting, licensing, wetlands certification and non-regulatory nps pollution activities. Prevent adverse impacts to wetland functions that affect nps pollution abatement from hydrologic changes, sedimentation, or contaminant, ex: pretreatment practices: vegetated systems, detention/retention basins		
	Section 4: Roads, Bridges, Public Rights of Way		
4-01	Conduct road, bridge are related drainage/stormwater structures inspection/maintenance (de-icing material usage and storage, pot-hole repair, bridge washing, scraping and painting, cleaning catch basins, etc.) according to best management practices		
4-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) - according to best management practices		

		Genesee County	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
4-03	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities		
4-04	Incorporate alternatives to traditional de-icing practices, including adjusting mix rates, using non-salt and non-sand alternatives. Store in a enclosed areas with impervious floor.		
4-05	Target existing public holdings, such as parks, for removing unnecessary impervious surfaces		
4-06	Incorporate New York State Department of Transportation design and guidance documents, standard specifications, and procedural manuals (*Highway Design Manual, Environmental Procedures Manual,* Maintenance Guidelines, etc.) into local laws and operating procedures		
4-07	Participate in Cornell Local Roads Program activities and training		
4-08	Target training programs at highway officials, contractors, construction workers, inspectors, zoning and planning officials		
4-09	Culvert maintenance: Culverts are routinely inspected, maintained and resized when necessary so that they will remain unobstructed, allowing for the free flow of water during storm events. Blockages resulting from sedimentation, debris, excessive vegetation and structural failure are issues to be aware of.		
	Section 5: Onsite Wastewater Treatment Systems		
5-01	Conduct regular inspections of OWTS at minimum at property transfer or within 1 year prior to transfer	Regulation/Practice: Genesee County Sanitary Code/Health Dept. - inspection/permit required to construct, alter, repair or extend. Permit can be transferred to new property owner, new permit/inspection don't necessarily occur for property transfer.	Regulation/Practice: Genesee County Sanitary Code/Health Dept. - Are inspected if requested during financing/refinancing by lender. May be inspected by the health dept. if there is a complaint. Genesee County Health Department received a $200,000 grant which can be used for replacing septic systems and wells, connection to public water, or lead remediation.
5-02	Institute setback guidelines		
5-04	Target outreach programs at homeowners, contractors and developers		Practice: Genesee County DOH, CCE, SWCD: offer various education and outreach materials and programs. SWCD has been looking for updated materials to distribute
5-05	Require all properties with access to municipal service to connect.	Genesee County Sanitary Code - No new construction of systems where sanitary sewer is "available and accessible"	

2011-12 Laws/Practices		LeRoy - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
Section 1: Development			
1-01	Identify retrofit opportunities for existing development - ex: retention/detention areas, stormwater ponds, construction of wastewater treatment systems to replace older septic systems…		
1-02	Encourage homeowners to place compost piles away from waterbodies and roadways.		
1-03	Encourage proper use and disposal of lawn and other household chemicals (res., com., indus., rec., uses etc.).		
1-04	Storm drain/curb stenciling/labeling program.		
1-05	Encourage volunteer programs.		
1-06	Encourage the use of indigenous plants in landscapeing.		
1-07	Develop outreach programs targeted at water quality management. Target training for contractors, developers, inspectors and zoning and planning officials.		
1-08	Encourage proper control of pet wastes.		
1-09	Written details regarding enforcement of stormwater regulations & requirements - ex: responsibility, penalties, etc.		
1-10	Use of drainage districts.		
1-11	Minimize the amount of land disturbed (including cut and fill) and the duration of disturbance durring construction.		
1-12	Preserve natural features and conform with the natural boundaries and alignment of waterbodies durring development. Account for topography and soil type to minimize erosion. Limit grades of access roads.	Sub-135-22. - Existing features which would add value to residential development, such as trees, watercourses etc., should be preserved.	
1-13	Retain and protect trees and other natural vegetation on and near disturbed sites. Require tree surveys and/or cutting plans.	Sub-135-22. - Existing features which would add value to residential development, such as trees, watercourses etc., should be preserved.	
1-14	Minimize the creation of impervious areas / encourage permeable surfaces.		
1-15	Maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction.	Sub-135-6.C - The preliminary layout must include drainage plans.	
1-16	Stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching - to protect exposed and critical areas during development. Timeline for completion.		
1-17	Use appropriate solid and hazardous waste generation and disposal practices including source controls and recycling.		
1-18	Ensure proper operation and maintenance of runoff management facilities.		Practice--facilities are maintained
1-19	Encourage cluster development/conservation subdivisions.		
1-20	Implement Federal/State Stormwater (SPDES) Phase II requirements including MS4 (when applicable) and Construction Permits as well as Municipal and Industrial Discharge Permits		
1-21	Discourage development in flood plain and/or development below base flood elevation	Z.O. 165-11. F - Restrictions on building on lots under water or lots subject to flooding.	
Section 2: Forestry and Agriculture			
Forestry - if applicable			
2-01	Site restoration practices for forrestry sites. Consider potential water quality impacts when selecting silviculture system (yarding system, site preparation, pesticides employment, etc.)		
2-02	Have specialists (geologist, soil scientist, geotechnical engineer, wildland hydrologist) review plans in high erosion hazard areas.		
2-03	Consider Harvesting practices and preplan harvest areas - ex: operation season, skid trails/access on stable soils, avoiding-steep gradients/multiple stream crossings/poor drainage areas, etc.		
Agriculture			

2-04	Implementation of the Agricultural Environmental Management (AEM) program.		County AEM/Round 18 Ag NPS grant - 2 CAFO farms awarded within 2012 Oatka Creek Watershed Agricultural Nutrient Reduction Project to implement priority BMPs, and AEM/CNMP/CAFO requirements/recommendations.
2-05	Ensure Concentrated Animal Feeding Operations (CAFO) regulations and permits are being followed and Comprehensive Nutrient Management Plans are being used.		See Round 18 Ag NPS grant above - implementation of AEM CAFO and CNMP regs./plans/recommendations.
2-06	Implement barnyard runoff controls.		Round 18 Ag NPS grant will include waste management system, manure storage facility, etc. Recently Barnyard Runoff Management Systems and other operational BMPs were implemented on farms in Ogden(2), Wheatland(1), LeRoy(3), Pavilion(2), Byron(1), Warsaw(5), Covington(3), Orangeville(1), and Middlebury(1) through the Genesee River Implementation Grant project.
2-07	Discourage grazing in environmentally sensitive areas (e.g. up to creek banks…)		Round 18 Ag NPS grant above will include vegetative stream buffers.
2-08	Use of agricultural protection such as agricultural districts, agricultural preservation ordinances and practices, right to farm laws, and agricultural and farmland protection plans	Ag. Districts Present; Agricultural and Farmland Protection Plan - pg17 Goal and Recommendation 2: Identify and adopt land use regulations that protect farmland and create a supportive environment for agricultural businesses. p28. In some cases the Z.O. district regulations incorporate a "right to farm" statement at the head of the agricultural Z.O. district regulations. This puts prospective new non-farm residents on notice that they are not protected against such "nuisances" as the noise, dust, insects and odors generated in the day to day operation of the modern farm.	
Section 3: Waterways, Wetlands and Riparian Area Management and Restoration			
Waterways			
3-01	Control in stream sedimentation and/or clear debris. Schedule inspections of sediment control measures for maintenance/repair.		
3-02	Establish riparian buffers.		Round 18 Ag NPS grant above will include vegetative stream buffers.
3-03	Prevent animal wastes from entering waterbodies. Ex: animal control/animal waste disposal ordinances and/or practices.	Ag and Farmland Protection Plan - p29 - referring to Zoning. 1. In the R+A Residential Agricultural District and R-1 General Residential District additional setback requirements exist for manure storage, farm buildings for storage of products or equipment and farm buildings for housing animals, as well as farm water supply ponds. No such setbacks are required in the R-2 Medium Density Residential District. 2. There is a required setback of 100 feet from any property or street line for farm water supply, conservancy and fire protection ponds, but not for ponds in general, or for artificial lakes.	Round 18 Ag NPS grant - targeted toward preventing animal wastes from entering waterbody, will include waste management system, manure storage facility, vegetative buffers, etc.
3-04	Protect stream banks - vegetative stabilization-maintain/add vegetation(before using structural measures); indirect nonstructural-ex: regulate nearby irrigation, rerouting overbank drainage; direct structural-ex: revetments and bulkheads; indirect structural-ex: deflecting channel flow dikes.		Round 18 Ag NPS grant will include vegetative stream buffers.
3-05	Use setbacks to minimize disturbance of land adjacent to stream banks and shorelines.	Ag and Farmland Protection Plan - p29 - referring to zoning - 1. In the R+A Residential Agricultural District and R-1 General Residential District additional setback requirements exist for manure storage, farm buildings for storage of products or equipment and farm buildings for housing animals, as well as farm water supply ponds. No such setbacks are required in the R-2 Medium Density Residential District. 2. There is a required setback of 100 feet from any property or street line for farm water supply, conservancy and fire protection ponds, but not for ponds in general, or for artificial lakes.	
3-06	Prevent discharges to waterbodies in amounts that would adversely affect the taste, color or odor of the waters, or would impair the waters for their best usages.		
Wetlands			
3-07	Prioritize wetlands and riparian areas and their non-point source (nps) control potential.		
3-08	Identify wetlands and riparian areas with significant nps control potential especially when implementing nps management practices.		

3-09	Include considerations/regulations to protect wetlands, ex: permitting, licensing, wetlands certification and non-regulatory nps pollution activities. Prevent adverse impacts to wetland functions that affect nps pollution abatement from hydrologic changes, sedimentation, or contaminant, ex: pretreatment practices: vegetated systems, detention/retention basins...		
Section 4: Roads, Bridges, Public Rights of Way			
4-01	Conduct road, bridge, and drainage/stormwater structure inspection and maintenance and procedures (de-icing material usage and storage, pot-hole repair, bridge washing, scraping and painting, cleaning catch basins, etc.) according to best management practices.		Basic BMPs are used: no chemical pesticides used by the town, training seminars attended on occasion, etc. For the few structures within the town, a visual inspection takes place; maintenance of catch basins performed regularly with vacuum truck.
4-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) - according to best management practices.		
4-03	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities.		Site stabilization has been performed near some road bank areas, but mainly in and around culverts (rip-rap installation).
4-04	Incorporate alternatives to traditional de-icing practices including adjusting mix rates, using non-salt and non-sand alternatives. Store in a enclosed areas with impervious floor.		According to G/FLRPC 2011 Salt Storage Survey - enclosed storage on pavement floor.
4-05	Target existing public holdings, such as parks, for removing unnecessary impervious surfaces.		
4-06	Incorporate New York State Department of Transportation design and guidance documents, standard specifications, and procedural manuals (*Highway Design Manual, Environmental Procedures Manual,* Maintenance Guidelines, etc.) into local laws and operating procedures.		
4-07	Participate in Cornell Local Roads Program activities and training.		Staff participate regularly.
4-08	Target training programs at highway officials, contractors, construction workers, inspectors, zoning and planning officials.		When staff are available.
4-09	Culvert maintenance: routinely inspected, maintained and resized when necessary so that they will remain unobstructed during storm events. Blockages resulting from sedimentation, debris, excessive vegetation and structural failure should be identified and mitigated.		Annual visual inspection takes place; extra care given at known problem areas. Ongoing resizing practice done in conjunction with road rehabilitation
Section 5: Onsite Wastewater Treatment Systems			
5-01	Conduct regular inspections of septic/onsite wastewater treatment systems (OWTS), at minimum durring transfer of property or within 1 year prior to transfer.		
5-02	Institute setback guidelines		
5-04	Target OWTS outreach programs at homeowners, contractors and developers		
5-05	Require all properties with access to municipal sewer service to connect.	Sub-135-27. 12 and 13 - Master plan must show connections with existing water supplies, and also with existing sewer systems. Ag and Farmland Protection Plan - recommends Department of Agriculture and Markets Guideline – Conditions on Future Service - connections should be limited within age districts - (1) The only land and/or structures which will be allowed to connect to the proposed waterline or sewer within the agricultural district will be existing structures at the time of construction, further agricultural structures, and land and structures that have already been approved for development by the local governing body prior to the filing of the Final Notice of Intent by the municipality.	
		Ag and Farmland Protection Plan-2010.	
		not-comp-2002, Z.O.-1999, Z.O. map2007, site plan 1996, pud-1999, subdivision-1989, flood1999,	

2011-12 Laws/Practices		LeRoy - Village	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 1: Development		
1-01	Identify retrofit opportunities for existing development - ex: retention/detention areas, stormwater ponds, construction of wastewater treatment systems to replace older septic systems…		
1-02	Encourage homeowners to place compost piles away from waterbodies and roadways.		
1-03	Encourage proper use and disposal of lawn and other household chemicals (res., com., indus., rec., uses etc.).		
1-04	Storm drain/curb stenciling/labeling program.		
1-05	Encourage volunteer programs.		
1-06	Encourage the use of indigenous plants in landscaping.		Professionals consulted in order to choose the most practical species for large-scale municipal planting activities.
1-07	Develop outreach programs targeted at water quality management. Target training for contractors, developers, inspectors and zoning and planning officials.		
1-08	Encourage proper control of pet wastes.		
1-09	Written details regarding enforcement of stormwater regulations & requirements - ex: responsibility, penalties, etc.		
1-10	Use of drainage districts.		
1-11	Minimize the amount of land disturbed (including cut and fill) and the duration of disturbance durring construction.	Z.O. 215-34.A - Promote more economical and efficient use of the land.	
1-12	Preserve natural features and conform with the natural boundaries and alignment of waterbodies durring development. Account for topography and soil type to minimize erosion. Limit grades of access roads.	Z.O. 215-33 - The purpose of the Land Conservation District is to delineate those areas where substantial development of the land in the way of building or structures is prohibited because of natural conditions.	
1-13	Retain and protect trees and other natural vegetation on and near disturbed sites. Require tree surveys and/or cutting plans.	Z.O. 215-33 - The purpose of the Land Conservation District is to delineate those areas where substantial development of the land in the way of building or structures is prohibited because of natural conditions.	Village looking into the Cornell Urban Forestry program which includes the creation of tree surveys.
1-14	Minimize the creation of impervious areas / encourage permeable surfaces.		
1-15	Maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction.		
1-16	Stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching - to protect exposed and critical areas during development. Timeline for completion.		Municipal practice
1-17	Use appropriate solid and hazardous waste generation and disposal practices including source controls and recycling.		Municipal recycling and disposal of materials.
1-18	Ensure proper operation and maintenance of runoff management facilities.		All public facilities are routinely monitored; private facilities are monitored also - problems emanating from them are addressed on an incremental basis.
1-19	Encourage cluster development/conservation subdivisions.		
1-20	Implement Federal/State Stormwater (SPDES) Phase II requirements including MS4 (when applicable) and Construction Permits as well as Municipal and Industrial Discharge Permits		
1-21	Discourage development in flood plain and/or development below base flood elevation	Z.O. 215-35. A - C - Floodplain Overlay Zone - identify potential areas of special flood hazard to prevent the threat of flood damages etc.	
	Section 2: Forestry and Agriculture		
	Forestry - if applicable		
2-01	Site restoration practices for forrestry sites. Consider potential water quality impacts when selecting silviculture system (yarding system, site preparation, pesticides employment, etc.)		
2-02	Have specialists (geologist, soil scientist, geotechnical engineer, wildland hydrologist) review plans in high erosion hazard areas.		
2-03	Consider Harvesting practices and preplan harvest areas - ex: operation season, skid trails/access on stable soils, avoiding-steep gradients/multiple stream crossings/poor drainage areas, etc.		
	Agriculture		
2-04	Implementation of the Agricultural Environmental Management (AEM) program.		
2-05	Ensure Concentrated Animal Feeding Operations (CAFO) regulations and permits are being followed and Comprehensive Nutrient Management Plans are being used.		
2-06	Implement barnyard runoff controls.		
2-07	Discourage grazing in environmentally sensitive areas (e.g. up to creek banks…)		

2011-12 Laws/Practices		LeRoy - Village	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
2-08	Use of agricultural protection such as agricultural districts, agricultural preservation ordinances and practices, right to farm laws, and agricultural and farmland protection plans	Town Agricultural and Farmland Protection Plan - p1, 17 Goal and Recommendation 2: Identify and adopt land use regulations that protect farmland and create a supportive environment for agricultural businesses. p28 In some cases the zoning district regulations incorporate a "right to farm" statement at the head of the agricultural zoning district regulations. This puts prospective new non-farm residents on notice that they are not protected against such "nuisances" as the noise, dust, insects and odors generated in the day to day operation of the modern farm.	
Section 3: Waterways, Wetlands and Riparian Area Management and Restoration			
Waterways			
3-01	Control in stream sedimentation and/or clear debris. Schedule inspections of sediment control measures for maintenance/repair.		Village routinely inspects Oatka Creek banks and clears debris as necessary.
3-02	Establish riparian buffers.		
3-03	Prevent animal wastes from entering waterbodies. Ex: animal control/animal waste disposal ordinances and/or practices.		
3-04	Protect stream banks - vegetative stabilization-maintain/add vegetation(before using structural measures); indirect nonstructural-ex: regulate nearby irrigation, rerouting overbank drainage; direct structural-ex: revetments and bulkheads; indirect structural-ex: deflecting channel flow dikes.		Issues with eroding creek banks, especially at bends in the creek, some stabilization was done about 5 years ago installing rocks on Oatka Creek bank between rte. 18 and rte. 5. Only completed a portion, applied for more money to complete.
3-05	Use setbacks to minimize disturbance of land adjacent to stream banks and shorelines.		South shore of Oatka Creek from Munson to Mill St.
3-06	Prevent discharges to waterbodies in amounts that would adversely affect the taste, color or odor of the waters, or would impair the waters for their best usages.		
Wetlands			
3-07	Prioritize wetlands and riparian areas and their non-point source (nps) control potential.		
3-08	Identify wetlands and riparian areas with significant nps control potential especially when implementing nps management practices.		
3-09	Include considerations/regulations to protect wetlands, ex: permitting, licensing, wetlands certification and non-regulatory nps pollution activities. Prevent adverse impacts to wetland functions that affect nps pollution abatement from hydrologic changes, sedimentation, or contaminant, ex: pretreatment practices: vegetated systems, detention/retention basins...		
Section 4: Roads, Bridges, Public Rights of Way			
4-01	Conduct road, bridge, and drainage/stormwater structure inspection and maintenance and procedures (de-icing material usage and storage, pot-hole repair, bridge washing, scraping and painting, cleaning catch basins, etc.) according to best management practices.		A number of BMPs were found to be practiced by the department; chemicals rarely used, all facilities maintained and monitored on a regular basis, etc. While current staffing levels do not allow for the implementation of a comprehensive maintenance plan, one has been considered; all facilities are nonetheless monitored and maintained as necessary.
4-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) - according to best management practices.		No ditches. Roadside facilities are maintained properly; rip rap observed to be installed near the creek.
4-03	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities.		Some rip rap used where necessary; village is currently considering feasibility of extending the retaining wall to encompass the area bridge-to-bridge (Munson to Mill St.).
4-04	Incorporate alternatives to traditional de-icing practices including adjusting mix rates, using non-salt and non-sand alternatives. Store in a enclosed areas with impervious floor.		According to G/FLRPC 2011 Salt Storage Survey - enclosed storage on pavement floor.
4-05	Target existing public holdings, such as parks, for removing unnecessary impervious surfaces.		
4-06	Incorporate New York State Department of Transportation design and guidance documents, standard specifications, and procedural manuals (*Highway Design Manual, Environmental Procedures Manual,* Maintenance Guidelines, etc.) into local laws and operating procedures.		DPW Superintendent is familiar with the publications; town engineer consulted regularly for questions regarding implementation.
4-07	Participate in Cornell Local Roads Program activities and training.		Practice
4-08	Target training programs at highway officials, contractors, construction workers, inspectors, zoning and planning officials.		As resources allow
4-09	Culvert maintenance: routinely inspected, maintained and resized when necessary so that they will remain unobstructed during storm events. Blockages resulting from sedimentation, debris, excessive vegetation and structural failure should be identified and mitigated.		Culverts are routinely inspected; blockages resulting from sedimentation are rare since sand was eliminated from the salting regimen. Over time, most culverts have been sized properly and are operating efficiently.
Section 5: Onsite Wastewater Treatment Systems			

2011-12 Laws/Practices		LeRoy - Village	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
5-01	Conduct regular inspections of septic/onsite wastewater treatment systems (OWTS), at minimum durring transfer of property or within 1 year prior to transfer.		
5-02	Institute setback guidelines		
5-04	Target OWTS outreach programs at homeowners, contractors and developers		
5-05	Require all properties with access to municipal sewer service to connect.	Sub-50-12. C.3 - Where accessible, the storm drainage system shall be connected with existing facilities. Sub-50-12. D(4) - Every lot within a subdivision shall be provided with a connection to a sanitary sewer. Sub-50-12. E(3) - Every lot within a subdivision shall be provided with a connection to the main public water supply.	

2011-12 Laws/Practices		Livingston County	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 1: Development		
1-01	Identify retrofit opportunities for existing development - ex: retention/detention areas, stormwater ponds, construction of wastewater treatment systems to replace older septic systems…		
1-02	Encourage homeowners to place compost piles away from waterbodies and roadways.		GLOW provides composting education and brochures. L.C. Environmental Management Council (EMC), and L.C. Planning provide education on disposal of solid, liquid and toxic wastes.
1-03	Encourage proper use and disposal of lawn and other household chemicals (res., com., indus., rec., uses etc.).		GLOW Region Solid Waste Management Committee, in cooperation with GLOW Region Soil and Water Conservation, Farm Bureau and Cornell Cooperative Extension offices, farm pesticide collection programs; Household Hazardous Waste programs held. L.C. EMC provides education on disposal of solid, liquid and toxic wastes.
1-04	Storm drain/curb stenciling/labeling program.		
1-05	Encourage volunteer programs.		Oatka Creek Watershed Committee, L.C. EMC and other volunteer groups in place. Members of the EMC participate in clean-ups of roadsides and recreational areas.
1-06	Encourage the use of indigenous plants in landscaping.		
1-07	Develop outreach programs targeted at water quality management. Target training for contractors, developers, inspectors and zoning and planning officials.		Oatka Creek Watershed Committee are involved in education/outreach. L.C. EMC provides information and encourages public participation regarding water quality (ex: water quality management plans). G/FLRPC conducts workshops with water quality sessions, and does education/outreach.
1-08	Encourage proper control of pet wastes.		
1-09	Written details regarding enforcement of stormwater regulations & requirements - ex: responsibility, penalties, etc.		
1-10	Use of drainage districts.		
1-11	Minimize the amount of land disturbed (including cut and fill) and the duration of disturbance durring construction.		
1-12	Preserve natural features and conform with the natural boundaries and alignment of waterbodies durring development. Account for topography and soil type to minimize erosion. Limit grades of access roads.	Could be required in SWPPPs for construction disturbing 1 acre or more.	Natural Resource Inventories (NRIs): The EMC, and L.C. Planning have developed a natural resource inventory for L.C. The EMC will utilize these data to assist municipalities, developers, and the private sector in land development planning. County NRI information will include bedrock geology, soil resources, hydrology, unique natural features, wetlands, and floodplains.
1-13	Retain and protect trees and other natural vegetation on and near disturbed sites. Require tree surveys and/or cutting plans.		
1-14	Minimize the creation of impervious areas / encourage permeable surfaces.		
1-15	Maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction.		Likely required in SWPPPs for construction disturbing 1 acre or more.
1-16	Stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching - to protect exposed and critical areas during development. Timeline for completion.		
1-17	Use appropriate solid and hazardous waste generation and disposal practices including source controls and recycling.		L.C. EMC and L.C. Planning provide advice and information on disposal of solid, liquid, toxic wastes, as well as recycling.
1-18	Ensure proper operation and maintenance of runoff management facilities.		
1-19	Encourage cluster development/conservation subdivisions.		
1-20	Implement Federal/State Stormwater (SPDES) Phase II requirements including MS4 (when applicable) and Construction Permits as well as Municipal and Industrial Discharge Permits	No MS4s within the County. General Permit for construction required anywhere 1 acre or more is disturbed and requires SWPPPs.	Construction site and Construction Permit inspection conducted by the county SWCD at the request of NYSDEC;
1-21	Discourage development in flood plain and/or development below base flood elevation		
	Section 2: Forestry and Agriculture		
	Forestry - if applicable		
2-01	Site restoration practices for forrestry sites. Consider potential water quality impacts when selecting silviculture system (yarding system, site preparation, pesticides employment, etc.)		
2-02	Have specialists (geologist, soil scientist, geotechnical engineer, wildland hydrologist) review plans in high erosion hazard areas.		
2-03	Consider Harvesting practices and preplan harvest areas - ex: operation season, skid trails/access on stable soils, avoiding-steep gradients/multiple stream crossings/poor drainage areas, etc.		SWCD in conjunction with DEC offers woodlot management outreach services to land owners.

2011-12 Laws/Practices		Livingston County	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Agriculture		
2-04	Implementation of the Agricultural Environmental Management (AEM) program.		AEM program and 5 Year plan in place.
2-05	Ensure Concentrated Animal Feeding Operations (CAFO) regulations and permits are being followed and Comprehensive Nutrient Management Plans are being used.		5 year AEM Plan - Desired Future Conditions: Identify and reduce nutrient and sediment loading from watershed by implementation of various BMP's and development of needed nutrient management plans.
2-06	Implement barnyard runoff controls.		5 year AEM Plan - page 16, Desired Future Conditions: Identify and reduce nutrient and sediment loading from watershed by implementation of various BMP's and development of needed nutrient management plans.
2-07	Discourage grazing in environmentally sensitive areas (e.g. up to creek banks…)		Caring for Creeks Grant, EPF Ag NPS Abatement grants. AEM BMPs.
2-08	Use of agricultural protection such as agricultural districts, agricultural preservation ordinances and practices, right to farm laws, and agricultural and farmland protection plans		Ag. districts present.
	Section 3: Waterways, Wetlands and Riparian Area Management and Restoration		
	Waterways		
3-01	Control in stream sedimentation and/or clear debris. Schedule inspections of sediment control measures for maintenance/repair.		
3-02	Establish riparian buffers.		SWCD works in conjunction with land owners, farmers in particular. Potential AEM bmp.
3-03	Prevent animal wastes from entering waterbodies. Ex: animal control/animal waste disposal ordinances and/or practices.		SWCD/NRCD comprehensive nutrient management plans.
3-04	Protect stream banks - vegetative stabilization-maintain/add vegetation(before using structural measures); indirect nonstructural-ex: regulate nearby irrigation, rerouting overbank drainage; direct structural-ex: revetments and bulkheads; indirect structural-ex: deflecting channel flow dikes.		SWCD has used vegetated systems to stabilize severely eroded banks; other approaches are case-by-case.
3-05	Use setbacks to minimize disturbance of land adjacent to stream banks and shorelines.		
3-06	Prevent discharges to waterbodies in amounts that would adversely affect the taste, color or odor of the waters, or would impair the waters for their best usages.		
	Wetlands		
3-07	Prioritize wetlands and riparian areas and their non-point source (nps) control potential.		Guiding principle of SWCD operations. Ex: field work, and education/outreach programs
3-08	Identify wetlands and riparian areas with significant nps control potential especially when implementing nps management practices.		
3-09	Include considerations/regulations to protect wetlands, ex: permitting, licensing, wetlands certification and non-regulatory nps pollution activities. Prevent adverse impacts to wetland functions that affect nps pollution abatement from hydrologic changes, sedimentation, or contaminant, ex: pretreatment practices: vegetated systems, detention/retention basins...		
	Section 4: Roads, Bridges, Public Rights of Way		
4-01	Conduct road, bridge, and drainage/stormwater structure inspection and maintenance and procedures (de-icing material usage and storage, pot-hole repair, bridge washing, scraping and painting, cleaning catch basins, etc.) according to best management practices.		
4-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) - according to best management practices.		FLLOWPA funding has been used to reduce erosion through hydro seeding county and town roadside in hydro seeding and stabilizing road ditches.
4-03	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities.		
4-04	Incorporate alternatives to traditional de-icing practices including adjusting mix rates, using non-salt and non-sand alternatives. Store in a enclosed areas with impervious floor.		L.C. EMC and Planning have looked into the impacts associated with highway deicing salts.
4-05	Target existing public holdings, such as parks, for removing unnecessary impervious surfaces.		
4-06	Incorporate New York State Department of Transportation design and guidance documents, standard specifications, and procedural manuals (*Highway Design Manual, Environmental Procedures Manual,* Maintenance Guidelines, etc.) into local laws and operating procedures.		
4-07	Participate in Cornell Local Roads Program activities and training.		
4-08	Target training programs at highway officials, contractors, construction workers, inspectors, zoning and planning officials.		L.C. EMC and L.C. Planning have held training programs and workshops designed to teach local officials and the public the fundamentals on such issues as the SEQR review process, etc. G/FLRPC Local Government Workshops targeted toward Gov. officials, planning/zoning officials, etc.
4-09	Culvert maintenance: routinely inspected, maintained and resized when necessary so that they will remain unobstructed during storm events. Blockages resulting from sedimentation, debris, excessive vegetation and structural failure should be identified and mitigated.		

2011-12 Laws/Practices		Livingston County	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 5: Onsite Wastewater Treatment Systems		
5-01	Conduct regular inspections of septic/onsite wastewater treatment systems (OWTS), at minimum durring transfer of property or within 1 year prior to transfer.	L.C. Sanitary Code - No schedule of inspections, only that systems are "subject to inspection". Dept. of Health investigates complaints of nuisances (including those relating to septic systems) and can issue repair orders. Sanitary Code II.7(a-d): [Inspections to occur at time of construction and at property transfer]. II.4.9 A 'valid' permit may be transferred to another party.	
5-02	Institute setback guidelines		
5-04	Target OWTS outreach programs at homeowners, contractors and developers		Cornell Cooperative Extension, SWCDs, L.C. Health Dept. all conduct education and outreach programs and/or offer technical assistance.
5-05	Require all properties with access to municipal sewer service to connect.	L.C. Sanitary Code II.3.3 No permits for construction or repair of an individual sewage treatment system shall be issued for property accessible to a public or municipal sanitary sewerage system.	

2011-12 Laws/Practices		Middlebury - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 1: Development		
1-01	Identify retrofit opportunities for existing development - ex: retention/detention areas, stormwater ponds, construction of wastewater treatment systems to replace older septic systems…		
1-02	Encourage homeowners to place compost piles away from waterbodies and roadways.		
1-03	Encourage proper use and disposal of lawn and other household chemicals (res., com., indus., rec., uses etc.).		
1-04	Storm drain/curb stenciling/labeling program.		
1-05	Encourage volunteer programs.		
1-06	Encourage the use of indigenous plants in landscaping.		
1-07	Develop outreach programs targeted at water quality management. Target training for contractors, developers, inspectors and zoning and planning officials.		
1-08	Encourage proper control of pet wastes.		
1-09	Written details regarding enforcement of stormwater regulations & requirements - ex: responsibility, penalties, etc.		
1-10	Use of drainage districts.		
1-11	Minimize the amount of land disturbed (including cut and fill) and the duration of disturbance durring construction.	Z.O.906.M.1 - Fill operations shall be prohibited.	
1-12	Preserve natural features and conform with the natural boundaries and alignment of waterbodies durring development. Account for topography and soil type to minimize erosion. Limit grades of access roads.	Z.O.501.C. - Whenever natural features such as trees, brooks, drainage channels interfere with the proposed development, the retention of the maximum amount of such features shall be encouraged.	
1-13	Retain and protect trees and other natural vegetation on and near disturbed sites. Require tree surveys and/or cutting plans.	Z.O.501.C. - Whenever natural features such as trees, brooks, drainage channels interfere with the proposed development, the retention of the maximum amount of such features shall be encouraged.	
1-14	Minimize the creation of impervious areas / encourage permeable surfaces.		
1-15	Maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction.	Z.O.502.P - All construction plans shall include consideration of storm water drainage needs.	
1-16	Stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching - to protect exposed and critical areas during development. Timeline for completion.		
1-17	Use appropriate solid and hazardous waste generation and disposal practices including source controls and recycling.		
1-18	Ensure proper operation and maintenance of runoff management facilities.		
1-19	Encourage cluster development/conservation subdivisions.		
1-20	Implement Federal/State Stormwater (SPDES) Phase II requirements including MS4 (when applicable) and Construction Permits as well as Municipal and Industrial Discharge Permits		
1-21	Discourage development in flood plain and/or development below base flood elevation	Z.O.906.A - Flood Plain Overlay Districts - provisions for development...protect the health and safety of human life.	
	Section 2: Forestry and Agriculture		
	Forestry - if applicable		
2-01	Site restoration practices for forrestry sites. Consider potential water quality impacts when selecting silviculture system (yarding system, site preparation, pesticides employment, etc.)		
2-02	Have specialists (geologist, soil scientist, geotechnical engineer, wildland hydrologist) review plans in high erosion hazard areas.		
2-03	Consider Harvesting practices and preplan harvest areas - ex: operation season, skid trails/access on stable soils, avoiding-steep gradients/multiple stream crossings/poor drainage areas, etc.		
	Agriculture		
2-04	Implementation of the Agricultural Environmental Management (AEM) program.		
2-05	Ensure Concentrated Animal Feeding Operations (CAFO) regulations and permits are being followed and Comprehensive Nutrient Management Plans are being used.		
2-06	Implement barnyard runoff controls.		
2-07	Discourage grazing in environmentally sensitive areas (e.g. up to creek banks…)		

2011-12 Laws/Practices		Middlebury - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
2-08	Use of agricultural protection such as agricultural districts, agricultural preservation ordinances and practices, right to farm laws, and agricultural and farmland protection plans	Z.O.901.A - Agriculture Districts are designed to protect predominantly agricultural areas from suburban and urban development. C.P. - Every effort should be made to protect and promote the agricultural industry within the Town while designating specific commercial zones in targeted areas along the Rte 19 corridor. Agricultural districts should be continued as an incentive to keep the agricultural base strong, while smart growth opportunities are identified.	
Section 3: Waterways, Wetlands and Riparian Area Management and Restoration			
Waterways			
3-01	Control in stream sedimentation and/or clear debris. Schedule inspections of sediment control measures for maintenance/repair.		
3-02	Establish riparian buffers.		
3-03	Prevent animal wastes from entering waterbodies. Ex: animal control/animal waste disposal ordinances and/or practices.	Z.O.1007 - Animal Waste Storage Facilities - details stipulate best management practices for such systems, including preventing animal wastes from entering waterbodies and ground water, as well as interception, treatment and storage of polluted runoff, and adhering to Natural Resource Conservation Service standards and specifications. Z.O.XI.1114 - Animal Waste Management Systems - includes details stipulate best management practices for such systems, including preventing animal wastes from entering waterbodies.	
3-04	Protect stream banks - vegetative stabilization-maintain/add vegetation(before using structural measures); indirect nonstructural-ex: regulate nearby irrigation, rerouting overbank drainage; direct structural-ex: revetments and bulkheads; indirect structural-ex: deflecting channel flow dikes.		
3-05	Use setbacks to minimize disturbance of land adjacent to stream banks and shorelines.	Z.O.501.A - No structure shall be built within 50 feet of the bed of a stream carrying water on an average of 6 months a year. See also Z.O.906.B - Flood Plan Overlay District - Methods for reducing flood losses.	
3-06	Prevent discharges to waterbodies in amounts that would adversely affect the taste, color or odor of the waters, or would impair the waters for their best usages.		
Wetlands			
3-07	Prioritize wetlands and riparian areas and their non-point source (nps) control potential.		
3-08	Identify wetlands and riparian areas with significant nps control potential especially when implementing nps management practices.		
3-09	Include considerations/regulations to protect wetlands, ex: permitting, licensing, wetlands certification and non-regulatory nps pollution activities. Prevent adverse impacts to wetland functions that affect nps pollution abatement from hydrologic changes, sedimentation, or contaminant, ex: pretreatment practices: vegetated systems, detention/retention basins...		
Section 4: Roads, Bridges, Public Rights of Way			
4-01	Conduct road, bridge, and drainage/stormwater structure inspection and maintenance and procedures (de-icing material usage and storage, pot-hole repair, bridge washing, scraping and painting, cleaning catch basins, etc.) according to best management practices.		
4-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) - according to best management practices.		
4-03	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities.		
4-04	Incorporate alternatives to traditional de-icing practices including adjusting mix rates, using non-salt and non-sand alternatives. Store in a enclosed areas with impervious floor.		According to G/FLRPC 2011 Salt Storage Survey - salt and salt brine mix, enclosed storage on pavement floor.
4-05	Target existing public holdings, such as parks, for removing unnecessary impervious surfaces.		
4-06	Incorporate New York State Department of Transportation design and guidance documents, standard specifications, and procedural manuals (*Highway Design Manual, Environmental Procedures Manual,* Maintenance Guidelines, etc.) into local laws and operating procedures.		
4-07	Participate in Cornell Local Roads Program activities and training.		
4-08	Target training programs at highway officials, contractors, construction workers, inspectors, zoning and planning officials.		

2011-12 Laws/Practices		Middlebury - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
4-09	Culvert maintenance: routinely inspected, maintained and resized when necessary so that they will remain unobstructed during storm events. Blockages resulting from sedimentation, debris, excessive vegetation and structural failure should be identified and mitigated.		
Section 5: Onsite Wastewater Treatment Systems			
5-01	Conduct regular inspections of septic/onsite wastewater treatment systems (OWTS), at minimum durring transfer of property or within 1 year prior to transfer.		
5-02	Institute setback guidelines		
5-04	Target OWTS outreach programs at homeowners, contractors and developers		
5-05	Require all properties with access to municipal sewer service to connect.	Z.O.502.M - If the use of any lot or building involves the disposal of sewage or wastewater and public sewers are not available, an adequate sanitary disposal system shall be installed.	

2011-12 Laws/Practices		Monroe County	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 1: Development		
1-01	Identify retrofit opportunities for existing development - ex: retention/detention areas, stormwater ponds, construction of wastewater treatment systems to replace older septic systems…		Monroe County Stormwater Master Plan process kicked off 12/12. Plan will include identification of areas where additional stormwater management retrofits are needed to increase capasity to accommodate both current and future stormwater needs.
1-02	Encourage homeowners to place compost piles away from waterbodies and roadways.		Stormwater Coalition of M.C. - distribute brochures to municipalities and residents. CCE - composting education and guides available online.
1-03	Encourage proper use and disposal of lawn and other household chemicals (res., com., indus., rec., uses etc.).		M.C. Household Hazardous Wastes Program and Ecopark - provides residents with a location to dispose of, or recycle certain items including household hazardous waste materials, batteries, cleaners, paint, oil, fertilizer, chemicals, etc. M.C. Dept. of Environmental Services - prescription drug disposal program. Stormwater Coalition of M.C. - distribute brochures to municipalities and residents as needed. SWCD - Agricultural Plastic Container Recycling Program at least once per year - collection of Ag plastics, and education on proper use/disposal of Ag plastics.
1-04	Storm drain/curb stenciling/labeling program.		Stormwater Coalition of M.C. - "H2O Hero" campaigne includes storm drain/curb stenciling in cooperation with municipalities, SWCD, Water Quality Coordinating Committee, etc.
1-05	Encourage volunteer programs.		Black Creek Watershed Coalition, Oatka Creek Watershed Committee, Marsh Monitoring, M.C. Dept. of Health - Community Water Watch program, M.C. Parks Dept. - **Pick up the Parks program**. Other volunteer groups in place.
1-06	Encourage the use of indigenous plants in landscapeing.		SWCD - encourages based on projects, trying to find plants with the highest chance of success. Tree and shrub sale, occurs on an annual basis; hardy varieties of native species are provided to the public at low-cost.
1-07	Develop outreach programs targeted at water quality management. Target training for contractors, developers, inspectors and zoning and planning officials.	M.C. Stormwater Management Packet for Developers.	Stormwater Coalition of M.C. - public outreach, programs, distribution of materials. SWCD - workshops on erosion and sediment control, outreach and implementation of AG BMPS (through AEM), staff to Black Creek Watershed Coalition and Oatka Creek Watershed Committee. CCE - education programs relating to water, proper fertilizing, nutrient runoff from gardens and lawns, and youth programs relating to water. M. C. Planning Dept. conducts biannual Land Use Decision Making Training Program for water quality, land use and other related topics. County-wide Stormwater Master Plan process will include public education and outreach. Additional education and outreach by the Black Creek Watershed Coalition and Oatka Creek Watershed Committee. G/FLRPC conducts workshops which include water quality sessions, and provide education/outreach.
1-08	Encourage proper control of pet wastes.	M. C. Code Ch. 323-20 Requirements for pet owners using county parks and dog parks.	Stormwater Coalition - Stormwater Management Plan - 1.4.7 pet waste signs, bags, trash cans in parks etc.
1-09	Written details regarding enforcement of stormwater regulations & requirements - ex: responsibility, penalties, etc.	Required of MS4 communities.	
1-10	Use of drainage districts.	The creation of a Monroe County Stormwater District is being explored.	
1-11	Minimize the amount of land disturbed (including cut and fill) and the duration of disturbance durring construction.	M.C. Green Building Policy-I. Construction/Renovations over 5,000sqft should pursue LEED certification or incorporated LEED practices to the maximum extent possible. Appendix D - LEED Checklists - Reduced site disturbance, Maximize open space…	
1-12	Preserve natural features and conform with the natural boundaries and alignment of waterbodies durring development. Account for topography and soil type to minimize erosion. Limit grades of access roads.	Could be required in SWPPPs for construction disturbing 1 acre or more. M.C. Green Building Policy - (construction over 5,000sqft) Appendix D - LEED Checklists - Site selection, Maximize open space, Protect habitat…	
1-13	Retain and protect trees and other natural vegetation on and near disturbed sites. Require tree surveys and/or cutting plans.		
1-14	Minimize the creation of impervious areas / encourage permeable surfaces.	M.C. Green Building Policy - (construction over 5,000sqft) Appendix D - LEED Checklists - Maximize open space, Stormwater design,	
1-15	Maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction.	Likely required in SWPPPs for construction disturbing 1 acre or more. County Pure Waters developing a Master Plan which includes portions on stormwater management. Stormwater Coalition - Stormwater Management Plan. M.C. Green Building Policy - (construction over 5,000sqft) Appendix D - LEED Checklists - Maximize open space, Stormwater design, Erosion and sediment control...	
1-16	Stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching - to protect exposed and critical areas during development. Timeline for completion.	M.C. Green Building Policy - (construction over 5,000sqft) Appendix D - LEED Checklists - Stormwater design, Erosion and sediment control…	

2011-12 Laws/Practices		Monroe County	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
1-17	Use appropriate solid and hazardous waste generation and disposal practices including source controls and recycling.	M.C. Code 347-14.R. - Operation of Solid Waste Facilities - All wastewater and wash water shall be discharged into a sanitary sewer or other approved disposal system. (Additional disposal procedures for hazardous materials). M.C. Code 347-16(6) - Sanitary Landfills - It should be readily feasible to prevent concentrated surface drainage, seeps or springs from flowing into the solid waste or standing water or floodwaters from reaching elevations as high as the lowest solid waste. M.C. Code 347-15 - Operation of Recycling Process Facilities. M.C. Charter C6-20.B - Department of Environmental Services - Powers and Duties - (1) To be responsible for the development, operation and maintenance of all sewage treatment and disposal facilities and trunk sewer systems constructed by the County. (4) To be responsible for the planning, development, operation and maintenance of all solid waste handling facilities owned or contracted for by the County. (6) To manage resource recovery facilities in such a way as to maximize recycling and minimize the use of landfills.. M.C. Green Building Policy - (construction over 5,000sqft) Appendix D - LEED Checklist -Waste management, Chemical and pollutant source control, Toxic material reduction, Onsite disposal/reuse, Storage and collection of Recyclables...	M.C. Recycling program.
1-18	Ensure proper operation and maintenance of runoff management facilities.	M.C. Green Building Policy - (construction over 5,000sqft) - internal design team for design review, oversight, monitoring, reporting, policy implementation. During construction – consultant to confirm Green Building Goals not being compromised. LEED certification post construction could be required. Consultant would have to provide a LEED summary. M.C. DOT - routine inspections occur on a 5-year cycle for all highway outfalls. Highway culverts are inspected as needed. Any deficiencies are addressed in a timely manner based on their scope and severity.	
1-19	Encourage cluster development/conservation subdivisions.	M.C. Green Building Policy - (construction over 5,000sqft) Appendix D - LEED Checklists - Reduced site disturbance, Maximize open space, Development density...	Covered in M.C.Planning Dept. Land Use Training Program
1-20	Implement Federal/State Stormwater (SPDES) Phase II requirements including MS4 (when applicable) and Construction Permits as well as Municipal and Industrial Discharge Permits	SPDES Phase II requirements mandatory for MS4 communities. MS4s are required to develop and implement an ordinance or other regulatory mechanism to require erosion and sediment controls on construction projects, to conduct construction site inspections and to provide for enforcement measures. General Permit for construction required anywhere 1 acre or more is disturbed and requires SWPPPs. Stormwater Coalition - Stormwater Management Plan. County-wide Stormwater Master Plan process will include assessments and recomendations regarding the MS4 programs and their efficiency.	MS4 municipalities are required to implement the 6 min measures for their MS4 permits. All municipalities are required to issue Construction Permits for projects disturbing 1 or more acres of land. SWCD: Construction site and construction permit inspection conducted at the request of municipalities and the Stormwater Coalition. They respond to requests for technical assistance including MS4 & Construction SPDES Permit assistance, SWPPP Review, construction site complaints, stormwater pond assistance, and MS4 audit assistance at the request of the municipalities. Stormwater Coalition of M.C. consists of 29 municipalities that work together to ensure enforcement of stormwater regulations. Task groups include Construction, Education, and Illicit Discharge/Pollution Prevention. The Coalition along with the Water Education Collaborative and SWCP work to satisfy min control measures 1&2 through education/outreach and public involvement. M.C. DOT Complies with Phase II requirements. G/FLRPC assists municipalities with stormwater and water quality issues through education and outreach, green infrastructure outreach and planning, and participation in the Stormwater Coalition.
1-21	Discourage development in flood plain and/or development below base flood elevation		Floodplain maps have recently been updated
Section 2: Forestry and Agriculture			
Forestry - if applicable			
2-01	Site restoration practices for forrestry sites. Consider potential water quality impacts when selecting silviculture system (yarding system, site preparation, pesticides employment, etc.)		
2-02	Have specialists (geologist, soil scientist, geotechnical engineer, wildland hydrologist) review plans in high erosion hazard areas.		
2-03	Consider Harvesting practices and preplan harvest areas - ex: operation season, skid trails/access on stable soils, avoiding-steep gradients/multiple stream crossings/poor drainage areas, etc.		SWCD - AEM is used as a base assessment for Forest management practices related to Agriculture. In-depth forest management is referred to DEC.

2011-12 Laws/Practices		Monroe County	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Agriculture		
2-04	Implementation of the Agricultural Environmental Management (AEM) program.	Master Plan 4-19 - Encourage farmers to carry out an AEM.	SWCD - AEM is a voluntary program. The AEM program was implemented in the Black and Oatka Creek Watersheds from 1998-present(2012). To date the District has completed 78 AEM Tier 1 surveys, 10 Tier 2 farm assessments, and 6 Tier 3A farm plans in the Black Creek Watershed. The District has completed 33 Tier 1 surveys, 16 Tier 2 assessments, and 2 tier 3A farm plans in the Oatka Creek Watershed. Funding available to farmers to implement Ag non-point source pollution prevention. Erosion and sediment control planning is available through AEM. In 2011 (4) Water and Sediment Control Basins were installed in the Black Creek watershed through a Great Lakes Commission grant. The District was awarded a Round 17 Ag NPS Grant for field erosion and sediment control projects on four farms. Several more projects are planned through a Great Lakes Commission grant as well. Recently M.C. SWCD and Genesee County SWCD have been awarded a $1,119,928 Round 18 Ag NPS grant for the Oatka Creek Watershed Agricultural Nutrient Reduction Project by the NYS Agricultural Nonpoint Source Pollution Abatement & Control Program. The project will implement 36 bumps on 5 farms identified as priority projects in the AEM Tier 2 process. BMPs will include: Heavy Use Area Protection, Barn Roof Runoff Structures, Riparian Buffer Strips/Filter Strips, Waste Storage Facilities, Waste Transport Systems, Access Roads, Milk house Waste Collection Systems, etc.
2-05	Ensure Concentrated Animal Feeding Operations (CAFO) regulations and permits are being followed and Comprehensive Nutrient Management Plans are being used.		SWCD - CAFO regulations/permits are required with AEMs (if applicable). There are 2 AEM farms operating under CAFO permits in the Black Creek Watershed and 1 AEM farm operating under CAFO permit in the Oatka Creek Watershed. The DEC site listing has one more farm listed on their CAFO, however it is unknown by the district if this particular farm is still operating under CAFO status because their program is voluntary. If farm is working under a CAFO permit they are required to follow comprehensive nutrient management plans. See also Round 18 Ag NPS grant above - implementation of AEM CAFO and CNMP regs./plans/recommendations.
2-06	Implement barnyard runoff controls.		SWCD - Barnyard practices were implemented on 1 Ogden farm and 1 Riga farm through the Lake Ontario Implementation Grant. The Genesee River Implementation Grant was amended in 2007 to included a barnyard runoff management practice on a Riga farm. Round 18 Ag NPS grant will include barnyard runoff controls.
2-07	Discourage grazing in environmentally sensitive areas (e.g. up to creek banks…)		SWCD - Grazing planning is available to all M.C. Farms through the AEM program. Grazing in environmentally sensitive areas is discouraged. Round 18 Ag NPS grant will include vegetative stream buffers. A Caring for Creeks grant is also still available to award farmers who agree to a riparian buffers.
2-08	Use of agricultural protection such as agricultural districts, agricultural preservation ordinances and practices, right to farm laws, and agricultural and farmland protection plans	M.C. Agriculture and Farmland Protection Plan.	Ag Districts Program
	Section 3: Waterways, Wetlands and Riparian Area Management and Restoration		
	Waterways		
3-01	Control in stream sedimentation and/or clear debris. Schedule inspections of sediment control measures for maintenance/repair.		SWCD - general goal and practice. AEM Tier 5B Plan evaluation is used to monitor completed Ag BMPs and farm plans.
3-02	Establish riparian buffers.		SWCD - will encourage when assisting landowners/farmers with SWPPPs and AEMs, or if reviewing Site Plans. 1 Riparian buffer implemented on unnamed trib. to Black Creek on 1 farm in Riga for 430ftx15ft. Round 18 Ag NPS grant will include vegetative stream buffers. A Caring for Creeks grant is also still available to award farmers who agree to riparian buffers.
3-03	Prevent animal wastes from entering waterbodies. Ex: animal control/animal waste disposal ordinances and/or practices.	M.C. Code Ch. 323-20 Requirements for pet owners using county parks and dog parks.	SWCD - Regulated in CAFO CNMP plans, AEM Tier 3A Conservation Plans. Round 18 Ag NPS grant - all 5 farms will be implementing practices to prevent animal waste from entering waterbody. 4/5 are CAFO regulated.
3-04	Protect stream banks - vegetative stabilization-maintain/add vegetation(before using structural measures); indirect nonstructural-ex: regulate nearby irrigation, rerouting overbank drainage; direct structural-ex: revetments and bulkheads; indirect structural-ex: deflecting channel flow dikes.		SWCD has used native vegetation, such as planting dogwood and willow stakes to stabilized banks. Encourages towns to plant grasses, and native vegetation on banks and not mow right up to banks. Has assisted municipalities in stream bank protection though re-sloping and installation of vegetation, vegetated rip rap, and toe deflector stones to redirect water to the center of the creek channel. Approaches are developed on a case-by-case, site specific basis. Round 18 Ag NPS grant will include vegetative stream buffers.
3-05	Use setbacks to minimize disturbance of land adjacent to stream banks and shorelines.		

2011-12 Laws/Practices		Monroe County	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
3-06	Prevent discharges to waterbodies in amounts that would adversely affect the taste, color or odor of the waters, or would impair the waters for their best usages.	M.C. Code V.205-35 Fuel Spills (Aircraft) - Policies for fuel spill cleanup and cleanup responsibility. M.C. Code 347-14.R. - Operation of Solid Waste Facilities - All wastewater and wash water shall be discharged into a sanitary sewer or other approved disposal system. (Additional disposal procedures for hazardous materials). M.C. Code 347-16(6) - Sanitary Landfills - It should be readily feasible to prevent concentrated surface drainage, seeps or springs from flowing into the solid waste or standing water or floodwaters from reaching elevations as high as the lowest solid waste.	Greater Rochester International Airport - aircraft deicing stations present where fluids can be sent to sanitary sewer to prevent runoff/entering storm sewer. Black Creek Watershed Coalition, Oatka Creek Watershed Committee work to prevent harmful discharges through stormwater work.
	Wetlands		
3-07	Prioritize wetlands and riparian areas and their non-point source (nps) control potential.	M.C. Code Ch. 377	SWCD - disseminate information regarding regulations/requirements to the town/developers/residents/farmers/ homeowners as requested. SWCD co-hosts workshops for municipal boards on wetland regulation, creation and protection issues. Typically 1-2 workshops are held each year with 40-70 attendees.
3-08	Identify wetlands and riparian areas with significant nps control potential especially when implementing nps management practices.		
3-09	Include considerations/regulations to protect wetlands, ex: permitting, licensing, wetlands certification and non-regulatory nps pollution activities. Prevent adverse impacts to wetland functions that affect nps pollution abatement from hydrologic changes, sedimentation, or contaminant, ex: pretreatment practices: vegetated systems, detention/retention basins...	M.C. Code Ch. 377-4,5 - Wetlands - Permit needed for regulated activities conducted in wetlands, with the exception of many farming related activities (grazing, growing crops, etc.). Regulated activities include draining, dredging, excavation, dumping, filling, erecting any structures or roads, any pollution, any other use that impairs wetland functions.	
	Section 4: Roads, Bridges, Public Rights of Way		
4-01	Conduct road, bridge, and drainage/stormwater structure inspection and maintenance and procedures (de-icing material usage and storage, pot-hole repair, bridge washing, scraping and painting, cleaning catch basins, etc.) according to best management practices.	M.C. Code V.205-35 Fuel Spills (Aircraft) - Policies for fuel spill cleanup and cleanup responsibility.	M.C. DOT - routinely maintains best management practices with all of its maintenance operations. While many of these functions are performed under contract by local Town DPW's, M.C DOT's own staff is also trained to perform its operations using appropriate BMP's. Greater Rochester International Airport - deicing stations where fluids can be sent to sanitary sewer to prevent runoff or entering stormwater sewer/watershed.
4-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) - according to best management practices.	M.C. DOT follows its Integrated Vegetation Management Program dated April 2001.	
4-03	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities.	M.C. DOT - opportunities are pursued as they become identified during routine maintenance operations.	WQCC/SWCD utilized FLLOWPA funding to create an inventory of areas in the county with erosion problems
4-04	Incorporate alternatives to traditional de-icing practices including adjusting mix rates, using non-salt and non-sand alternatives. Store in a enclosed areas with impervious floor.	Practices are utilized by local Town DPW's under contract to perform winter highway maintenance operations for M.C. DOT.	
4-05	Target existing public holdings, such as parks, for removing unnecessary impervious surfaces.		
4-06	Incorporate New York State Department of Transportation design and guidance documents, standard specifications, and procedural manuals (*Highway Design Manual, Environmental Procedures Manual,* Maintenance Guidelines, etc.) into local laws and operating procedures.	Design Criteria and Construction Manual - references to NYSDOT standards and manuals. M.C. DOT formally recognizes and accepts NYSDOT documents for use in procedures and projects wherever local documents do not supersede (but they aren't involved with writing local laws).	
4-07	Participate in Cornell Local Roads Program activities and training.	M.C. DOT staff participates regularly with training by CLRP.	
4-08	Target training programs at highway officials, contractors, construction workers, inspectors, zoning and planning officials.	M.C. DOT staff participates regularly with training by SWCD.	M.C. Landuse Decision Maker Training and G/FLRPC Local Government Workshops targeted toward Gov. officials, planning/zoning officials, etc.
4-09	Culvert maintenance: routinely inspected, maintained and resized when necessary so that they will remain unobstructed during storm events. Blockages resulting from sedimentation, debris, excessive vegetation and structural failure should be identified and mitigated.	Routine inspections occur on a 4-year cycle for all M.C. DOT maintained bridges and on a 5-year cycle for all highway outfalls. Highway culverts are inspected as needed. Any deficiencies are addressed in a timely manner based on their scope and severity.	
	Section 5: Onsite Wastewater Treatment Systems		
5-01	Conduct regular inspections of septic/onsite wastewater treatment systems (OWTS), at minimum durring transfer of property or within 1 year prior to transfer.	M.C. Sanitary Code-Ch. 569 - Construction of new and/or the alteration or repair of any existing residential on-site systems requires a permit however, inspections at property transfers are recommended not required.	Practice: M.C. Health Dept./M.C. Sanitary Code: requires permit/inspections for alteration/repair. Recommends* inspections at property transfers and refinancing. Will investigate if they get complaints of odor.
5-02	Institute setback guidelines	County Sanitary Code 569-21.C.8 The location of any water wells within 500 feet of the proposed sewage disposal system. MC Wetland Law Ch377 - creation of septic systems in or adjacent to a wetland would have to be reviewed to determine if it should be allowed and approved to receive a wetland permit.	

2011-12 Laws/Practices		Monroe County	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
5-04	Target OWTS outreach programs at homeowners, contractors and developers	Monroe County DOH, CCE, SWCD all offer various education and outreach materials and programs	Stormwater Coalition of M.C./WQCC/DOH - brochures/education/outreach
5-05	Require all properties with access to municipal sewer service to connect.	Monroe County Sanitary Code 569-22, - Connection to public sewer required if available - if public sewer is available and accessible, private septic can not be created, altered or repaired.	

2011-12 Laws/Practices		Orangeville - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 1: Development		
1-01	Identify retrofit opportunities for existing development - ex: retention/detention areas, stormwater ponds, construction of wastewater treatment systems to replace older septic systems…		
1-02	Encourage homeowners to place compost piles away from waterbodies and roadways.		
1-03	Encourage proper use and disposal of lawn and other household chemicals (res., com., indus., rec., uses etc.).		
1-04	Storm drain/curb stenciling/labeling program.		
1-05	Encourage volunteer programs.		
1-06	Encourage the use of indigenous plants in landscaping.		
1-07	Develop outreach programs targeted at water quality management. Target training for contractors, developers, inspectors and zoning and planning officials.		
1-08	Encourage proper control of pet wastes.		
1-09	Written details regarding enforcement of stormwater regulations & requirements - ex: responsibility, penalties, etc.		
1-10	Use of drainage districts.		
1-11	Minimize the amount of land disturbed (including cut and fill) and the duration of disturbance durring construction.	Z.O.1103 - Excavation Operations - All reclamation work shall be complete within one (1) year after the termination of operations, at the expense of the operator.	
1-12	Preserve natural features and conform with the natural boundaries and alignment of waterbodies durring development. Account for topography and soil type to minimize erosion. Limit grades of access roads.	Z.O.501 - Preservation of Natural Features A. No structure shall be built within fifty (50) feet of the bed of a stream carrying water on an average of six (6) months of the year (except for certain public facilities and infrastructure) C. Whenever natural features such as trees, brooks and drainage channels interfere with the proposed use of property, the retention of the maximum amount of such features consistent with the intended use of the property shall be encouraged. Z.O.1103.L - Excavation Operations - Existing hills, trees and ground cover fronting along public roads or adjacent property shall be preserved, maintained and supplemented...(when feasible, otherwise new landscaping).	
1-13	Retain and protect trees and other natural vegetation on and near disturbed sites. Require tree surveys and/or cutting plans.	Z.O.1103.L - Excavation Operations - Existing hills, trees and ground cover fronting along public roads or adjacent property shall be preserved, maintained and supplemented by selective cutting, transplanting and addition of new trees, shrubs and other ground cover for the purpose of screening and noise reduction (when feasible, otherwise new landscaping).	
1-14	Minimize the creation of impervious areas / encourage permeable surfaces.		
1-15	Maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction.	Z.O. 1103.P. - Excavation Operations - An adequate and comprehensive drainage system shall be provided to convey the storm water runoff originating on and crossing the premises in accordance with the natural direction of runoff for the total watershed area. No excavation shall be allowed within fifty (50) feet to a natural stream. Sediment control measures shall be installed.	
1-16	Stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching - to protect exposed and critical areas during development. Timeline for completion.	Z.O. 1103.K. - Excavation Operations - All topsoil and subsoil shall be stripped from the active excavation area and stockpiled and seeded for use in accordance with the restoration plan. Such stockpiles shall be treated to minimize the effects of erosion.	
1-17	Use appropriate solid and hazardous waste generation and disposal practices including source controls and recycling.		
1-18	Ensure proper operation and maintenance of runoff management facilities.		
1-19	Encourage cluster development/conservation subdivisions.	Z.O. 907. - Cluster Residnential District	
1-20	Implement Federal/State Stormwater (SPDES) Phase II requirements including MS4 (when applicable) and Construction Permits as well as Municipal and Industrial Discharge Permits	Z.O. 502.W. - Regulations Applicable to all Zones - For the control of wastewater and stormwater discharges, in accordance with the Clean Water Act under New York State Law, all projects disturbing a specific area of ground, as prescribed by state law, are required to obtain a permit through the State Pollutant Discharge Elimination System (SPDES) program. State regulations should be referenced for specific requirements.	
1-21	Discourage development in flood plain and/or development below base flood elevation	Z.O.306. - Site Plan Review - comply with flood hazard and flood insurance regulations, special attention to the adequacy and impact of structures, roadways and landscaping in areas with susceptibility to ponding, flooding and/or erosion. Z.O. 1303.B.4. - Residential - Residential construction should be strictly controlled in areas which are subject to flooding and characterized by steep slopes or soils which are unstable and subject to erosion. Z.O. 1307.B.6. - Conservation and Open Space - Regulate development within flood hazard areas so that it meets the requirements of the Federal Flood Insurance Program and will be resistant to flood damages, will not restrict the flow of flood waters, and will not increase flood hazards to other properties.	

2011-12 Laws/Practices		Orangeville - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 2: Forestry and Agriculture		
	Forestry - if applicable		
2-01	Site restoration practices for forrestry sites. Consider potential water quality impacts when selecting silviculture system (yarding system, site preparation, pesticides employment, etc.)		
2-02	Have specialists (geologist, soil scientist, geotechnical engineer, wildland hydrologist) review plans in high erosion hazard areas.		
2-03	Consider Harvesting practices and preplan harvest areas - ex: operation season, skid trails/access on stable soils, avoiding-steep gradients/multiple stream crossings/poor drainage areas, etc.		
	Agriculture		
2-04	Implementation of the Agricultural Environmental Management (AEM) program.		
2-05	Ensure Concentrated Animal Feeding Operations (CAFO) regulations and permits are being followed and Comprehensive Nutrient Management Plans are being used.		
2-06	Implement barnyard runoff controls.		
2-07	Discourage grazing in environmentally sensitive areas (e.g. up to creek banks…)		
2-08	Use of agricultural protection such as agricultural districts, agricultural preservation ordinances and practices, right to farm laws, and agricultural and farmland protection plans	Z.O. 901. - Low Density District. Z.O. 1009,1010,1118 Gentleman Farm Operations Tiers 1, 2, 3. C.P. 1302. - Agricultural-Rural - A. Goal - Agricultural Development is important and should be protected in the Town of Orangeville. Law. C. Goal - Retain appropriate areas of the Town for agriculture. See also D. Policies. Z.O. 1307.A - Conservation and Open Space - Goal - Protect important environmental resources from the adverse effects of development.	
	Section 3: Waterways, Wetlands and Riparian Area Management and Restoration		
	Waterways		
3-01	Control in stream sedimentation and/or clear debris. Schedule inspections of sediment control measures for maintenance/repair.		
3-02	Establish riparian buffers.		
3-03	Prevent animal wastes from entering waterbodies. Ex: animal control/animal waste disposal ordinances and/or practices.	Z.O.1005 - Animal Waster Management Systems - G. Polluted runoff and seepage from concentrated waste areas should be intercepted and directed to storage or treatment facilities for future disposal or be directly applied to land in manner acceptable to the SWCD, or a State certified engineer, or to the NCRS standards. H. Waste water from processing should be collected and directly applied, stored, or treated prior to re-use. I. Adequate drainage, erosion control, and other soil and water management practices shall be incorporated to prevent system-related problems and potential adverse impacts on nearby properties. P. Waste management systems should not be located in areas of special flood hazard unless it is protected by dikes, levees or other means.	
3-04	Protect stream banks - vegetative stabilization-maintain/add vegetation(before using structural measures); indirect nonstructural-ex: regulate nearby irrigation, rerouting overbank drainage; direct structural-ex: revetments and bulkheads; indirect structural-ex: deflecting channel flow dikes.		
3-05	Use setbacks to minimize disturbance of land adjacent to stream banks and shorelines.	Z.O.501 - Preservation of Natural Features - A. No structure shall be built within fifty (50) feet of the bed of a stream carrying water on an average of six (6) months of the year (except for certain public facilities and infrastructure) C. Whenever natural features such as trees, brooks and drainage channels interfere with the proposed use of property, the retention of the maximum amount of such features consistent with the intended use of the property shall be encouraged.	
3-06	Prevent discharges to waterbodies in amounts that would adversely affect the taste, color or odor of the waters, or would impair the waters for their best usages.		
	Wetlands		
3-07	Prioritize wetlands and riparian areas and their non-point source (nps) control potential.		
3-08	Identify wetlands and riparian areas with significant nps control potential especially when implementing nps management practices.		
3-09	Include considerations/regulations to protect wetlands, ex: permitting, licensing, wetlands certification and non-regulatory nps pollution activities. Prevent adverse impacts to wetland functions that affect nps pollution abatement from hydrologic changes, sedimentation, or contaminant, ex: pretreatment practices: vegetated systems, detention/retention basins...	Z.O. 502.X. - Regulations Applicable to all Zones - US EPA and NYS DEC have regulations that preserve, protect and conserve freshwater wetlands and their benefits. Any project shall meet all Federal and State rules and regulations concerning wetlands.	
	Section 4: Roads, Bridges, Public Rights of Way		
4-01	Conduct road, bridge, and drainage/stormwater structure inspection and maintenance and procedures (de-icing material usage and storage, pot-hole repair, bridge washing, scraping and painting, cleaning catch basins, etc.) according to best management practices.		

2011-12 Laws/Practices		Orangeville - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
4-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) - according to best management practices.		
4-03	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities.		
4-04	Incorporate alternatives to traditional de-icing practices including adjusting mix rates, using non-salt and non-sand alternatives. Store in a enclosed areas with impervious floor.		According to G/FLRPC 2011 Salt Storage Survey - 50% sand 50% salt, enclosed storage on pavement floor.
4-05	Target existing public holdings, such as parks, for removing unnecessary impervious surfaces.		
4-06	Incorporate New York State Department of Transportation design and guidance documents, standard specifications, and procedural manuals (*Highway Design Manual, Environmental Procedures Manual,* Maintenance Guidelines, etc.) into local laws and operating procedures.		
4-07	Participate in Cornell Local Roads Program activities and training.		
4-08	Target training programs at highway officials, contractors, construction workers, inspectors, zoning and planning officials.		
4-09	Culvert maintenance: routinely inspected, maintained and resized when necessary so that they will remain unobstructed during storm events. Blockages resulting from sedimentation, debris, excessive vegetation and structural failure should be identified and mitigated.		
	Section 5: Onsite Wastewater Treatment Systems		
5-01	Conduct regular inspections of septic/onsite wastewater treatment systems (OWTS), at minimum durring transfer of property or within 1 year prior to transfer.		
5-02	Institute setback guidelines		
5-04	Target OWTS outreach programs at homeowners, contractors and developers		
5-05	Require all properties with access to municipal sewer service to connect.	Z.O. 502.M. - Regulations Applicable to all Zones - If the use of any lot or building involves the disposal of sewage or wastewater and public sewers are not available, an adequate sanitary disposal system for the same shall be installed in accordance with regulations and standards promulgated by the Department of Health and at all times maintained on such lot or in lawful connection therewith. Certification of approval for the installation of on-site sewage disposal systems shall be obtained from the Department of Health and submitted to the Zoning Enforcement Officer prior to the start of construction.	

2011-12 Laws/Practices		Pavilion - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 1: Development		
1-01	Identify retrofit opportunities for existing development - ex: retention/detention areas, stormwater ponds, construction of wastewater treatment systems to replace older septic systems…		
1-02	Encourage homeowners to place compost piles away from waterbodies and roadways.		
1-03	Encourage proper use and disposal of lawn and other household chemicals (res., com., indus., rec., uses etc.).		
1-04	Storm drain/curb stenciling/labeling program.		
1-05	Encourage volunteer programs.		
1-06	Encourage the use of indigenous plants in landscaping.		
1-07	Develop outreach programs targeted at water quality management. Target training for contractors, developers, inspectors and zoning and planning officials.		
1-08	Encourage proper control of pet wastes.		
1-09	Written details regarding enforcement of stormwater regulations & requirements - ex: responsibility, penalties, etc.	Sub-D. - pg.16. - The Planning Board shall refer all residential subdivision proposals to the G.C. SWCD for their review as to the acceptability of proposed drainage, erosion and sediment control measures both during and after completion.	
1-10	Use of drainage districts.		
1-11	Minimize the amount of land disturbed (including cut and fill) and the duration of disturbance durring construction.	Z.O. 402.H - Excavation During Construction - In any construction, open excavations shall be limited to a maximum of sixty days, with appropriate fencing, barricades or covering.	
1-12	Preserve natural features and conform with the natural boundaries and alignment of waterbodies durring development. Account for topography and soil type to minimize erosion. Limit grades of access roads.	Sub-7. - Preserve the natural and scenic qualities of open lands. Sub-2. - Where a subdivision is traversed by a natural lake, pond or stream, the boundaries of the said watercourse shall be preserved.	
1-13	Retain and protect trees and other natural vegetation on and near disturbed sites. Require tree surveys and/or cutting plans.	Sub-2.F.6. - Design Standards - No tree with a diameter of eight inches or more…shall be removed…Removal of additional trees shall be subject to approval of the Planning Board.	
1-14	Minimize the creation of impervious areas / encourage permeable surfaces.		
1-15	Maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction.	Z.O. 808.C.2.j - Site Plan Review - Description of proposed measures to control runoff and drainage for the site and when required by NYS DEC and/or SEQR process, a Stormwater Management and Erosion Control Plan. Sub-D pg.16. - The Planning Board shall refer all residential subdivision proposals to the G.C. SWCD for their review as to the acceptability of proposed drainage, erosion and sediment control measures both during and after completion. Sub-10. pg22. - Storm drainage plan indicating the location and size.	
1-16	Stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching - to protect exposed and critical areas during development. Timeline for completion.	Z.O.607 - Commercial Excavation - A-B - [regarding major and minor excavations, minor excavations require a special use permit requiring erosion plans to be written and submitted to the G.C. SWCD for review]. B8: All topsoil and subsoil shall be stripped from the excavation areas and stockpiled and seeded for use in accordance with the reclamation plan…such stockpiles shall be treated to minimize the effects of erosion. Z.O. 402.H. Excavation During Construction - In any construction, open excavations shall be limited to a maximum of sixty (60) days, with appropriate fencing, barricades or covering. Sub-F. pg16 - Topsoil moved during the course of construction shall be redistributed.	Ditches/public land - hay is generally used when the situation calls for it.

2011-12 Laws/Practices		Pavilion - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
1-17	Use appropriate solid and hazardous waste generation and disposal practices including source controls and recycling.	Z.O. 808.C.2.k. - Site Plan Review - A description of the proposed generation, storage and disposal of hazardous material and/or hazardous waste on-site.	
1-18	Ensure proper operation and maintenance of runoff management facilities.	Sub-D. pg16. - The Planning Board shall refer all residential subdivision proposals to the G.C. SWCD for their review as to the acceptability of proposed drainage, erosion and sediment control measures both during and after completion...All easements deemed necessary to maintain either natural or main made storm water drainage, erosion and/ or sediment control measures shall be provided and plotted accordingly...	
1-19	Encourage cluster development/conservation subdivisions.	Z.O. 617. - Cluster Residential Development - permitted with special use permit and requirements. Z.O. 506. - Planned Unit Development District	
1-20	Implement Federal/State Stormwater (SPDES) Phase II requirements including MS4 (when applicable) and Construction Permits as well as Municipal and Industrial Discharge Permits		
1-21	Discourage development in flood plain and/or development below base flood elevation	Sub-B.6 pg15. - Where there is a question as to the suitability of the land due to factors such as flooding, the Planning Board may withhold approval of such lots. Sub-G.2 pg17. - Land subject to flooding shall not be platted for occupancy. Z.O. 401.E - Lots under Water or Subject to Flooding may be excluded for development.	
Section 2: Forestry and Agriculture			
Forestry - if applicable			
2-01	Site restoration practices for forrestry sites. Consider potential water quality impacts when selecting silviculture system (yarding system, site preparation, pesticides employment, etc.)		
2-02	Have specialists (geologist, soil scientist, geotechnical engineer, wildland hydrologist) review plans in high erosion hazard areas.		
2-03	Consider Harvesting practices and preplan harvest areas - ex: operation season, skid trails/access on stable soils, avoiding-steep gradients/multiple stream crossings/poor drainage areas, etc.		
Agriculture			
2-04	Implementation of the Agricultural Environmental Management (AEM) program.		
2-05	Ensure Concentrated Animal Feeding Operations (CAFO) regulations and permits are being followed and Comprehensive Nutrient Management Plans are being used.		
2-06	Implement barnyard runoff controls.	Z.O. 409.A - Stabling Farm Animals - There shall be no stabling of farm animals or storage of manure, fertilizer, or similar odor or dust producing substance within the C District unless a suitable site plan has been approved by the Planning Board. See also 2-14.	Barnyard Runoff Management Systems and other operational BMPs were implemented on farms in Ogden(2), Wheatland(1), LeRoy(3), Pavilion(2), Byron(1), Warsaw(5), Covington(3), Orangeville(1), and Middlebury(1) through the Genesee River Implementation Grant project.
2-07	Discourage grazing in environmentally sensitive areas (e.g. up to creek banks…)		
2-08	Use of agricultural protection such as agricultural districts, agricultural preservation ordinances and practices, right to farm laws, and agricultural and farmland protection plans	Z.O. 501-502 - Ag. Districts designed to accommodate primarily agricultural uses in order to preserve the Town's agricultural base and maintain its rural nature.	
Section 3: Waterways, Wetlands and Riparian Area Management and Restoration			
Waterways			
3-01	Control in stream sedimentation and/or clear debris. Schedule inspections of sediment control measures for maintenance/repair.	Z.O. 103.I. To prevent the pollution of streams and ponds; to safeguard the water table, and to encourage the wise use and sound management of the natural resources throughout the Town in order to preserve the integrity, stability and beauty of the community and the value of the land.	Highway dept. has conducted such activities working closely with SWCD and DEC.
3-02	Establish riparian buffers.		
3-03	Prevent animal wastes from entering waterbodies. Ex: animal control/animal waste disposal ordinances and/or practices.	Z.O. 618. - Animal Waste Storage Facilities.	

2011-12 Laws/Practices		Pavilion - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
3-04	Protect stream banks - vegetative stabilization-maintain/add vegetation(before using structural measures); indirect nonstructural-ex: regulate nearby irrigation, rerouting overbank drainage; direct structural-ex: revetments and bulkheads; indirect structural-ex: deflecting channel flow dikes.	Z.O. 607.B.8. - Topsoil - All topsoil and subsoil shall be stripped from the excavation areas and stockpiled and seeded for use in accordance with the reclamation plan. The location of topsoil to be stored shall be identified. Such stockpiles shall be treated to minimize the effects of erosion by wind or water upon public roads, streams, or adjacent property.	
3-05	Use setbacks to minimize disturbance of land adjacent to stream banks and shorelines.		
3-06	Prevent discharges to waterbodies in amounts that would adversely affect the taste, color or odor of the waters, or would impair the waters for their best usages.	Z.O. 607.B4. - Commercial Excavation - Drainage - All surface drainage and any waste matter shall be controlled to prevent any silt, waste products, process residues, etc. from flowing…into any stream.	
	Wetlands		
3-07	Prioritize wetlands and riparian areas and their non-point source (nps) control potential.		
3-08	Identify wetlands and riparian areas with significant nps control potential especially when implementing nps management practices.		
3-09	Include considerations/regulations to protect wetlands, ex: permitting, licensing, wetlands certification and non-regulatory nps pollution activities. Prevent adverse impacts to wetland functions that affect nps pollution abatement from hydrologic changes, sedimentation, or contaminant, ex: pretreatment practices: vegetated systems, detention/retention basins...		
	Section 4: Roads, Bridges, Public Rights of Way		
4-01	Conduct road, bridge, and drainage/stormwater structure inspection and maintenance and procedures (de-icing material usage and storage, pot-hole repair, bridge washing, scraping and painting, cleaning catch basins, etc.) according to best management practices.		Basic BMPs are practiced by the department. Visual inspection takes place; repairs are then done in conjunction with paving, which occurs on a rotating basis.
4-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) - according to best management practices.		No pesticides used, vegetation maintained near waterways, etc.
4-03	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities.		Some ditch stabilization, which included using rip rap, etc.; check dams have been installed in certain locations.
4-04	Incorporate alternatives to traditional de-icing practices including adjusting mix rates, using non-salt and non-sand alternatives. Store in a enclosed areas with impervious floor.		According to G/FLRPC 2011 Salt Storage Survey - 75%Salt/ 25%Sand, enclosed storage on pavement floor.
4-05	Target existing public holdings, such as parks, for removing unnecessary impervious surfaces.		
4-06	Incorporate New York State Department of Transportation design and guidance documents, standard specifications, and procedural manuals (*Highway Design Manual, Environmental Procedures Manual,* Maintenance Guidelines, etc.) into local laws and operating procedures.		
4-07	Participate in Cornell Local Roads Program activities and training.		Attend as needed.
4-08	Target training programs at highway officials, contractors, construction workers, inspectors, zoning and planning officials.		
4-09	Culvert maintenance: routinely inspected, maintained and resized when necessary so that they will remain unobstructed during storm events. Blockages resulting from sedimentation, debris, excessive vegetation and structural failure should be identified and mitigated.		Culverts are routinely inspected visually.
	Section 5: Onsite Wastewater Treatment Systems		
5-01	Conduct regular inspections of septic/onsite wastewater treatment systems (OWTS), at minimum durring transfer of property or within 1 year prior to transfer.		
5-02	Institute setback guidelines		
5-04	Target OWTS outreach programs at homeowners, contractors and developers		
5-05	Require all properties with access to municipal sewer service to connect.	Sub-V.1.E - Wastewater disposal systems. See also pg.22. - Connection to existing lines.	

2011-12 Laws/Practices		Perry - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 1: Development		
1-01	Identify retrofit opportunities for existing development - ex: retention/detention areas, stormwater ponds, construction of wastewater treatment systems to replace older septic systems…		
1-02	Encourage homeowners to place compost piles away from waterbodies and roadways.		
1-03	Encourage proper use and disposal of lawn and other household chemicals (res., com., indus., rec., uses etc.).		
1-04	Storm drain/curb stenciling/labeling program.		
1-05	Encourage volunteer programs.		
1-06	Encourage the use of indigenous plants in landscaping.		
1-07	Develop outreach programs targeted at water quality management. Target training for contractors, developers, inspectors and zoning and planning officials.		
1-08	Encourage proper control of pet wastes.	Z.O. VI.6600.F - Site Plan Review - Kennels: Waste Disposal - Adequate provisions shall be made for disposing of animal waste.	
1-09	Written details regarding enforcement of stormwater regulations & requirements - ex: responsibility, penalties, etc.		
1-10	Use of drainage districts.		
1-11	Minimize the amount of land disturbed (including cut and fill) and the duration of disturbance durring construction.		
1-12	Preserve natural features and conform with the natural boundaries and alignment of waterbodies durring development. Account for topography and soil type to minimize erosion. Limit grades of access roads.		
1-13	Retain and protect trees and other natural vegetation on and near disturbed sites. Require tree surveys and/or cutting plans.		
1-14	Minimize the creation of impervious areas / encourage permeable surfaces.		
1-15	Maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction.		
1-16	Stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching - to protect exposed and critical areas during development. Timeline for completion.		
1-17	Use appropriate solid and hazardous waste generation and disposal practices including source controls and recycling.		
1-18	Ensure proper operation and maintenance of runoff management facilities.		
1-19	Encourage cluster development/conservation subdivisions.	Z.O. V.2400. - Cluster Residential Developments - Cluster Residential Developments - Maintenance of Open Space - The Town Planning Board…may establish such conditions on the ownership, use, and maintenance of open lands shown on the plat as the Board deems necessary to assure the preservation of the natural and scenic qualities of the open lands.	
1-20	Implement Federal/State Stormwater (SPDES) Phase II requirements including MS4 (when applicable) and Construction Permits as well as Municipal and Industrial Discharge Permits		
1-21	Discourage development in flood plain and/or development below base flood elevation		
	Section 2: Forestry and Agriculture		
	Forestry - if applicable		
2-01	Site restoration practices for forrestry sites. Consider potential water quality impacts when selecting silviculture system (yarding system, site preparation, pesticides employment, etc.)		
2-02	Have specialists (geologist, soil scientist, geotechnical engineer, wildland hydrologist) review plans in high erosion hazard areas.		
2-03	Consider Harvesting practices and preplan harvest areas - ex: operation season, skid trails/access on stable soils, avoiding-steep gradients/multiple stream crossings/poor drainage areas, etc.		
	Agriculture		
2-04	Implementation of the Agricultural Environmental Management (AEM) program.		
2-05	Ensure Concentrated Animal Feeding Operations (CAFO) regulations and permits are being followed and Comprehensive Nutrient Management Plans are being used.		
2-06	Implement barnyard runoff controls.		
2-07	Discourage grazing in environmentally sensitive areas (e.g. up to creek banks…)		
2-08	Use of agricultural protection such as agricultural districts, agricultural preservation ordinances and practices, right to farm laws, and agricultural and farmland protection plans	Ag. Districts Present.	

2011-12 Laws/Practices		Perry - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 3: Waterways, Wetlands and Riparian Area Management and Restoration		
	Waterways		
3-01	Control in stream sedimentation and/or clear debris. Schedule inspections of sediment control measures for maintenance/repair.		
3-02	Establish riparian buffers.	C.P. pg16 - Conservation Area - The Land Use Plan map indicates conservation areas along the entire length of all streams within the Town and Village.	
3-03	Prevent animal wastes from entering waterbodies. Ex: animal control/animal waste disposal ordinances and/or practices.	Z.O. VI.5300. - Special Use Permits - Animal Waste Management System - The Town Planning Board may approve a Special Use Permit…for Animal Waste Management Systems provided the standards and provisions specified below are followed [specifications shall conform to NRCS standards].	
3-04	Protect stream banks - vegetative stabilization-maintain/add vegetation(before using structural measures); indirect nonstructural-ex: regulate nearby irrigation, rerouting overbank drainage; direct structural-ex: revetments and bulkheads; indirect structural-ex: deflecting channel flow dikes.		
3-05	Use setbacks to minimize disturbance of land adjacent to stream banks and shorelines.		
3-06	Prevent discharges to waterbodies in amounts that would adversely affect the taste, color or odor of the waters, or would impair the waters for their best usages.		
	Wetlands		
3-07	Prioritize wetlands and riparian areas and their non-point source (nps) control potential.		
3-08	Identify wetlands and riparian areas with significant nps control potential especially when implementing nps management practices.		
3-09	Include considerations/regulations to protect wetlands, ex: permitting, licensing, wetlands certification and non-regulatory nps pollution activities. Prevent adverse impacts to wetland functions that affect nps pollution abatement from hydrologic changes, sedimentation, or contaminant, ex: pretreatment practices: vegetated systems, detention/retention basins...		
	Section 4: Roads, Bridges, Public Rights of Way		
4-01	Conduct road, bridge, and drainage/stormwater structure inspection and maintenance and procedures (de-icing material usage and storage, pot-hole repair, bridge washing, scraping and painting, cleaning catch basins, etc.) according to best management practices.		
4-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) - according to best management practices.		
4-03	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities.		
4-04	Incorporate alternatives to traditional de-icing practices including adjusting mix rates, using non-salt and non-sand alternatives. Store in a enclosed areas with impervious floor.		According to G/FLRPC 2011 Salt Storage Survey - 30%sand/70% salt, stored on pavement.
4-05	Target existing public holdings, such as parks, for removing unnecessary impervious surfaces.		
4-06	Incorporate New York State Department of Transportation design and guidance documents, standard specifications, and procedural manuals (*Highway Design Manual, Environmental Procedures Manual,* Maintenance Guidelines, etc.) into local laws and operating procedures.		
4-07	Participate in Cornell Local Roads Program activities and training.		
4-08	Target training programs at highway officials, contractors, construction workers, inspectors, zoning and planning officials.		
4-09	Culvert maintenance: routinely inspected, maintained and resized when necessary so that they will remain unobstructed during storm events. Blockages resulting from sedimentation, debris, excessive vegetation and structural failure should be identified and mitigated.		
	Section 5: Onsite Wastewater Treatment Systems		
5-01	Conduct regular inspections of septic/onsite wastewater treatment systems (OWTS), at minimum durring transfer of property or within 1 year prior to transfer.		
5-02	Institute setback guidelines		
5-04	Target OWTS outreach programs at homeowners, contractors and developers		
5-05	Require all properties with access to municipal sewer service to connect.		

		Riga	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 1: Development		
1-01	Identify retrofit opportunities for existing development - ex: retention/detention areas, stormwater ponds, construction of wastewater treatment systems to replace older septic systems	Subdivision Sec. 81-17B: design of stormwater detention facilities shall be included	
1-02	Encourage homeowners to place compost piles away from waterbodies and roadways		
1-03	Encourage proper use and disposal of lawn and other household chemicals (res., com., indus., rec., uses etc.)		
1-04	Storm drain/curb stenciling/labeling		
1-05	Encourage volunteer programs		
1-06	Encourage the use of indigenous plants		
1-07	Develop outreach programs targeted at water quality management. Target training for contractors, developers, inspectors and zoning and planning officials.	Comp Plan pg. 62 - expand education and training - Elected officials and advisory board members should receive ongoing training in the tools and techniques available to them in order to protect the Town's and Village's natural resources.	
1-08	Encourage proper control of pet wastes		
1-09	Enforcement details regarding stormwater regulations & requirements - responsibility, penalties, etc.		
1-10	Use of drainage districts		
1-11	Minimize the amount of land disturbed (including cut and fill) and the duration of disturbance	Z.O. 95-29. B.4 - The preservation of trees, outstanding natural topography and geological features and the prevention of soil erosion.	
1-12	Preserve natural features and conform with the natural boundaries and alignment of waterbodies. Account for topography and soil type to minimize erosion. Limit grades of access roads.	Z.O. 95-29 PRD Planned Residential Development District - exceptions allowed in order to: have more usable open space and recreation areas, preserve trees and topography/geologic features and prevent soil erosion. 95-29. B.4 - The preservation of trees, outstanding natural topography and geological features and the prevention of soil erosion. S of L. 81-31. B - To the fullest extent possible, all existing trees and shrubbery shall be conserved. Subdivision 81-31.C - Where a subdivision is traversed by a natural lake, pond or stream, the boundaries or alignment of said watercourse shall be preserved. Comp Plan pg34 C. Designate appropriate areas for various types of residential development, including cluster type development to limit impact on natural features. Z.O. 95-29. E.1.d - A tracing overlay showing all soil areas and their classifications and those areas, if any, with moderate or high susceptibility to erosion.	
1-13	Retain and protect trees and other natural vegetation on and near disturbed sites. Require tree surveys and/or cutting plans.	Z.O. 95-29. B.4 - The preservation of trees, outstanding natural topography and geological features and the prevention of soil erosion. Subdivision 81-31. B - To the fullest extent possible, all existing trees and shrubbery shall be conserved.	
1-14	Minimize the creation of impervious areas [encourage permeable surface]		
1-15	Maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction	Z.O. 95-29. E.1.e - Planned Residential Developments - Site plan approval process - Requires storm drainage calculations justifying sizing of proposed drainage system and capabilities of receiving stream or piping system. Z.O. 95-24. D.3 - [EPOD] Appropriate erosion control measures be installed and maintained on site, to ensure that any watercourse or wetland will be adequately protected from runoff, soil erosion and siltation resulting from construction or development activities. Comp Plan pg. 62 - Create Stormwater Management Plan	Practice: during major projects, treatment put into place.

		Riga	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
1-16	Stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching - to protect exposed and critical areas during development. Complete a.s.a.p., include timeline.	Subdivision 81-31. A - Topsoil moved during the course of construction shall be redistributed. Z.O. 95-24. D.3 - [EPOD] Appropriate erosion control measures be installed and maintained on site, to ensure that any watercourse or wetland will be adequately protected from runoff, soil erosion and siltation resulting from construction or development activities. Z.O. 95-29. E.1.d - A tracing overlay showing all soil areas and their classifications and those areas, if any, with moderate or high susceptibility to erosion.	Municipal hydro seeding takes place when called for; hay and mulch are also used as the situation necessitates.
1-17	Use appropriate solid and hazardous waste generation and disposal practices including source controls and recycling		
1-18	Ensure proper operation and maintenance of runoff management facilities		General municipal practice
1-19	Encourage cluster development/conservation subdivisions	Comp Plan Pg. 34 C. Designate appropriate areas for various types of residential development including use of environmental protection overlay district and cluster development	
1-20	Implement Federal/State Stormwater (SPDES) Phase II requirements including MS4 (when applicable) and Construction Permits as well as Municipal and Industrial Discharge Permits		(Non-MS4) Voluntary stormwater coalition member. Construction site and Construction Permit inspection conducted by the county SWCD at the request of NYSDECAll. Municipalities are required to issue Construction Permits for projects disturbing 1 or more acres of land. Town complies with Phase II regulations for urbanized areas; plans are requested for all large projects.
1-21	Discourage development in flood plain and/or development below base flood elevation	Z.O. 95-22. F.3.c - Structures shall not be permitted in Floodway Zone. Code-Sec. 51 Flood Damage Prevention (regarding Flood Plain Overlay District) - 51-13.G. Certificate of compliance - A certificate of compliance is required from the local administrator stating that the building or land conforms to the requirements of this chapter based on inspections, and/or any certified elevations, hydraulic data, flood proofing, anchoring requirements or encroachment analyses which may have been required as a condition of the approved permit. 51-16. Required Elevation for residential structures - Most flood zones - lowest floor (including basement) – must be at or above the base flood level, but as high as 2ft above. When no base flood elevation data is available – lowest floor must be at least three feet above the highest adjacent grade. Nonresidential – Most flood zones - lowest floor, elevated to or above two feet above the base flood elevation; or be flood proofed so that the structure is watertight below two feet above the base flood level with walls substantially impermeable to the passage of water and have a certificate from a licensed professional engineer or architect. See also Flood Plain Overlay District Z.O. 95-23	
	Section 2: Forestry and Agriculture		
	Forestry - if applicable		
2-01	Consider site restoration. Consider potential water quality impacts when selecting silviculture system (yarding system, site preparation, pesticides employment, etc.)		
2-02	Have specialists (geologist, soil scientist, geotechnical engineer, wildland hydrologist) review plans in high erosion hazard areas		
2-03	Consider Harvesting practices and preplan harvest areas - ex: operation season, skid trails/access on stable soils, avoiding-steep gradients/multiple stream crossings/poor drainage areas, etc.		
	Agriculture		
2-04	Implement the Agricultural Environmental Management (AEM) program		

		Riga	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
2-05	Ensure Concentrated Animal Feeding Operations (CAFO) regulations and permits are being followed and Comprehensive Nutrition Management Plans are being used. (combined with below) (ADD NEW ROUND OF FUNDING)(any other animal waste one for non cafes?)		
2-06	Implement barnyard runoff controls.		Practice: SWCD: Barnyard practices were implemented on 1 Riga farm through the Lake Ontario Implementation Grant.
2-07	Discourage grazing in environmentally sensitive areas (e.g. up to creek banks)		
2-08	Use of agricultural protection such as Agricultural Districts, agricultural preservation ordinances and practices, right to farm laws, and Agricultural and Farmland Protection Plans	Z.O. 95-25. A - The Rural Ag. District Zone is intended to conserve those land areas which are suitable for farm and age. uses, and protect them against encroachment.	
	Section 3: Waterways and Wetlands		
	Waterways		
3-01	Control in stream sedimentation, clear debris. Schedule inspections of sediment control measures for maintenance/repair.		
3-02	Establish riparian buffers		Practice: SWCD: will encourage when assisting landowners/farmers with SWPPPs and AEMs, or if reviewing Site Plans. 1 Riparian buffer implemented on unnamed trib to Black Creek on 1 farm in Riga for 430ftx15ft. in Riga 400ft by 15ft.
3-03	Prevent animal wastes from entering waterbodies. Ex: animal control ordinances and/or practices that pertain to animal waste disposal		
3-04	Protect stream banks - vegetative stabilization-maintain/add vegetation(before using structural measures); indirect nonstructural-ex: regulate nearby irrigation, rerouting overbank drainage; direct structural-ex: revetments and bulkheads; indirect structural-ex: deflecting channel flow dikes	Z.O. 95-24. D.3 - [EPOD] Appropriate erosion control measures be installed and maintained on site, to ensure that any watercourse or wetland will be adequately protected from runoff, soil erosion and siltation resulting from construction or development activities.	Practice: SWCD In conjunction with the Town of Riga implemented 1 Stabilization project on an unnamed tributary to Black Creek on the corner of Stearns & Griffin Rds-429 linear feet (100 feet was vegetated rip rap. and the remainder of the project was re-sloped and planted with native vegetation with no stone implemented).
3-05	Use setbacks to minimize disturbance of land adjacent to stream banks and shorelines		
3-06	Prevent discharges to waterbodies in amounts that would adversely affect the taste, color or odor of the waters, or would impair the waters for their best usages		
	Wetlands and Riparian Area Management and Restoration		
3-07	Prioritize wetlands and riparian areas and their non-point source (nps) control potential	Comp Plan pg. 85 - priority to preserve of wetlands	
3-08	Identify wetlands and riparian areas with significant nps control potential especially when implementing nps management practices.		
3-09	Include considerations/regulations to protect wetlands, ex: permitting, licensing, wetlands certification and non-regulatory nps pollution activities. Prevent adverse impacts to wetland functions that affect nps pollution abatement from hydrologic changes, sedimentation, or contaminant, ex: pretreatment practices: vegetated systems, detention/retention basins	Z.O. 95-24. D.3 - [EPOD] Appropriate erosion control measures be installed and maintained on site, to ensure that any watercourse or wetland will be adequately protected from runoff, soil erosion and siltation resulting from construction or development activities.	
	Section 4: Roads, Bridges, Public Rights of Way		
4-01	Conduct road, bridge are related drainage/stormwater structures inspection/maintenance (de-icing material usage and storage, pot-hole repair, bridge washing, scraping and painting, cleaning catch basins, etc.) according to best management practices		Basic BMPs conducted by department; new salt storage barn constructed in 2006. Visual inspection for most facilities; all are maintained on a regular basis
4-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) - according to best management practices		Practice: no pesticides used; no jurisdiction near creek beds, however

		Riga	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
4-03	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities		Practice: major project on Fairbanks Road embankment re-contoured all banks, ditches, etc.
4-04	Incorporate alternatives to traditional de-icing practices, including adjusting mix rates, using non-salt and non-sand alternatives. Store in a enclosed areas with impervious floor.		Practice: According to G/FLRPC 2011 Salt Storage Survey - 8 gal magic product/ 1 ton salt, enclosed storage on pavement floor.
4-05	Target existing public holdings, such as parks, for removing unnecessary impervious surfaces		
4-06	Incorporate New York State Department of Transportation design and guidance documents, standard specifications, and procedural manuals (*Highway Design Manual, Environmental Procedures Manual,* Maintenance Guidelines, etc.) into local laws and operating procedures		Practice: familiar with documents and procedures
4-07	Participate in Cornell Local Roads Program activities and training		Practice: staff attend regularly
4-08	Target training programs at highway officials, contractors, construction workers, inspectors, zoning and planning officials	Comp Plan pg. 62 - expand education and training - Elected officials and advisory board members should receive ongoing training in the tools and techniques available to them in order to protect the Town's and Village's natural resources.	Practice: staff attend regularly
4-09	Culvert maintenance: Culverts are routinely inspected, maintained and resized when necessary so that they will remain unobstructed, allowing for the free flow of water during storm events. Blockages resulting from sedimentation, debris, excessive vegetation and structural failure are issues to be aware of.	Comp Plan pg. 83 - mentions the question of whether culverts are maintained, but does not elaborate or state a priority to find out and to maintain	Practice: ditching in the town is minimal; however, staff walk the roads as part of a regular spring cleanup and report on findings; county receives information regarding facilities that they are in charge of also
	Section 5: Onsite Wastewater Treatment Systems		
5-01	Conduct regular inspections of OWTS at minimum at property transfer or within 1 year prior to transfer		
5-02	Institute setback guidelines		
5-04	Target outreach programs at homeowners, contractors and developers		
5-05	Require all properties with access to municipal service to connect.		

2011-12 Laws/Practices		Scottsville - Village	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 1: Development		
1-01	Identify retrofit opportunities for existing development - ex: retention/detention areas, stormwater ponds, construction of wastewater treatment systems to replace older septic systems…		Several retention/detention areas observed to be in place. Switched sewage treatment facility over to M.C. Pure Waters; discharge changed from Oatka Creek to Lake Ontario at Frank E. VanLare Wastewater Treatment Facility.
1-02	Encourage homeowners to place compost piles away from waterbodies and roadways.		
1-03	Encourage proper use and disposal of lawn and other household chemicals (res., com., indus., rec., uses etc.).		
1-04	Storm drain/curb stenciling/labeling program.		
1-05	Encourage volunteer programs.	Wheatland/Scottsville Comp. Plan, 2-9: "…there is a need for the Town…to address water quality issues by actively participating in the various watershed and water quality committees, and by maintaining current knowledge of existing and upcoming regulations pertaining to water quality..."	
1-06	Encourage the use of indigenous plants in landscaping.		Cornell Cooperative Extension experts and publications regularly consulted regarding ideal native/disease resistant plant species
1-07	Develop outreach programs targeted at water quality management. Target training for contractors, developers, inspectors and zoning and planning officials.		
1-08	Encourage proper control of pet wastes.	Z.O. Ch. 54 Animals Article II Dog Control Sec. 54-10b: The owner of any dog which is within the [Village] shall not permit his or her dog to…defecate in such a way as to cause annoyance to the residents…	
1-09	Written details regarding enforcement of stormwater regulations & requirements - ex: responsibility, penalties, etc.		
1-10	Use of drainage districts.		
1-11	Minimize the amount of land disturbed (including cut and fill) and the duration of disturbance durring construction.		General Practice
1-12	Preserve natural features and conform with the natural boundaries and alignment of waterbodies durring development. Account for topography and soil type to minimize erosion. Limit grades of access roads.	Joint Comprehensive Plan: 2-8: natural corridors and other vital environmental areas shall be preserved or mitigated if necessary. 2-12: "...based on the environmentally sensitive nature of steep slopes...there is a need to periodically review and evaluate their status, and consider regulating development in and near these areas through supplemental Z.O. regulations..."	
1-13	Retain and protect trees and other natural vegetation on and near disturbed sites. Require tree surveys and/or cutting plans.		
1-14	Minimize the creation of impervious areas / encourage permeable surfaces.		
1-15	Maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction.		Phase II Pre/Post Construction Regulations strictly adhered to.
1-16	Stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching - to protect exposed and critical areas during development. Timeline for completion.		Municipality uses SWCD hydro seeder when necessary for ditches etc.; a spreader is also used w/back raking.
1-17	Use appropriate solid and hazardous waste generation and disposal practices including source controls and recycling.		
1-18	Ensure proper operation and maintenance of runoff management facilities.		Of the few detention basins within village limits, each is maintained regularly.
1-19	Encourage cluster development/conservation subdivisions.	Joint Comp. Plan, 4-9: "Promote the preservation of woodlots and natural areas under the development review process by encouraging the use of "forever-wild" areas, permitting innovative design techniques that protect sensitive areas, encouraging natural design themes for development, and/or requiring the use of conservation easements in all development."	
1-20	Implement Federal/State Stormwater (SPDES) Phase II requirements including MS4 (when applicable) and Construction Permits as well as Municipal and Industrial Discharge Permits		(Non-MS4). Other Phase II requirements rigorously enforced by village and town officials; Construction site and Construction Permit inspection conducted by the county SWCD at the request of NYSDEC or constituent municipalities; Voluntary stormwater coalition member. Phase II Regulations are rigorously enforced by department.

2011-12 Laws/Practices		Scottsville - Village	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
1-21	Discourage development in flood plain and/or development below base flood elevation	Local Law for Flood Damage Prevention pg. 8. - No structure can be built/altered and no land can be excavated or filled without following Flood Damage Prevention Law regulations. Floodplain development permit required. Anchoring required. Required Elevation for residential structures - Most flood zones within flood plain - lowest floor (including basement) – must be to or above two feet above base flood elevation. When no base flood elevation data is available – lowest floor must be at least three feet above the highest adjacent grade. Nonresidential – Most flood zones - lowest floor, elevated to or above two feet above the base flood elevation; or be completely flood proofed to that level and have a certificate from a licensed professional engineer or architect. Residential- Joint Comp. Plan 2-11…there is a need to consider enacting further safety measures in [flood prone areas] through the use of supplemental Z.O. regulations...	
Section 2: Forestry and Agriculture			
Forestry - if applicable			
2-01	Site restoration practices for forrestry sites. Consider potential water quality impacts when selecting silviculture system (yarding system, site preparation, pesticides employment, etc.)		
2-02	Have specialists (geologist, soil scientist, geotechnical engineer, wildland hydrologist) review plans in high erosion hazard areas.		
2-03	Consider Harvesting practices and preplan harvest areas - ex: operation season, skid trails/access on stable soils, avoiding-steep gradients/multiple stream crossings/poor drainage areas, etc.		
Agriculture			
2-04	Implementation of the Agricultural Environmental Management (AEM) program.		
2-05	Ensure Concentrated Animal Feeding Operations (CAFO) regulations and permits are being followed and Comprehensive Nutrient Management Plans are being used.		
2-06	Implement barnyard runoff controls.		
2-07	Discourage grazing in environmentally sensitive areas (e.g. up to creek banks…)		
2-08	Use of agricultural protection such as agricultural districts, agricultural preservation ordinances and practices, right to farm laws, and agricultural and farmland protection plans		
Section 3: Waterways, Wetlands and Riparian Area Management and Restoration			
Waterways			
3-01	Control in stream sedimentation and/or clear debris. Schedule inspections of sediment control measures for maintenance/repair.		
3-02	Establish riparian buffers.		
3-03	Prevent animal wastes from entering waterbodies. Ex: animal control/animal waste disposal ordinances and/or practices.		
3-04	Protect stream banks - vegetative stabilization-maintain/add vegetation(before using structural measures); indirect nonstructural-ex: regulate nearby irrigation, rerouting overbank drainage; direct structural-ex: revetments and bulkheads; indirect structural-ex: deflecting channel flow dikes.		
3-05	Use setbacks to minimize disturbance of land adjacent to stream banks and shorelines.		
3-06	Prevent discharges to waterbodies in amounts that would adversely affect the taste, color or odor of the waters, or would impair the waters for their best usages.		
Wetlands			
3-07	Prioritize wetlands and riparian areas and their non-point source (nps) control potential.		
3-08	Identify wetlands and riparian areas with significant nps control potential especially when implementing nps management practices.	Joint Comp. Plan 2-11 - …the Town…should officially designate local environmentally sensitive areas through a Preservation of Environmentally Sensitive Areas Program.	
3-09	Include considerations/regulations to protect wetlands, ex: permitting, licensing, wetlands certification and non-regulatory nps pollution activities. Prevent adverse impacts to wetland functions that affect nps pollution abatement from hydrologic changes, sedimentation, or contaminant, ex: pretreatment practices: vegetated systems, detention/retention basins...		
Section 4: Roads, Bridges, Public Rights of Way			
4-01	Conduct road, bridge, and drainage/stormwater structure inspection and maintenance and procedures (de-icing material usage and storage, pot-hole repair, bridge washing, scraping and painting, cleaning catch basins, etc.) according to best management practices.	Joint Comp. Plan 2-20 - The Town and Village should continue to maintain their storm sewer systems in keeping with past practices and current regulatory requirements.	Basic BMPs are in place; pesticides are never used near waterways, road salt storage enclosed, chemicals rarely if ever used, etc. Structures inspected regularly;
4-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) - according to best management practices.		Does not apply--village landscape does not necessitate right of way activities
4-03	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities.		Few steep slopes or erosion problem areas within village limits.

2011-12 Laws/Practices		Scottsville - Village	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
4-04	Incorporate alternatives to traditional de-icing practices including adjusting mix rates, using non-salt and non-sand alternatives. Store in a enclosed areas with impervious floor.		According to G/FLRPC 2011 Salt Storage Survey - enclosed storage on pavement floor. Alternatives such as magnesium chloride have been tested, but proved to be ineffective.
4-05	Target existing public holdings, such as parks, for removing unnecessary impervious surfaces.		
4-06	Incorporate New York State Department of Transportation design and guidance documents, standard specifications, and procedural manuals (*Highway Design Manual, Environmental Procedures Manual,* Maintenance Guidelines, etc.) into local laws and operating procedures.		Referred to often.
4-07	Participate in Cornell Local Roads Program activities and training.		General Practice.
4-08	Target training programs at highway officials, contractors, construction workers, inspectors, zoning and planning officials.		When available
4-09	Culvert maintenance: routinely inspected, maintained and resized when necessary so that they will remain unobstructed during storm events. Blockages resulting from sedimentation, debris, excessive vegetation and structural failure should be identified and mitigated.		Sub-standard structures are all identified and on a long-term replacement plan;
Section 5: Onsite Wastewater Treatment Systems			
5-01	Conduct regular inspections of septic/onsite wastewater treatment systems (OWTS), at minimum durring transfer of property or within 1 year prior to transfer.		
5-02	Institute setback guidelines		
5-04	Target OWTS outreach programs at homeowners, contractors and developers		
5-05	Require all properties with access to municipal sewer service to connect.	Z.O. 131-5 - Sewers - The owner of any...property use for human occupancy...in which there is a public sewer line or to which there is otherwise...accessible a public sewer line is required to connect. Joint Comprehensive Plan 6-7 - Several specific reasons to consider limited construction of public sanitary sewers {health reasons, surface and ground water, inadequate soils and other site-specific reasons}	

2011-12 Laws/Practices		Stafford - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 1: Development		
1-01	Identify retrofit opportunities for existing development - ex: retention/detention areas, stormwater ponds, construction of wastewater treatment systems to replace older septic systems…		
1-02	Encourage homeowners to place compost piles away from waterbodies and roadways.		
1-03	Encourage proper use and disposal of lawn and other household chemicals (res., com., indus., rec., uses etc.).		
1-04	Storm drain/curb stenciling/labeling program.		
1-05	Encourage volunteer programs.		
1-06	Encourage the use of indigenous plants in landscaping.		
1-07	Develop outreach programs targeted at water quality management. Target training for contractors, developers, inspectors and zoning and planning officials.	Comp Plan - Goals/Objectives - Promote public education to promote septic system maintenance. The Town should work with the local SWCD, the County and other involved agencies to address this problem through means such as public education about septic tank maintenance, and technical assistance programs. Work with the SWCD for continued outreach and education, and provision of technical assistance on water and wastewater issues.	
1-08	Encourage proper control of pet wastes.		
1-09	Written details regarding enforcement of stormwater regulations & requirements - ex: responsibility, penalties, etc.	Z.O. 182-27 Site Plan Review (2) The Planning Board shall have the authority to impose such reasonable conditions and restrictions as are directly related to and incidental to a proposed site plan. Upon its approval of said site plan, any such conditions must be met in connection with the issuance of permits by applicable enforcement agents or officers of the Town.	
1-10	Use of drainage districts.		
1-11	Minimize the amount of land disturbed (including cut and fill) and the duration of disturbance durring construction.	182-36.A.2 - Commercial excavation As part of the application process for a special use permit, the applicant's plan shall be presented to the G.C. SWCD for its review and comments. Also, before issuing a special use permit, the Planning Board must find that such excavation will not endanger the stability of adjacent land or structures or the quality or quantity of groundwater and that it does not constitute a detriment to public health, safety or welfare by reason of excessive dust, noise, traffic, erosion, siltation or other condition.	
1-12	Preserve natural features and conform with the natural boundaries and alignment of waterbodies durring development. Account for topography and soil type to minimize erosion. Limit grades of access roads.	Z.O. IV Site Plan Sec 182-39 J - Existing on-site vegetation shall be preserved to the maximum extent possible and no cutting of trees exceeding 4 inches in diameter. [RE: Communication Towers]	
1-13	Retain and protect trees and other natural vegetation on and near disturbed sites. Require tree surveys and/or cutting plans.	Z.O. 136 A.2.6 – Commercial Excavation - Roadside landscape. Existing trees and ground cover along public road frontage shall be preserved, maintained and supplemented. 182-39 J - Communication Towers - Existing on-site vegetation shall be preserved to the maximum extent possible and no cutting of trees exceeding 4 inches in diameter.	
1-14	Minimize the creation of impervious areas / encourage permeable surfaces.		
1-15	Maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction.	Z.O. IV Site Plan Sec182-27 - Applicant must submit...(6) Preliminary engineering plans, street improvements, storm drainage, water supply and sanitary sewer facilities and fire protection. 182-36.A.2.b.[4] - Commercial excavation - Drainage. All surface drainage and any waste matter shall be controlled to prevent any silt, waste products, process residues, etc., from flowing onto public roads, adjacent property or into any stream.	

2011-12 Laws/Practices		Stafford - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
1-16	Stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching - to protect exposed and critical areas during development. Timeline for completion.	182-36[8] Commercial excavation Topsoil. All topsoil and subsoil shall be stripped from the excavation areas and stockpiled and seeded for use in accordance with the reclamation plan. The location of topsoil to be stored shall be identified. Such stockpiles shall be treated to minimize the effects of erosion by wind or water upon public roads, streams or adjacent property. This subsection shall be applied to all operations except that of topsoil removal. [12] - Commercial excavation - Reclamation plan. The applicant shall submit a reclamation plan. "Reclamation plan" means the applicant's proposal for reclaiming the affected land, including…the method of reclamation and a schedule for performing reclamation. Where feasible, reclamation shall be a continuing operation. Grading, topsoil replacement and replanting of the area designated for restoration shall continue during the permit period. All reclamation work shall be complete within one year after the termination of operations, at the expense of the operator.	Municipal Practice
1-17	Use appropriate solid and hazardous waste generation and disposal practices including source controls and recycling.		
1-18	Ensure proper operation and maintenance of runoff management facilities.		few such facilities present within the department, but they are looked after as necessary
1-19	Encourage cluster development/conservation subdivisions.	Comp Plan - Implementation - Rural Cluster Developments. Revise site plan guidelines to encourage applicants to cluster home sites closer together in order to preserve significant features or open space. (Overall density must conform to existing standards). These type of "rural" cluster regulations do not require the construction of roads.	
1-20	Implement Federal/State Stormwater (SPDES) Phase II requirements including MS4 (when applicable) and Construction Permits as well as Municipal and Industrial Discharge Permits		
1-21	Discourage development in flood plain and/or development below base flood elevation	Z.O. Sec 182-12 E. Restrictions to development on lots under water or lots subject to flooding. Flood Damage Prevention Law - requirements to build specific heights above base flood elevation, or required flood proofing depending on the use and Flood map zone.	
Section 2: Forestry and Agriculture			
Forestry - if applicable			
2-01	Site restoration practices for forrestry sites. Consider potential water quality impacts when selecting silviculture system (yarding system, site preparation, pesticides employment, etc.)		
2-02	Have specialists (geologist, soil scientist, geotechnical engineer, wildland hydrologist) review plans in high erosion hazard areas.		
2-03	Consider Harvesting practices and preplan harvest areas - ex: operation season, skid trails/access on stable soils, avoiding-steep gradients/multiple stream crossings/poor drainage areas, etc.		
Agriculture			
2-04	Implementation of the Agricultural Environmental Management (AEM) program.		See County AEM/Round 18 Ag NPS grant - 1 dairy farm awarded within 2012 Oatka Creek Watershed Agricultural Nutrient Reduction Project to implement priority AEM BMPs
2-05	Ensure Concentrated Animal Feeding Operations (CAFO) regulations and permits are being followed and Comprehensive Nutrient Management Plans are being used.		
2-06	Implement barnyard runoff controls.		See Round 18 Ag NPS grant above - will include barnyard runoff management BMPs including trench & roof gutter system, watering facility, and access road.
2-07	Discourage grazing in environmentally sensitive areas (e.g. up to creek banks…)		Round 18 Ag NPS grant above will include grazing plan implementation. Buffer in place on targeted farm.
2-08	Use of agricultural protection such as agricultural districts, agricultural preservation ordinances and practices, right to farm laws, and agricultural and farmland protection plans	Z.O. Sec 182-21 - Agricultural Districts are designed to preserve the Towns agricultural base and maintain its rural nature.	
Section 3: Waterways, Wetlands and Riparian Area Management and Restoration			
Waterways			

2011-12 Laws/Practices		Stafford - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
3-01	Control in stream sedimentation and/or clear debris. Schedule inspections of sediment control measures for maintenance/repair.		
3-02	Establish riparian buffers.	Comp Plan - Recommendations - The Town should consider instituting environmental overlays along the major streams to limit development and agricultural use along the edge of the stream banks in order to protect the integrity of the streams and their water quality.	Round 18 Ag NPS grant above - buffer already established on target farm will be maintained.
3-03	Prevent animal wastes from entering waterbodies. Ex: animal control/animal waste disposal ordinances and/or practices.	Z.O. 182-33 - Stabling of Farm Animals - C. Disposal of bedding - manure or other animal waste shall be in conformance with guidelines established by the US Soil Conservation Service and/or G.C. SWCD. The ZEO may require an individual who stables farm animals to provide the Town with an animal waste disposal plan approved by one of the aforementioned agencies. See also 182.37 - Animal Waste Storage Facilities	Round 18 Ag NPS grant - targeted toward preventing animal wastes from entering waterbody, will include barnyard runoff management BMPs including trench & roof gutter system, watering facility, and access road. Buffer already established on target farm.
3-04	Protect stream banks - vegetative stabilization-maintain/add vegetation(before using structural measures); indirect nonstructural-ex: regulate nearby irrigation, rerouting overbank drainage; direct structural-ex: revetments and bulkheads; indirect structural-ex: deflecting channel flow dikes.	182-36.A.2.b.[4] - Commercial excavation - Drainage. All surface drainage and any waste matter shall be controlled to prevent any silt, waste products, process residues, etc., from flowing onto public roads, adjacent property or into any stream.	Round 18 Ag NPS grant - Buffer already established on target farm will be maintained.
3-05	Use setbacks to minimize disturbance of land adjacent to stream banks and shorelines.		
3-06	Prevent discharges to waterbodies in amounts that would adversely affect the taste, color or odor of the waters, or would impair the waters for their best usages.	182-36.A.2.b.[4] - Commercial excavation - Drainage. All surface drainage and any waste matter shall be controlled to prevent any silt, waste products, process residues, etc., from flowing onto public roads, adjacent property or into any stream.	
Wetlands			
3-07	Prioritize wetlands and riparian areas and their non-point source (nps) control potential.	Comp Plan - Town could undertake a natural resources inventory to identify important wetlands, floodplains, prime farm soils and other environmental resources.	
3-08	Identify wetlands and riparian areas with significant nps control potential especially when implementing nps management practices.	Comp Plan - The Town has concentrated areas of wetlands, with mapped wetlands (map 5) along waterways and in other scattered locations throughout the Town. Inappropriate development of these areas could lead to flooding and drainage problems. Areas of federal wetlands in Stafford are concentrated in the southern portion of Town, particularly the southeastern corner, and along Black Creek and Bigelow Creek.	
3-09	Include considerations/regulations to protect wetlands, ex: permitting, licensing, wetlands certification and non-regulatory nps pollution activities. Prevent adverse impacts to wetland functions that affect nps pollution abatement from hydrologic changes, sedimentation, or contaminant, ex: pretreatment practices: vegetated systems, detention/retention basins...		
Section 4: Roads, Bridges, Public Rights of Way			
4-01	Conduct road, bridge, and drainage/stormwater structure inspection and maintenance and procedures (de-icing material usage and storage, pot-hole repair, bridge washing, scraping and painting, cleaning catch basins, etc.) according to best management practices.		basic BMPs are being practiced by the department; site stabilization, etc. Culverts are the only structures (besides bridges); department recently began a detailed visual inspection of such facilities
4-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) - according to best management practices.		when right of way activities disturb large areas, no chemicals are used and hand seeding takes place after; the department attempts to retain as much vegetation as possible
4-03	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities.		
4-04	Incorporate alternatives to traditional de-icing practices including adjusting mix rates, using non-salt and non-sand alternatives. Store in a enclosed areas with impervious floor.		According to G/FLRPC 2011 Salt Storage Survey - enclosed storage on pavement floor.
4-05	Target existing public holdings, such as parks, for removing unnecessary impervious surfaces.		

2011-12 Laws/Practices		Stafford - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
4-06	Incorporate New York State Department of Transportation design and guidance documents, standard specifications, and procedural manuals (*Highway Design Manual, Environmental Procedures Manual,* Maintenance Guidelines, etc.) into local laws and operating procedures.		
4-07	Participate in Cornell Local Roads Program activities and training.		attends regularly
4-08	Target training programs at highway officials, contractors, construction workers, inspectors, zoning and planning officials.		
4-09	Culvert maintenance: routinely inspected, maintained and resized when necessary so that they will remain unobstructed during storm events. Blockages resulting from sedimentation, debris, excessive vegetation and structural failure should be identified and mitigated.		department has recently begun a detailed visual inspection program for such facilities. problem culverts have been identified
Section 5: Onsite Wastewater Treatment Systems			
5-01	Conduct regular inspections of septic/onsite wastewater treatment systems (OWTS), at minimum durring transfer of property or within 1 year prior to transfer.	Comp Plan Goals - Protect groundwater and surface water resources from contamination from failing septic systems and other sources of pollution. Recommendations - Ensure adequate monitoring and enforcement regarding failing septic systems to protect groundwater quality.	
5-02	Institute setback guidelines		
5-04	Target OWTS outreach programs at homeowners, contractors and developers	Comp Plan - Goals/Objectives - Promote public education to promote septic system maintenance. The Town should work with the local SWCD, the County and other involved agencies to address this problem through means such as public education about septic tank maintenance, and technical assistance programs. Work with the SWCD for continued outreach and education, and provision of technical assistance on water and wastewater issues.	
5-05	Require all properties with access to municipal sewer service to connect.	Comp Plan - There is no public sewerage system in the Town of Stafford. All households are serviced with privately maintained sanitary waste systems (septic systems).	

2011-12 Laws/Practices		Warsaw - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 1: Development		
1-01	Identify retrofit opportunities for existing development - ex: retention/detention areas, stormwater ponds, construction of wastewater treatment systems to replace older septic systems…		
1-02	Encourage homeowners to place compost piles away from waterbodies and roadways.		
1-03	Encourage proper use and disposal of lawn and other household chemicals (res., com., indus., rec., uses etc.).		
1-04	Storm drain/curb stenciling/labeling program.		
1-05	Encourage volunteer programs.		
1-06	Encourage the use of indigenous plants in landscaping.	Sub-IV.V.E - Required Trees - …Required trees shall be approved by the Planning Board and shall be compatible with subdivision development in terms of…nuisance characteristics, disease and pest resistance and general hardiness;	
1-07	Develop outreach programs targeted at water quality management. Target training for contractors, developers, inspectors and zoning and planning officials.		
1-08	Encourage proper control of pet wastes.		
1-09	Written details regarding enforcement of stormwater regulations & requirements - ex: responsibility, penalties, etc.		
1-10	Use of drainage districts.		
1-11	Minimize the amount of land disturbed (including cut and fill) and the duration of disturbance durring construction.		
1-12	Preserve natural features and conform with the natural boundaries and alignment of waterbodies durring development. Account for topography and soil type to minimize erosion. Limit grades of access roads.	Z.O. 501.A. - No structure shall be built within 50 feet of the bed of stream carrying water on an average of 6 months of the year. Z.O. 501.C. - Natural features such as trees, brooks, drainage channels shall be preserved. Sub-D. pg. 24 - The Planning Board, shall wherever possible, preserve all natural features. Sec 1104 Excavation Operations L: Existing hills, trees and ground cover...shall be preserved.	
1-13	Retain and protect trees and other natural vegetation on and near disturbed sites. Require tree surveys and/or cutting plans.	Z.O. 501.C. - Natural features such as trees, brooks, drainage channels shall be preserved. Z.O. 1104.L - Excavation Operations - Existing hills, trees and ground cover...shall be preserved Sub-K pg18 - Preserve tree life. Sub-D. pg 24 - No tree with a diameter of 8 inches or more shall be removed.	
1-14	Minimize the creation of impervious areas / encourage permeable surfaces.		
1-15	Maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction.	Z.O. 1104. - Excavation Operations P and Q: [regarding an adequate and comprehensive drainage system]. Sub-A. pg23 - The subdivider may be required to carry away and surface water that may exist either previous too or as a result of the subdivision. Sub-pg28. - Subdivider must provide a storm drainage plan indicating the approximate location and size.	
1-16	Stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching - to protect exposed and critical areas during development. Timeline for completion.	Z.O. 1104.K. - Excavation Operations - All topsoil and subsoil shall be stripped from the active excavation area and stockpiled and seeded for use in accordance with the restoration plan. R. - All applications for a permit under this section must contain an operations plan in sufficient detail to describe the excavation operation including active excavation and storage areas.	
1-17	Use appropriate solid and hazardous waste generation and disposal practices including source controls and recycling.		
1-18	Ensure proper operation and maintenance of runoff management facilities.		
1-19	Encourage cluster development/conservation subdivisions.	Z.O. 1113.A. - Cluster residential developments may be permitted upon approval by the Planning Board.	
1-20	Implement Federal/State Stormwater (SPDES) Phase II requirements including MS4 (when applicable) and Construction Permits as well as Municipal and Industrial Discharge Permits		
1-21	Discourage development in flood plain and/or development below base flood elevation	Z.O. 906.A. - Minimize development on unstable land. Restrict or prohibit uses that are dangerous. (See Section 906. A (1-9) and B. (1-5)). Sub-D. pg. 24 - Land subject to flooding shall not be platted for residential occupancy.	
	Section 2: Forestry and Agriculture		
	Forestry - if applicable		
2-01	Site restoration practices for forrestry sites. Consider potential water quality impacts when selecting silviculture system (yarding system, site preparation, pesticides employment, etc.)		
2-02	Have specialists (geologist, soil scientist, geotechnical engineer, wildland hydrologist) review plans in high erosion hazard areas.		

2011-12 Laws/Practices		Warsaw - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
2-03	Consider Harvesting practices and preplan harvest areas - ex: operation season, skid trails/access on stable soils, avoiding-steep gradients/multiple stream crossings/poor drainage areas, etc.		
	Agriculture		
2-04	Implementation of the Agricultural Environmental Management (AEM) program.		
2-05	Ensure Concentrated Animal Feeding Operations (CAFO) regulations and permits are being followed and Comprehensive Nutrient Management Plans are being used.		
2-06	Implement barnyard runoff controls.		
2-07	Discourage grazing in environmentally sensitive areas (e.g. up to creek banks…)		
2-08	Use of agricultural protection such as agricultural districts, agricultural preservation ordinances and practices, right to farm laws, and agricultural and farmland protection plans	Z.O. 901.A. - Ag. Districts are designed to protect predominantly agricultural areas from suburban and urban development, encourage the continuation of agriculture, and preserve open space and natural resources.	
Section 3: Waterways, Wetlands and Riparian Area Management and Restoration			
	Waterways		
3-01	Control in stream sedimentation and/or clear debris. Schedule inspections of sediment control measures for maintenance/repair.		
3-02	Establish riparian buffers.		
3-03	Prevent animal wastes from entering waterbodies. Ex: animal control/animal waste disposal ordinances and/or practices.	Z.O. 1006. - Animal Waste Management Systems, see also 2-14	
3-04	Protect stream banks - vegetative stabilization-maintain/add vegetation(before using structural measures); indirect nonstructural-ex: regulate nearby irrigation, rerouting overbank drainage; direct structural-ex: revetments and bulkheads; indirect structural-ex: deflecting channel flow dikes.		
3-05	Use setbacks to minimize disturbance of land adjacent to stream banks and shorelines.	Z.O. 501.A. - No structure shall be built within 50 feet of the bed of stream carrying water on an average of 6 months of the year.	
3-06	Prevent discharges to waterbodies in amounts that would adversely affect the taste, color or odor of the waters, or would impair the waters for their best usages.		
	Wetlands		
3-07	Prioritize wetlands and riparian areas and their non-point source (nps) control potential.		
3-08	Identify wetlands and riparian areas with significant nps control potential especially when implementing nps management practices.		
3-09	Include considerations/regulations to protect wetlands, ex: permitting, licensing, wetlands certification and non-regulatory nps pollution activities. Prevent adverse impacts to wetland functions that affect nps pollution abatement from hydrologic changes, sedimentation, or contaminant, ex: pretreatment practices: vegetated systems, detention/retention basins...		
Section 4: Roads, Bridges, Public Rights of Way			
4-01	Conduct road, bridge, and drainage/stormwater structure inspection and maintenance and procedures (de-icing material usage and storage, pot-hole repair, bridge washing, scraping and painting, cleaning catch basins, etc.) according to best management practices.		
4-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) - according to best management practices.		

2011-12 Laws/Practices		Warsaw - Town	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
4-03	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities.		
4-04	Incorporate alternatives to traditional de-icing practices including adjusting mix rates, using non-salt and non-sand alternatives. Store in a enclosed areas with impervious floor.		According to G/FLRPC 2011 Salt Storage Survey - 50% sand/ 50% salt, enclosed storage on pavement floor.
4-05	Target existing public holdings, such as parks, for removing unnecessary impervious surfaces.		
4-06	Incorporate New York State Department of Transportation design and guidance documents, standard specifications, and procedural manuals (*Highway Design Manual, Environmental Procedures Manual,* Maintenance Guidelines, etc.) into local laws and operating procedures.		
4-07	Participate in Cornell Local Roads Program activities and training.		
4-08	Target training programs at highway officials, contractors, construction workers, inspectors, zoning and planning officials.		
4-09	Culvert maintenance: routinely inspected, maintained and resized when necessary so that they will remain unobstructed during storm events. Blockages resulting from sedimentation, debris, excessive vegetation and structural failure should be identified and mitigated.		
Section 5: Onsite Wastewater Treatment Systems			
5-01	Conduct regular inspections of septic/onsite wastewater treatment systems (OWTS), at minimum durring transfer of property or within 1 year prior to transfer.		
5-02	Institute setback guidelines		
5-04	Target OWTS outreach programs at homeowners, contractors and developers		
5-05	Require all properties with access to municipal sewer service to connect.		

2011-12 Laws/Practices		Warsaw - Village	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 1: Development		
1-01	Identify retrofit opportunities for existing development - ex: retention/detention areas, stormwater ponds, construction of wastewater treatment systems to replace older septic systems…		
1-02	Encourage homeowners to place compost piles away from waterbodies and roadways.		
1-03	Encourage proper use and disposal of lawn and other household chemicals (res., com., indus., rec., uses etc.).		
1-04	Storm drain/curb stenciling/labeling program.		
1-05	Encourage volunteer programs.		
1-06	Encourage the use of indigenous plants in landscaping.		
1-07	Develop outreach programs targeted at water quality management. Target training for contractors, developers, inspectors and zoning and planning officials.		
1-08	Encourage proper control of pet wastes.		
1-09	Written details regarding enforcement of stormwater regulations & requirements - ex: responsibility, penalties, etc.		
1-10	Use of drainage districts.		
1-11	Minimize the amount of land disturbed (including cut and fill) and the duration of disturbance durring construction.		
1-12	Preserve natural features and conform with the natural boundaries and alignment of waterbodies durring development. Account for topography and soil type to minimize erosion. Limit grades of access roads.	Z.O. 163-29.A. - No structure shall be built within 50 feet of the bed of stream carrying water on an average of 6 months of the year. Z.O. 163-29.D. - Natural features such as trees, brooks, drainage channels shall be preserved. Z.O. 163-41.B.6. - Preservation of trees, streams, wetlands, and natural topography....prevention of soil erosion. Z.O. 163-58.A.3. - PDD - Natural features, including streams, and trees shall be preserved and incorporated in the landscaping of the development. Z.O. 163-41.D.2. - PDD - a and b - Analysis of soils and the topography of the site. Sub-133.17.F. and L. [Include in sketch plan]- General topography and drainage patterns included in plan and the general soil conditions of the entire proposed site.	
1-13	Retain and protect trees and other natural vegetation on and near disturbed sites. Require tree surveys and/or cutting plans.	Z.O. 163.29.D - Natural features such as trees, brooks, drainage channels shall be preserved. Z.O. 163.41.B.6. - PDD - Preservation of trees, streams, wetlands, and natural topography. Z.O. 163.58.A.3. - PDD - Natural features, including streams, and trees shall be preserved and incorporated in the landscaping of the development.	
1-14	Minimize the creation of impervious areas / encourage permeable surfaces.		
1-15	Maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction.	Sub-133.18.G. - Preliminary Plats - Drainage report including calculations for runoff during construction. Also, the use of erosion and sediment prevention measures. 19C: Subdivision drainage plan: [illustrating proposed stormwater drainage facilities and design data] Z.O. 163.30.X. - All construction plans shall include consideration of stormwater drainage needs. Z.O. 163.41.B.5. - PDD - The proposed residential development shall be adequately served by essential public facilities, such as storm water drainage facilities.	
1-16	Stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching - to protect exposed and critical areas during development. Timeline for completion.	Sub-133.18. G. - Preliminary Plats - Drainage report including calculations for runoff during construction. Also, the use of erosion and sediment prevention measures.	
1-17	Use appropriate solid and hazardous waste generation and disposal practices including source controls and recycling.		
1-18	Ensure proper operation and maintenance of runoff management facilities.		
1-19	Encourage cluster development/conservation subdivisions.	Z.O. 163.59. - Cluster developments may be approved.	
1-20	Implement Federal/State Stormwater (SPDES) Phase II requirements including MS4 (when applicable) and Construction Permits as well as Municipal and Industrial Discharge Permits		
1-21	Discourage development in flood plain and/or development below base flood elevation	Z.O. 163.40. - Minimize development on unstable land. Restrict or prohibit uses that are dangerous. (See A (1-6) and B (1-8)).	
	Section 2: Forestry and Agriculture		
	Forestry - if applicable		
2-01	Site restoration practices for forrestry sites. Consider potential water quality impacts when selecting silviculture system (yarding system, site preparation, pesticides employment, etc.)		
2-02	Have specialists (geologist, soil scientist, geotechnical engineer, wildland hydrologist) review plans in high erosion hazard areas.		

2011-12 Laws/Practices		Warsaw - Village	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
2-03	Consider Harvesting practices and preplan harvest areas - ex: operation season, skid trails/access on stable soils, avoiding-steep gradients/multiple stream crossings/poor drainage areas, etc.		
	Agriculture		
2-04	Implementation of the Agricultural Environmental Management (AEM) program.		
2-05	Ensure Concentrated Animal Feeding Operations (CAFO) regulations and permits are being followed and Comprehensive Nutrient Management Plans are being used.		
2-06	Implement barnyard runoff controls.		
2-07	Discourage grazing in environmentally sensitive areas (e.g. up to creek banks…)		
2-08	Use of agricultural protection such as agricultural districts, agricultural preservation ordinances and practices, right to farm laws, and agricultural and farmland protection plans	Portion of Ag. District Present within Village Limits	
	Section 3: Waterways, Wetlands and Riparian Area Management and Restoration		
	Waterways		
3-01	Control in stream sedimentation and/or clear debris. Schedule inspections of sediment control measures for maintenance/repair.		
3-02	Establish riparian buffers.		
3-03	Prevent animal wastes from entering waterbodies. Ex: animal control/animal waste disposal ordinances and/or practices.		
3-04	Protect stream banks - vegetative stabilization-maintain/add vegetation(before using structural measures); indirect nonstructural-ex: regulate nearby irrigation, rerouting overbank drainage; direct structural-ex: revetments and bulkheads; indirect structural-ex: deflecting channel flow dikes.		
3-05	Use setbacks to minimize disturbance of land adjacent to stream banks and shorelines.	Z.O. 163.29.A. - No structure shall be built within 50 feet of the bed of stream carrying water on an average of 6 months of the year.	
3-06	Prevent discharges to waterbodies in amounts that would adversely affect the taste, color or odor of the waters, or would impair the waters for their best usages.		
	Wetlands		
3-07	Prioritize wetlands and riparian areas and their non-point source (nps) control potential.		
3-08	Identify wetlands and riparian areas with significant nps control potential especially when implementing nps management practices.	C.P. pg.26 - Wetlands Management Act - Legislation to preserve wetlands.	
3-09	Include considerations/regulations to protect wetlands, ex: permitting, licensing, wetlands certification and non-regulatory nps pollution activities. Prevent adverse impacts to wetland functions that affect nps pollution abatement from hydrologic changes, sedimentation, or contaminant, ex: pretreatment practices: vegetated systems, detention/retention basins...		
	Section 4: Roads, Bridges, Public Rights of Way		
4-01	Conduct road, bridge, and drainage/stormwater structure inspection and maintenance and procedures (de-icing material usage and storage, pot-hole repair, bridge washing, scraping and painting, cleaning catch basins, etc.) according to best management practices.		
4-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) - according to best management practices.		
4-03	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities.		
4-04	Incorporate alternatives to traditional de-icing practices including adjusting mix rates, using non-salt and non-sand alternatives. Store in a enclosed areas with impervious floor.		According to G/FLRPC 2011 Salt Storage Survey - 50% sand/ 50% salt, open storage on gravel.
4-05	Target existing public holdings, such as parks, for removing unnecessary impervious surfaces.		
4-06	Incorporate New York State Department of Transportation design and guidance documents, standard specifications, and procedural manuals (*Highway Design Manual, Environmental Procedures Manual,* Maintenance Guidelines, etc.) into local laws and operating procedures.		

2011-12 Laws/Practices		Warsaw - Village	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
4-07	Participate in Cornell Local Roads Program activities and training.		
4-08	Target training programs at highway officials, contractors, construction workers, inspectors, zoning and planning officials.		
4-09	Culvert maintenance: routinely inspected, maintained and resized when necessary so that they will remain unobstructed during storm events. Blockages resulting from sedimentation, debris, excessive vegetation and structural failure should be identified and mitigated.		
Section 5: Onsite Wastewater Treatment Systems			
5-01	Conduct regular inspections of septic/onsite wastewater treatment systems (OWTS), at minimum durring transfer of property or within 1 year prior to transfer.		
5-02	Institute setback guidelines		
5-04	Target OWTS outreach programs at homeowners, contractors and developers		
5-05	Require all properties with access to municipal sewer service to connect.		

		Wheatland	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 1: Development		
1-01	Identify retrofit opportunities for existing development - ex: retention/detention areas, stormwater ponds, construction of wastewater treatment systems to replace older septic systems		
1-02	Encourage homeowners to place compost piles away from waterbodies and roadways		
1-03	Encourage proper use and disposal of lawn and other household chemicals (res., com., indus., rec., uses etc.)		
1-04	Storm drain/curb stenciling/labeling		
1-05	Encourage volunteer programs	Wheatland/Scottsville Comp. Plan, 2-9: "…there is a need for the Town…to address water quality issues by actively participating in the various watershed and water quality committees, and by maintaining current knowledge of existing and upcoming regulations pertaining to water quality..."	
1-06	Encourage the use of indigenous plants		
1-07	Develop outreach programs targeted at water quality management. Target training for contractors, developers, inspectors and zoning and planning officials.		
1-08	Encourage proper control of pet wastes		
1-09	Enforcement details regarding stormwater regulations & requirements - responsibility, penalties, etc.	Z.O. 98-19. C.6 - A system for storm water drainage (must use the design criteria listed). Z.O. 98-19. E.1 - Adequate stormwater drainage shall be provided and based on a ten year rainfall frequency. S of L. 82-34. B.7 - Proposed system for stormwater drainage (must use the design criteria listed).	
1-10	Use of drainage districts		
1-11	Minimize the amount of land disturbed (including cut and fill) and the duration of disturbance	Z.O. 98-16. A.2(d) - Control filling b/c may increase erosion or flooding	
1-12	Preserve natural features and conform with the natural boundaries and alignment of waterbodies. Account for topography and soil type to minimize erosion. Limit grades of access roads.	Z.O. 98-15. B(4) - The quality of the natural environment shall be conserved through preservation of trees and outstanding natural topography. Z.O. 98-19. C.10 - A tracing overlay showing all soils areas and their classification, and those areas with high susceptibility to erosion. S of L. 82-33. A - The physical characteristics of the land shall be provided to minimize erosion potential. B - Natural features should be preserved such as trees etc. Joint Comprehensive Plan: 2-8: natural corridors and other vital environmental areas shall be preserved or mitigated if necessary. 2-12: "...based on the environmentally sensitive nature of steep slopes...there is a need to periodically review and evaluate their status, and consider regulating development in and near these areas through supplemental zoning regulations..."	
1-13	Retain and protect trees and other natural vegetation on and near disturbed sites. Require tree surveys and/or cutting plans.	Z.O. 98-15. B(4) - The quality of the natural environment shall be conserved through preservation of trees and outstanding natural topography. S of L. 82-33. B - Natural features should be preserved such as trees etc.	
1-14	Minimize the creation of impervious areas [encourage permeable surface]		
1-15	Maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction	Z.O. 98-16. E.1.d.3 - All subdivision proposals shall have adequate drainage provided to reduce flooding . S of L. 82-35. F - A separate drainage report, including calculations of runoff, which clearly indicate the design and intended method of all stormwater disposal. Z.O. 98-19. C.6 - A system for storm water drainage (must use the design criteria listed). Z.O. 98-19. C.11 - A separate drainage report clearly showing the intended method of all stormwater disposal. Z.O. 98-19. E.1 - Adequate stormwater drainage shall be provided and based on a ten year rainfall frequency. S of L. 82-34. B.7 - Proposed system for stormwater drainage (must use the design criteria listed). S of L. 82-35. F - A separate drainage report, including calculations of runoff, which clearly indicate the design and intended method of all stormwater disposal.	

		Wheatland	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
1-16	Stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching - to protect exposed and critical areas during development. Complete a.s.a.p., include timeline.		
1-17	Use appropriate solid and hazardous waste generation and disposal practices including source controls and recycling		
1-18	Ensure proper operation and maintenance of runoff management facilities		
1-19	Encourage cluster development/conservation subdivisions	S of L. 82-32 - Cluster development Joint Comp. Plan, 4-9: "Promote the preservation of woodlots and natural areas under the development review process by encouraging the use of "forever-wild" areas, permitting innovative design techniques that protect sensitive areas, encouraging natural design themes for development, and/or requiring the use of conservation easements in all development."	
1-20	Implement Federal/State Stormwater (SPDES) Phase II requirements including MS4 (when applicable) and Construction Permits as well as Municipal and Industrial Discharge Permits		
1-21	Discourage development in flood plain and/or development below base flood elevation	Z.O. 130-18 Flood Damage Prevention. No development will be allowed in an area of special flood hazard without a flood plain development permit. Anchoring required. Required Elevation for residential structures - Most flood zones within Special Flood Hazard area - lowest floor (including basement) – must be to or above the base flood elevation. When no base flood elevation data is available – lowest floor must be at least 0-2 feet above the highest adjacent grade depending on the zone. Nonresidential – Most flood zones - lowest floor, elevated to or above two feet above the base flood elevation, or at least two feet above the highest adjacent grade; or be completely flood proofed to that level and have a certificate from a licensed professional engineer or architect. Z.O. 130-10 Floodplain and Residence Districts: Table of Use Regulations. 130-11 Floodplain and Residence Districts: Table of Dimensional Regulations. Z.O. 98-16. A.2(c) - Control the alteration of natural floodplains, streams, and natural barriers.	
	Section 2: Forestry and Agriculture		
	Forestry - if applicable		
2-01	Consider site restoration. Consider potential water quality impacts when selecting silviculture system (yarding system, site preparation, pesticides employment, etc.)		
2-02	Have specialists (geologist, soil scientist, geotechnical engineer, wildland hydrologist) review plans in high erosion hazard areas		
2-03	Consider Harvesting practices and preplan harvest areas - ex: operation season, skid trails/access on stable soils, avoiding-steep gradients/multiple stream crossings/poor drainage areas, etc.		
	Agriculture		
2-04	Implement the Agricultural Environmental Management (AEM) program		See County AEM/Round 18 Ag NPS grant - 2 farms (1 CAFO) awarded within 2012 Oatka Creek Watershed Agricultural Nutrient Reduction Project to implement priority bmps, and AEM/CNMP/CAFO requirements/recommendations
2-05	Ensure Concentrated Animal Feeding Operations (CAFO) regulations and permits are being followed and Comprehensive Nutrition Management Plans are being used. (combined with below) (ADD NEW ROUND OF FUNDING)(any other animal waste one for non cafes?)		See Round 18 Ag NPS grant above - implementation of AEM CAFO and CNMP regs/plans/recommendations.

		Wheatland	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
2-06	Implement barnyard runoff controls.		See Round 18 Ag NPS grant above - includes barnyard runoff controls such as roof water management system, covered barnyard, heavy use area protection, milk house waste collection, manure storage, gutter system to transport clean water to creek, etc. See Also: Barnyard Runoff Management Systems and other operational BMPs were implemented on farms in Ogden(2), Wheatland(1), LeRoy(3), Pavilion(2), Byron(1), Warsaw(5), Covington(3), Orangeville(1), and Middlebury(1) through the Genesee River Implementation Grant project
2-07	Discourage grazing in environmentally sensitive areas (e.g. up to creek banks)		Round 18 Ag NPS grant will include vegetative stream buffers
2-08	Use of agricultural protection such as Agricultural Districts, agricultural preservation ordinances and practices, right to farm laws, and Agricultural and Farmland Protection Plans	Z.O. 98-11.1 - Agriculture Districts (agriculture continued and expanded). Joint Comp. Plan, 2-14: "… Consider promoting/encouraging an agriculture advisory board; Encourage active participation in the Agricultural District program; Limit water and sewer services to areas where development can occur without impacting active farming." See Also: Monroe County Agricultural and Farmland Protection Plan	
	Section 3: Waterways and Wetlands		
	Waterways		
3-01	Control in stream sedimentation, clear debris. Schedule inspections of sediment control measures for maintenance/repair.		
3-02	Establish riparian buffers		Round 18 Ag NPS grant above will include vegetative stream buffers.
3-03	Prevent animal wastes from entering waterbodies. Ex: animal control ordinances and/or practices that pertain to animal waste disposal		Round 18 Ag NPS grant - targeted toward preventing animal wastes from entering waterbody, will include vegetative stream buffers, barnyard runoff controls, manure storage, etc.
3-04	Protect stream banks - vegetative stabilization-maintain/add vegetation(before using structural measures); indirect nonstructural-ex: regulate nearby irrigation, rerouting overbank drainage; direct structural-ex: revetments and bulkheads; indirect structural-ex: deflecting channel flow dikes		Round 18 Ag NPS grant includes vegetative stream buffers, rerouting drainage, etc.
3-05	Use setbacks to minimize disturbance of land adjacent to stream banks and shorelines		
3-06	Prevent discharges to waterbodies in amounts that would adversely affect the taste, color or odor of the waters, or would impair the waters for their best usages		
	Wetlands and Riparian Area Management and Restoration		
3-07	Prioritize wetlands and riparian areas and their non-point source (nps) control potential		
3-08	Identify wetlands and riparian areas with significant nps control potential especially when implementing nps management practices.	Joint Comp. Plan, 2-11: "…the Town…should officially designate local environmentally sensitive areas through a Preservation of Environmentally Sensitive Areas Program. "	

		Wheatland	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
3-09	Include considerations/regulations to protect wetlands, ex: permitting, licensing, wetlands certification and non-regulatory nps pollution activities. Prevent adverse impacts to wetland functions that affect nps pollution abatement from hydrologic changes, sedimentation, or contaminant, ex: pretreatment practices: vegetated systems, detention/retention basins		
	Section 4: Roads, Bridges, Public Rights of Way		
4-01	Conduct road, bridge are related drainage/stormwater structures inspection/maintenance (de-icing material usage and storage, pot-hole repair, bridge washing, scraping and painting, cleaning catch basins, etc.) according to best management practices	Joint Comp. Plan, 2-20: "The Town and Village should continue to maintain their storm sewer systems in keeping with past practices and current regulatory requirements."	
4-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) - according to best management practices		
4-03	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities		
4-04	Incorporate alternatives to traditional de-icing practices, including adjusting mix rates, using non-salt and non-sand alternatives. Store in a enclosed areas with impervious floor.		Practice: According to G/FLRPC 2011 Salt Storage Survey - 5 gal ice ban/ 1 ton salt, enclosed storage on concrete floor.
4-05	Target existing public holdings, such as parks, for removing unnecessary impervious surfaces		
4-06	Incorporate New York State Department of Transportation design and guidance documents, standard specifications, and procedural manuals (*Highway Design Manual, Environmental Procedures Manual,* Maintenance Guidelines, etc.) into local laws and operating procedures		
4-07	Participate in Cornell Local Roads Program activities and training		
4-08	Target training programs at highway officials, contractors, construction workers, inspectors, zoning and planning officials		
4-09	Culvert maintenance: Culverts are routinely inspected, maintained and resized when necessary so that they will remain unobstructed, allowing for the free flow of water during storm events. Blockages resulting from sedimentation, debris, excessive vegetation and structural failure are issues to be aware of.		
	Section 5: Onsite Wastewater Treatment Systems		
5-01	Conduct regular inspections of OWTS at minimum at property transfer or within 1 year prior to transfer		
5-02	Institute setback guidelines	Z.O. 98-16. E.1.c.4 - On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding. County Sanitary Code 569-21.C.8 The location of any water wells within 500 feet of the proposed sewage disposal system.	
5-04	Target outreach programs at homeowners, contractors and developers		
5-05	Require all properties with access to municipal service to connect.	Joint Comprehensive Plan, 6-7: Several specific reasons to consider limited construction of public sanitary sewers {health reasons, surface and ground water, inadequate soils and other site-specific reasons}"	

2011-12 Laws/Practices		Wyoming County	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
Section 1: Development			
1-01	Identify retrofit opportunities for existing development - ex: retention/detention areas, stormwater ponds, construction of wastewater treatment systems to replace older septic systems…		
1-02	Encourage homeowners to place compost piles away from waterbodies and roadways.		GLOW provides composting education and brochures.
1-03	Encourage proper use and disposal of lawn and other household chemicals (res., com., indus., rec., uses etc.).		GLOW Region Solid Waste Management Committee, in cooperation with GLOW Region Soil and Water Conservation, Farm Bureau and Cornell Cooperative Extension offices, farm pesticide collection programs; Household Hazardous Waste programs held.
1-04	Storm drain/curb stenciling/labeling program.		Conducted in both watersheds at various points in time; MS4s and storm drains are relatively limited in upper reaches and in rural towns, however
1-05	Encourage volunteer programs.		Black Creek Watershed Coalition, Oatka Creek Watershed Committee, Cornell Cooperative Extension and SWCD have various programs and volunteer efforts geared toward stream and ecosystem stewardship.
1-06	Encourage the use of indigenous plants in landscapeing.		
1-07	Develop outreach programs targeted at water quality management. Target training for contractors, developers, inspectors and zoning and planning officials.		CCE, SWCD and the two watershed groups provide education and information relating to water, wetlands, aquifers, soil maps, flood plain areas, conservation planning, have developed several programs regarding water quality, including (but not limited to) septic system outreach, erosion and sediment control workshops, agricultural BMPs, conservation education, watershed planning and household hazardous waste. In conjunction with the W.C. Water Resources Coordinating Committee, SWCD gives a tour of recently completed projects and to illustrate and educate on conservation techniques (open to the public). G/FLRPC conducts workshops with water quality sessions, and does education/outreach.
1-08	Encourage proper control of pet wastes.		
1-09	Written details regarding enforcement of stormwater regulations & requirements - ex: responsibility, penalties, etc.		
1-10	Use of drainage districts.		
1-11	Minimize the amount of land disturbed (including cut and fill) and the duration of disturbance durring construction.		
1-12	Preserve natural features and conform with the natural boundaries and alignment of waterbodies durring development. Account for topography and soil type to minimize erosion. Limit grades of access roads.		Could be required in SWPPPs for construction disturbing 1 acre or more. SWCD can provide technical assistance in the planning and design of erosion control practices, and evaluate soil conditions and data from soil surveys.
1-13	Retain and protect trees and other natural vegetation on and near disturbed sites. Require tree surveys and/or cutting plans.		
1-14	Minimize the creation of impervious areas / encourage permeable surfaces.		
1-15	Maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction.		Likely required in SWPPPs for construction disturbing 1 acre or more. SWCD can provide technical assistance related to drainage.
1-16	Stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching - to protect exposed and critical areas during development. Timeline for completion.		Prevention of soil erosion is a priority of the SWCD. SWCD can provide assistance with site plan reviews.
1-17	Use appropriate solid and hazardous waste generation and disposal practices including source controls and recycling.		
1-18	Ensure proper operation and maintenance of runoff management facilities.		
1-19	Encourage cluster development/conservation subdivisions.		
1-20	Implement Federal/State Stormwater (SPDES) Phase II requirements including MS4 (when applicable) and Construction Permits as well as Municipal and Industrial Discharge Permits	No MS4s within the County. General Permit for construction required anywhere 1 acre or more is disturbed and requires SWPPPs.	Construction site and construction permit inspection conducted by the County SWCD at the request of NYSDEC. SWCD is available to review and assist with stormwater management plans.
1-21	Discourage development in flood plain and/or development below base flood elevation		SWCD-Continuing effort with all municipalities in Wyoming County
Section 2: Forestry and Agriculture			
Forestry - if applicable			
2-01	Site restoration practices for forrestry sites. Consider potential water quality impacts when selecting silviculture system (yarding system, site preparation, pesticides employment, etc.)		
2-02	Have specialists (geologist, soil scientist, geotechnical engineer, wildland hydrologist) review plans in high erosion hazard areas.		SWCD can provide technical assistance in the planning and design of erosion control practices, and evaluate soil conditions and data from soil surveys. NYSDEC Forester may consult on projects within the watershed.
2-03	Consider Harvesting practices and preplan harvest areas - ex: operation season, skid trails/access on stable soils, avoiding-steep gradients/multiple stream crossings/poor drainage areas, etc.		SWCD in conjunction with the Seneca Trail RC& D Council and NYSDEC have offered woodlot management outreach services to land owners in the past

2011-12 Laws/Practices		Wyoming County	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Agriculture		
2-04	Implementation of the Agricultural Environmental Management (AEM) program.		SWCD and NRCS provide technical assistance for farmers in creating AEM plans and designing/planning/adopting Agricultural BMP recommendations.
2-05	Ensure Concentrated Animal Feeding Operations (CAFO) regulations and permits are being followed and Comprehensive Nutrient Management Plans are being used.		SWCD and NRCS provide assistance to farmers and the ceretified nutrient management planners with agricultural waste management techniques and BMP implementation. FLLOWPA, EQIP and NYS Agricultural Nonpoint Source Pollution Abatement & Control Program funds have been used for NPS pollution control programs. SWCD is available for technical assistance regarding CAFO planning and complying with regulations.
2-06	Implement barnyard runoff controls.		SWCD provides technical assistance for farmers in creating AEM plans and designing/planning/adopting Ag BMP recommendations. Can include barnyard runoff controls, managing manuer and fertilizer runoff. Many BMP's have been implement through FLLOWPA, EQIP and NYS Agricultural Nonpoint Source Pollution Abatement & Control Program funds.
2-07	Discourage grazing in environmentally sensitive areas (e.g. up to creek banks…)		SWCD and the Seneca Trail RC&D Council provide technical assistance for farmers in creating AEM & grazing management plans and designing/planning/adopting Ag BMP recommendations. Many BMP's have been implement through FLLOWPA, EQIP and NYS Agricultural Nonpoint Source Pollution Abatement & Control Program funds.
2-08	Use of agricultural protection such as agricultural districts, agricultural preservation ordinances and practices, right to farm laws, and agricultural and farmland protection plans	County Agricultural Preservation Plan completed in 2006. Several Towns have enacted "Right to Farm" Laws.	Agriculture Assessment Program allows eligible farms to be assessed on their agricultural value rather than market value. There are currently 4 agricultural districts present in the county.
	Section 3: Waterways, Wetlands and Riparian Area Management and Restoration		
	Waterways		
3-01	Control in stream sedimentation and/or clear debris. Schedule inspections of sediment control measures for maintenance/repair.		SWCD maintains a General Stream Permit with the NYSDEC to allow landowners and municipalities to conduct stream protection projects such as bank stabilization and debris removal, etc. SWCD has done inventories of streams to identify locations where tree/debris removal is needed. SWCD can assist with permit applications for the NYSDEC and U.S. Army Corps of Engineers Stream Permit Programs, and provide technical assistance in the implementation. Providing assistance to farms in the Oatka Creek Watershed with Erosion & Sediment Control through Great Lakes Commission & NYS Ag & Markets Grants.
3-02	Establish riparian buffers.		SWCD and NRCS can provide technical assistance for farmers in creating Ag BMP's which can include buffers and grazing strategies.
3-03	Prevent animal wastes from entering waterbodies. Ex: animal control/animal waste disposal ordinances and/or practices.		SWCD provides assistance to farmers with agricultural waste management techniques and BMP's to reduce ag watse runoff. SWCD/NRCS assists the Comprehnsive Nutrient Management Planners in the creation of comprehensive nutrient management plans, silage leachate management systems and other related BMP's.
3-04	Protect stream banks - vegetative stabilization-maintain/add vegetation(before using structural measures); indirect nonstructural-ex: regulate nearby irrigation, rerouting overbank drainage; direct structural-ex: revetments and bulkheads; indirect structural-ex: deflecting channel flow dikes.		FL/LOWPA funding has been utilized for streambank stabilization projects in the past. SWCD has used vegetated systems, such as downed trees and logs, to stabilize severly eroded banks. Other innovative approaches are developed on a case-by-case, site-specific basis. SWCD maintains a General Stream Permit with the NYSDEC to allow landowners and municipalities to conduct stream protection projects such as bank stabilization, etc. They also can assist with permit applications for the NYSDEC and U.S. Army Corps of Engineers Stream Permit Programs, and provide technical assistance in implementation.
3-05	Use setbacks to minimize disturbance of land adjacent to stream banks and shorelines.		
3-06	Prevent discharges to waterbodies in amounts that would adversely affect the taste, color or odor of the waters, or would impair the waters for their best usages.		
	Wetlands		
3-07	Prioritize wetlands and riparian areas and their non-point source (nps) control potential.		Guiding principle of SWCD operations - illustrated through efforts in the field as well as related technical assistance, education and outreach programs. SWCD available for assistance with wetland permits.
3-08	Identify wetlands and riparian areas with significant nps control potential especially when implementing nps management practices.		
3-09	Include considerations/regulations to protect wetlands, ex: permitting, licensing, wetlands certification and non-regulatory nps pollution activities. Prevent adverse impacts to wetland functions that affect nps pollution abatement from hydrologic changes, sedimentation, or contaminant, ex: pretreatment practices: vegetated systems, detention/retention basins...		
	Section 4: Roads, Bridges, Public Rights of Way		
4-01	Conduct road, bridge, and drainage/stormwater structure inspection and maintenance and procedures (de-icing material usage and storage, pot-hole repair, bridge washing, scraping and painting, cleaning catch basins, etc.) according to best management practices.		SWCD routinely works with the County and Town Highway Departments to identify and address concerns.
4-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) - according to best management practices.		FLLOWPA funding has been used by SWCD to aid in hydro seeding and stabilizing road ditches.

2011-12 Laws/Practices		Wyoming County	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
4-03	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities.		FLLOWPA funding has been used by SWCD to aid in hydro seeding and stabilizing road ditches. WCSWCD, in cooperation with W.C. Highway Dept. operates a hydro seeding program to assist municipalities and highway departments in seeding areas such as parks, stream banks, pond dikes, road ditches, and highway construction projects.
4-04	Incorporate alternatives to traditional de-icing practices including adjusting mix rates, using non-salt and non-sand alternatives. Store in a enclosed areas with impervious floor.		Salt storage facilties created
4-05	Target existing public holdings, such as parks, for removing unnecessary impervious surfaces.		
4-06	Incorporate New York State Department of Transportation design and guidance documents, standard specifications, and procedural manuals (*Highway Design Manual, Environmental Procedures Manual,* Maintenance Guidelines, etc.) into local laws and operating procedures.		SWCD has supplied highway departments with NYS Standards and Specifications for Erosion and Sediment Control.
4-07	Participate in Cornell Local Roads Program activities and training.		Available to all Town & County Highway Departments.
4-08	Target training programs at highway officials, contractors, construction workers, inspectors, zoning and planning officials.		SWCD has supplied highway departments with Erosion and Sediment Control along with basic training and background. Additional training and outreach available related to drainage, water quality, soils, erosion and sediment control, etc. G/FLRPC Local Government Workshops targeted toward Gov. officials, planning/zoning officials, etc.
4-09	Culvert maintenance: routinely inspected, maintained and resized when necessary so that they will remain unobstructed during storm events. Blockages resulting from sedimentation, debris, excessive vegetation and structural failure should be identified and mitigated.		SWCD has been involved with evaluating and determining culvert upgrade needs. Several culvert stabilization projects have been identified and prioritized in the Oatka Creek Watershed.
Section 5: Onsite Wastewater Treatment Systems			
5-01	Conduct regular inspections of septic/onsite wastewater treatment systems (OWTS), at minimum durring transfer of property or within 1 year prior to transfer.		W.C. Health Dept. - Inspections at property transfer, refinance and/or expansion.
5-02	Institute setback guidelines		
5-04	Target OWTS outreach programs at homeowners, contractors and developers		W.C. DOH, CCE, SWCD all offer various education and outreach materials and programs. SWCD has conducted a program geared toward residential maintenance of systems.
5-05	Require all properties with access to municipal sewer service to connect.		

2011-12 Laws/Practices		Wyoming - Village	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
	Section 1: Development		
1-01	Identify retrofit opportunities for existing development - ex: retention/detention areas, stormwater ponds, construction of wastewater treatment systems to replace older septic systems…		
1-02	Encourage homeowners to place compost piles away from waterbodies and roadways.		
1-03	Encourage proper use and disposal of lawn and other household chemicals (res., com., indus., rec., uses etc.).		
1-04	Storm drain/curb stenciling/labeling program.		
1-05	Encourage volunteer programs.		
1-06	Encourage the use of indigenous plants in landscaping.		
1-07	Develop outreach programs targeted at water quality management. Target training for contractors, developers, inspectors and zoning and planning officials.		
1-08	Encourage proper control of pet wastes.		
1-09	Written details regarding enforcement of stormwater regulations & requirements - ex: responsibility, penalties, etc.		
1-10	Use of drainage districts.		
1-11	Minimize the amount of land disturbed (including cut and fill) and the duration of disturbance durring construction.	Z.O. V.501.A.11. - Excavation - In any construction, open excavations shall be limited to a maximum of thirty (30) days, with appropriate fencing, barricades, or covering.	
1-12	Preserve natural features and conform with the natural boundaries and alignment of waterbodies durring development. Account for topography and soil type to minimize erosion. Limit grades of access roads.		
1-13	Retain and protect trees and other natural vegetation on and near disturbed sites. Require tree surveys and/or cutting plans.		
1-14	Minimize the creation of impervious areas / encourage permeable surfaces.		
1-15	Maintain runoff rates, or control increased runoff caused by changed surface conditions to minimize flooding, erosion, sedimentation and pollutants entering waterbodies prior to, during and after construction.	Z.O. 403.F.8. - Planning Board-Special Use Permit Standards - Appropriate on-lot drainage is required to eliminate any potential on-site water related problems. The drainage systems instituted shall not detrimentally impact on adjacent properties.	
1-16	Stabilize disturbed soils; redistribute topsoil for seeding and planting; use temporary vegetation, silt barriers, and mulching - to protect exposed and critical areas during development. Timeline for completion.	Z.O. V.501.A.11. - Excavation - In any construction, open excavations shall be limited to a maximum of thirty (30) days, with appropriate fencing, barricades, or covering.	
1-17	Use appropriate solid and hazardous waste generation and disposal practices including source controls and recycling.		
1-18	Ensure proper operation and maintenance of runoff management facilities.		
1-19	Encourage cluster development/conservation subdivisions.	Z.O. 711. - PUD Planned Unit Development District – to permit greater flexibility…while promoting more economical and efficient use of land……; and to preserve natural and scenic qualities of the site during the development process. (No mention of increased density to provide more open space)	
1-20	Implement Federal/State Stormwater (SPDES) Phase II requirements including MS4 (when applicable) and Construction Permits as well as Municipal and Industrial Discharge Permits		
1-21	Discourage development in flood plain and/or development below base flood elevation	Z.O. 713. - Flood Plain Overlay District - Location Information only on zoning map, does not include any rules, regulations, discouragement or anything.	
	Section 2: Forestry and Agriculture		
	Forestry - if applicable		
2-01	Site restoration practices for forrestry sites. Consider potential water quality impacts when selecting silviculture system (yarding system, site preparation, pesticides employment, etc.)		
2-02	Have specialists (geologist, soil scientist, geotechnical engineer, wildland hydrologist) review plans in high erosion hazard areas.		
2-03	Consider Harvesting practices and preplan harvest areas - ex: operation season, skid trails/access on stable soils, avoiding-steep gradients/multiple stream crossings/poor drainage areas, etc.		
	Agriculture		
2-04	Implementation of the Agricultural Environmental Management (AEM) program.		
2-05	Ensure Concentrated Animal Feeding Operations (CAFO) regulations and permits are being followed and Comprehensive Nutrient Management Plans are being used.		
2-06	Implement barnyard runoff controls.		
2-07	Discourage grazing in environmentally sensitive areas (e.g. up to creek banks…)		

2011-12 Laws/Practices		Wyoming - Village	
#	Best Management Practices (BMP)	Law, Regulation, Plan	Program/Practice
2-08	Use of agricultural protection such as agricultural districts, agricultural preservation ordinances and practices, right to farm laws, and agricultural and farmland protection plans		
	Section 3: Waterways, Wetlands and Riparian Area Management and Restoration		
	Waterways		
3-01	Control in stream sedimentation and/or clear debris. Schedule inspections of sediment control measures for maintenance/repair.		
3-02	Establish riparian buffers.		
3-03	Prevent animal wastes from entering waterbodies. Ex: animal control/animal waste disposal ordinances and/or practices.		
3-04	Protect stream banks - vegetative stabilization-maintain/add vegetation(before using structural measures); indirect nonstructural-ex: regulate nearby irrigation, rerouting overbank drainage; direct structural-ex: revetments and bulkheads; indirect structural-ex: deflecting channel flow dikes.		
3-05	Use setbacks to minimize disturbance of land adjacent to stream banks and shorelines.		
3-06	Prevent discharges to waterbodies in amounts that would adversely affect the taste, color or odor of the waters, or would impair the waters for their best usages.		
	Wetlands		
3-07	Prioritize wetlands and riparian areas and their non-point source (nps) control potential.		
3-08	Identify wetlands and riparian areas with significant nps control potential especially when implementing nps management practices.		
3-09	Include considerations/regulations to protect wetlands, ex: permitting, licensing, wetlands certification and non-regulatory nps pollution activities. Prevent adverse impacts to wetland functions that affect nps pollution abatement from hydrologic changes, sedimentation, or contaminant, ex: pretreatment practices: vegetated systems, detention/retention basins...		
	Section 4: Roads, Bridges, Public Rights of Way		
4-01	Conduct road, bridge, and drainage/stormwater structure inspection and maintenance and procedures (de-icing material usage and storage, pot-hole repair, bridge washing, scraping and painting, cleaning catch basins, etc.) according to best management practices.		
4-02	Conduct right-of-way activities (mowing, brush removal, pesticide and fertilizer use, etc.) - according to best management practices.		
4-03	Develop and identify erosion/sediment control areas (examples include steep slopes, easily erodible soils, and nearby sensitive areas) and retrofit opportunities.		
4-04	Incorporate alternatives to traditional de-icing practices including adjusting mix rates, using non-salt and non-sand alternatives. Store in a enclosed areas with impervious floor.		
4-05	Target existing public holdings, such as parks, for removing unnecessary impervious surfaces.		
4-06	Incorporate New York State Department of Transportation design and guidance documents, standard specifications, and procedural manuals (*Highway Design Manual, Environmental Procedures Manual,* Maintenance Guidelines, etc.) into local laws and operating procedures.		
4-07	Participate in Cornell Local Roads Program activities and training.		
4-08	Target training programs at highway officials, contractors, construction workers, inspectors, zoning and planning officials.		
4-09	Culvert maintenance: routinely inspected, maintained and resized when necessary so that they will remain unobstructed during storm events. Blockages resulting from sedimentation, debris, excessive vegetation and structural failure should be identified and mitigated.		
	Section 5: Onsite Wastewater Treatment Systems		
5-01	Conduct regular inspections of septic/onsite wastewater treatment systems (OWTS), at minimum durring transfer of property or within 1 year prior to transfer.		
5-02	Institute setback guidelines		
5-04	Target OWTS outreach programs at homeowners, contractors and developers		
5-05	Require all properties with access to municipal sewer service to connect.		

Appendix B
Annotated Reference List, New York Water Resources Institute (2013)

NEW YORK STATE WATER RESOURCES INSTITUTE

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Infrastructure Team Annotated Reference List
Updated April 15, 2013

This list is in no way exhaustive. Rather, it attempts to provide a set of references that offer key pieces of information in building a basic understanding of the main components of our research as a whole. It is subjective in its completeness. Annotations attempt to identify unique or defining characteristics of each entry.

Federal Documents

Clean Watersheds Needs Survey (2008) USEPA
http://water.epa.gov/scitech/datait/databases/cwns/
- Comprehensive assessment of capital needs for states to meet Clean Water Act goals

Drinking Water Infrastructure Needs Survey and Assessment (2009) USEPA
http://water.epa.gov/infrastructure/drinkingwater/dwns/index.cfm
- Survey of water supply needs from over 70,000 systems reviewed in 2007

National Characteristics of Drinking Water Systems Serving 10,000 or Fewer People (2011) USEPA
http://water.epa.gov/type/drink/pws/smallsystems/upload/REVFINAL-Nat-Characte-July-2011-508-compliant.pdf
- Inventory of, and info on financing and operation of small systems of all sorts

Integrated Planning and Priority Setting in the Clean Water State Revolving Fund Program (2001) USEPA
http://water.epa.gov/grants_funding/cwsrf/upload/2002_06_28_cwfinance_cwsrf_ipps_web.pdf
- Guidance document on how to incorporate planning into state-scale decision making on wastewater treatment project funding

Growing Toward More Efficient Water Use : Linking development, infrastructure, and drinking water policies (2006) USEPA
http://www.epa.gov/dced/water_efficiency.htm
- Related to smart growth and its benefits to water supply system management

NY State Documents

Wastewater Infrastructure Needs of New York State (2008) NYSDEC
http://www.dec.ny.gov/chemical/42383.html
- Overview of wastewater infrastructure needs and suggestions for how to move forward

Drinking Water Infrastructure Needs of New York State (2008) NYSDOH
http://www.health.ny.gov/environmental/water/drinking/infrastructure_needs.htm
- Overview of water supply infrastructure needs and suggestions for how to move forward

Clean Water State Revolving Fund: Final Intended Use Plan (2012) NYS Environmental Facilities Corporation
http://www.nysefc.org/default.aspx?tabid=112
- Annual list of projects, with costs and project descriptions, that will receive funding through the NY CWSRF

Descriptive data of municipal wastewater treatment plants in New York State (2004) NYSDEC
http://www.dec.ny.gov/chemical/8721.html
- Survey of all POTWs in NY, with descriptive data, treatment process info, and basic summary statistics

Water Resources Management Strategy: Delaware Lower-Hudson region (1989) NYS Water Resources Planning Council
- An older attempt at a comprehensive water plan for NY, divided into regions such as this one

30 Year Trends in Water Quality of Rivers & Streams in NY State (2004) NYSDEC
http://www.dec.ny.gov/chemical/78979.html
- Trends in NY surface water quality based largely on benthic macro-invertebrate studies

Growing Cracks in the Foundation : Local Governments are Losing Ground on Addressing Vital Infrastructure Needs (2012) NYS Comptroller
http://www.osc.state.ny.us/localgov/pubs/infrastructure.pdf
- Audit of NY infrastructure – sewer and water supply - at the municipal level, along with case studies

Smart Growth & Consolidation

Restructuring and Consolidation of Small Drinking Water Systems (2007) USEPA
http://www.epa.gov/ogwdw000/smallsystems/pdfs/compendium_smallsystems_restruct.pdf
- A compendium of state authorities, statutes, and regulations

Estimating benefits of regional solutions for water and wastewater service (2008) Cromwell, J., & Rubin, S.
- Study of the economic benefits possible through management consolidation at the regional scale

Economies of scale in wastewater treatment and planning for urban growth (2004) Hopkins, L.D., et al., *Environment and Planning B: Planning and Design*, *31*(6), 879–893
- Study of the Chicago region and the benefits and costs of attempting to capture economies of scale through wastewater treatment plant consolidation

Essential Smart Growth Fixes for Rural Planning , Zoning , and Development Codes (2012) USEPA
http://www.epa.gov/smartgrowth/essential_fixes.htm

Essential Smart Growth Fixes for Urban and Suburban Zoning Codes (2009) USEPA
http://www.epa.gov/smartgrowth/essential_fixes.htm

Does Sprawl Cost Us All? Isolating the Effects of Housing Patterns on Public Water and Sewer Costs (2002) Speir, C., & Stephenson, K., *Journal of the American Planning Association, 68*:1, 56-70

Protecting Water Resources with Higher Density Development (2006) USEPA
http://www.epa.gov/smartgrowth/water_density.htm
- Study of land use and development patterns and their effects on water resources using SG WATER model

Development & Water Quality

Effect of average flow and capacity utilization on effluent water quality from US municipal wastewater treatment facilities (2011) Weirich, S.R., et al., *Water research*, *45*(14)
- Statistical analysis relating plant flow size to both effluent violations and constituent concentrations of interest, such as BOD and TSS

Watershed Modeling to Assess the Sensitivity of Streamflow, Nutrient, and Sediment Loads to Potential Climate Change and Urban Development in 20 U. S. Watersheds (2013) USEPA
http://cfpub.epa.gov/ncea/global/recordisplay.cfm?deid=247495
- Examples of watershed modeling, with methodological details and description of datasets related to hydrology, land use, water quality and quantity

Increased Carbon Transport in the Hudson River: Unexpected Consequence of Nitrogen Deposition? (2005) Findlay, S.E.G., *Frontiers in Ecology and the Environment*, *3*(3), 133.
- An analysis of carbon loading and removal processes in the Hudson River over time

Is Impervious Cover Still Important? Review of Recent Research (2009) Schueler, T.R., et al., Journal of hydrologic engineering

- An assessment and reformulation of models that attempt to use impervious service coverage as a predictor of water quality in certain basins

Impervious surface coverage : The emergence of a key environmental indicator (1996) Arnold Jr, C.L., & Gibbons, C.J., *Journal of the American Planning Association*, *62*(2)

- Use of impervious cover in a watershed as an indicator of environmental water quality

Effects of Urban Development on Stream Ecosystems in Nine Metropolitan Study Areas Across the United States (2012) USGS
http://pubs.usgs.gov/circ/1373/

- Results of a synthesis of reports on nine urban watersheds as part of the National Water-Quality Assessment Program

Water-quality Assessment Of The Hudson River Basin In New York And Adjacent States – Analysis of available nutrient, pesticide, volatile organic compound, and suspended-sediment data, 1970-90 (1996) USGS
http://ny.water.usgs.gov/projects/hdsn/report/Retro.pdf

- Historical information and analysis of both ground and surface waters of the Hudson Basin

Economics & Financing

Water Infrastructure Financing : History of EPA Appropriations (2012) Copeland, C., Congressional Research Service
http://www.fas.org/sgp/crs/misc/96-647.pdf

- Gives a year by year account of funding allocated under the Clean Water Act, some history on its creation, and discussion of trends over time

Failure to Act: The economic impact of current investment trends in water and wastewater treatment infrastructure (2011) American Society of Civil Engineers
http://www.asce.org/uploadedFiles/Infrastructure/Failure_to_Act/Water%20Report%20Executive%20Summary.pdf

- Addresses the question of how poorly funded and operating water infrastructure impact the economy

Economic Benefits of Conserved Rivers: An annotated bibliography (2001) National Parks Service
http://www.nps.gov/ncrc/rivers/fulabib.pdf

- A collection of resources on the economic issues related to watershed management, floodplains, dams, water quality, recreation, tourism, etc

Financing Sustainable Water Infrastructure (2012) The Johnson Foundation
http://www.johnsonfdn.org/sites/default/files/reports_publications/WaterInfrastructure.pdf

- Strategy document related to a conference held on financing water infrastructure

Green Infrastructure

Green Infrastructure Plan for Saratoga County (2006)
http://www.saratogaplan.org/cp_GreenInfrastructure.html

- Example of county-scale planning effort to include green infrastructure

Managing Wet Weather with Green Infrastructure: Water quality scorecard (2009) USEPA

- Project guidance & practices at the municipal, neighborhood, and site scales

Wetlands in the Watersheds of the New York City Water Supply System (2009) NYCDEP
http://www.fws.gov/northeast/EcologicalServices/pdf/wetlandswatershedsNYCwatersupplysystem.pdf

- Mapping, description and status of wetlands in the NYC watershed; more descriptive than analytical

Decision Support Criteria & Multi-Criteria Analysis

A comparison of multiple criteria analysis and unaided approaches to environmental decision making (2007) Hajkowicz, S., *Environmental Science & Policy*, *10*(3), 177–184
- Study showing that decision makers do not necessarily change policies even when more analytical frameworks provide support

A Review of Multiple Criteria Analysis for Water Resource Planning and Management (2006) Hajkowicz, S., & Collins, K. *Water Resources Management*, *21*(9), 1553–1566
- Survey of 113 MCA analyses from 34 countries; commentary of prevalence of methods

Determining a sustainable and economically optimal wastewater treatment and discharge strategy (2013) Hardisty, P.E., et al., *Journal of environmental management*, *114*, 285–92
- Reveals that advanced treatment options are not always efficient pathways towards environmental water quality goals

Evaluation of the Great Lakes Near Shore Index (1988) Schierow, L., & Chesters, G., *Water Resources, 22*(3), 269–277
- An example of a water quality and management index used in the Great Lakes basin

A critique of EPA's index of watershed indicators (2001) Schultz, M.T., *Journal of environmental management*, *62*(4), 429–42
- Comment on a more rigorous approach to multi-unit index manipulation

Heuristic Screening Methodology for Regional Wastewater Treatment Planning (1993) Voutchkov, N., & Boulos, P., *Journal of environmental engineering*, *119*(4), 603–614
- Case study of using the critical-distance parameter for locating regional wastewater treatment facilities

Housing Density and Urban Land Use as Indicators of Stream Quality, *Watershed Protection Techniques, 2*(4), 735–739.
Nutrients

Unusual seasonal patterns and inferred processes of nitrogen retention in forested headwaters of the Upper Susquehanna River (2009) Goodale, C.L., et al., *Biogeochemistry*, *93*(3), 197–218
- Example of study on surface water nitrate concentrations in the Upper Sus

Nutrient Loadings to Streams of the Continental United States from Municipal and Industrial Effluent (2011) Maupin, M., & Ivahnenko, T., *Journal of the American Water Resources Association*, *47*(5), 950–964
- Using precursor to the USGS model SPARROW to infer total nitrogen and phosphorus from EPA point discharge data across the country

Corporate Water & Risk

Significant Industries: Hudson Valley Region (2011) NYS Department of Labor
http://www.labor.ny.gov/stats/PDFs/Significant-Industries-Hudson-Valley.pdf
- A survey of industries in the Hudson Valley region, with information on employment, wages, etc.

CDP Water Disclosure 2010 Global Report (2010) Carbon Disclosure Project
https://www.cdproject.net/CDPResults/CDP-2010-Water-Disclosure-Global-Report.pdf
- Results of a questionnaire completed by 137 corporations regarding water needs and usage

POTW Anecdotes

Lansing Sewer District No. 1: Map, plan, and report (2011) Hunt Engineers
http://lansingtown.com/phocadownload/Sewer/mprscanaug2012.pdf
- Info on the proposed small wastewater treatment facility for the Town of Lansing

Newburgh, NY: Wastewater Treatment Plant Update 2011 Severn Trent Services
http://www.cityofnewburgh-ny.gov/sites/newburghny/files/file/file/2011annualreport_0.pdf

Water Conservation & Planning

Water Conservation and Long-Term Water Supply Planning in The Hudson Valley: A Rockland County Case Study (2012) SUNY New Paltz, Center for Research Regional Education & Outreach
http://www.newpaltz.edu/crreo/brief_7_rockland_water.pdf

Revitalizing Hudson Riverfronts (2010) Scenic Hudson
http://www.scenichudson.org/ourwork/riverfrontcommunities/publications

- Guidance on riverfront development with special attention paid to climate change impacts

Water Shortages, Development, and Drought in Rockland County, NY (2005) Lyon, B., et al., *Journal of the American Water Resources Association*

- A case study of how climate change can exacerbate challenges related to poor planning and management

Utilities

The Water Resources Utility of the Future : A Blueprint for Action (2013) NACWA, WERF, WEF
http://www.uswateralliance.org/tag/water-resources-utility-of-the-future-blueprint-for-action/

- From the perspective of water and wastewater operators and professional groups

Appendix C
Sample Local Law for Stormwater Management and Erosion & Sediment Control

Sample Local Law for Stormwater Management and Erosion & Sediment Control *(Revised 3/06)*

This model local law is intended to be a guidance tool for communities that are subject to the Municipal Separate Storm Sewer System (MS4) Phase II stormwater management requirements of the National Pollutant Discharge Elimination System (NPDES) regulations, administered by New York State through the State Pollutant Discharge Elimination System (SPDES) regulations. The goal of providing this model law is to assist communities in amending existing laws and ordinances and/or adopting new provisions of local law to meet the new federal and state guidelines for stormwater control. In designing a model stormwater law for a New York State audience, we include suggestions for standard language and concepts that we believe a good stormwater management program should contain. This local law should not be construed as an exhaustive listing of all the language needed for a local law, but represents a good base that communities can build upon and customize to be consistent with the local conditions and staff resources available in their municipality.

Throughout the local law, there are sections in which you must insert the name of your municipality and the agency that you have given regulatory power over stormwater management issues. These sections are denoted by **bold** text placed in brackets. By using this document and customizing these sections, you can create a viable local law with minimal editing. Municipalities should work with their municipal attorney throughout the process.

Italicized text with this symbol ➲ should be interpreted as comments, instructions, or information to assist the local law writer. This text *should not appear* in your final local law.

The contents of this local law are as follows:

Sample Local Law for Stormwater Management and Erosion & Sediment Control

A local law to amend the **(Zoning Law/Subdivision Law/Site Plan Review Law/Erosion and Sediment Control Law)** of the **((City/Town/Village) of _____),** Local law Number _____of the Year _____.

➲*Article 1 and Article 2 must be adopted for proper implementation. The municipality and its legal counsel, after reviewing their local codes and this model language, should pick additional provisions from Articles 3, 4, 5 and 6 to ensure review and enforcement of stormwater pollution prevention plans at the local level.*

Be it enacted by the **(City Council/Town Board/Village Board of Trustees)** of the **((City/Town/Village) of _____)** as follows:

Article 1. General Provisions

Section 1. Findings of Fact

It is hereby determined that:

1.1 Land development activities and associated increases in site impervious cover often alter the hydrologic response of local watersheds and increase stormwater runoff rates and volumes, flooding, stream channel erosion, or sediment transport and deposition;

1.2 This stormwater runoff contributes to increased quantities of water-borne pollutants, including siltation of aquatic habitat for fish and other desirable species;

1.3 Clearing and grading during construction tends to increase soil erosion and add to the loss of native vegetation necessary for terrestrial and aquatic habitat;

1.4 Improper design and construction of stormwater management practices can increase the velocity of stormwater runoff thereby increasing stream bank erosion and sedimentation;

1.5 Impervious surfaces allow less water to percolate into the soil, thereby decreasing groundwater recharge and stream baseflow;

1.6 Substantial economic losses can result from these adverse impacts on the waters of the municipality;

1.7 Stormwater runoff, soil erosion and nonpoint source pollution can be controlled and minimized through the regulation of stormwater runoff from land development activities;

1.8 The regulation of stormwater runoff discharges from land development activities in order to control and minimize increases in stormwater runoff rates and volumes, soil erosion, stream channel erosion, and nonpoint source pollution associated with stormwater runoff is in the public interest and will minimize threats to public health and safety.

1.9 Regulation of land development activities by means of performance standards governing stormwater management and site design will produce development compatible with the natural functions of a particular site or an entire watershed and thereby mitigate the adverse effects of erosion and sedimentation from development.

Section 2. Purpose

The purpose of this local law is to establish minimum stormwater management requirements and controls to

protect and safeguard the general health, safety, and welfare of the public residing within this jurisdiction and to address the findings of fact in Section 1 hereof. This local law seeks to meet those purposes by achieving the following objectives:

2.1 Meet the requirements of minimum measures 4 and 5 of the SPDES General Permit for Stormwater Discharges from Municipal Separate Stormwater Sewer Systems (MS4s), Permit no. GP-02-02 or as amended or revised;

2.2 Require land development activities to conform to the substantive requirements of the NYS Department of Environmental Conservation State Pollutant Discharge Elimination System (SPDES) General Permit for Construction Activities GP-02-01 or as amended or revised;

2.3 Minimize increases in stormwater runoff from land development activities in order to reduce flooding, siltation, increases in stream temperature, and streambank erosion and maintain the integrity of stream channels;

2.4 Minimize increases in pollution caused by stormwater runoff from land development activities which would otherwise degrade local water quality;

2.5 Minimize the total annual volume of stormwater runoff which flows from any specific site during and following development to the maximum extent practicable; and

2.6 Reduce stormwater runoff rates and volumes, soil erosion and nonpoint source pollution, wherever possible, through stormwater management practices and to ensure that these management practices are properly maintained and eliminate threats to public safety.

➲ *The above list is a general set of objectives to reduce the impact of stormwater on receiving waters. Section 2.1 applies to regulated MS4s; a municipality not currently under this program may wish to leave this objective out, although the community may become regulated in the future. The advantage to adopting a local law for all municipalities is that the local government then has control over review and approval of Stormwater Pollution Prevention Plans (SWPPPs) during subdivision and site plan review. The local government may also wish to set some more specific objectives, based on priority water quality (refer to New York State 303 (d) list of priority waters at* www.dec.state.ny.us/website/dow/303dcalm.html *) and habitat problems (e.g., to reduce phosphorus loads being delivered to recreational lakes, to sustain a Class TS trout fishery).*

Section 3. Statutory Authority

In accordance with Article 10 of the Municipal Home Rule Law of the State of New York, the **(City Council/Town Board/Village Board of Trustees of _____)** has the authority to enact local laws and amend local laws and for the purpose of promoting the health, safety or general welfare of the **((City/Town/Village) of _____)** and for the protection and enhancement of its physical environment. The **(City Council/Town Board/Village Board of Trustees of _____)** may include in any such local law provisions for the appointment of any municipal officer, employees, or independent contractor to effectuate, administer and enforce such local law.

Section 4. Applicability

4.1 This local law shall be applicable to all land development activities as defined in this local law, Article 2, Section 1**.**

4.2 The municipality shall designate a Stormwater Management Officer who shall accept and review all stormwater pollution prevention plans and forward such plans to the applicable municipal board. The

Stormwater Management Officer may (1) review the plans, (2) upon approval by the ((City Council/Town Board/Village Board of Trustees) of the (Town/Village/City) of _____), engage the services of a registered professional engineer to review the plans, specifications and related documents at a cost not to exceed a fee schedule established by said governing board, or (3) accept the certification of a licensed professional that the plans conform to the requirements of this law.

4.3 All land development activities subject to review and approval by the **(applicable board of the (City/Town Village) of _____)** under **(subdivision, site plan, and/or special permit)** regulations shall be reviewed subject to the standards contained in this local law

4.4 All land development activities not subject to review as stated in section 4.3 shall be required to submit a Stormwater Pollution Prevention Plan (SWPPP) to the Stormwater Management Officer who shall approve the SWPPP if it complies with the requirements of this law.

Section 5. Exemptions

The following activities may be exempt from review under this law.

➲ *The municipality may elect to include some or all of the exemptions in Section 5.*

5.1 Agricultural activity as defined in this local law.

5.2 Silvicultural activity except that landing areas and log haul roads are subject to this law.

5.3 Routine maintenance activities that disturb less than five acres and are performed to maintain the original line and grade, hydraulic capacity or original purpose of a facility.

5.4 Repairs to any stormwater management practice or facility deemed necessary by the Stormwater Management Officer.

5.5 Any part of a subdivision if a plat for the subdivision has been approved by the **((City/Town/Village) of _____)** on or before the effective date of this law.

5.6 Land development activities for which a building permit has been approved on or before the effective date of this law.

5.7 Cemetery graves.

5.8 Installation of fence, sign, telephone, and electric poles and other kinds of posts or poles.

5.9 Emergency activity immediately necessary to protect life, property or natural resources.

5.10 Activities of an individual engaging in home gardening by growing flowers, vegetable and other plants primarily for use by that person and his or her family.

5.11 Landscaping and horticultural activities in connection with an existing structure.

Article 2. Zoning Law Amendment: Stormwater Control

➲*Municipalities that do not have zoning should add the language in Article 2 to Article 3 (Subdivision Regulation Amendment) or Article 4 (Site Plan Review Law Amendment) as applicable for their municipality.*

The Zoning Law is hereby amended to include Article ___, a new supplemental regulation titled Stormwater Control.

Section 1. Definitions

The terms used in this local law or in documents prepared or reviewed under this local law shall have the meaning as set forth in this section.

➲*Definitions should be incorporated into the appropriate section of the municipality's zoning law which contains definitions.*

Agricultural Activity - the activity of an active farm including grazing and watering livestock, irrigating crops, harvesting crops, using land for growing agricultural products, and cutting timber for sale, but shall not include the operation of a dude ranch or similar operation, or the construction of new structures associated with agricultural activities.

Applicant - a property owner or agent of a property owner who has filed an application for a land development activity.

Building - any structure, either temporary or permanent, having walls and a roof, designed for the shelter of any person, animal, or property, and occupying more than 100 square feet of area.

Channel - a natural or artificial watercourse with a definite bed and banks that conducts continuously or periodically flowing water.

Clearing - any activity that removes the vegetative surface cover.

Dedication - the deliberate appropriation of property by its owner for general public use.

Department - the New York State Department of Environmental Conservation

Design Manual - the *New York State Stormwater Management Design Manual*, most recent version including applicable updates, that serves as the official guide for stormwater management principles, methods and practices.

Developer - a person who undertakes land development activities.

Erosion Control Manual - the most recent version of the "New York Standards and Specifications for Erosion and Sediment Control" manual, commonly known as the "Blue Book".

Grading - excavation or fill of material, including the resulting conditions thereof.

Impervious Cover - those surfaces, improvements and structures that cannot effectively infiltrate rainfall, snow melt and water (e.g., building rooftops, pavement, sidewalks, driveways, etc).

Industrial Stormwater Permit - a State Pollutant Discharge Elimination System permit issued to a commercial industry or group of industries which regulates the pollutant levels associated with industrial stormwater discharges or specifies on-site pollution control strategies.

Infiltration - the process of percolating stormwater into the subsoil.

Jurisdictional Wetland - an area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation.

Land Development Activity - construction activity including clearing, grading, excavating, soil disturbance or placement of fill that results in land disturbance of equal to or greater than one acre (*see* ➲*Note)*, or activities disturbing less than one acre of total land area that is part of a larger common plan of development or sale, even though multiple separate and distinct land development activities may take place at different times on different schedules.

➲ *A community should review the local site plan, subdivision, zoning and erosion & sediment control laws and ordinances to see if there are minimum land disturbance requirements already specified in those laws. To meet the SPDES guidelines under GP-02-02, the municipality must require SWPPPs for construction activities that result in land disturbance equal to or greater than one acre, or activities disturbing less than one acre if they are part of a larger common plan of development or sale or in a specified watershed. The municipality may wish to reduce this threshold to a lesser amount of disturbance to conform to local standards which may be stricter than the standards set forth in the state regulations. Many communities regulate land disturbance activities of more than 5000 square feet (1/8 acre), with an exemption if the amount of impervious cover created does not exceed 1000 square feet.*

Landowner - the legal or beneficial owner of land, including those holding the right to purchase or lease the

land, or any other person holding proprietary rights in the land.

Maintenance Agreement - a legally recorded document that acts as a property deed restriction, and which provides for long-term maintenance of stormwater management practices.

Nonpoint Source Pollution - pollution from any source other than from any discernible, confined, and discrete conveyances, and shall include, but not be limited to, pollutants from agricultural, silvicultural, mining, construction, subsurface disposal and urban runoff sources.

Phasing - clearing a parcel of land in distinct pieces or parts, with the stabilization of each piece completed before the clearing of the next.

Pollutant of Concern - sediment or a water quality measurement that addresses sediment (such as total suspended solids, turbidity or siltation) and any other pollutant that has been identified as a cause of impairment of any water body that will receive a discharge from the land development activity.

Project - land development activity

Recharge - the replenishment of underground water reserves.

Sediment Control - measures that prevent eroded sediment from leaving the site.

Sensitive Areas - cold water fisheries, shellfish beds, swimming beaches, groundwater recharge areas, water supply reservoirs, habitats for threatened, endangered or special concern species.

SPDES General Permit for Construction Activities GP-02-01 - A permit under the New York State Pollutant Discharge Elimination System (SPDES) issued to developers of construction activities to regulate disturbance of one or more acres of land.

SPDES General Permit for Stormwater Discharges from Municipal Separate Stormwater Sewer Systems GP-02-02 - A permit under the New York State Pollutant Discharge Elimination System (SPDES) issued to municipalities to regulate discharges from municipal separate storm sewers for compliance with EPA established water quality standards and/or to specify stormwater control standards

Stabilization - the use of practices that prevent exposed soil from eroding.

Stop Work Order - an order issued which requires that all construction activity on a site be stopped.

Stormwater - rainwater, surface runoff, snowmelt and drainage

Stormwater Hotspot - a land use or activity that generates higher concentrations of hydrocarbons, trace metals or toxicants than are found in typical stormwater runoff, based on monitoring studies.

Stormwater Management - the use of structural or non-structural practices that are designed to reduce stormwater runoff and mitigate its adverse impacts on property, natural resources and the environment.

Stormwater Management Facility - one or a series of stormwater management practices installed, stabilized and operating for the purpose of controlling stormwater runoff.

Stormwater Management Officer - an employee or officer designated by the municipality to accept and review stormwater pollution prevention plans, forward the plans to the applicable municipal board and inspect stormwater management practices

> ➲*The Stormwater Management Officer would likely be the Code Enforcement Officer or his/her staff. A consultant cannot be appointed as Stormwater Management Officer. Plan reviews and site inspections may be delegated to a consultant paid for through the applicant's escrow account, however the final approval must be made by a municipal employee or board member.*

Stormwater Management Practices (SMPs) - measures, either structural or nonstructural, that are determined to be the most effective, practical means of preventing flood damage and preventing or reducing point source or nonpoint source pollution inputs to stormwater runoff and water bodies.

Stormwater Pollution Prevention Plan (SWPPP) - a plan for controlling stormwater runoff and pollutants from a site during and after construction activities.

Stormwater Runoff - flow on the surface of the ground, resulting from precipitation

Surface Waters of the State of New York - lakes, bays, sounds, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Atlantic ocean within the territorial seas of the state of New York and all other bodies of surface water, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters that do not combine or effect a junction with natural surface or underground waters), which are wholly or partially within or bordering the state or within its jurisdiction.

Storm sewers and waste treatment systems, including treatment ponds or lagoons which also meet the criteria of this definition are not waters of the state. This exclusion applies only to manmade bodies of water which neither were originally created in waters of the state (such as a disposal area in wetlands) nor resulted from impoundment of waters of the state.

Watercourse - a permanent or intermittent stream or other body of water, either natural or man-made, which gathers or carries surface water.

Waterway - a channel that directs surface runoff to a watercourse or to the public storm drain.

Section 2. Stormwater Pollution Prevention Plans

2.1. Stormwater Pollution Prevention Plan Requirement

No application for approval of a land development activity shall be reviewed until the appropriate board has received a Stormwater Pollution Prevention Plan (SWPPP) prepared in accordance with the specifications in this local law.

2.2 Contents of Stormwater Pollution Prevention Plans

2.2.1 All SWPPPs shall provide the following background information and erosion and sediment controls:

1. Background information about the scope of the project, including location, type and size of project.
2. Site map/construction drawing(s) for the project, including a general location map. At a minimum, the site map should show the total site area; all improvements; areas of disturbance; areas that will not be disturbed; existing vegetation; on-site and adjacent off-site surface water(s); wetlands and drainage patterns that could be affected by the construction activity; existing and final slopes; locations of off-site material, waste, borrow or equipment storage areas; and location(s) of the stormwater discharges(s);

➲*Site map should be at a scale no smaller than 1"=100' (e.g. 1"=500" is smaller than 1"=100")*

3. Description of the soil(s) present at the site;
4. Construction phasing plan describing the intended sequence of construction activities, including clearing and grubbing, excavation and grading, utility and infrastructure installation and any other activity at the site that results in soil disturbance. Consistent with the New York Standards and Specifications for Erosion and Sediment Control (Erosion Control Manual), not more than five (5) acres shall be disturbed at any one time unless pursuant to an approved SWPPP.

➲ *A municipality may choose to reduce the amount of land that may be exposed at any one time.*

5. Description of the pollution prevention measures that will be used to control litter, construction chemicals and construction debris from becoming a pollutant source in

stormwater runoff;

6. Description of construction and waste materials expected to be stored on-site with updates as appropriate, and a description of controls to reduce pollutants from these materials including storage practices to minimize exposure of the materials to stormwater, and spill -prevention and response;
7. Temporary and permanent structural and vegetative measures to be used for soil stabilization, runoff control and sediment control for each stage of the project from initial land clearing and grubbing to project close-out;
8. A site map/construction drawing(s) specifying the location(s), size(s) and length(s) of each erosion and sediment control practice;
9. Dimensions, material specifications and installation details for all erosion and sediment control practices, including the siting and sizing of any temporary sediment basins;
10. Temporary practices that will be converted to permanent control measures;
11. Implementation schedule for staging temporary erosion and sediment control practices, including the timing of initial placement and duration that each practice should remain in place;
12. Maintenance schedule to ensure continuous and effective operation of the erosion and sediment control practice;
13. Name(s) of the receiving water(s);
14. Delineation of SWPPP implementation responsibilities for each part of the site;
15. Description of structural practices designed to divert flows from exposed soils, store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site to the degree attainable; and
16. Any existing data that describes the stormwater runoff at the site.

2.2.2 Land development activities as defined in Section 1 of this Article and meeting Condition "A", "B" or "C" below shall also include water quantity and water quality controls (post-construction stormwater runoff controls) as set forth in Section 2.2.3 below as applicable:

Condition A - Stormwater runoff from land development activities discharging a pollutant of concern to either an impaired water identified on the Department's 303(d) list of impaired waters or a Total Maximum Daily Load (TMDL) designated watershed for which pollutants in stormwater have been identified as a source of the impairment.

Condition B - Stormwater runoff from land development activities disturbing five (5) or more acres.

Condition C - Stormwater runoff from land development activity disturbing between one (1) and five (5) acres of land during the course of the project, exclusive of the construction of single family residences and construction activities at agricultural properties.

2.2.3 SWPPP Requirements for Condition A, B and C:

1. All information in Section 2.2 .1 of this local law
2. Description of each post-construction stormwater management practice;
3. Site map/construction drawing(s) showing the specific location(s) and size(s) of each post-construction stormwater management practice;
4. Hydrologic and hydraulic analysis for all structural components of the stormwater management system for the applicable design storms
5. Comparison of post-development stormwater runoff conditions with pre-development conditions

6. Dimensions, material specifications and installation details for each post-construction stormwater management practice;
7. Maintenance schedule to ensure continuous and effective operation of each post-construction stormwater management practice.
8. Maintenance easements to ensure access to all stormwater management practices at the site for the purpose of inspection and repair. Easements shall be recorded on the plan and shall remain in effect with transfer of title to the property.
9. Inspection and maintenance agreement binding on all subsequent landowners served by the on-site stormwater management measures in accordance with Article 2, Section 4 of this local law.
10. For Condition A, the SWPPP shall be prepared by a landscape architect, certified professional or professional engineer and must be signed by the professional preparing the plan, who shall certify that the design of all stormwater management practices meet the requirements in this local law.[1]

2.3 Other Environmental Permits

The applicant shall assure that all other applicable environmental permits have been or will be acquired for the land development activity prior to approval of the final stormwater design plan.

2.4 Contractor Certification

2.4.1 Each contractor and subcontractor identified in the SWPPP who will be involved in soil disturbance and/or stormwater management practice installation shall sign and date a copy of the following certification statement before undertaking any land development activity : "I certify under penalty of law that I understand and agree to comply with the terms and conditions of the Stormwater Pollution Prevention Plan. I also understand that it is unlawful for any person to cause or contribute to a violation of water quality standards."

2.4.2 The certification must include the name and title of the person providing the signature, address and telephone number of the contracting firm; the address (or other identifying description) of the site; and the date the certification is made.

2.4.3 The certification statement(s) shall become part of the SWPPP for the land development activity.

2.5 A copy of the SWPPP shall be retained at the site of the land development activity during construction from the date of initiation of construction activities to the date of final stabilization.

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[1] Revised 3/06 - formerly Section 2.3. This section was moved under Section 2.2.3 to more closely meet the New York State requirements for Condition A in Section 2.2.2. The NY SPDES General Permit for Stormwater Runoff from Construction Activities (GP-02-01) requires that SWPPPs be prepared by a licensed professional for land development activities discharging a pollutant of concern to an impaired water identified on the Department's 303(d) list of impaired waters or to a Total Maximum Daily Load (TMDL) designated watershed for which pollutants in stormwater have been identified as a source of the impairment.

Section 3. Performance and Design Criteria for Stormwater Management and Erosion and Sediment Control

All land development activities shall be subject to the following performance and design criteria:

3.1 Technical Standards

For the purpose of this local law, the following documents shall serve as the official guides and specifications for stormwater management. Stormwater management practices that are designed and constructed in accordance with these technical documents shall be presumed to meet the standards imposed by this law:

3.1.1 The New York State Stormwater Management Design Manual (New York State Department of Environmental Conservation, most current version or its successor, hereafter referred to as the Design Manual)

3.1.2 New York Standards and Specifications for Erosion and Sediment Control, (Empire State Chapter of the Soil and Water Conservation Society, 2004, most current version or its successor, hereafter referred to as the Erosion Control Manual).

➲ *The New York State technical guidance documents may be ordered from The Department. An order form as well as downloadable versions of the Manuals are available on the Internet at;*

http://www.dec.state.ny.us/website/dow/toolbox/escstandards/index.html

http://www.dec.state.ny.us/website/dow/toolbox/swmanual/

3.2 Equivalence to Technical Standards[2]

Where stormwater management practices are not in accordance with technical standards, the applicant or developer must demonstrate equivalence to the technical standards set forth in Article 2, Section 3.1 and the SWPPP shall be prepared by a licensed professional.

3.3 Water Quality Standards

Any land development activity shall not cause an increase in turbidity that will result in substantial visible contrast to natural conditions in surface waters of the state of New York.

Section 4. Maintenance, Inspection and Repair of Stormwater Facilities[3]

4.1 Maintenance and Inspection During Construction[4]

4.1.1 The applicant or developer of the land development activity or their representative shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the applicant or developer to achieve compliance with the conditions of this local law. Sediment shall be removed from sediment

[2] Added 3/06 to ensure that the local law addresses the New York State requirement for applicants to demonstrate through preparation by a licensed professional that stormwater management practices that are not prepared in accordance with NYSDEC technical standards will work in the field to prevent soil erosion and maintain water quality.

[3] Revised 3/06 to add the word "Inspection" to the title to more closely reflect the content of the section.

[4] Revised 3/06 to add the word "Inspection" to the title to more closely reflect the content of the section.

traps or sediment ponds whenever their design capacity has been reduced by fifty (50) percent.

4.1.2 For land development activities as defined in Section 1 of this Article and meeting Condition A, B or C in Section 2.2.2, the applicant shall have a qualified professional conduct site inspections and document the effectiveness of all erosion and sediment control practices every 7 days and within 24 hours of any storm event producing 0.5 inches of precipitation or more. Inspection reports shall be maintained in a site log book.[5]

4.1.3 The applicant or developer or their representative shall be on site at all times when construction or grading activity takes place and shall inspect and document the effectiveness of all erosion and sediment control practices.[6]

➲ *4.1.3 is an optional clause for municipalities that are interested in requiring more oversight by the developer during construction activities.*

4.2 Maintenance Easement(s)

Prior to the issuance of any approval that has a stormwater management facility as one of the requirements, the applicant or developer must execute a maintenance easement agreement that shall be binding on all subsequent landowners served by the stormwater management facility. The easement shall provide for access to the facility at reasonable times for periodic inspection by the **((City/Town/Village) of _____)** to ensure that the facility is maintained in proper working condition to meet design standards and any other provisions established by this local law. The easement shall be recorded by the grantor in the office of the County Clerk after approval by the counsel for the **((City/Town/Village) of _____)**.

4.3 Maintenance after Construction

The owner or operator of permanent stormwater management practices installed in accordance with this law shall ensure they are operated and maintained[7] to achieve the goals of this law. Proper operation and maintenance also includes as a minimum, the following:

4.3.1 A preventive/corrective maintenance program for all critical facilities and systems of treatment and control (or related appurtenances) which are installed or used by the owner or operator to achieve the goals of this law.

4.3.2 Written procedures for operation and maintenance and training new maintenance personnel.

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[5] Revised 3/06. This clause was rewritten to more closely meet the New York State requirements for Conditions A, B and C in Section 2.2.2. The NY SPDES General Permit for Stormwater Runoff fromConstruction Activities (GP-02-01) requires that inspections be conducted every 7 days and within 24 hours of any storm event producing 0.5 inches of precipitation or more for all projects that are required to prepare full SWPPPs as stated in Conditions A, B and C, and to copy such reports to a site log book.

[6] Revised 3/06. Originally part of 4.1.2, this clause was relocated as a separate section to show that it is optional.

[7] Revised 3/06 to correct a grammatical error.

4.3.3 Discharges from the SMPs shall not exceed design criteria or cause or contribute to water quality standard violations in accordance with Article 2, section 3.3.

4.4 Maintenance Agreements

The **((City/Town/Village) of _____)** shall approve a formal maintenance agreement for stormwater management facilities binding on all subsequent landowners and recorded in the office of the County Clerk as a deed restriction on the property prior to final plan approval. The maintenance agreement shall be consistent with the terms and conditions of Schedule B of this local law entitled Sample Stormwater Control Facility Maintenance Agreement. The **((City/Town/Village) of _____)**, in lieu of a maintenance agreement, at its sole discretion may accept dedication of any existing or future stormwater management facility, provided such facility meets all the requirements of this local law and includes adequate and perpetual access and sufficient area, by easement or otherwise, for inspection and regular maintenance.

Section 5. Severability and Effective Date

5.1 Severability

If the provisions of any article, section, subsection, paragraph, subdivision or clause of this local law shall be judged invalid by a court of competent jurisdiction, such order of judgment shall not affect or invalidate the remainder of any article, section, subsection, paragraph, subdivision or clause of this local law.

5.2 Effective Date

This Local Law shall be effective upon filing with the office of the Secretary of State.

Approved by: _____ Date _____

Article 3. Subdivision Regulation Amendment

Sections ___ and ___ of the Subdivision Regulations of the **((City/Town/Village) of _____)** are hereby amended by adding the following to the information requirements:

A. *For Preliminary Subdivision Plat add*: Stormwater Pollution Prevention Plan: A Stormwater Pollution Prevention Plan (SWPPP) consistent with the requirements of Article 1 and 2 of this local law shall be required for Preliminary Subdivision Plat approval. The SWPPP shall meet the performance and design criteria and standards in Article 2 of this local law. The approved Preliminary Subdivision Plat shall be consistent with the provisions of this local law.

B. *For Final Subdivision Plat approval add*: Stormwater Pollution Prevention Plan: A Stormwater Pollution Prevention Plan consistent with the requirements of Article 1 and 2 of this local law and with the terms of preliminary plan approval shall be required for Final Subdivision Plat approval. The SWPPP shall meet the performance and design criteria and standards in Article 2 of this local law. The approved Final Subdivision Plat shall be consistent with the provisions of this local law.

➲ *If the municipality has only one requirement for a final plan (no preliminary) then use Paragraph A language only.*

Article 4. Site Plan Review Regulation Amendment

Sections ___ and ___ of the Site Plan Review regulations of the **((City/Town/Village) of _____)** are hereby amended by adding the following to the information requirements:

For Site Plan Approval add: Stormwater Pollution Prevention Plan: A Stormwater Pollution Prevention Plan consistent with the requirements of Article 1 and 2 of this local law shall be required for Site Plan Approval. The SWPPP shall meet the performance and design criteria and standards in Article 2 of this local law. The approved Site Plan shall be consistent with the provisions of this local law.

Article 5. Erosion & Sediment Control Law Repeal or Amendment[8]

Repeal:

The Erosion & Sediment Control Law of the **((City/Town/Village) of _____)** is hereby repealed.

➲ *By adopting Articles 1 and 2 (and 3, 4 and 6 where necessary) of the Model Local Law for Stormwater Management and Erosion & Sediment Control, the municipality will have regulatory authority for both erosion & sediment control and post-construction stormwater management so a separate erosion & sediment control law is not needed.*

OR

Amendment:

Section _____of the Erosion & Sediment Control Law of the **((City/Town/Village) of _____)** is hereby amended by adding the following clause: Stormwater Pollution Prevention Plan: A Stormwater Pollution Prevention Plan consistent with the requirements of Article 1 and 2 of this local law shall be required. The SWPPP shall meet the performance and design criteria and standards in Article 2 of this local law. The approved erosion control permit shall be consistent with the provisions of this local law.

➲ *The municipality must also adopt Articles 1, 2, 3 and 4 (as applicable for their municipality) in order to address post-construction stormwater runoff control in stormwater pollution prevention plans.*

Article 6. Administration and Enforcement

➲***The following provisions for construction inspection, performance guarantees and bonds, and enforcement are important to include in a stormwater control program, but may already exist in local law. Therefore the municipality and its counsel should review their existing provisions for these activities, compare them with the following provisions, and consider whether revisions or amendments are necessary to achieve the purposes of this local law.***

Section 1. Construction Inspection

[8] Revised 3/06 to clarify that adoption of this Sample Local Law provides all the required language for local regulation of erosion & sediment control, therefore repeal of an existing erosion & sediment control law and replacement with the Sample Local Law may be the best option for many municipalities.

1.1 Erosion and Sediment Control Inspection

The **((City/Town/Village) of _____)** Stormwater Management Officer may require such inspections as necessary to determine compliance with this law and may either approve that portion of the work completed or notify the applicant wherein the work fails to comply with the requirements of this law and the stormwater pollution prevention plan (SWPPP) as approved. To obtain inspections, the applicant shall notify the **((City/Town/Village) of _____)** enforcement official at least 48 hours before any of the following as required by the Stormwater Management Officer:

1.1.1 Start of construction

1.1.2 Installation of sediment and erosion control measures

1.1.3 Completion of site clearing

1.1.4 Completion of rough grading

1.1.5 Completion of final grading

1.1.6 Close of the construction season

1.1.7 Completion of final landscaping

1.1.8 Successful establishment of landscaping in public areas.

If any violations are found, the applicant and developer shall be notified in writing of the nature of the violation and the required corrective actions. No further work shall be conducted except for site stabilization until any violations are corrected and all work previously completed has received approval by the Stormwater Management Officer.

1.2 Stormwater Management Practice Inspections

The **((City/Town/Village) of _____)** Stormwater Management Officer, is responsible for conducting inspections of stormwater management practices (SMPs). All applicants are required to submit "as built" plans for any stormwater management practices located on-site after final construction is completed. The plan must show the final design specifications for all stormwater management facilities and must be certified by a professional engineer.

1.3 Inspection of Stormwater Facilities After Project Completion

Inspection programs shall be established on any reasonable basis, including but not limited to: routine inspections; random inspections; inspections based upon complaints or other notice of possible violations; inspection of drainage basins or areas identified as higher than typical sources of sediment or other contaminants or pollutants; inspections of businesses or industries of a type associated with higher than usual discharges of contaminants or pollutants or with discharges of a type which are more likely than the typical discharge to cause violations of state or federal water or sediment quality standards or the SPDES stormwater permit; and joint inspections with other agencies inspecting under environmental or safety laws. Inspections may include, but are not limited to: reviewing maintenance and repair records; sampling discharges, surface water, groundwater, and material or water in drainage control facilities; and evaluating the condition of drainage control facilities and other stormwater management practices.

➲*Inspections may be performed by local government staff or the local government may designate an inspector required to have a Professional Engineer's (PE) license or Certified Professional in Erosion and Sediment Control (CPESC) certificate, as long as the designated inspector is required to submit a report.*

1.4 Submission of Reports

The ((City/Town/Village) of _____) Stormwater Management Officer may require monitoring and reporting from entities subject to this law as are necessary to determine compliance with this law.

1.5 Right-of-Entry for Inspection

When any new stormwater management facility is installed on private property or when any new connection is made between private property and the public storm water system, the landowner shall grant to the **((City/Town/Village) of _____)** the right to enter the property at reasonable times and in a reasonable manner for the purpose of inspection as specified in paragraph 1.3.

Section 2. Performance Guarantee

2.1 Construction Completion Guarantee

In order to ensure the full and faithful completion of all land development activities related to compliance with all conditions set forth by the **((City/Town/Village) of _____)** in its approval of the Stormwater Pollution Prevention Plan, the **((City/Town/Village) of _____)** may require the applicant or developer to provide, prior to construction, a performance bond, cash escrow, or irrevocable letter of credit from an appropriate financial or surety institution which guarantees satisfactory completion of the project and names the **((City/Town/Village) of _____)** as the beneficiary. The security shall be in an amount to be determined by the **((City/Town/Village) of _____)** based on submission of final design plans, with reference to actual construction and landscaping costs. The performance guarantee shall remain in force until the surety is released from liability by the **((City/Town/Village) of _____)**, provided that such period shall not be less than one year from the date of final acceptance or such other certification that the facility(ies) have been constructed in accordance with the approved plans and specifications and that a one year inspection has been conducted and the facilities have been found to be acceptable to the **((City/Town/Village) of _____).** Per annum interest on cash escrow deposits shall be reinvested in the account until the surety is released from liability.

2.2 Maintenance Guarantee

Where stormwater management and erosion and sediment control facilities are to be operated and maintained by the developer or by a corporation that owns or manages a commercial or industrial facility, the developer, prior to construction, may be required to provide the **((City/Town/Village) of _____)** with an irrevocable letter of credit from an approved financial institution or surety to ensure proper operation and maintenance of all stormwater management and erosion control facilities both during and after construction, and until the facilities are removed from operation. If the developer or landowner fails to properly operate and maintain stormwater management and erosion and sediment control facilities, the **((City/Town/Village) of _____)** may draw upon the account to cover the costs of proper operation and maintenance, including engineering and inspection costs.

2.3 Recordkeeping

The ((City/Town/Village) of _____) may require entities subject to this law to maintain records demonstrating compliance with this law.

Section 3. Enforcement and Penalties

3.1 Notice of Violation.

When the **((City/Town/Village) of _____)** determines that a land development activity is not being carried out in accordance with the requirements of this local law, it may issue a written notice of violation to the landowner. The notice of violation shall contain :

3.1.1 the name and address of the landowner, developer or applicant;

3.1.2 the address when available or a description of the building, structure or land upon which the violation is occurring;

3.1.3 a statement specifying the nature of the violation;

3.1.4 a description of the remedial measures necessary to bring the land development activity into compliance with this local law and a time schedule for the completion of such remedial action;

3.1.5 a statement of the penalty or penalties that shall or may be assessed against the person to whom the notice of violation is directed;

3.1.6 a statement that the determination of violation may be appealed to the municipality by filing a written notice of appeal within fifteen (15) days of service of notice of violation.

3.2 Stop Work Orders

The **((City/Town/Village) of _____)** may issue a stop work order for violations of this law. Persons receiving a stop work order shall be required to halt all land development activities, except those activities that address the violations leading to the stop work order. The stop work order shall be in effect until the **((City/Town/Village) of _____)** confirms that the land development activity is in compliance and the violation has been satisfactorily addressed. Failure to address a stop work order in a timely manner may result in civil, criminal, or monetary penalties in accordance with the enforcement measures authorized in this local law.

3.3 Violations

Any land development activity that is commenced or is conducted contrary to this local law, may be restrained by injunction or otherwise abated in a manner provided by law.

3.4 Penalties

In addition to or as an alternative to any penalty provided herein or by law, any person who violates the provisions of this local law shall be guilty of a violation punishable by a fine not exceeding three hundred fifty dollars ($350) or imprisonment for a period not to exceed six months, or both for conviction of a first offense; for conviction of a second offense both of which were committed within a period of five years, punishable by a fine not less than three hundred fifty dollars nor more than seven hundred dollars ($700) or imprisonment for a period not to exceed six months, or both; and upon conviction for a third or subsequent offense all of which were committed within a period of five years, punishable by a fine not less than seven hundred dollars nor more than one thousand dollars ($1000) or imprisonment for a period not to exceed six months, or both. However, for the purposes of conferring jurisdiction upon courts and judicial officers generally, violations of this local law shall be deemed misdemeanors and for such purpose only all provisions of law relating to misdemeanors shall apply to such violations. Each week's continued violation shall constitute a separate additional violation.

3.5 Withholding of Certificate of Occupancy

If any building or land development activity is installed or conducted in violation of this local law the Stormwater Management Officer may prevent the occupancy of said building or land.

3.6 Restoration of lands

Any violator may be required to restore land to its undisturbed condition. In the event that restoration is not undertaken within a reasonable time after notice, the **((City/Town/Village) of _____)** may take necessary corrective action, the cost of which shall become a lien upon the property until paid.

Section 4. Fees for Services

The **((City/Town/Village) of _____)** may require any person undertaking land development activities regulated by this law to pay reasonable costs at prevailing rates for review of SWPPPs, inspections, or SMP maintenance performed by the **((City/Town/Village) of _____)** or performed by a third party for the **((City/Town/Village) of _____)**.

Schedule A

Stormwater Management Practices Acceptable for Water Quality (*From: New York State Stormwater Management Design Manual, Table 5.1*)		
Group	**Practice**	**Description**
Pond	Micropool Extended Detention Pond (P-1)	Pond that treats the majority of the water quality volume through extended detention, and incorporates a micropool at the outlet of the pond to prevent sediment resuspension.
	Wet Pond (P-2)	Pond that provides storage for the entire water quality volume in the permanent pool.
	Wet Extended Detention Pond (P-3)	Pond that treats a portion of the water quality volume by detaining storm flows above a permanent pool for a specified minimum detention time.
	Multiple Pond System (P-4)	A group of ponds that collectively treat the water quality volume.
	Pocket Pond (P-5)	A stormwater wetland design adapted for the treatment of runoff from small drainage areas that has little or no baseflow available to maintain water elevations and relies on groundwater to maintain a permanent pool.
Wetland	Shallow Wetland (W-1)	A wetland that provides water quality treatment entirely in a shallow marsh.
	Extended Detention Wetland (W-2)	A wetland system that provides some fraction of the water quality volume by detaining storm flows above the marsh surface.
	Pond/Wetland System (W-3)	A wetland system that provides a portion of the water quality volume in the permanent pool of a wet pond that precedes the marsh for a specified minimum detention time.
	Pocket Wetland (W-4)	A shallow wetland design adapted for the treatment of runoff from small drainage areas that has variable water levels and relies on groundwater for its permanent pool.
Infiltration	Infiltration Trench (I-1)	An infiltration practice that stores the water quality volume in the void spaces of a gravel trench before it is infiltrated into the ground.
	Infiltration Basin (I-2)	An infiltration practice that stores the water quality volume in a shallow depression before it is infiltrated into the ground.
	Dry Well (I-3)	An infiltration practice similar in design to the infiltration trench, and best suited for treatment of rooftop runoff.
Filtering Practices	Surface Sand Filter (F-1)	A filtering practice that treats stormwater by settling out larger particles in a sediment chamber, and then filtering stormwater through a sand matrix.
	Underground Sand Filter (F-2)	A filtering practice that treats stormwater as it flows through underground settling and filtering chambers.
	Perimeter Sand Filter (F-3)	A filter that incorporates a sediment chamber and filter bed as parallel vaults adjacent to a parking lot.
	Organic Filter (F-4)	A filtering practice that uses an organic medium such as compost in the filter in place of sand.
	Bioretention (F-5)	A shallow depression that treats stormwater as it flows through a soil matrix, and is returned to the storm drain system.
Open Channels	Dry Swale (O-1)	An open drainage channel or depression explicitly designed to detain and promote the filtration of stormwater runoff into the soil media.
	Wet Swale (O-2)	An open drainage channel or depression designed to retain water or intercept groundwater for water quality treatment.

Schedule B

SAMPLE STORMWATER CONTROL FACILITY MAINTENANCE AGREEMENT

Whereas, the Municipality of _____("Municipality") and the _____ ("facility owner") want to enter into an agreement to provide for the long term maintenance and continuation of stormwater control measures approved by the Municipality for the below named project, and

Whereas, the Municipality and the facility owner desire that the stormwater control measures be built in accordance with the approved project plans and thereafter be maintained, cleaned, repaired, replaced and continued in perpetuity in order to ensure optimum performance of the components. Therefore, the Municipality and the facility owner agree as follows:

1. This agreement binds the Municipality and the facility owner, its successors and assigns, to the maintenance provisions depicted in the approved project plans which are attached as Schedule A of this agreement.

2. The facility owner shall maintain, clean, repair, replace and continue the stormwater control measures depicted in Schedule A as necessary to ensure optimum performance of the measures to design specifications. The stormwater control measures shall include, but shall not be limited to, the following: drainage ditches, swales, dry wells, infiltrators, drop inlets, pipes, culverts, soil absorption devices and retention ponds.

3. The facility owner shall be responsible for all expenses related to the maintenance of the stormwater control measures and shall establish a means for the collection and distribution of expenses among parties for any commonly owned facilities.

4. The facility owner shall provide for the periodic inspection of the stormwater control measures, not less than once in every five year period, to determine the condition and integrity of the measures. Such inspection shall be performed by a Professional Engineer licensed by the State of New York. The inspecting engineer shall prepare and submit to the Municipality within 30 days of the inspection, a written report of the findings including recommendations for those actions necessary for the continuation of the stormwater control measures.

5. The facility owner shall not authorize, undertake or permit alteration, abandonment, modification or discontinuation of the stormwater control measures except in accordance with written approval of the Municipality.

6. The facility owner shall undertake necessary repairs and replacement of the stormwater control measures at the direction of the Municipality or in accordance with the recommendations of the inspecting engineer.

7. The facility owner shall provide to the Municipality within 30 days of the date of this agreement, a security for the maintenance and continuation of the stormwater control measures in the form of (a Bond, letter of credit or escrow account).

8. This agreement shall be recorded in the Office of the County Clerk, County of _____together with the deed for the common property and shall be included in the offering plan and/or prospectus approved pursuant to _____.

9. If ever the Municipality determines that the facility owner has failed to construct or maintain the stormwater control measures in accordance with the project plan or has failed to undertake corrective action specified by the Municipality or by the inspecting engineer, the Municipality is authorized to undertake such steps as reasonably necessary for the preservation, continuation or maintenance of the stormwater control measures and to affix the expenses thereof as a lien against the property.

10. This agreement is effective _____ .

_____ _____

***From: Lake George Park Commission Model Stormwater Management Ordinance, Schedule** E*

Appendix D
Town of Huron Septic Law

TOWN OF HURON SEPTIC LAW

Local Law No. 3 of 1996, as most recently amended by Local Law No. 1 of 2013

1. **Short Title.** This law may be referred to as the "Town of Huron Septic Law."

2. **Purpose.** In order to safeguard public health, safety, and welfare, and protect the environment, including the quality of ground and surface water, it is necessary to regulate and control all septic systems in the Town under this law.

3. **Other Law and Regulations.** This law is intended to supplement and expand the requirements for septic systems under the State Public Health Law and Regulations, including Part 75A, which is incorporated into this law by reference. To the extent this law conflicts with such regulations and other requirements under state law, the more restrictive law and regulations shall prevail. This septic law is intended to be construed as in harmony with the State Public Health Law and Regulations (including Part 75A), the Town Building Law, and the Town Zoning Law.

4. **Definitions.**

A. To the extent terms are not defined in this law but are defined in the State Public Health Law and Regulations, the Town Building Law, or the Town Zoning Law, the terms used in this law shall have the same meaning.

B. The following terms shall have the following meanings:

(1) **Aerobic System.** An Enhanced Treatment Unit (ETU), which provides for the biological decomposition of the organic portion of the wastewater by mechanical aeration of the wastewater. All aerobic systems shall have a label indicating compliance with the standards for a Class I unit as described in the National Sanitation Foundation (NSF) International Standard 40 or equivalent testing.

(2) **Alternative Systems.** Holding tanks and non-waterborne sewage disposal systems as described or defined in Part 75A, Section 75-A.10 including composting toilets, chemical and recirculating toilets and incinerator toilets.

(3) **Building Inspector.** The person who administrates and enforces the New York State Uniform Fire Prevention and Building Codes, Town of Huron Building Law and Town of Huron Zoning Law.

(4) **Certificate of Compliance.** A form that certifies full compliance with this local law until the next inspection as provided by this law is required.

(5) **Coastal Area.** Any beach, bluff, other natural protective feature, or coastline as those terms are defined in the Town of Huron Coastal Erosion Hazard Area Law (Local Law No. 4 of 2002, as amended), including the Crescent Beach Sandbar.

(6) **Conditional Certificate of Acceptance.** A form that permits continued use of a septic system until the system is brought into full compliance and a Certificate of Compliance is issued.

(7) **Enhanced Treatment.** The biological and physical treatment of wastewater to reduce the amount of biochemical oxygen demand (BOD) and total suspended solids (TSS) of wastewater prior to distribution to an absorption area.

(8) **Enhanced Treatment Unit (ETU).** A pre-manufactured wastewater treatment system that provides Enhanced Treatment of wastewater prior to discharge to a subsurface soil absorption area. All ETUs shall have a label indicating compliance with the standards for a Class I unit as described in the National Sanitation Foundation (NSF) International Standard 40 or equivalent testing.

(9) **Gray Water.** Wastewater not mixed with toilet waste, not including water softener discharges.

(10) **Gray Water System.** A septic system for disposal, treatment, storage, dispersal, transmittal, or disposal of gray water, other than a discharge to a public sewer system or discharge to surface waters permitted by the New York State Department of Environmental Conservation.

(11) **Holding Tank.** A water-tight tank that holds septage without an outflow.

(12) **Increase in Living Area**. The addition of enclosed inside living area to an existing residential structure, which increases the load or potential load on the septic system.

(13) **Leachate.** Liquid effluent discharged from a septic tank.

(14) **Part 75A.** Title 10 of the New York Code, Rules and Regulations, Part 75A (10 N.Y.C.R.R. Part 75A), as it may be amended from time to time.

(15) **Sewer System.** A common sewer system owned and operated by a private group of individuals, a municipality or public authority.

(16) **Pump-out Records.** Receipts or written statements from a septic hauler licensed by the New York State Department of Environmental Conservation indicating dates and detail of work done.

(17) **Septage.** All waste and material removed from a septic tank, raw sewage, and untreated effluent.

(18) **Septic Board of Appeals.** A board appointed by the Town Board to hear written appeals arising under this law, also referred to as the "Board."

(19) **Septic Inspection Report.** A report of a septic inspection on a form prescribed by the Town Board.

(20) **Septic Inspector.** A person appointed by the Town Board who performs septic inspections as set forth in this law.

(21) **Septic System**. A system for disposal, treatment, storage, dispersal, transmittal, or disposal of sewage or gray water, other than a discharge to a public sewer system or a discharge to surface waters permitted by the New York State Department of Environmental Conservation.

(22) **Sewage.** All domestic wastewater, including any combination of human waste with water discharged to a plumbing system, waste from a flush toilet, bath, sink, lavatory, dishwasher or laundry machine, and waste carried by water from any other fixture, equipment or machine, but not storm drains, residential floor drains, sump pumps, eaves, or agricultural waste.

(23) **State Public Health Law and Regulations.** The Public Health Law of the State of New York, and regulations promulgated pursuant to that law, including 10 N.Y.C.R.R. Part 75A, as they may be amended from time to time.

(24) **Town.** The Town of Huron, Wayne County.

(25) **Town Board.** The Town Board of the Town of Huron, Wayne County.

(26) **Town Building Law.** Town of Huron Building Law, enacted as Local Law No.1 of 1989, as amended.

(27) **Town Zoning Law.** Town of Huron Zoning Law, enacted as Local Law No. 1 of 1973, as amended.

(28) **Transfer of Ownership**. A transfer of real property title from one person to another.

(29) **Wastewater.** Any water discharged through a plumbing fixture to include, but not limited to, sewage and any water or waste from a device which is produced in the house or property.

5. General Provisions.

A. **Effect.** Completion of a septic inspection or Septic Inspection Report, and issuance of a Building Permit, Certificate of Occupancy or Compliance, or Conditional Certificate of Acceptance, does not constitute any representation or certification of the Town to anyone other than the applicant.

B. **Work Requirements.** All work shall be done in accordance with this law and the State Public Health Law and Regulations. The property owner shall be responsible for all actions and costs required to comply with this law, including inspections, design, maintenance, repairs, and installation.

C. **Septic Inspection Report.** The Town Board shall approve the form of a Septic Inspection Report, which shall be used to document the results of all septic inspections conducted pursuant to this law. All such reports shall be filed with the Town Building Inspector**,** and a copy furnished to the property owner.

D. **Delegation of Authority.** While the Town Board has primary authority to administrate and enforce this law, it may delegate authority under this law to Town officers, employees, or agents as it sees fit.

E. **Septic Inspector.** The Town Board shall, by resolution, appoint a Septic Inspector to administer this law. The Septic Inspector is authorized to conduct inspections under this law. The Town Board may also designate one or more Deputy Septic Inspectors to assist the Septic Inspector and act in his or her absence. The Building Inspector or his or her deputy may also serve as Septic Inspector.

F. **Fees.** The Town Board may, by resolution, establish fees that shall be paid to the Town for inspections, certificates, or other actions by the Town under this law.

G. **Deeded Rights-of-Way or Easements.** If new construction, replacement, modification or upgrade of a septic system, in whole or in part, results in part of the system or its components being installed on property not owned by the applicant, a deeded right-of-way to allow that use shall be obtained and recorded at the Wayne County Clerk's Office, and a copy filed with any permit application.

H. **Land Application of Waste.** Dumping, spreading or other land spreading of human septage, whether by commercial application or individual application, is prohibited within the Town.

I. **Maintenance Contracts.** Whenever a maintenance or service contract is required for all or part of a septic system, the property owner shall provide the Town with a current copy of the contract, and maintain written evidence of continuous contract coverage satisfactory to the Town. Maintenance contracts are required

for ETUs, and may be required by the Town for other systems. Maintenance contracts for ETUs shall require, at a minimum, semi-annual inspections and subsequent necessary adjustments by the manufacturer or a certified manufacturer's representative for the life of the system. Maintenance contracts for ETUs shall include the cost of regular pumping, the frequency of which shall be recommended by the manufacturer or its certified representative, based on the semi-annual inspections of the system. In no case shall the time between pump-outs exceed three years, unless specifically recommended otherwise by the manufacturer or its certified representative. Within ten (10) business days of any ETU inspection, the Town shall be provided with a written report documenting the results of the inspection including a written certification from the manufacturer or its certified representative that the system is fully functional and operating property; or that repairs or system replacement is warranted.

6. <u>New Construction.</u>

A. Applicability. This section applies to septic systems associated with new construction, including installation of temporary septic systems, and seasonal or permanent structures.

B. Permit Requirements. Pursuant to the Town Building Law, a Building Permit is required prior to commencement of any construction, including installation of a new septic system, and a Certificate of Occupancy is required prior to commencement of use or occupancy, including use of any septic system. Furthermore, any work in the Coastal Area, including the Crescent Beach Sandbar, or any other coastal erosion hazard area, may require a permit under the Town of Huron Coastal Erosion Hazard Area Law (Local Law No. 4 of 2002, as amended).

C. System Compliance. All new septic system installations shall comply with the State Public Health Law and Regulations, including Part 75A, and this law. All new installations shall meet the following additional requirements:

(1) All septic tanks shall have a wastewater filter installed on the outlet of the tank.

(2) All distribution boxes shall be equipped with speed levelers.

(3) All new septic systems installed in Coastal Areas shall be aerobic systems, unless it is clearly demonstrated that the requirements of Part 75A can be satisfied with another type of system.

(4) Due to the limited lot sizes and unique physical configuration of the Crescent Beach Sandbar, all aerobic systems installed on the Crescent Beach Sand Bar shall include ultra-violet (UV) disinfection. Chlorine disinfection will be an acceptable alternative provided that there are no

health, environmental, or water quality related regulatory constraints that prohibit its use. Further, any chlorine disinfection system must include an accompanying de-chlorination system to eliminate chlorine residual prior to discharge. The UV or chlorine disinfection system shall be designed by a New York State licensed professional engineer and be bundled with the aerobic system as an integral part of the overall pre-manufactured treatment system.

(5) Alternative Systems will be permitted provided that they are designed and installed in compliance with Part 75A and this law and that all gray water is treated with a gray water system in compliance with Part 75A and this law. Gray water systems in Coastal Areas shall comply with Section 6 (C) of this law.

D. **Submittals.** With an application for a Building Permit, the property owner shall submit design plans, sealed by a New York State licensed professional engineer, for the septic system including the following:

(1) Date, North point and scale. The plan shall be at a scale of no more than 100 feet to the inch.

(2) Name of owner of the property.

(3) Name of the engineer, surveyor, or architect responsible for the plans.

(4) Contours at vertical intervals no greater than 5 feet as determined by a topographic survey.

(5) Delineation of any land exceeding a slope of 10%, land within a New York State designated freshwater wetland, or land within a FEMA Special Flood Hazard Zone.

(6) Delineation of limits of any land to be disturbed in any manner including areas to be cut, filled, excavated, or graded and contours, both existing and proposed, at vertical intervals of no more than 5 feet.

(7) Location and description of all swales, ponds, basins, fences, dikes or other devices to control soil erosion and sedimentation.

(8) Datum to which contour elevations refer. Where reasonably practical, datum shall refer to USGS established elevations.

(9) All existing watercourses, tree masses, and other significant natural features.

(10) All existing buildings, sewers, water mains, culverts, wells, and other significant man-made features and utilities.

(11) All existing property lines, easements and rights-of-way and the purpose for which the easements or rights-of-way have been established.

(12) As required by Part 75A, the results and locations of deep hole tests and percolation tests to determine soil percolation capabilities and deep soil profiles.

(13) Detailed design and layout of all components of the septic system including all necessary information to document compliance with Part 75A.

(14) A legible location map.

(15) A map revision box.

(16) A map legends/key.

(17) A signature block for the Town Building Inspector.

E. **Inspection of Septic System Installation.** All work performed shall be left open for inspection. Prior to backfilling any newly installed septic system, the Building Inspector shall visually inspect for compliance with the septic system design, Part 75A, and this law.

7. **<u>Replacement, Modification or Upgrade of an Existing Septic System.</u>**

A. **Applicability.** This section shall apply to the total or partial replacement, modification or upgrade to an existing septic system.

B. **Permit Requirements.** Pursuant to the Town Building Law, a Building Permit is required prior to commencement of any construction, including installation of a new septic system, and a Certificate of Occupancy is required prior to commencement of use or occupancy, including use of any septic system.

C. **System Compliance.** All existing septic systems must be functional, and as a minimum, provide for separation of solids and grease, and adequate percolation. Existing systems that are replaced, modified, or upgraded shall comply, to the extent reasonably feasible, with design requirements of Part 75A and this law, and shall meet the following additional requirements:

(1) All septic tanks shall have a wastewater filter installed on the outlet of the tank.

(2) All distribution boxes shall be equipped with speed levelers.

(3) All replacement septic systems installed in Coastal Areas shall be aerobic systems unless it is clearly demonstrated that the requirements of Part 75A can be met with another type of system.

(4) Due to the limited lot sizes and unique physical configuration of the Crescent Beach Sandbar, all aerobic systems installed on the Crescent Beach Sand Bar shall include ultra-violet (UV) disinfection. Chlorine disinfection will be an acceptable alternative provided there are no health, environmental, or water quality related regulatory constraints that prohibit its use. Further, any chlorine disinfection system must include an accompanying de-chlorination system to eliminate chlorine residual prior to discharge. The UV or chlorine disinfection system shall be designed by a New York State licensed professional engineer and be bundled with the aerobic system as an integral part of the overall pre-manufactured treatment system.

(5) All existing ETUs, as of the effective date of this law, shall be modified as necessary so as to be in compliance with Part 75A, to the extent practical, and this law.

(6) Alternative Systems will be permitted provided that they are designed and installed in compliance with Part 75A and this law and that all gray water is treated with a gray water system in compliance with Part 75A and this law. Existing Gray water systems in Coastal Areas shall comply with Section 7 (C) of this law.

(7) All repairs to existing septic systems, downstream of the distribution box shall be designed and supervised by a New York State licensed professional engineer. The plans for such repairs shall be submitted to the Building Inspector per the requirements of subdivision 6 (D) of this law.

D. Partial Replacement, Repair, Upgrade or Modification.

(1) Any partial replacement, repair, upgrade or modification of a component of a septic system shall comply with this section 7.

(2) If fifty (50%) percent or more of a septic system is replaced, repaired, upgraded or modified, the complete system shall comply with subdivision 7(E) of this law.

E. Complete Replacement. Complete replacements of existing septic systems are subject to the following requirements:

(1) Percolation Tests. The property owner (or his or her designee) shall

perform a percolation (perk) test in the planned location of all leach fields. At the request of the Building Inspector, he or she shall be allowed to be present at the inspection.

(2) **System Design.** Design of replacement systems and components shall, to the extent practical, comply with Part 75A and this law. On existing sites where full compliance with Part 75A is determined by the Town to be unattainable, the Town may allow reduced design requirements, to the extent appropriate, as follows:

(a) For ETUs only, a reduction of up to thirty-three (33%) percent of the required leach lines. For aerobic systems in Coastal Areas, a further reduction may be permitted, depending upon site constraints and the design of the system.

(b) Reduced property line setbacks, but not less than four feet.

(c) Reduced setbacks between a septic tank and structure, but not less than two feet.

(d) Reduced mean high water (MHW) setbacks, but not less than 40 feet.

(e) Continuation of preexisting gray water discharge to one or more separate septic tanks or disposal systems, provided that each system provides for separation of oils and greases, and has an adequate leaching facility.

(3) **Submittals.** With an application for a Building Permit, the applicant shall submit design plans, sealed by a New York State licensed professional engineer, meeting the requirements of Subdivision 6(D) of this law. In addition, for a complete replacement of an existing system with a conventional septic system incorporating a mechanical pump, proof must be submitted that the pump station has an engineered design and is sized for the septic system application.

F. **Inspection of Septic System Installation.** All work performed shall be left open for inspection. Prior to backfilling any modification, upgrade or replacement of an existing septic system, the Building Inspector shall visually inspect for compliance with the septic system design, Part 75A, and this law.

G. **Septic Inspection Report.** Prior to issuance of a Certificate of Compliance, the Building Inspector shall complete and file a Septic Inspection Report with the Town, which shall document conformance of the installation with the system design and observed conditions and use. The property owner shall be furnished a copy of the Septic Inspection Report and any Certificate of Compliance.

8. Inspection of Existing Septic Systems.

A. Required Inspections. A septic inspection of all septic systems serving an existing residence, or commercial or industrial facility, as provided by this section, shall be completed by the Septic Inspector periodically as provided by subdivision 8(D) of this law, and prior to:

(1) Increase in living area or increase in effluent volume.

(2) Change in type of use.

(3) Change in intensity of a commercial use that increases the number of employees or occupants, or increases the discharge of sewage.

(4) Transfer of ownership for systems that have not been inspected under this law.

(5) Modification or construction resulting in at least a fifty (50%) percent increase in the interior floor space of a principal structure.

B. System Compliance. All existing septic systems must be functional, consistent with the existing or proposed use. At a minimum, all existing septic systems must provide for separation of solids and grease, and adequate percolation.

C. Mandatory System Upgrade. The existing septic system shall be upgraded, in accordance with section 7 of this law, to be in compliance, to the extent reasonably feasible, with design requirements of Part 75A, whenever one of the following occurs:

(1) Results of a septic inspection indicate that the existing septic system has failed, or is failing to protect public health and safety of the environment based on one or more of the following criteria:

(i) The dye test required by subdivision 8(D) of this law results in the presence of dye on the ground surface, the septic tank inlet or any inlets or outlets to the distribution box.

(ii) There is a back-up of sewage into the home, building or facility as a result of an overloaded or clogged leach field.

(iii) There is a discharge of effluent directly or indirectly to the ground surface and ponding, surface outbreaks and damp soils are frequently or seasonally observed over the leach field.

(iv) The level of liquid in the distribution box is above the level of the

outlet invert.

(v) The septic tank requires pumping more than four times per year and/or sewage is observed running back into the septic tank from the leach field during pumping.

(vi) The septic system is clearly non-compliant with the design criteria and one or more of the requirements of Part 75A, whether or not there is obvious visual evidence of system failure.

(2) Increase in living area.

(3) Change in intensity of a commercial use that increases the number of employees or occupants, or increases the discharge of sewage.

(4) Transfer of Ownership, if at such time the septic inspection reveals that system upgrade is required.

D. Periodic Inspection. Periodic inspections shall be performed by Septic Inspector as set forth in this subdivision.

(1) Commercial Properties. Commercial properties shall be inspected at the time of any fire inspection required under the Town of Huron Building Law, or New York State Uniform Fire Prevention and Building Code, and in any case at least once every two years. If a property passes inspection, it shall be issued a Certificate of Compliance that expires on the deadline for the next mandated fire inspection.

(a) Access. The business or property owner or his or her agent shall:

(i) Provide access to all structures on the property to ascertain where plumbing exits each structure.

(ii) Uncover all tanks, inspection ports and outlet baffles for inspection. The tank shall be pumped so that an inspection of the tank can be performed. If the tank is over twelve inches below grade, riser installation may be required.

(b) Inspection Criteria.

The Septic Inspector may determine that the existing septic system has failed or is failing to protect public health and the environment based on a combination of one or more of the following criteria:

(i) A dye test shall be conducted to ascertain if all fixtures are connected to the tank and to ascertain if effluent is being

discharged to the surface or surface waters. However, a dye test will not be an inspection criteria on the Crescent Beach Sandbar or any other area where the Septic Inspector determines that dye testing would be inconclusive due to the hydrogeologic conditions of the area.

(ii) There is a back-up of sewage into the house, building or facility as a result of an overloaded or clogged leach field.

(iii) There is a discharge of effluent directly or indirectly to the ground surface and ponding, surface outbreaks and damp soils are frequently or seasonally observed over the leach field.

(iv) The level of liquid in the distribution box is above the level of the outlet invert.

(v) General condition of the septic tank including its age, size and condition, any evidence of effluent back-up or leakage into or out of the tank, or evidence that the septic tank requires pumping more than four (4) times per year and/or sewage is observed running back into the septic tank from the leach field during pumping.

(vi) The septic system is clearly non-compliant with the design criteria and one or more of the requirements of Part 75A, whether or not there is obvious visual evidence of system failure.

(vii) The distribution box shall only be exposed if a problem is found and further evaluation is required.

(viii) Leach lines and seepage pits shall only be exposed if a problem is found and further evaluation is required.

(ix) The holding tank shall be maintained, and pump-out records shall be presented at time of inspection, which document holding tank maintenance. The Septic Inspector shall witness a pump-out to ascertain if the tank is water tight.

(x) At time of inspection, the Septic Inspector shall verify that ETUs have been serviced by the maintenance provider at the frequency, and in accordance with the requirements of subdivision 5(I) of this law.

(c) Failed Systems. Commercial properties shall be brought into

compliance by date of the next required inspection. Repeated failures found in a subsequent inspection shall be corrected within 45 days. In the event of direct discharge of raw sewage to the surface or surface water, the Building Inspector shall order that the discharge be terminated immediately, and if the septic system has a tank, the outlet shall be sealed, and the tank used as a holding tank until the system is brought into compliance. The Building Inspector may also take further enforcement action, or refer the matter to the Town Board of Health, as provided in section 11 of this law.

(d) Demonstrated Compliance. If a Building Permit and Certificate of Occupancy, or a Certificate of Compliance (after proper inspection under this law) are issued for a new or upgraded septic system, no inspection shall be required for two (2) years after issuance of the Certificate of Occupancy.

(2) Residential and Other Non-Commercial Properties. All other properties shall be inspected at least once every ten (10) years. except that properties in Coastal Areas shall be inspected at least once every five (5) years. If a property passes inspection, it shall be issued a Certificate of Compliance that expires ten years after the inspection, except that Certificates of Compliance issued for properties in Coastal Areas shall expire five years after the inspection. However, if a Conditional Certificate of Acceptance is issued rather than a Certificate of Compliance, the Septic Inspector may require an inspection at such time as the Septic Inspector deems appropriate.

(a) Property Owner. The property owner or his or her agent shall:

(i) Provide access to all structures that have plumbing.

(ii) Uncover all tanks and outlet ports so that a dye test may be performed, and if the tank is over twelve inches below grade, ensure that risers have been installed.

(b) Inspection Criteria.

The Septic Inspector may determine that the existing septic system has failed or is failing to protect public health and the environment based on a combination of one or more of the following criteria:

(i) A dye test shall be performed using 25 gallons of water per bedroom introduced into the septic system to ascertain if effluent is discharging to the surface or surface waters, and if the system has a working leach system. However, a dye

test will not be an inspection criteria on the Crescent Beach Sandbar or any other area where the Septic Inspector determines that dye testing would be inconclusive due to the hydrogeologic conditions of the area.

(ii) Any of the criteria listed in paragraph 8(D)(1) of this law.

(iii) The holding tanks must be maintained, and pump-out records shall be presented at time of inspection, which document that the holding tank is being maintained. The Septic Inspector shall witness a pump-out to ascertain if the tank is water tight.

(iv) At time of inspection, the Septic Inspector shall verify that ETUs have been serviced by the maintenance provider at the frequency, and in accordance with the requirements of subdivision 5(I) of this law.

(c) Failed Systems. Failures shall be brought into compliance within two years from the date of initial inspection. Repeated failures found in a subsequent inspection shall be corrected within 45 days. In the event of direct discharge of raw sewage to the surface or surface water, the Building Inspector shall order that the discharge be terminated immediately, and if the septic system has a tank, the outlet shall be sealed, and the tank used as a holding tank until the system is brought into compliance immediately. The Building Inspector may also take further enforcement action, or refer the matter to the Town Board of Health, as provided in section 11 of this law.

(d) Demonstrated Compliance. If a Building Permit and Certificate of Occupancy, or a Certificate of Compliance (after proper inspection under this law) are issued for a new or upgraded septic system, no inspection shall be required for five (5) years after issuance of the Certificate of Occupancy.

E. Property Transfer Inspections. Inspection is to performed by the Building Inspector or his or her designated septic inspector.

(1) Property Owner. Prior to inspection, the property owner or his or her agent shall:

(a) Provide access to all structures on the property to ascertain where plumbing exits each structure.

(b) Uncover all tanks, inspection ports and outlet baffles for

inspection.

(c) If the tank is over twelve inches below grade, riser installation may be required.

(2) Inspection Criteria.

The Septic Inspector may determine that the existing septic system has failed or is failing to protect public health and the environment based on a combination of one or more of the following criteria:

(a) **General.** Any of the criteria listed in paragraph 8(D)(1) of this law.

(b) **Tank.** The tank inspection shall include, but not be limited to:

(i) Determination of the proper liquid level in tank.

(ii) General condition of the tank including its age and size, and any evidence of effluent back-up or leakage into or out of the tank.

(iii) A dye test shall be performed using 75 gallons of water per bedroom introduced into the septic system to ascertain house fixtures are connected to the tank and to ascertain if effluent is discharging to the surface or surface waters, and if the system has a working leach system. However, a dye test will not be an inspection criteria on the Crescent Beach Sandbar or any other area where the Septic Inspector determines that dye testing would be inconclusive due to the hydrogeologic conditions of the area.

(iv) The tank shall be pumped completely by a septic hauler to ascertain if tank is water tight and if the baffles are correctly installed. If the Building Inspector determines that the tank may float, then the tank shall only be pumped to a level to support baffle inspection.

(v) The volume of the tank shall be determined. If the volume of the tank is less than 1,000 gallons, the tank shall be replaced with a tank with a minimum volume of at least 1,000 gallons. Furthermore, the volume of the tank shall be in accordance with Part 75A and this law.

(c) **Distribution Box.** The distribution box shall be located and exposed and its condition characterized including any evidence of

solids carryover, leakage into and out of the distribution box, unequal diversion of flow, or any evidence of back-up.

(d) **Leach Lines.** Leach lines shall only be exposed if a problem is found and further evaluation is required. However, the overall condition of the leach field will be observed including any signs of hydraulic failure, condition of surface vegetation, and ponding within the disposal area.

(e) **Seepage Pits.** Seepage pits are allowed if effluent is passed through a septic tank before the seepage pit, and shall only be exposed if a problem is found and further evaluation is required.

(f) **Holding Tank.** The holding tank shall be maintained, and pump-out records shall be presented at time of inspection, which document holding tank maintenance. The Building Inspector or his or her designated septic inspector shall witness a pump-out to ascertain if the tank is water tight.

(g) **ETUs.** It will be the responsibility of the property owner or his or her agent to arrange for an inspection of ETUs, with a written report of such inspection to be furnished to the Building Inspector or his or her designated septic inspector at the time of property transfer. At time of inspection, adequate proof shall be produced that ETUs have been serviced by the maintenance provider at the frequency, and in accordance with the requirements of subdivision 5(I) of this law.

(h) **Demonstrated Compliance.** If a Building Permit and Certificate of Occupancy, or a Certificate of Compliance (after proper inspection under this law) have been issued within two (2) years prior to the transfer of ownership for commercial properties or three (3) years prior to the transfer of ownership for residential or other properties, no additional inspection shall be required until the time of the next periodic inspection,

F. **Winter Inspections.** Winter inspections shall only be conducted when the area is free of snow and frozen ground. On waterfront properties, winter inspections shall not be conducted when the adjoining waterway is frozen over. A partial inspection of the septic tank and exposed components may be conducted for property transfer inspections, and a Conditional Certificate of Acceptance issued, provided that a full inspection is completed when conditions permit.

G. **Failed Systems.** Failed systems shall be brought into compliance, to the extent practical, to comply with Part 75A and this law before transfer of ownership or re-occupation of the structure.

H. **Septic Inspection Report.** Within fifteen (15) days of the inspection, the Septic Inspector shall file a completed Septic Inspection Report with the Town which shall document observed conditions and use. The property owner shall be furnished a copy of the Septic Inspection Report and any Certificate of Compliance that is issued.

9. **Enforcement Action Upon Complaint.** The Building Inspector is authorized to investigate all written complaints or concerns regarding compliance with this law.

A. **Voluntary Cooperation.** If the Building Inspector finds a reasonable basis to investigate such complaints or concerns, he or she shall first make efforts to notify the property owner of the complaint or concerns, and then proceed to visually inspect the septic system. The Building Inspector shall attempt to obtain the cooperation of the property owner to validate and resolve any concerns, and may request permission from the property owner to inspect the septic system or property. If permission is denied, except in exigent circumstances, the Building Inspector shall not enter the property to conduct an inspection without an administrative search warrant, which may be issued by the Town of Huron Justice Court.

B. **Enforcement Action.** If the Building Inspector determines that a septic system is not functioning properly, or is not in compliance with applicable legal requirements, he or she is authorized to order: (i) replacement of the tank; (ii) pumping of the tank; or (iii) other repairs or improvements; to the extent reasonably necessary to restore functionality and compliance with legal requirements. The property owner shall be responsible for all actions and costs necessary to support system inspection and repairs. If a violation of applicable legal requirements is found to exist, the Building Inspector shall order the property owner to terminate use of the septic system and discharge of sewage either immediately; or within thirty (30) days. If deficiencies are not resolved within thirty (30) days, the property owner shall also submit a schedule for compliance to the Building Inspector, who may order compliance with such schedule or such other schedule as he or she deems appropriate to protect public health, welfare and the environment. The Building Inspector may also take further enforcement action, or refer the matter to the Town Board of Health, as provided in section 11 of this law.

10. **Variances.** Variances from the requirements of this law may be granted by the Septic Board of Appeals, in accordance with this section.

A. **Septic Board of Appeals.** The Zoning Board of Appeals shall act as the Septic Board of Appeals.

B. **Standard.** The Septic Board of Appeals may grant a variance where the requirements of this law pose a practical difficulty or unnecessary hardship, and

the Board finds that the variance will safeguard public health, safety, and welfare, and protect the environment, including the quality of ground and surface water. The Septic Board of Appeals shall consider the following factors and make applicable findings regarding:

(1) Whether the use or activity to be authorized by the waiver or variance is in harmony with the purpose and intent of this law.

(2) Whether a substantial change will be produced in the general condition of the water quality or a substantial risk to groundwater quality or quantity will be created because of the variance.

(3) Whether the hardship or difficulty can be alleviated by some other method that is feasible for the applicant to pursue.

(4) Whether the variance requested is the minimum variance necessary to afford relief. To this end, the Septic Board of Appeals may recommend a lesser variance than that applied for.

(5) Whether the hardship or difficulty has been created by the applicant.

C. Exemption for Areas Proposed to Be Served by a Sewer System. In addition, if the owners of fifty (50%) percent of the assessed valuation of an area of the Town propose that a sewer system be installed to serve that area, they may apply for a variance giving that area a general exemption from the requirements of this law. If the Septic Board of Appeals finds that a reasonable plan to pursue the sewer system is presented, the Board may grant such a variance for up to three years, subject to annual review, except that septic systems in the area would still be subject to inspection, including dye tests, to ensure that they were not discharging raw sewage. If a septic system is discharging raw sewage, upgrades or repairs shall be made to eliminate such discharges. Such a variance may, upon application, be extended by the Board for additional periods of up to three years each, subject to annual review, provided significant progress in the pursuit of a sewer system is demonstrated.

D. General Procedures.

(1) Applications. The Septic Board of Appeals shall prescribe the form for applications for a variance. The application shall include:

(a) The applicant's name, address and his interest in the subject property; and if not the property owner the owner's name and address and the owner's signed consent to file the application.

(b) A narrative description of the proposed use or action together with any other pertinent information that may be necessary to

adequately review the application.

(c) A sketch plan illustrating all proposed site alterations, all structures existing on site, the existing uses and zoning of adjacent parcels, site contours and drainage patterns.

(d) A statement articulating the hardship or difficulty imposed by the enforcement and administration of this law with specific reference to the factors listed in paragraph 10(B).

(e) A statement assessing the potential impact on water quality or the use or activity to be authorized by the variance.

(2) **Hearing.** The Septic Board of Appeals shall fix a reasonable time for the hearing of any application for a variance within sixty-two (62) days from the day an application is filed.

(3) **Notice.** The Septic Board of Appeals shall give notice of the hearing on any application for a variance by the publication of a notice of such hearing in a newspaper of general circulation in the Town at least five (5) days prior to the date the hearing, and mailing notice to the applicant at least ten (10) days prior to the date of the hearing.

(4) **Meetings.** All meetings of the Septic Board of Appeals shall be held at the call of the Chairperson and at such other times as such Board may determine. All meetings of such Board shall be open to the public. The concurring vote of a majority of the members of the Board shall be necessary for the Board to act.

(5) **Oaths.** The Chairperson, or in absence of the Chairperson, the Acting Chairperson, may administer oaths and compel the attendance of witnesses.

(6) **Meetings, Minutes, Records.** Meetings of the Septic Board of Appeals shall be open to the public to the extent provided in Article Seven of the Public Officers Law. The Septic Board of Appeals shall keep minutes of its proceedings, showing the vote of each member upon every question, or if absent or failing to vote, indicating such fact, and shall also keep records of its examinations and other official actions.

(7) **Decision.** The Septic Board of Appeals shall make its decision within sixty-two (62) days of the hearing; provided, however, the time within which the Board must render its decision may be extended by mutual consent of the applicant and the Board.

(8) **Conditions.** The Septic Board of Appeals may impose such reasonable

conditions and restrictions as are directly related to and incidental to achievement of the purposes of this law and the standards for a variance.

(9) Filing. Every decision or determination of the Board shall be filed immediately in the office of the Town Clerk, and shall be a public record

11. Violations.

A. Inspections. If a property owner refuses to allow access to his or her property to conduct an inspection as required by this law, the Building Inspector shall not enter the property to conduct an inspection without an administrative search warrant, which may be issued by the Town of Huron Justice Court.

B. Abatement. In case any septic system is constructed, reconstructed, altered, converted or maintained or used, or any property is transferred, in violation of this law, or any order of the Building Inspector under this law is not complied with, the Building Inspector or the Town Board (acting as the Town Board of Health), in addition to other remedies, may institute any appropriate action to restrain, correct, or abate such violation, prevent the use of such septic system, or enforce this law or requirements under the State Public Health Law and Regulations, and the Building Inspector may revoke a Certificate of Compliance or Occupancy.

C. Hearing. The Town Board (acting as the Town Board of Health) may schedule a hearing on an alleged violation, and if the conditions arising from the violation are found to be a threat to public health, safety, or welfare of the community, the Board may order the violation corrected. Alternatively, the Board may direct that the Town take corrective action and assess all costs and expenses incurred by the Town in connection with the proceedings and correction of the violation upon the property, provided it utilizes the same procedure as set forth in section 9 of the Town Building Law for unsafe structures.

D. Criminal Penalties. Any person, firm or corporation who violates, disobeys, neglects, refuses to comply with or resists the enforcement of any provision of this law or any written order of Building Inspector issued under this law shall be guilty of an offense, and upon conviction of such offense may be subject to a fine of not more than five hundred dollars, or imprisonment for a period of not more than fifteen days, or both such fine and imprisonment for each offense. However, a person, firm or corporation convicted of a second or other repeated violation of this law, with at least one previous violation occurring within the period of five (5) years immediately preceding the latest violation, may be guilty of a misdemeanor, and may be subject to a fine of not more than one thousand dollars, or imprisonment for not more than six months, or both such fine and imprisonment for each offense. The Building Inspector is authorized to issue appearance tickets for violations of this law requiring appearance by the alleged violator in Huron Town Justice Court.

E. **Civil Penalties.** Any person, firm or corporation who violates, disobeys, neglects, refuses to comply with or resists the enforcement of any provision of this law or any written order of the Building Inspector issued under this law shall be deemed to have violated this local law, and may be liable to pay the Town a civil penalty of up to one thousand dollars for each such violation. Such a civil penalty may be assessed in any action or proceeding brought by the Septic Inspector or the Town Board to enforce the provisions of this law.

F. **Continuous Violations.** Each day a violation or offense is continued or not corrected shall be deemed a separate violation or offense.

12. **Recourse**. Any person or persons, jointly or severally aggrieved by any decision or action of the Septic Board of Appeals or any officer, department, board or bureau of the Town arising under this law, may apply to the Supreme Court for review by a proceeding under Article 78 of the Civil Practice Law and Rules. Such a proceeding against the Septic Board of Appeals must be instituted within 30 days after the filing of a decision of the Septic Board of Appeals in the office of the Town Clerk, and against any other officer, Department, board or bureau of the Town within 30 days of the decision or action.

13. **Savings Clause.** If any part of this law is held unconstitutional, invalid or ineffective, the remainder of this law shall be valid.

14. **Effective Date.** This local law shall take effect within 20 days after filing with the Secretary of State.

Appendix E
Construction Stormwater Pollution Prevention and Erosion and Sediment Control Ordinance

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Section I: Introduction / Purpose

Land disturbance activities and associated increases in impervious cover alter the hydrologic response of local watersheds and increase stormwater runoff rates and volumes, flooding, stream channel erosion, and sediment transport and deposition. This stormwater runoff contributes to increased quantities of water-borne pollutants. Stormwater runoff, soil erosion and nonpoint source pollution can be controlled and minimized through the regulation of stormwater runoff from development sites.

During the construction process, soil is the most vulnerable to erosion by wind and water. This eroded soil endangers water resources by reducing water quality, and causing the siltation of aquatic habitat for fish and other desirable species. Eroded soil also necessitates maintenance and/or repair of sewers and ditches, and the dredging of waterways. In addition, clearing and/or grading during construction tends to increase soil erosion and causes the loss of native vegetation necessary for terrestrial and aquatic habitat, and to provide a healthy living environment for citizens of Town of Parma. Improper design and construction of stormwater management practices can increase the velocity of stormwater runoff thereby increasing stream bank erosion and sedimentation. Impervious surfaces allow less water to percolate into the soil, thereby decreasing groundwater recharge and stream base flow. Regulation of land disturbance activities by means of performance standards governing stormwater management and site design will produce development compatible with the natural functions of a particular site or an entire watershed and thereby mitigate the

adverse effects of erosion and sedimentation from development.

As a result, the purpose of this local regulation is to safeguard public health, protect property, prevent damage to the environment and promote the public welfare by guiding, regulating, and controlling the design, construction, use, and maintenance of any development or other activity which disturbs or breaks the topsoil or results in the movement of earth on land in Town of Parma. It seeks to meet those purposes by achieving the following objectives:

- Meet the requirements of minimum measures 4 and 5 of the SPDES General Permit for Stormwater Discharges from Municipal Separate Stormwater Sewer Systems (MS4s), Permit no. GP-02-02 or as amended or revised;
- Require land disturbance activities to conform to the substantive requirements of the NYS Department of Environmental Conservation State Pollutant Discharge Elimination System (SPDES) General Permit for Construction Activities or as amended or revised;
- Minimize increases in stormwater runoff from land disturbance activities in order to reduce flooding, siltation, increases in stream temperature, and streambank erosion and maintain the integrity of stream channels;
- Minimize increases in pollution caused by stormwater runoff from land disturbance activities which would otherwise degrade local water quality;
- Minimize the total annual volume of stormwater runoff which flows from any specific site during and following development to the maximum extent practicable; and
- Reduce stormwater runoff rates and volumes, soil erosion and nonpoint source pollution, wherever possible, through stormwater management practices and to ensure that these management practices are properly maintained and eliminate threats to public safety.

Section II: <u>Definitions</u>

Agricultural Activity - The activity of an active farm including grazing and watering livestock, irrigating crops, harvesting crops, using land for growing agricultural products, and cutting timber for sale, but shall not include the operation of a dude ranch or similar operation, or the construction of new structures associated with agricultural activities.

Applicant - A property owner or agent of a property owner who has filed an application for a land disturbance activity.

Clearing - Any activity which removes the vegetative surface cover.

Designated Agent - Individual(s) directed by the Town of Parma to conduct site inspections and/or perform other municipal duties.

Earthwork - Construction activities including clearing, grading, excavating, soil disturbance or placement of fill that result in land disturbance.

Erosion Control - Measures that minimize erosion.

Final Stabilization - All soil-disturbing activities at the site have been completed and a uniform perennial vegetative cover with density of 80% has been established or equivalent measures such as the use of mulches or geotextiles have been employed on all unpaved areas and areas not covered by permanent structures.

Grading - Excavation or fill of material, including the resulting conditions thereof.

Land Disturbance Activity - Construction activity including clearing, grading, excavating, soil disturbance or placement of fill that results in land disturbance of equal to or greater than 1 acre, or activities disturbing less than 1 acre of total land area that is part of a larger common plan of development or sale, even though multiple separate and distinct land disturbance activities may take place at different times on different schedules.

Licensed/Certified Professional - A person currently licensed to practice engineering in New York State, a registered landscape architect or a Certified Professional in Erosion and Sediment Control (CPESC).

New York State Stormwater Management Design Manual - the *New York State Stormwater Management Design Manual*, most recent version including applicable updates that serves as the official guide for stormwater management principles, methods and practices.

New York Standards and Specifications for Erosion and Sediment Control - the most recent version of this publication which is commonly known as the "Blue Book".

Phasing - Clearing a parcel of land in distinct sections, with the stabilization of each section before the clearing of the next.

Qualified Professional - A person knowledgeable in the principles and practices of erosion and sediment controls, such as a licensed professional engineer, registered landscape architect, Certified Professional in Erosion and Sediment Control (CPESC), or soil scientist.

Responsible Individual - As related to inspection of construction site erosion controls, any person with an in-depth understanding of the principles and practices of erosion and sediment control, stormwater management and the proper procedures and techniques for the installation and maintenance of erosion and sediment control features.

Sediment Control - Measures that prevent eroded sediment from leaving the site.

Silvicultural Activity - Activities that control the establishment, growth, composition, health and quality of forests and woodlands.

Site - A parcel of land, or a contiguous combination thereof, where grading work is performed as a single unified operation.

Site Plan Approval - The examination and subsequent authorization to proceed with a project based upon a drawing prepared to specifications and containing necessary elements, which show the arrangement, layout

and design of the proposed use of a single parcel of land as shown on said plan.

SPDES General Permit for Construction Activities - A permit under the New York State Pollutant Discharge Elimination System (SPDES) issued to developers of construction activities to regulate disturbance of one or more acres of land.

SPDES General Permit for Stormwater Discharges from Municipal Separate Stormwater Sewer Systems A permit under the New York State Pollutant Discharge Elimination System (SPDES) issued to municipalities to regulate discharges from municipal separate storm sewers for compliance with EPA established water quality standards and/or to specify stormwater control standards.

Stabilization - The use of practices that prevent exposed soil from eroding.

Start of Construction - The first land disturbance activity associated with a development, including: land preparation such as clearing, grading and filling; installation of streets and walkways; excavation for basements, footings, piers or foundations; erection of temporary forms; and installation of accessory buildings such as garages.

Stormwater Management - The use of structural or non-structural practices that are designed to reduce stormwater runoff pollutant loads, discharge volumes, and/or peak flow discharge rates.

Stormwater Management Officer - An employee or officer designated by the municipality to accept and review stormwater pollution prevention plans, forward the plans to the applicable municipal board and inspect stormwater management practices

Stormwater Pollution Prevention Plan (SWPPP) - A plan for controlling stormwater runoff and pollutants from a site during and after construction activities.

Stormwater Runoff - The flow on the surface of the ground, resulting from precipitation.

Surface Waters of the State of New York - Lakes, bays, sounds, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Atlantic ocean within the territorial seas of the state of New York and all other bodies of surface water, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters that do not combine or effect a junction with natural surface or underground waters), which are wholly or partially within or bordering the state or within its jurisdiction. Storm sewers and waste treatment systems, including treatment ponds or lagoons which also meet the criteria of this definition are not waters of the state. This exclusion applies only to manmade bodies of water which neither were originally created in waters of the state (such as a disposal area in wetlands) nor resulted from impoundment of waters of the state.

Town – Town of Parma

Waterway - A channel that directs surface runoff to a watercourse, or to the public storm drain.

Section III: <u>Applicability</u>

This ordinance shall be applicable to all land disturbance activities that will disturb one or more acres of land unless exempted under Section VII.C. of this ordinance. The ordinance also applies to land disturbance activities of less than one acre if such activities are part of a larger common plan of development or sale that will disturb one or more acres, even though multiple separate and distinct land disturbance activities may take place at different times on different schedules.

Section IV: Compatibility with Other Permits and Ordinance Requirements

Compliance with this ordinance does not relieve the applicant of the obligation and responsibility to obtain separate coverage under the NYSDEC SPDES General Permit for Construction Activities if required. For projects also applying for coverage under the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity, the applicant shall submit a copy of the Stormwater Pollution Prevention Plan (SWPPP), a Notice of Intent (NOI) with a certification statement including the date demonstrating submission to the NYSDEC, a letter of permission from the NYSDEC granting approval to disturb five (5) acres or greater of land at one time (if applicable) and any related documents to the Building Department for review and approval.

The requirements of this ordinance should be considered minimum requirements and where any provision of this ordinance imposes restrictions different from those imposed by any other federal, state, or local ordinance, rule or regulation, or other provision of law, the provisions that are more restrictive or impose more stringent requirements shall take precedence.

Construction activities that involve land disturbance may also require additional compliance measures detailed in other regulations and/or ordinances such as the Ordinance for Design and Management of Post-Construction Stormwater Pollution Prevention Measures.

Section V: Legislative Authority

In accordance with the Municipal Home Rule Law of the State of New York, the Town of Parma Town Board has the authority to enact this ordinance for the purpose of promoting the health, safety, or general welfare of the Town, including the protection and preservation of the property of its inhabitants. By the same authority, the Town Board may include in any such ordinance provisions for the appointment of any municipal employees to effectuate and administer such law.

Section VI: Standards for Construction Activities Covered Under this Ordinance

The Town of Parma requires the use of technical standards for erosion and sediment controls. These are detailed in the Town's Design Criteria and the *New York State Department of Environmental Conservation's Standards and Specifications for Erosion and Sediment Control*. For the design of water quality and water quantity controls (post-construction stormwater runoff control practices), the NYSDEC's technical standards are detailed in the *New York State Stormwater Management Design Manual.*

Where stormwater management practices are not in accordance with the aforementioned technical standards, the applicant or developer must demonstrate equivalence to these technical standards and the

SWPPP shall be prepared by a licensed/certified professional.

Section VII: Land Disturbance Activity Approval Process

A. Requirements of Application

1. Any applicant requesting site plan approval or a permit for land disturbance activity which would require the disturbance of ≥1 acre of land shall also include with a submission a SWPPP that shall be reviewed and approved by the Town prior to issuance of the final site plan approval or a permit.

2. No applicant shall be granted site plan approval or a permit which would require the disturbance of ≥*1 acre* of land without the review and approval of a SWPPP by the Town.

3. Furthermore, prior to the issuance of a permit or site plan approval all projects that would result in the disturbance of ≥1 acre of land will be required to comply with all applicable provisions of the Ordinance for Design and Management of Post-Construction Stormwater Pollution Prevention Measures. As part of the SWPPP the applicant shall include a signed statement that all applicable requirements of the Ordinance for Design and Management of Post-Construction Stormwater Pollution Prevention Measures have been met to the satisfaction of the Town of Parma.

4. Each application shall bear the name(s) and address(es) of the owner or developer of the site, and of any consulting firm retained by the applicant, together with the name of the applicant's principal contact at such firm, and shall be accompanied by a filing fee as set forth in Section XIV.

5. Each application shall include a comprehensive and complete SWPPP that shall be prepared in accordance with Section IX of this ordinance.

6. Each application shall include a statement that any land clearing, construction, or development involving the movement of land shall be in accordance with the submitted SWPPP.

7. All land disturbance activities as defined in Section II of this ordinance not subject to site plan or permit approval shall be required to submit a SWPPP to the Stormwater Management Officer designated by the Town Board who shall approve the SWPPP if it complies with the requirements of this ordinance.

B. Exemptions from Ordinance

The following activities are exempt from review under this ordinance:

- Any emergency activity which is immediately necessary for the protection of public health, property or natural resources.
- Agricultural activity as defined in this ordinance.

- Silvicultural activity except that landing areas and log haul roads are subject to this ordinance.
- Routine maintenance activities that disturb less than five acres and are performed to maintain the original line and grade, hydraulic capacity or original purpose of a facility.

- Repairs to any stormwater treatment practice deemed necessary by Town of Parma

Section VIII: Financial Guarantees

The Town may, at its discretion, require the applicant to submit a financial guarantee in a form acceptable to the Town prior to issuance of site plan approval or a permit in order to insure that the stormwater pollution prevention and erosion and sediment control practices are implemented and maintained by the applicant as required by the approved SWPPP. The financial guarantee may be in the form of cash, escrow or letter of credit from an appropriate financial or surety institution which names the Town as the beneficiary. The amount of the financial guarantee shall be the total estimated construction cost of the stormwater pollution prevention and erosion and sediment control practices approved, plus a contingency. The financial guarantee shall contain forfeiture provisions for failure to complete work specified in the SWPPP. The financial guarantee shall be released in full only upon satisfaction of the requirements listed in Section XI of this ordinance. At its discretion, the Town may allow for a partial release of the financial guarantee based on the completion of various development stages.

Section IX: Stormwater Pollution Prevention Plan Requirements

The Town shall designate a Stormwater Management Officer who shall accept and review all SWPPPs and forward such plans to the applicable municipal board. A consultant cannot be appointed as a Stormwater Management Officer. The Stormwater Management Officer may (1) review the plans, (2) upon approval by the Town Board, engage the services of a New York State licensed professional engineer to review the plans, specifications and related documents at a cost not to exceed a fee schedule established by said governing board, or (3) accept the certification of a licensed/certified professional that the plans conform to the requirements of this ordinance.

Prior to final approval of a land disturbance activity, a SWPPP shall be prepared by the applicant in accordance with the specifications outlined by the Town and submitted to the Stormwater Management Officer designated by the Town for review by the appropriate board. This plan must be prepared in accordance with sound engineering practices by a qualified professional as defined in Section II of this ordinance. The final plan must be signed by a New York State licensed professional engineer (PE), who will certify that the design of all stormwater pollution prevention and erosion and sediment control practices meet the requirements outlined in the Town's design criteria and the *New York Standards and Specifications for Erosion and Sediment Control* and shall be adequate to prevent transportation of sediment from the site to the satisfaction of Town.

The requirements to have a SWPPP prepared by a qualified professional and to have the final plan signed and certified by a New York State licensed professional engineer (PE) are not applicable to land disturbance activities that meet technical standards and are five (5) acres or less occurring on a single family residence, which is not part of a larger common plan of development, or an agricultural property. In addition, these land disturbance activities must not discharge directly to a 303(d) impaired waterbody or must not be located in a Total Maximum Daily Load (TMDL) watershed.

A. Minimum Requirements

All SWPPPs shall provide the following background information and erosion and sediment controls:

1. Background information about the scope of the project, including location, type and size of project and contact Information that includes the name, address, and telephone number of all persons having a legal interest in the property and the tax reference number and parcel number of the subject property or properties.

2. Site map/construction drawing(s) for the project, including a general location map and a 1" = 50' topographic base map of the site which extends a minimum of 100 feet beyond the limits of the proposed development. At a minimum, the site map should show the total site area; all improvements; areas of disturbance; areas that will not be disturbed; existing vegetation; on-site and adjacent off-site surface water(s) including receiving waters (name of the water), streams, ponds, culverts, ditches, and wetlands as well as drainage patterns that could be affected by the construction activity; existing and final slopes; locations of utilities, roads, soils types, forest cover, and significant natural and manmade features not otherwise shown; locations of off-site material, waste, borrow or equipment storage areas, proposed concrete clean out basin(s) and construction entrance; and location(s) of the stormwater discharges(s); and resources protected under other chapters of this ordinance or by easements;

3. Description of the soil(s) present at the site;

4. Construction phasing plan describing the intended sequence of construction activities, including clearing and grubbing, excavation and grading, utility and infrastructure installation, final grading and landscaping, and any other activity at the site that results in soil disturbance. Sequencing shall identify the expected date on which clearing will begin and the estimated duration of exposure of cleared areas. Consistent with the *New York State Standards and Specifications for Erosion and Sediment Control*, not more than five (5) acres shall be disturbed at any one time unless pursuant to an approved SWPPP and a letter of permission from the NYSDEC.

5. A description of the pollution prevention measures that will be used to control litter and prevent construction chemicals and construction debris from becoming a pollutant source in the stormwater discharges; a description of construction and waste materials expected to be stored on-site with updates as appropriate; a description of controls that will be implemented to reduce pollutants from these materials including storage practices to minimize exposure of the materials to stormwater; and a description of spill prevention and response measures.

6. A description of the temporary and permanent structural and vegetative measures to be used for soil stabilization, runoff control and sediment control for each stage of the project, from initial land disturbance to project closeout, including who will be responsible for the maintenance and implementation of said features at the site and what practices will be employed to ensure that adequate vegetative cover is established and preserved. For temporary and permanent vegetative control measures, the seeding mixtures and rates, types of sod, method of seedbed preparation, depth of topsoil, expected seeding dates,

type and rate of lime and fertilizer application, and kind and quantity of mulching shall be provided.

7. A site map/construction drawing(s) specifying the location(s), size(s) and length(s) of each erosion and sediment control practice;

8. Illustration of all necessary erosion and sediment control measures, including the siting and sizing of any temporary sediment basins and provide the dimensions, material specifications and installation details for each throughout all phases of construction and completion of development of the site. Depending upon the complexity of the project, the drafting of intermediate plans may be required at the close of each season.

9. Identification of all temporary practices that will be converted to permanent control measures.

10. Implementation schedule for staging temporary erosion and sediment control practices, including the timing of initial placement and duration that each practice should remain in place;

11. Identification of the parts or components of the SWPPP that require maintenance. Furthermore it shall also provide a schedule of required maintenance and identify the party responsible for such work.

12. Description of structural practices designed to divert flows from exposed soils, store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site to the degree attainable; and

13. Any existing data that describes the stormwater runoff at the site.

14. Assurance that all other applicable environmental permits have been acquired for the site prior to initial land disturbance. Copies of the applicable environmental permits shall be provided to the Town.

15. Assurance that the applicant or their "Responsible Individual" shall be on site at all times when earthwork takes place and shall inspect and document the effectiveness of all erosion and sediment control practices.

16. Assurance that all contractors and subcontractors involved in soil disturbance and/or stormwater management practice installation and maintenance shall be identified in the SWPPP. All such contractors and subcontractors shall sign a copy of the following certification statement before undertaking any land disturbance activity at the site:

"I certify under penalty of law that I understand and agree to comply with the terms and conditions of the SWPPP. I also understand that it is unlawful for any person to cause or contribute to a violation of the water quality standards."

The certification must include the name and title of the person providing the signature, address and telephone number of the contracting firm; the address (or other identifying description) of the site; and the date the certification is made. The certification statement must be included in the SWPPP.

B. Modifications to the Plan after Approval

Major amendments of the SWPPP shall be submitted to the Town and shall be approved or disapproved.

The applicant shall amend the SWPPP whenever:

1. (a) There is a significant change in design, construction, operation, or maintenance which may have a significant effect on the potential for the discharge of pollutants to the waters of the United States and which has not otherwise been addressed in the SWPPP; or

   (b) The SWPPP proves to be ineffective in providing the proper stormwater pollution prevention and erosion and sediment control as required by this ordinance. Amendments to the SWPPP may be reviewed by the Town. A copy of the newly amended SWPPP must be provided to the Town within 5 business days.

   (c) Site development has not commenced within 18 months from SWPPP approval.

2. Additionally, the SWPPP shall be amended to identify any new contractor or subcontractor that will implement any measure of the SWPPP. The Town may request copies of signed contractor certification statements from new contractors/subcontractors working on the site.

Field modifications of a minor nature may be authorized in writing by Town or its designated agent to the applicant.

Section X: Inspections

A. Town Inspections

The Town or designated agent as defined in Section II shall make inspections as hereinafter required and shall either approve that portion of the work completed or shall notify the applicant that the work fails to comply with the SWPPP. In addition, the Town reserves the right to enter the work site at any reasonable time for purposes of inspection. The SWPPP and the records of any inspections completed by the owner or their agent shall be maintained at the site in the site logbook from the date of initiation of construction activities to the date of final stabilization. To obtain inspections, the applicant shall notify the Town at least forty-eight (48) hours before the following activities occur:

1. Start of construction
2. Erosion and sediment control measures have been installed and stabilized

3. Site clearing has been completed
4. Rough grading has been completed
5. Final grading has been completed
6. Close of the construction Season
7. Final landscaping
8. Closeout inspection

The above inspection timetable does NOT relieve the owner of the obligation under this or any other permit or regulation to conduct regular inspections as set forth in said permit and/or regulation.

If any violations are found, the applicant and developer shall be notified in writing of the nature of the violation and the required corrective actions. No further earthwork shall be conducted on the site, except for site stabilization until the violations are corrected and approved by the Town.

B. Property Owner/Developer Inspections

The applicant shall employ a "Responsible Individual" as defined in Section II of this ordinance who will oversee the implementation of the SWPPP on a daily basis. The "Responsible Individual" shall be on site at all times when construction or grading activity takes place and shall inspect and document the effectiveness of all erosion and sediment control practices. The applicant shall also employ the services of a qualified professional in erosion and sediment control who will inspect and document the effectiveness of all erosion and sediment control practices. The documentation will be kept in a site logbook. Inspection reports will be completed every 7 days and within 24 hours of any storm event producing 0.5 inches of precipitation or more. A monthly summary of reports will be copied to the site logbook and delivered to the Town within 5 days after the month's end.

The requirement to employ a qualified professional to inspect and document the effectiveness of all erosion and sediment control practices is not applicable to land disturbance activities five (5) acres or less occurring on a single family residence, which is not part of a larger common plan of development or on an agricultural property. In addition, these land disturbance activities must not discharge directly to a 303(d) impaired waterbody or must not be located in a Total Maximum Daily Load (TMDL) watershed.

Section XI: Duration, Maintenance and Closeout

A. Duration

For a project that requires a NYSDEC SPDES Permit, the SWPPP approved by the Town shall be in effect until (i) the site has been finally stabilized, (ii) a Notice of Termination (N.O.T) is submitted to the NYSDEC in accordance with the general permit, and (iii) a final inspection has been completed by the Town.

For projects that do not require a NYSDEC N.O.T., the SWPPP is in effect until a final inspection is conducted and the Town has issued the applicant written approval.

B. Maintenance

1. The applicant shall at all times properly operate and maintain all stormwater management facilities and erosion and sediment control measures which are installed or used by the applicant to achieve compliance with the conditions of this ordinance. Sediment shall be removed from sediment traps or sediment ponds whenever their design capacity has been reduced by fifty (50) percent. The land disturbance activity shall not cause an increase in turbidity that will result in substantial visible contrast to natural conditions in surface waters of the state of New York.

2. At the end of the construction season when soil disturbance activities will be finalized or suspended until the following spring, it may be desirable to reduce the frequency of the required weekly site inspections to monthly inspections. In order to reduce inspection frequencies, the applicant must complete stabilization activities before proper installation is precluded by snow cover or frozen ground. If vegetation is used as a stabilization method, seeding, planting, and/or sodding must be scheduled to avoid fall frosts and to allow for proper germination/establishment. Installations and maintenance must be done according to the *New York State Standards and Specifications for Erosion and Sediment Control.*

C. Closeout

The applicant must satisfy the following project closeout requirements:

1. Reestablish grade of all permanent stormwater facilities;
2. Inspect grading of all drainage structures and provide elevation as-builts to the Town ;
3. Establish perennial vegetative cover to a density of eighty (80) percent over one hundred (100) percent of the site;
4. Removal of all debris and temporary erosion and sediment control practices;
5. Provide a written certification by a New York State licensed/certified professional that the site has undergone final stabilization (as defined in Section II) and that all temporary erosion and sediment controls not needed for long-term erosion control have been removed.
6. Complete any other measure deemed appropriate and necessary by the Town to stabilize the project site.

Section XII: Enforcement & Penalties

A. Notice of Violation

When the Town determines that an activity is not being carried out in accordance with the requirements of the ordinance, it shall issue a written notice of violation to the owner of the property. The notice of violation shall contain:

1. The name and address of the owner or applicant;

2. The address (when available) or a description of the building, structure or land on which the violation is occurring;

3. A statement specifying the nature of the violation;

4. A description of the remedial measures necessary to bring the development activity into compliance with this ordinance and a time schedule for the completion of such remedial action;

5. A statement of the penalty or penalties that may be assessed against the person(s) to whom the notice of violation is directed.

B. Stop-Work Order

The Town may issue a stop-work order for violations of this ordinance. Persons receiving a stop-work order shall be required to halt all land disturbance activities, except those activities that address the violations leading to the stop-work order. The stop-work order shall be in effect until the Town confirms that the land disturbance activity is in compliance, the violation has been satisfactorily addressed and the appropriate fee has been paid to remove the stop-work order. Failure to address a stop-work order in a timely manner may result in civil, criminal, or monetary penalties in accordance with the enforcement measures authorized in this ordinance.

C. Violation and Penalties

Failure to comply with any provision or requirement of this ordinance or violation of any statement, plan, application, permit or certification approved under the provisions of this ordinance, shall be considered a violation punishable by a fine and/or imprisonment, as provided for in section 10(4)(b) of the Municipal Home Rule Law of the State of New York. Each day on which any violation of any of the provisions of this ordinance occurs shall constitute one offense and each successive day of violation shall constitute a separate and distinct offense.

> *"Any person who violates the provisions of the ordinance shall be subject to a fine not exceeding three hundred fifty dollars ($350) or imprisonment for a period not to exceed fifteen days, or both for conviction of a first offense; a second violation of this* ordinance *committed within a period of five years, is punishable by a fine not less than three hundred fifty dollars ($350) nor more than seven hundred dollars ($700) or imprisonment for a period not to exceed thirty days, or both; and a third or subsequent violation all of which were committed within a period of five years, is punishable by a fine not less than seven hundred dollars($700) nor more than one thousand dollars ($1000) or imprisonment for a period not to exceed thirty days, or both."*

D. Withholding of Certificate of Occupancy

Certificates of Occupancy may not be granted until corrections to all stormwater management practices have been made and accepted by the Town.

Section XIII: Abatement

A. If the violation has not been corrected pursuant to the requirements set forth in the Notice of Violation, the municipal authority, its representatives and/or employees may enter upon the subject private property with the consent of the owner or with a valid search and/or seizure warrant, and are authorized to take any and all measures necessary to abate the violation and/or restore the property.

B. Cost

Within ten days after abatement of the violation, the owner of the property will be notified of the cost of abatement, including administrative costs. If the amount due is not paid within 30 days, the charges shall become a special assessment against the property and shall constitute a lien on the property for the amount of the assessment. Any person violating any provision of this article shall become liable to the Town of Parma by

Section XIV: Injunctive Relief
It shall be unlawful for any person to violate any provision or fail to comply with any of the requirements of this ordinance. If a person has violated or continues to violate the provisions of this ordinance, the Town may petition for a preliminary or permanent injunction restraining the person from activities which would create further violations or compelling the person to perform abatement or remediation of the violation.

Section XV: Violations deemed a Public Nuisance
In addition to the enforcement processes and penalties provided, any condition caused or permitted to exist in violation of any of the provisions of this ordinance is a threat to public health, safety and welfare, and is declared and deemed a nuisance, and may be summarily abated or restored at the violators expense, and/or a civil action to abate, enjoin or otherwise compel the cessation of such nuisance may be taken.

Section XVI: Remedies not exclusive
The remedies listed in this ordinance are not exclusive of any other remedies available under any applicable federal, state, local law or ordinance and it is within the discretion of the Town to seek cumulative remedies.

Section XVII Repeal
All Local Laws, ordinances and parts thereof inconsistent with this ordinance are hereby repealed.

Section XVIII: Severability

The provisions and sections of this ordinance shall be deemed to be separable and if the provisions of any article, section, subsection, paragraph, subdivision or clause of this ordinance shall be judged invalid by a court of competent jurisdiction, such order or judgment shall not affect or invalidate the remainder of any article, section, subsection, paragraph, subdivision or clause of this ordinance.

Section XIX: Fees

A review fee shall be paid by any applicant or its agent whenever the services of the Town Engineer or other professional are required to review sketches, plats or plans submitted for Town approval. The applicant shall also reimburse the Town for all reasonable and necessary engineering, administrative, and legal expenses incurred by the Town in connection with the review, inspection and consideration of a Stormwater Pollution Prevention Plan.

Section XX Effective Date
This ordinance shall take effect immediately upon adoption by the Town Board of the Town of Parma Pursuant to Town Law of the State of New York.

Appendix F
NYSDEC Optional Additional Language: Model Local Law for Flood Damage Prevention

NYSDEC Optional Additional Language
Model Local Law for Flood Damage Prevention
Optional Additional Language

General Comments.

The Model Local Law for Flood Damage Prevention contains language that complies with the floodplain management requirements of the National Flood Insurance Program (NFIP) contained in federal regulations 44 CFR 60.3 through 44 CFR 60.6. These requirements are minimum requirements for participation in the NFIP. The Federal Emergency Management Agency (FEMA) has calculated that buildings built to these standards suffer 70% less flood related damage than unprotected buildings. However, they can still suffer damage, so higher protection levels are warranted in most instances. For example, floods can be higher than the base flood elevation for various reasons, including larger storms, downstream obstructions, increased watershed development and floodplain filling. Setting higher standards protects against these risks.

Many of the following techniques result in lower flood insurance premiums either directly or through the Community Rating System (CRS). The CRS is a FEMA program that provides discounts for communities that take measures that are beyond the minimum requirements of the NFIP. CRS certification requires a community to accumulate at least 500 points. Flood insurance policies within communities with over 500 CRS points receive a five percent discount on each individual insurance premium. Flood insurance policies within flood hazard areas in CRS communities receive an additional five percent discount for each additional 500 points. Contact NYS DEC or visit the CRS Resource Center at http://training.fema.gov/emiweb/crs/ for more information about the Community Rating System.

The following pages contain ideas for options to decrease your community's flood risk. These are all optional. Each page contains an explanation of the measure and language that may be used. Should your community decide to utilize any of these measures, please make sure that any changes are brought to the attention of NYSDEC so that we may review the final language and assure that it is compliant with FEMA's regulations.

For more information about techniques to reduce flood risk in your community, see the publication "No Adverse Impact: A Toolkit for Common Sense Floodplain Management" by the Association of State Floodplain Managers (ASFPM). The Toolkit may be viewed at http://www.floods.org/NoAdverseImpact/NAI_Toolkit_2003.pdf or ordered directly from ASFPM by calling 608-274-0123. Questions about these materials may be addressed to the NYS DEC Floodplain Management Section at 518-402-8185 or wsnecham@gw.dec.state.ny.us.

NYSDEC Optional Additional Language
Model Local Law for Flood Damage Prevention
Optional Additional Language

Compensatory Storage.

Explanation: Riverine floodplains and coastal floodplains inland from the "V" wave runup zone are either approximate "A" zones, which have not had detailed engineering analyses or flood elevations, or detailed "AE" zones or "A" zones with a number attached, that have detailed flood elevation studies. In Riverine floodplains with detailed studies, there is usually also a floodway analysis. Development is excluded from the floodway unless an engineering analysis determines that the development results in no measurable increase in the Base Flood Elevation (elevation of the 100-year flood). However, development, including fill, is allowed in "A" zones outside of floodways.

Flood Insurance Studies assume that when the entire Riverine floodplain is filled outside of the floodway, an increase of up to one foot in the Base Flood Elevation will occur at the location of the encroachment. Some communities may wish to avoid that potential increase, and to also make certain that an encroachment does not result in increased flood elevations upstream or downstream of the development, by requiring developments that encroach into the floodplain to provide compensatory flood storage.

The following language may be used for that purpose. Enforcement of the following policy could result in up to 70 credits towards flood insurance discounts in communities that participate in FEMA's Community Rating System (CRS).

To provide compensatory storage for any encroachment within a flood hazard area, add the following language to your Local Law for Flood Damage Prevention. Note that your community's section numbering may be different. Contact NYS DEC for assistance.

Add a new Part (3) to Section 5.1-2: "Encroachments".

> *Whenever any portion of a floodplain is authorized for development, the volume of space occupied by the authorized fill or structure below the base flood elevation shall be compensated for and balanced by a hydraulically equivalent volume of excavation taken from below the base flood elevation at or adjacent to the development site. All such excavations shall be constructed to drain freely to the watercourse. No area below the waterline of a pond or other body of water can be credited as a compensating excavation.*

NYSDEC Optional Additional Language
Model Local Law for Flood Damage Prevention
Optional Additional Language

Repetitive Damage.

Explanation: FEMA's Increased Cost of Compliance (ICC) flood insurance coverage provides up to $30,000 towards elevating, floodproofing, demolishing or relocating a structure that has been substantially damaged or repetitively damaged. However, that coverage is only available to a repetitively damaged structure within a community that has adopted an ICC definition in its local law. Should your community wish to add a repetitive damage clause, a change must be made in the "Substantial Damage" definition.

Should you wish to include the definition, an insured structure which has been damaged twice within a ten year period for which the average damage equals or exceeds 25% of the market value of the structure would qualify for up to $30,000 towards elevating, floodproofing, demolishing or relocating the structure. Even without the repetitive damage clause, an insured structure that has been substantially damaged in a single flood event will qualify for this Aincreased cost of compliance@ coverage.

Note that the $30,000 in additional insurance coverage is available only up to the total limit of coverage under the National Flood Insurance Program. That limit is $250,000 for a residential structure and $500,000 for a non-residential structure. The total insurance claim plus the ICC claim may not exceed the above limits.

Should you decide to include a repetitive damage clause, the municipality will be responsible for keeping track of all flood related structural damages. Also, the requirement to bring a repetitively damaged structure up to the flood code would hold whether or not the property owner carries a flood insurance policy. This would apply to a building whether or not there has been a change in ownership of the building. Should you have questions about this requirement, please contact NYSDEC.

To add the definition, replace the definition on Page 6 of the model local law with the following language:

> ***Substantial Damage*** *means damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred. Substantial damage also means flood-related damages sustained by a structure on two separate occasions during a 10-year period for which the cost of repairs at the time of such flood event, on the average, equals or exceeds 25 percent of the market value of the structure before the damage occurred.*

NYSDEC Optional Additional Language
Model Local Law for Flood Damage Prevention
Optional Additional Language

Cumulative Substantial Improvement.

Explanation. The NFIP allows improvements valued at up to 50% of the building's pre-improvement value to be permitted without meeting the flood protection requirements. Over the years, a community may issue a succession of permits for different repairs or improvements to the same structures. This can greatly increase the overall flood damage potential for the structure and within a community. The community may wish to define "substantial improvement" cumulatively so that once a threshold of improvement within a certain length of time is reached, the structure is considered to be substantially improved and must meet flood protection requirements.

Enforcement of the following policy could result in up to 110 credits towards flood insurance discounts in communities that participate in FEMA's Community Rating System (CRS).

To add the requirement, replace the definition of "Substantial improvement on Page 6 of the model law with the following language:

> ***"Substantial improvement"*** *means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the "start of construction" of the improvement. Substantial improvement also means "cumulative substantial improvement." The term includes structures which have incurred "substantial damage", regardless of the actual repair work performed. The term does not, however, include either:*
>
> *(1) any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions; or*
>
> *(2) any alteration of a "Historic structure", provided that the alteration will not preclude the structure's continued designation as a "Historic structure".*

In addition, there must be a definition for "Cumulative Substantial Improvement" as follows:

> ***"Cumulative Substantial Improvement"*** *means any reconstruction, rehabilitation, addition, or other improvement of a structure that equals or exceeds 50 percent of the market value of the structure at the time of the improvement or repair when counted cumulatively for 10 years.*

The community may wish to decrease the 50-percent threshold to a lower number, or change the ten-year tracking period. An alternative approach would be to remove the "cumulative substantial improvement" language and instead decrease the 50-percent improvement threshold.

NYSDEC Optional Additional Language
Model Local Law for Flood Damage Prevention
Optional Additional Language

Critical Facilities.

Explanation: Certain special hazard or otherwise critical facilities should not be located within a flood prone area due to the serious danger to life an health and widespread social or economic dislocation that would result when the facility is subjected to flooding. Such facilities either have the potential to create significant environmental or health risk, or are needed for community support services during a disaster.

Requiring protection for critical facilities serves several purposes: it reduces threats to life and health; it reduces damage to vital public facilities; it reduces pollution of floodwaters by hazardous materials; and it ensures that the facilities will be operable during most flood emergencies.

The Community Rating System (CRS) provides 100 points to communities that prohibit critical facilities within the 500-year floodplain.

To add the requirement, add a definition of "Critical Facilities" to page 3 of the Model Local Law as follows:

Critical facilities *means:*

(1) Structures or facilities that produce, use, or store highly volatile, flammable, explosive, toxic and/or water-reactive materials;
(2) Hospitals, nursing homes, and housing likely to contain occupants who may not be sufficiently mobile to avoid death or injury during a flood;
(3) Police stations, fire stations, vehicle and equipment storage facilities, and emergency operations centers that are needed for flood response activities before, during, and after a flood; and
(4) Public and private utility facilities that are vital to maintaining or restoring normal services to flooded areas before, during, and after a flood.

Add a new Section 5.6 as follows:

5.6 Critical Facilities

In order to prevent potential flood damage to certain facilities that would result in serious danger to life and health, or widespread social or economic dislocation, no new critical facility shall be located within any Area of Special Flood Hazard, or within any 500-year flood zone shown as a B zone or a Shaded X zone on the Community's Flood Insurance Rate Maps.

NYSDEC Optional Additional Language
Model Local Law for Flood Damage Prevention
Optional Additional Language

Areas Behind Levees or below High Hazard Dams.

Explanation: Areas that are protected by levees that provide at least three feet of protection above the 100-year flood are usually not mapped as floodprone on FIRM's. Such levees can fail or overtop. There are also many areas that would be inundated by floodwaters should an upstream dam fail or overtop. While the probability of levee or dam failure is low in most areas, the consequences of such failure are large.

In the case of levees, a community may wish to apply flood elevation requirements to the levee protected area as though the levee was not there. In the case of a dam, the community may have access to an inundation map in the event of a dam failure.

For a community to apply flood protection development standards to areas below dams or behind levees, it must first have a map of the affected area. This process will become easier as FEMA's Map Modernization program provides more communities with digital Flood Insurance Rate Maps. To include these areas, the definition of "Area of special flood hazard" definition would have to be amended to include areas that the community has identified as part of map of levee protected areas and/or dam failure inundation zones. In addition, Section 3.2, which adopts the Flood Insurance Rate Map and Flood Insurance Study for the community, would have to be amended to include the appropriate maps.

SUBWATERSHED REPORT

1. Introduction

The *Oatka Creek Watershed Prioritization of Subwatersheds* provides a description of Oatka Creek's natural features such as hydrology, floodplains, and wetlands, along with consideration of water quality within the subwatersheds or stream segments. Some of the consideration of natural features and water quality were addressed in the *Oatka Creek Watershed Characterization Report*. Also included in this report is more recent analysis based on water quality information found in "*Oatka Creek Water Quality Assessment: Identifying Point and Nonpoint Sources of Pollution with Application of the SWAT Model*", Dale Matthew Pettenski (2012) in a thesis submitted to the Department of Environmental Science and Biology of the State University of New York College at Brockport, *Theses*. *Paper 38*." The report acknowledges the United States Department of Agriculture for funding the project and the Research Foundation of SUNY and Dr. Joseph Makarewicz for the opportunity to work as a graduate assistant.

This *Oatka Creek Watershed Prioritization of Subwatersheds* is the second component of a comprehensive watershed management plan for the Oatka Creek watershed. The subwatershed prioritization includes:

- Description of the watershed and its constituent subwatersheds including population density, hydrology, floodplains, impervious cover, land cover, riparian cover, and wetlands;
- Evaluation of existing water quality data, run-off characteristics and pollutant loadings; and
- Identification of pollution sources, sources of water quality impairment, and potential threats to water quality and watershed hydrology and ecology.

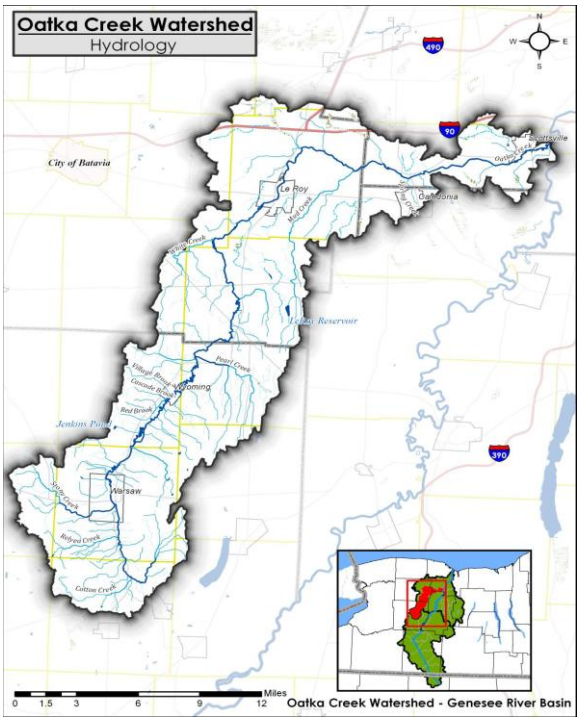
This *Oatka Creek Watershed Prioritization of Subwatersheds* report evaluates subwatersheds according to impairments and/or threats to water quality and habitat, and identifies priority subwatersheds for focused nonpoint source pollution management action.

2. General Characteristics

Hydrology

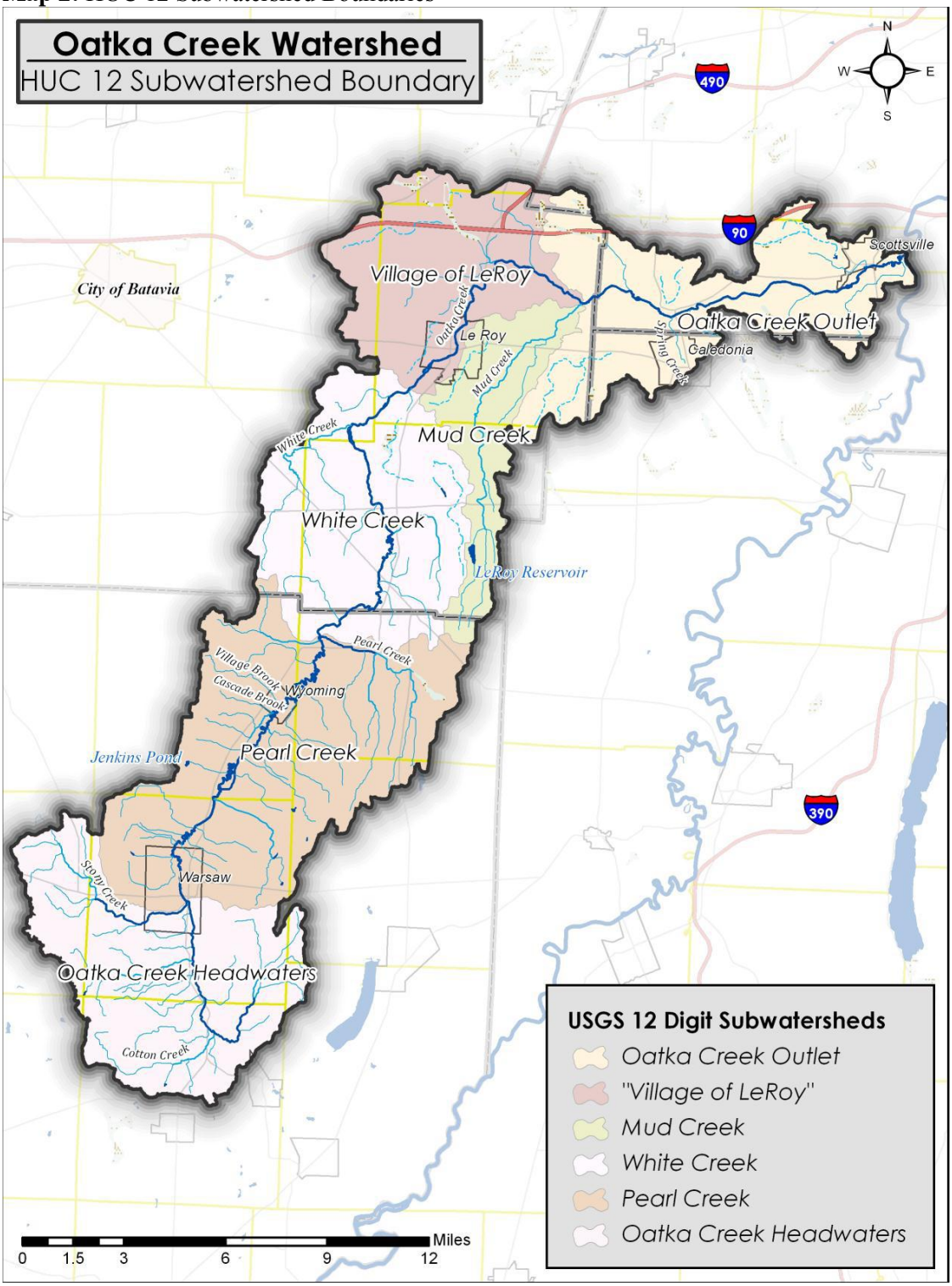
Hydrology is determined by a complex interaction between geology, groundwater, climate, physiography, and land cover. The general hydrology of the Oatka Creek watershed is shown in Map 1. Perhaps the most distinctive trait that characterizes the topography and, in turn, hydrology of the Oatka Creek watershed is that it lies within an area of North America that has been largely influenced by prolonged periods of glaciation. As a general rule, groundwater flow beneath western New York is northward from the Allegheny Plateau through the Eastern Great Lakes Lowlands with ultimate discharge into Lakes Erie and Ontario. Local deviations from this regional northward flow pattern may occur in response to small changes in topography caused by drumlins, beach ridges, recessional moraines, or bedrock escarpments. In addition, shallow groundwater flow paths may locally be affected by discharges into surface waters or withdrawal from surface waters.

Map 1: Hydrology

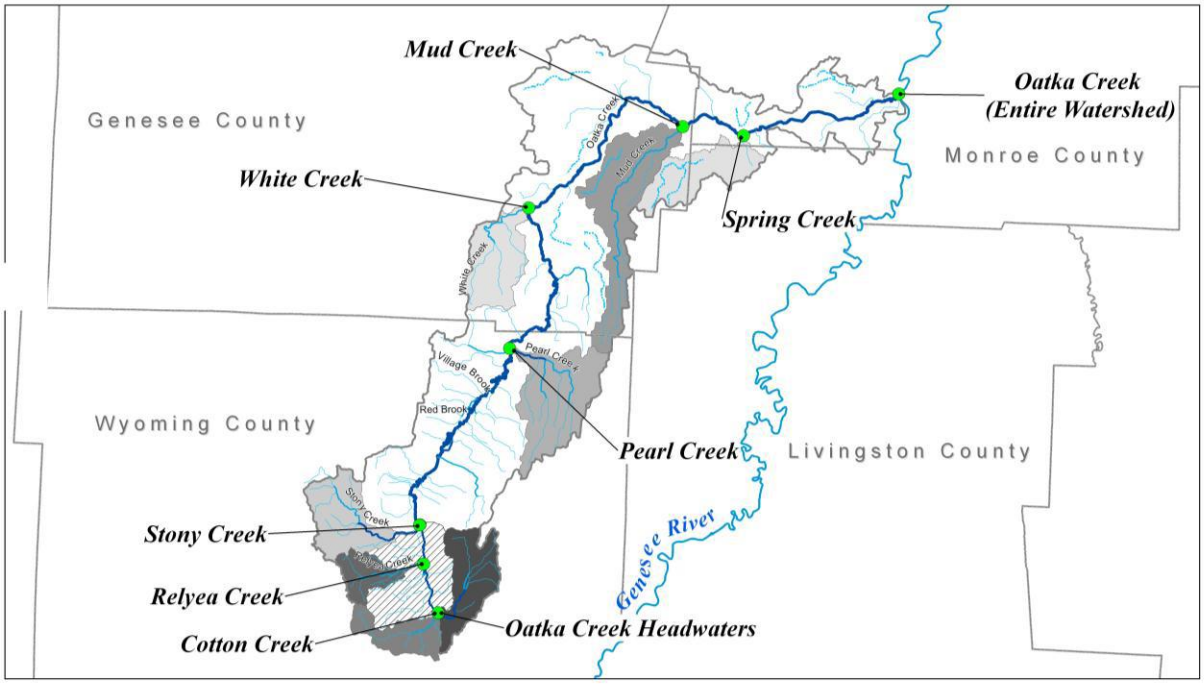


The subwatersheds used in this report relate to Map 2: USGS HUC 12 Watershed Boundaries and the stream segments discussed can be seen in Map 3: Streams and Associated Watersheds.

Map 2: HUC 12 Subwatershed Boundaries



Map 3: Streams and Associated Watersheds



The following sections describe the hydrologic features and properties of the Oatka Creek watershed and how their function relates to watershed management.

An excellent overview of the hydrology of the Oatka Creek watershed is provided on the website of the Oatka Creek Watershed Committee:

> Tributaries in central Wyoming County, the eastward trending ***Cotton Creek*** in Gainesville, and ***Relyea*** and ***Stony Creeks*** in Warsaw drain the western highlands; small streams drain the eastern highlands, and the junction of this drainage creates ***Oatka Creek***. As the Oatka progresses north through the Wyoming Valley, several unnamed seasonal tributaries drain west and east valley walls, bringing water from the hilltops at [approximately 1,900] feet elevation to 950 feet in the valley. The Oatka Creek itself falls only about five feet as it winds its way from Warsaw to Wyoming. ***Pearl Creek***, originating in Covington at an elevation of [1,400] feet, joins the Oatka Creek a short distance south of the Genesee County line. ***White Creek*** drains the towns of Bethany (elevation 1,020 feet) and Pavilion (elevation 910 feet). ***Mud Creek***, rising southeast of the LeRoy Reservoir (elevation 1,058 feet), drains in a NE direction before joining Oatka Creek 2 1/2 miles east of Buttermilk Falls [elevation 775 feet at crest] at an elevation of 630 feet. Few significant tributaries enter the Oatka between ***Mud Creek*** and the Hamlet of Mumford, where ***Spring Creek*** and some smaller limestone spring-fed streams that rise in the Onondaga limestone in Caledonia enter from the south, infusing the stream with high purity water and moderating both winter and summer water temperatures in the downstream reaches. Oatka Creek joins the ***Genesee River*** east of Scottsville at an elevation of [512] feet.[1]

Further valuable information on the LeRoy Reservoir was noted in *The Oatka Creek Watershed State of the Basin Report*:

> The Village of LeRoy use[d] a small reservoir, [***LeRoy Reservoir***], located on Mud Creek….The reservoir was built in 1915 and…has a surface area of approximately 59 acres, a maximum depth of 25 feet and an average depth of 10.5 feet. Daily water use range[d] seasonally from approximately 700,000 gallons per day to occasionally over 1,300,000 gallons per day in summer months... [***LeRoy Reservoir***] serves as a settling basin for nutrients and sediment that enter it from the headwaters of Mud Creek. These materials probably remain in Lake LeRoy and do not flow downstream toward Oatka Creek. The water level in the reservoir is usually below the top of the spillway except in the late winter and spring months. At those

times, water from the headwater regions of Mud Creek and from [***LeRoy Reservoir***] will flow downstream in Mud Creek and, ultimately, to Oatka Creek.[2]

LeRoy Reservoir is no longer used as a public drinking supply and was sold to Noblehurst Farms in 2009.

General flow statistics and other fundamental characteristics of the hydrologic network in the Oatka Creek have been summarized in Table 1. These data were derived from two primary sources – GIS analysis of the National Hydrography Dataset (NHD) and through the web-based USGS New York StreamStats GIS application. StreamStats allows users to obtain streamflow statistics, basin characteristics, and descriptive information for USGS data-collection stations and user-selected ungauged sites.[20] The program can estimate streamflow statistics for ungauged sites either on the basis of regional regression equations or on the basis of the known flows for nearby stream-gauging stations. All of the flow statistics provided in Table 1 are estimates that were derived through a combination of these approaches.

Table 1: Characteristics of Streams and Associated Subwatersheds in the Oatka Creek Watershed

	Oatka Creek Watershed	Spring Creek	Mud Creek	White Creek	Pearl Creek	Upstream of Warsaw (including Stony Creek)	Stony Creek	Relyea Creek	Cotton Creek	Headwaters (above Cotton Creek)
Drainage Area (Miles^2)	**216**	8.62	16.3	9.2	13.7	39	9.3	4.06	5.1	8.6
Main Channel Stream Length (Miles)*	**62.5**	9.68	14	7.9	8.6	11.5	7.8	5.31	5.85	6.4
Total Stream Network Length (Miles)	**430.2**	17.2	25.1	16.3	37.2	102	22	13.1	25	55.9
Mean Annual Precipitation (inches)	**33.7**	30.4	31.6	34.7	33.1	37.3	38.6	39.1	37.9	35.2
Mean Annual Runoff (inches)	**14.2**	10.4	12	15	14.1	18.2	19.4	19.9	18.8	15.9
Basin Lag Factor (hours)	**3.42**	.33	.36	.24	.2	.22	.07	.04	.09	.19
Basin Storage**	**.62**	.26	.68	.27	.35	.54	.4	.81	.61	.95
Average basin slope (feet per mi.)	**277**	101	161	238	394	335	320	300	305	264
Minimum daily flow (cfs)	**13**	--	--	--	--	--	--	--	--	--
Maximum daily flow (cfs)	**6,500**	--	--	--	--	--	--	--	--	--
Average daily stream flow (cfs)	**215.386**	--	--	--	--	--	--	--	--	--
Mean Annual Flow (cfs)	**213**	--	--	--	--	--	--	--	--	--

*Stream lengths vary here from those listed in other sections due to variations in calculation method. StreamStats includes braided channels and other intermittent stream reaches, creating greater stream lengths in some cases
**Defined as the percentage of total drainage area of identified lakes, ponds and swamps

Table 2 shows the general characteristics of the Oatka Creek subwatersheds. The upstream portion of the watershed includes the Oatka Creek Headwaters and Pearl Creek subwatersheds. Pearl Creek is the largest subwatershed. In general these two subwatersheds are relatively undeveloped with a low percent of impervious cover, high percent of forest cover, riparian cover and agricultural uses, and fairly low population density.

The mid-section of the Oatka Creek Watershed, the White Creek and Mud Creek subwatersheds, are characterized by relatively low impervious cover and forest cover, a high percentage of wetlands in the case of the White Creek subwatershed and agricultural uses, and fairly low population density.

The downstream portion of the Oatka Creek Watershed, the Village of LeRoy and Oatka Outlet subwatersheds are large subwatersheds relatively high population density and agricultural uses, relatively low forest and riparian cover, and in the case of the Oatka Creek Outlet subwatershed, very high impervious cover.

Table 2: General Characteristics of the Subwatersheds of the Oatka Creek Watershed

	Oatka	Oatka Crk Out	Oatka Crk Headwaters	Pearl Creek	White Creek	Mud Creek	Village of LeRoy
Total Area (Acres)	169582.15	**27817.42**	25029.90	**40488.98**	28363.76	11645.09	**36237.02**
Total Area (square miles)	1068.45	175.26	157.70	**255.10**	178.71	73.37	**228.31**
Impervious Cover (acres)	17270.72	7936.25	1196.85	2188.60	1798.25	859.07	3291.70
% Impervious Cover	10.18%	**28.53%**	4.78%	5.41%	6.34%	7.38%	9.08%
Forest Cover (acres)	34323.94	3888.89	9931.90	8732.82	4695.63	1847.10	5227.59
% Forest Cover	20.24%	13.98%	**39.68%**	**21.57%**	16.56%	15.86%	14.43%
Turf Cover (acres)	114386.53	17247.41	15881.92	28383.85	20207.54	7685.77	24980.05
% Turf Cover	67.45%	62.00%	63.45%	**70.10%**	**71.24%**	66.00%	68.94%
Riparian Cover (acres)	15828.80	1708.9	3521.88	5479.76	2711.17	1084.00	1323.09
% Riparian Cover	9.33%	6.14%	**14.07%**	**13.53%**	9.56%	9.31%	3.65%
Wetlands (acres)	11111.20	1769.6	1612.5	2809.3	2689.3	715.2	1515.3
% Wetlands	6.55%	6.36%	6.44%	6.94%	**9.48%**	6.14%	**4.18%**
Floodplains (acres)	6059.59	1655.14	289.56	1818.50	1045.58	316.07	934.74
Public Lands (acres)	676.84	**485.22**	50.24	77.20	12.39	13.77	38.02
Population	28231.00	**8609**	3726	**5753**	2982	1582	**5579**
Density-Population[a]	26.42	**49.12**	23.63	22.55	**16.69**	21.56	24.44
Commercial Land	668	136	136	**182**	43	19	**152**
Industrial Land	105	**26**	**26**	25	2	11	15
Aquifers (acres)	6924	58.82	**5367.06**	**1458.90**	39.67	0.00	0.00
Road Stream Crossings	75	12	**18**	12	13	4	**16**
SPDES	8	2	0	2	1	0	**3**
Large Parcels [b]	2204	350	350	**461**	**461**	205	377
[a]Density-Pop/Square Miles							
[b] Large Parcel≥ 10 acres							

Land Use and Land Cover

Land activities and water quality are inherently linked to one another. The type of activities that take place on the land will directly influence the quality and characteristics of the water that runs off of it. Understanding the characteristics of the land within a watershed area is therefore a central aspect of watershed planning. Land use characteristics such as public lands, commercial land, industrial land, developed open space, developed low intensity, developed medium intensity, developed high intensity, barren land, along with general agricultural land categories are listed in Tables 2 and 4.

Land Cover

Land cover refers to the type of features present on the surface of the earth. For example, agricultural fields, water, pine forests, and parking lots are all land cover types. Land cover may refer to a biological categorization of the surface, such as grassland or forest, or to a physical or chemical categorization such as concrete.

Land cover was assessed in the Oatka Creek watershed utilizing imagery associated with the National Land Cover Dataset. This dataset was developed by the Multi-Resolution Land Characteristics (MRLC) Consortium, a group of federal agencies who first joined together in 1993 to purchase satellite imagery for the conterminous U.S. to develop the NLCD. In 1999, a second-generation MRLC consortium was formed to purchase three dates of satellite imagery for the entire United States (MRLC 2001) and to coordinate the production of a comprehensive land cover database for the nation called the National Land Cover Database (NLCD 2001).[3] The latest NLCD version available was completed in 2006 and is used throughout this report.

The Oatka Creek watershed is dominated by agricultural land cover, with 31.2% devoted to "Cultivated Crops" and 31.3% of lands devoted to "Pasture/Hay." Forest cover accounts for approximately 21% of total land cover, while "developed" land accounts for a total of 6.8% of land cover within the Oatka Creek watershed. Natural land cover – defined here by NLCD categories 41 (Deciduous Forest), 42 (Evergreen Forest), 43 (Mixed Forest), 90 (Woody Wetlands) and 95 (Emergent Herbaceous Wetlands) – are important components of a healthy watershed. As stated in the EPA manual, *Identifying and Protecting Healthy Watersheds:*

> Natural vegetative cover stabilizes soil, regulated watershed hydrology, and provides habitat to terrestrial and riparian species. The type, quantity, and structure of the natural vegetation within a watershed have important influences on aquatic habitats…Conversely, agricultural and urban landscapes serve as net exporters of sediment and nutrients, while increasing surface runoff and decreasing infiltration to ground water stores.[4]

A summary of 2006 NLCD data focusing on natural land cover categories by subwatershed is shown in Table 3 and can be seen in the Forest Cover (acres), % Forest Cover, Turf Cover (acres), % Turf Cover, Riparian Cover (acres), and % Riparian Cover categories.

Table 3: 2006 NLCD Natural Land Cover within the Oatka Creek Watershed

HUC 12 Subwatershed	Subwatershed Area (Acres)	*% Forest*	*% Wetland*	Natural Cover Total
Oatka Creek Headwaters	24,945.36	*35.7%*	*2.7%*	38.4%
Pearl Creek	36,308.63	*21.6%*	*2.7%*	24.3%
White Creek	25,435.30	*16.6%*	*5.8%*	22.4%
Mud Creek	10,442.77	*15.9%*	*6.5%*	22.3%
Village of LeRoy	18,462.55	*15.2%*	*6.4%*	21.6%
Oatka Creek Outlet	22,445.64	*15.5%*	*7.3%*	22.8%
Oatka Creek Watershed	**138,033.14**	***20.9%***	***4.8%***	**25.7%**

As the figures indicate, natural cover is relatively low throughout the watershed, with the highest percent natural cover found in the headwaters in Wyoming County. This is another indication of the watershed's intensive agricultural character. A full explanation of 2006 NLCD categories and results by subwatershed are provided in Table 4: 2006 NLCD Land Cover – Subwatersheds of Oatka Creek Watershed.

Table 4: 2006 NLCD Land Cover – Subwatersheds of Oatka Creek Watershed												
	Headwaters		**Pearl Creek**		**White Creek**		**Mud Creek**		**Village of LeRoy**		**Outlet**	
NLCD Category	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**
11 - Open Water	33.58	0.1%	50.93	0.1%	12.23	0.0%	75.61	0.7%	63.38	0.3%	27.13	0.1%
21 - Developed, Open Space	915.82	3.7%	1,481.59	4.1%	1,244.97	4.9%	552.43	5.3%	902.92	4.9%	1,135.77	5.1%
22 - Developed, Low Intensity	135.44	0.5%	374.96	1.0%	305.79	1.2%	179.03	1.7%	703.66	3.8%	495.72	2.2%
23 - Developed, Medium Intensity	22.02	0.1%	89.40	0.2%	56.71	0.2%	38.92	0.4%	213.50	1.2%	133.44	0.6%
24 - Developed, High Intensity	0.89	0.0%	16.68	0.0%	5.12	0.0%	14.23	0.1%	70.28	0.4%	23.57	0.1%
31 - Barren Land	16.90	0.1%	23.57	0.1%	0.00	0.0%	358.95	3.4%	80.73	0.4%	41.37	0.2%
41 - Deciduous Forest	6,576.44	26.4%	6,854.21	18.9%	3,411.09	13.4%	1,459.35	14.0%	2,401.42	13.0%	2,632.27	11.7%
42 - Evergreen Forest	594.68	2.4%	91.63	0.3%	39.14	0.2%	18.24	0.2%	21.35	0.1%	54.71	0.2%
43 - Mixed Forest	1,735.35	7.0%	885.35	2.4%	760.59	3.0%	178.81	1.7%	374.51	2.0%	800.40	3.6%
52 - Shrub/Scrub	1,155.34	4.6%	1,858.33	5.1%	629.82	2.5%	523.52	5.0%	715.89	3.9%	781.27	3.5%
71 - Grass/Herbaceous	56.04	0.2%	123.21	0.3%	57.16	0.2%	54.93	0.5%	79.17	0.4%	109.42	0.5%
81 - Pasture Hay	7,435.10	29.8%	13,039.45	35.9%	9,376.83	36.9%	2,138.55	20.5%	5,593.23	30.3%	5,853.65	26.1%
82 - Cultivated Crops	5,595.68	22.4%	10,432.32	28.7%	8,057.37	31.7%	4,175.24	40.0%	6,060.48	32.8%	8,722.33	38.9%
90 - Woody Wetlands	623.82	2.5%	930.28	2.6%	1,329.25	5.2%	648.50	6.2%	1,122.65	6.1%	1,566.99	7.0%
95 - Emergent Herbaceous Wetlands	48.26	0.2%	56.71	0.2%	149.23	0.6%	26.46	0.3%	59.38	0.3%	67.61	0.3%
Total	24,945.36		36,308.63		25,435.30		10,442.77		18,462.55		22,445.64	

Land Cover in the Riparian Zone

The land area directly adjacent to streams is considered to be among the most dynamic and sensitive components of a watershed and has a significant influence on water quality. A stream surrounded by tree cover and vegetation, for example, will benefit from the cooling effects of shade from the tree canopy above and bank stabilization from tree roots and other types of plant cover below. Detritus from surrounding plants will also be contributed to the stream as a source of nutrition and habitat for a variety of animals and organisms. Conversely, streams surrounded by impervious, hard, non-vegetative cover or agricultural cover will likely experience greater soil loss and more impacts from nonpoint source pollution.

Table 5: Analysis of Natural Land Cover within a 300' Buffer of All Streams, by Subwatershed					
HUC 12 Subwatershed	Riparian Buffer Area (Acres)	*% Forest*	*% Wetland*	Natural Cover Total	*% Impervious*
Oatka Creek Headwaters	4,034.2	42.4%	7.5%	50%	<1%
Pearl Creek	6,345.1	32.4%	5.3%	37.7%	<1%
White Creek	3,198.9	26.4%	18.8%	45.2%	<1%
Mud Creek	1,368.8	19.2%	21.0%	40.2%	<1%
Village of LeRoy	1,511.2	18.5%	26.2%	44.7%	2.3%
Oatka Creek Outlet	1,960.2	27.5%	27.4%	54.9%	<1%
Oatka Creek Watershed	**18,389.61**	**30.9%**	**13.4%**	**44.3%**	**<1%**

In an effort to ascertain the level of natural cover within areas surrounding streams, a 300' buffer was created around each tributary within the watershed (150' linear distance perpendicular from the stream on both sides of the stream). The riparian buffer linear distance of 150' (45.7m) was selected in an effort to accommodate 30m² cells used by the NLCD raster grid. While correlations exist between various riparian buffer widths and specific ecological, chemical and stream morphological conditions, no such implications are made here with this selection of the 150' linear distance. Rather, the goal is simply to provide a snapshot of land cover in and around the riparian zone throughout the watershed.[32]
It is again important to emphasize that NLCD land cover classification is generalized on a 30x30 meter scale (.22 acres). Random ground-truthing of NLCD land cover pixels against aerial photography generally reveals a diverse array of actual land cover types within a given NLCD 30x30 meter pixel area. Results of this analysis should therefore be viewed with a degree of caution. Full results by subwatershed are provided in Table 6.

As Table 5 illustrates, the lands adjacent to stream corridors within the Oatka Creek watershed have a modest percentage of natural cover within them, ranging from 40.2% natural cover in the Mud Creek subwatershed to 54.9% natural cover in the Oatka Creek Outlet subwatershed, with an overall total average of 44.3% natural cover throughout the entire Oatka Creek watershed. In the absence of natural cover, agricultural land cover – mainly pasture hay and cultivated crops – is often found to be the predominant land cover type (refer to full figures in Table 6).

Table 5 also includes the percentage of impervious cover, which is a good indicator of aquatic system health.[33] This particular measure of impervious cover is a statistical average of the four "development" subcategories of the NLCD. Impervious cover is very low throughout the riparian area across the entire Oatka Creek watershed, with the highest level of riparian area impervious cover found in the 'Village of LeRoy' subwatershed at 2.3%.

Table 6: 2006 NLCD Land Cover – 300' Riparian Buffer Analysis within Subwatersheds of Oatka Creek Watershed

	Headwaters		Pearl Creek		White Creek		Mud Creek		Village of LeRoy		Outlet	
NLCD Category	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**
11 - Open Water	20.0	0.5%	23.1	0.4%	10.0	0.3%	35.4	2.6%	44.3	2.9%	14.2	0.7%
21 - Developed, Open Space	173.2	4.3%	185.9	2.9%	135.4	4.2%	57.2	4.2%	74.1	4.9%	55.2	2.8%
22 - Developed, Low Intensity	28.7	0.7%	52.3	0.8%	30.9	1.0%	8.7	0.6%	50.9	3.4%	21.6	1.1%
23 - Developed, Medium Intensity	8.7	0.2%	16.2	0.3%	10.2	0.3%	1.1	0.1%	17.3	1.1%	5.6	0.3%
24 - Developed, High Intensity	0.2	0.0%	1.1	0.0%	1.8	0.1%		0.0%	2.2	0.1%	1.6	0.1%
31 - Barren Land	3.1	0.1%	8.5	0.1%		0.0%	0.2	0.0%		0.0%	0.2	0.0%
41 - Deciduous Forest	1,224.1	30.3%	1,793.6	28.3%	592.7	18.5%	209.9	15.3%	168.4	11.1%	258.9	13.2 %
42 - Evergreen Forest	114.3	2.8%	9.8	0.2%	5.1	0.2%	1.1	0.1%	7.8	0.5%	10.5	0.5%
43 - Mixed Forest	374.1	9.3%	251.8	4.0%	247.7	7.7%	51.8	3.8%	103.0	6.8%	268.9	13.7 %
52 - Shrub/Scrub	235.7	5.8%	297.3	4.7%	107.4	3.4%	87.8	6.4%	71.2	4.7%	59.2	3.0%
71 - Grass/Herbaceous	4.4	0.1%	16.0	0.3%	5.1	0.2%	6.2	0.5%	1.1	0.1%	8.9	0.5%
81 - Pasture Hay	1,047.9	26.0%	1,907.9	30.1%	971.6	30.4%	311.1	22.7%	295.1	19.5%	301.1	15.4 %
82 - Cultivated Crops	515.3	12.8%	1,466.0	23.1%	490.4	15.3%	346.7	25.3%	324.5	21.5%	430.8	22.0 %
90 - Woody Wetlands	260.2	6.4%	299.1	4.7%	518.8	16.2%	250.2	18.3%	326.9	21.6%	499.3	25.5 %
95 - Emergent Herbaceous Wetlands	24.2	0.6%	16.5	0.3%	71.6	2.2%	1.3	0.1%	24.5	1.6%	24.5	1.2%
Total	4,034.2		6,345.1		3,198.9		1,368.8		1,511.2		1,960.2	

Impervious Cover

The Center for Watershed Protection (CWP) defines impervious cover as "any surface in the urban landscape that cannot effectively absorb or infiltrate rainfall."[5] It is the sum of roads, parking lots, sidewalks, rooftops, and other impermeable surfaces of the urban landscape. The impacts of impervious cover on aquatic systems are well documented.[5] In 1994, CWP published the paper *The Importance of Imperviousness,* which outlined the empirical evidence showing the relationship between impervious cover and stream quality. Among the conclusions drawn from that paper:

- Impervious surfaces reduce infiltration of stormwater and increase stormwater runoff volumes and velocities;
- Impervious surfaces increase stream channel instability which, in turn, triggers a cycle of streambank erosion and habitat degradation;
- Impervious surfaces collect and accumulate pollutants deposited from the atmosphere, leaked from vehicles or derived from other sources and quickly directs those pollutants into receiving waterbodies in a concentrated fashion;
- Impervious surfaces along with other associated factors (such as decreased tree cover) amplify stream warming;
- Increases in impervious surfaces are associated with a decrease in the diversity, richness and composition of the aquatic insect community, such as macroinvertebrates; and
- Levels of subwatershed imperviousness in excess of 10 to 15% can have a negative impact on the abundance and diversity of fish communities as well as the richness of both the wetland plant and amphibian community.

Impervious cover (IC) is therefore a key indicator of stream quality and watershed health. The CWP has integrated these research findings into a general watershed-planning model, known as the Impervious Cover Model (ICM). The ICM predicts that most stream quality indicators decline when watershed IC exceeds 10%, with severe degradation expected beyond 25% IC. While the actual stream response to the level of IC will vary based on a variety of conditions (local topography and physiology, other prevailing land cover characteristics, stormwater practices, watershed history), IC has nonetheless been identified as a significant contributor to aquatic system decline and therefore a reliable indicator of urban hydrologic stress.[6]

Impervious cover is obviously highest in urbanized areas within the watershed, such as the Villages of Warsaw, LeRoy, Caledonia and Scottsville. The density of buildings and streets creates a high degree of impervious cover in these areas. Because the catchment boundary in the Caledonia area is large, the ratio of impervious cover to open space is reduced, creating a low IC value. Overall, IC is not a major concern across the Oatka Creek watershed when measured by this standard, even in most villages. The Village of LeRoy does have several small catchments with a high %IC. The ICM therefore provides a starting point for further research into how these areas affect local aquatic health.

Floodplains

The National Flood Insurance Program (NFIP) is a federal program that enables property owners to purchase affordable flood insurance. Before the NFIP, flood insurance was generally unavailable. The program is based on a partnership between communities and the federal government in which the community adopts floodplain management regulations to reduce flood risks and the federal government makes flood insurance available within the community.

The National Flood Insurance Program uses the 100-year flood as the standard on which to base its regulations. This is a national standard used by virtually every Federal and most state agencies, including New York State agencies, in the administration of their programs as they relate to floodplains. The technical and engineering methods involved in determining the magnitude of these floods are well

established. Although the 100-year flood is the event that is estimated to have a one percent chance of being equaled or exceeded each year, there is no guarantee that a flood of this magnitude could not occur in fewer than 100 years or that one will necessarily occur in each 100 year period at a precise location.

Flood Insurance Rate Maps (FIRM) are produced by the Federal Emergency Management Agency and provide the official record of special flood hazard areas. While paper or flat FIRM maps are generally available online for every community in the Oatka Creek watershed, corresponding digital GIS data pertaining to the flood boundary is not available for every Oatka Creek watershed community through state or federal agencies. Furthermore, some portions of watershed communities have never been mapped by FEMA at all, creating significant and sometimes perplexing gaps in the floodplain record. (In order to create efficiencies in the mapping process, FEMA likely elected to skip certain areas that were not prone to frequent flooding or had low population density). Information provided by FEMA has been combined with information created by local offices and agencies in an effort to provide comprehensive picture of the 100-year flood zone across the entire Oatka Creek watershed.

Map 4 illustrates those areas identified as within the 100-year flood zone. While these boundaries are generally very close to the actual boundaries as indicated on official FIRM maps, some variation is evident from place to place. Maps and associated data are therefore for planning purposes only and should not be used to determine the level of flood hazard in any particular area.

Map 4: Floodplains

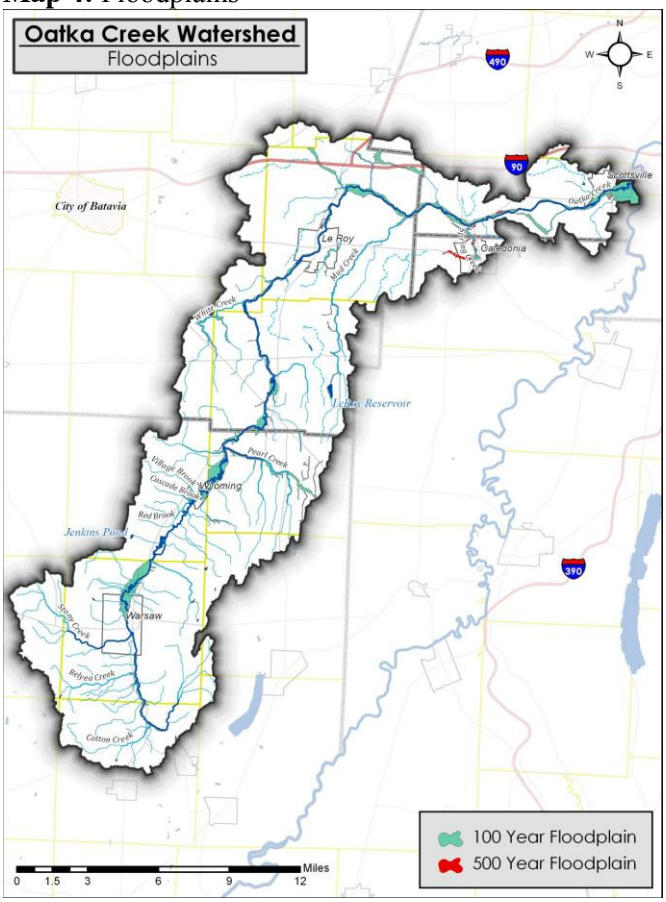


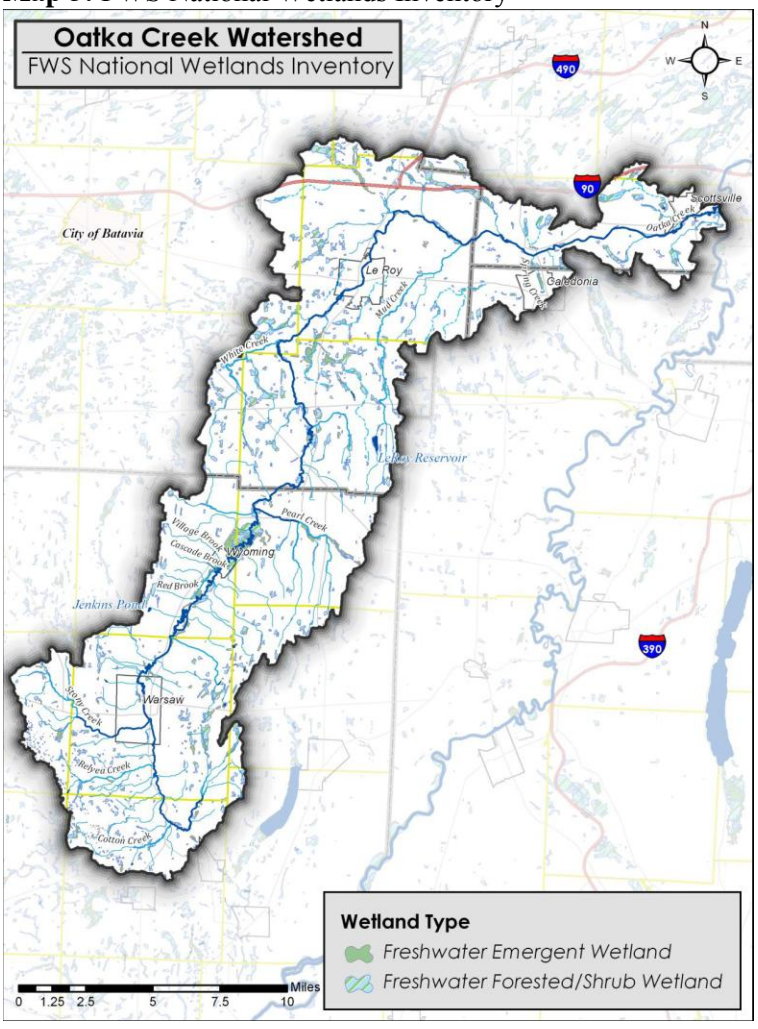
Table 7: Analysis of 100-Year Flood Zone in the Oatka Creek Watershed			
Subwatershed	**Acres at or below 100-year flood elevation**	**% of Subwatershed Area**	**% of Oatka Creek Watershed Area**
Oatka Creek Headwaters	289.56	1.2%	0.2%
Pearl Creek	1,818.05	5.0%	1.3%
White Creek	1,045.58	4.1%	0.8%
Mud Creek	316.07	3.0%	0.2%
Village of LeRoy	934.74	5.1%	0.7%
Oatka Creek Outlet	1,655.14	7.4%	1.2%
Oatka Creek	**6,059.14**	**4.4%**	**--**

Analysis of the 100-year base flood elevation (1% flood risk) indicated that 4.4% of the total land area within the Oatka Creek watershed is within this zone. The Oatka Creek Outlet subwatershed has the highest concentration of lands in the 100-year floodplain, with 1,655 acres accounting for 1.2% of total watershed area. Full results of this analysis are provided in Table 7.

Wetlands

Wetlands serve a number of important functions within a watershed, including sediment trapping, chemical detoxification, nutrient removal, flood protection, shoreline stabilization, ground water recharge, stream flow maintenance, and wildlife and fisheries habitat.

Map 5: FWS National Wetlands Inventory



In 1986, the Emergency Wetlands Resources Act mandated that the US Fish and Wildlife Service complete the mapping and digitizing of the nation's wetlands. The result is the Wetlands Geospatial Data Layer of the National Spatial Data Infrastructure. This digital data provides highly detailed information on freshwater wetlands and ponds with numerous classifications and sub-classifications. Federal wetlands (referred to as the National Wetlands Inventory (NWI)) in the Oatka Creek watershed are illustrated on Map 5. A subwatershed analysis of the NWI geospatial information is provided in Table 8.

Table 8. US Fish and Wildlife Service National Wetlands Inventory for Oatka Creek Watershed							
Subwatershed	**Total Acreage**	*Freshwater Emergent Wetland*	*Freshwater Forested/Shrub Wetland*	*Freshwater Pond*	*Lake*	*Other*	*Riverine*
Oatka Creek Headwaters	1,612.5	264.5	1,183.5	164.4	*0*	0.1	*0*
Pearl Creek	2,809.1	766.2	1,808.5	198.0	*0*	*0*	36.5
White Creek	2,689.3	259.7	2,264.1	56.0	*0*	0.3	109.2
Mud Creek	715.2	16.8	581.8	61.8	47.8	7.0	
Village of LeRoy	1,515.3	231.1	1,163.7	51.0	23.4	1.5	44.6
Oatka Creek Outlet	1,769.6	202.7	1,311.8	65.0	*0*	107.7	82.4
Oatka Creek Watershed	11,111.0	1,741.1	8,313.3	596.2	71.2	116.7	272.6

3. Water Quality

Priority Waterbodies List (PWL)
States must complete periodic assessments of water quality and habitat conditions in order to evaluate whether standards are met, and whether the designated uses are supported. In New York, surface waters exhibiting symptoms of degradation are placed on a Priority Waterbodies List (PWL), and categorized based on the severity of water quality and/or habitat degradation.

The most recently published Priority Waterbodies List (2003) evaluates 5 segments of Oatka Creek: upper, middle (Genesee Co.), middle (Wyoming Co.), lower Oatka Creek, each with its associated minor tributaries, and the LeRoy Reservoir (Table 9). [7]

Table 9: Priority waterbody listings (PWL) for segments of Oatka Creek and its tributaries (NYSDEC PWL 2003).				
Oatka Creek Segment	**Use Impairment**	**Cause Source**	**Class**	**W B Category**
Lower Oatka Ck & Minor Tribs.	Aquatic Life suspected of being **stressed** Aesthetics suspected of being **stressed** Public bathing suspected of being **stressed**	algal/weed growth; silt/sediments agriculture; stream-bank erosion	B	minor impacts
Middle Oatka Ck & Minor Tribs. (Wyoming Co.)	Recreation suspected of being **stressed** Aesthetics suspected of being **stressed**	algal/weed growth; nutrients; silt/sediment agriculture; stream-bank erosion	C	Minor Impacts
Middle Oatka Ck & Minor Tribs. (Genesee Co.)	Recreation suspected of being **stressed** Aesthetics suspected of being **stressed**	algal/weed growth; nutrients; silt/sediment agriculture; stream-bank erosion	C	minor impacts
Upper Oatka Ck & Minor Tribs.	Recreation suspected of being **stressed** Aesthetics suspected of being **stressed**	algal/weed growth; nutrients; silt/sediment agriculture; stream-bank erosion	C	minor impacts
LeRoy Reservoir (Sect. 303(d) listed waterbody)	Water supply known to be **stressed**. Aesthetics known to be **stressed**.	water level/flow, nutrients, pathogens hydro modification; failing on-site systems		minor impacts

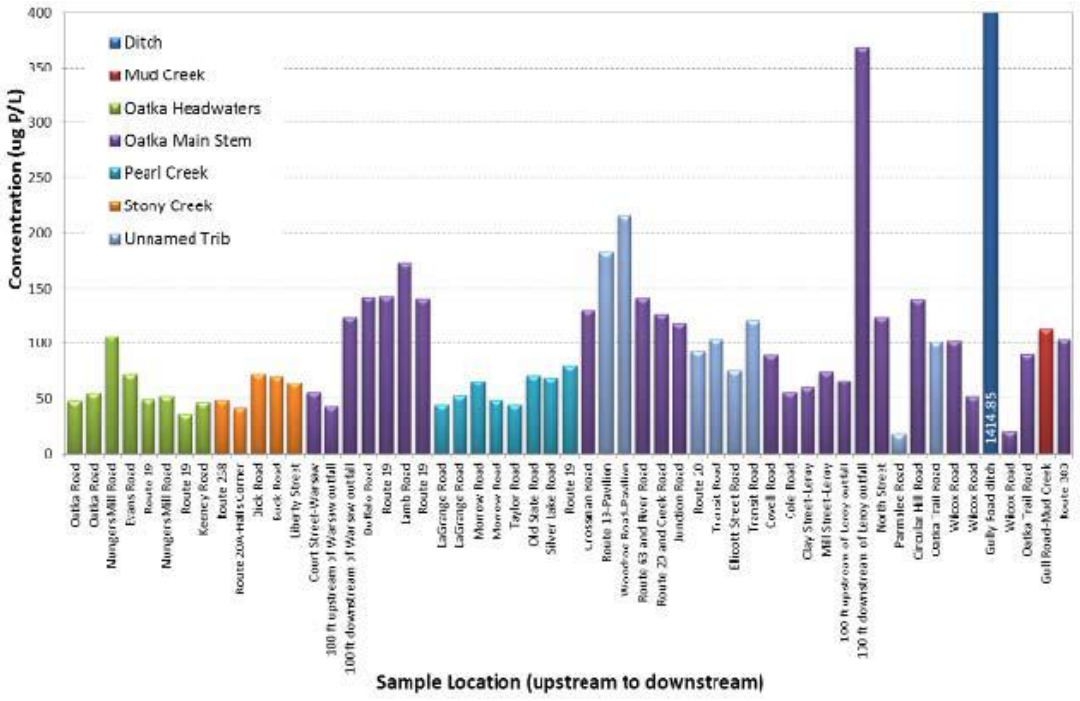
Section 303(d) Listing
In New York, waterbodies with designated uses considered precluded or impaired are eligible for placement on the 303(d) list. This list is named for the section of the Clean Water Act requiring states, territories, and authorized tribes to assess water-quality conditions within their jurisdictions and compare the data to promulgated standards. The 303(d) list is a product of this assessment; water bodies are placed

on the list when additional controls are needed to bring water quality into compliance with standards and criteria.

The Final New York State (June 2010) Section 303(d) List of Impaired Waters Requiring a TMDL/Other Strategy (http://www.dec.ny.gov/docs/water_pdf/303dlistfinal10.pdf) lists no segments of Oatka Creek with impairments significant enough to require TMDL development or other controls.

Water chemistry
The Oatka Creek Watershed State of the Basin Report (2002) noted few, if any, water quality parameters that fall outside ambient water quality standards or guidance values. However, concentrations of phosphorus, an important nutrient, and of suspended solids that contribute to turbidity, are especially high at times of high flow. The report recommends regular monitoring of these parameters of potential concern.

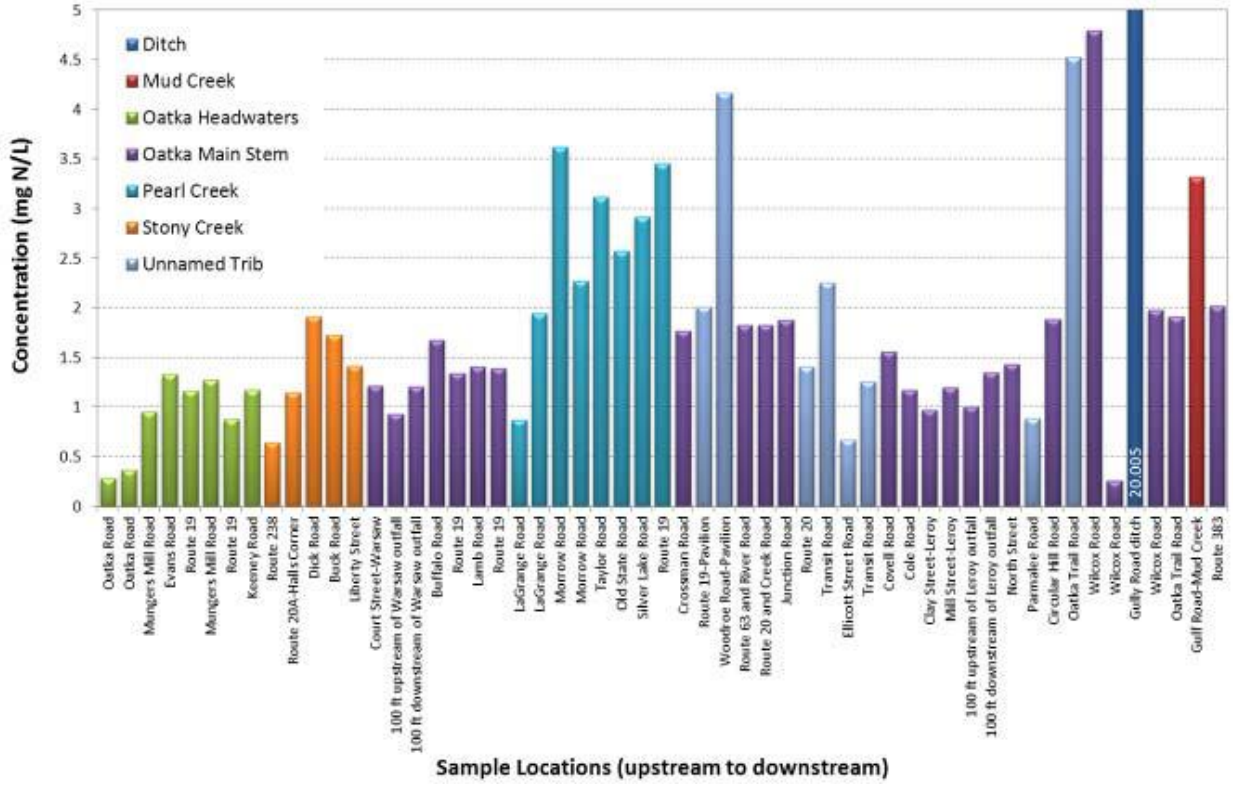
Figure 1: Total Phosphorus Average Concentrations, 2003-2004, from upstream (left) to downstream (right) on Oatka Creek. *(Source: Makarewicz and Lewis, 2004)*



As a follow-up to this recommendation, Makarewicz and Lewis (2004) collected grab samples at multiple sites along the main stream and a number of tributaries on eight dates between Sept. 2003 and May 2004, measuring total and soluble reactive phosphorus (TP (Figure 1) and SRP), nitrate and total Kjeldahl nitrogen (NO3-N (Figure 2) and TKN), sodium and total suspended solids (TSS) in order to locate sources of point and nonpoint pollution. This study identified seven areas affected by nonpoint sources of pollution on tributaries or the main stream. In each case, the sites were in proximity to agricultural lands. In addition, the study was able to discern the effects of the wastewater treatment plants at Warsaw and at LeRoy on in-stream concentrations of phosphorus and nitrogen. Makarewicz and Lewis (2004) recommend that landowners and managers in the watershed work together to implement best management practices (BMP) on agricultural lands in the watershed, especially at the sites they note as "stressed". The two wastewater treatment plants were operating within their current State Pollution Discharge Elimination

System (SPDES) permits during the study period. The investigators recommended stakeholder discussions to consider the potential for the effects of increased population growth and associated increased point source loading on Oatka Creek.

Figure 2: Nitrate Average Concentrations, from upstream (left) to downstream (right) on Oatka Creek. *(Source: Makarewicz and Lewis, 2004)*



Watershed Runoff Export Coefficients

An approach utilizing an export coefficient model to estimate annual loss of water and materials from the landscape was described in the Oatka Creek Watershed Characterization. Because limited data are available to calibrate or verify a model of chemical and sediment loss from the landscape (i.e., pollutant load) in Oatka Creek, a simple landscape approach was used with regionally-appropriate export coefficients based on land cover and soil hydrologic class. The export coefficient modeling approach is typically used to characterize rural landscapes, with nonpoint sources of pollution and limited - if any - stormwater collection and point source discharges.

This is an empirical modeling approach; the export coefficients were derived from field investigations of watersheds with a range of land cover and soil hydrologic class conditions. We endeavored to select export coefficients from areas with physiographic, climatic and soil conditions comparable to those found in the Oatka Creek watershed. The analysis estimates the annual export of material, and results are reported in units of mass per area per time (kg/ha/yr). For the purposes of this analysis, we focused on export of phosphorus from the landscape. Analysis of export for other parameters may be conducted in the future as needed.

The USGS estimated the phosphorus yield of the Oatka Creek watershed from the median concentrations for a six-year period (2003-2008). The yields were not available on a subwatershed basis, so the yield for the entire Oatka Creek watershed was used. Annual yields ranged from 0.32 to 0.42 kg/ha, and averaged

0.36 kg/ha. The average annual load of phosphorus, based on a 200 square mile watershed area, was 18,446 kg.

Phosphorus loading estimated from land cover types incorporated export coefficients with land cover area to derive total loading for the subwatersheds (Table 10), as described above. Areas within 100m of streams were weighted. The dominant land cover type related to agricultural uses – Cultivated Crops and Hay/Pasture account for 63% of total watershed land cover, and 50% of land cover within 100m of streams. The second most-common land cover type is Deciduous Forest, which accounts for 17% of the total watershed land cover, and 23% of land cover within 100m of streams.

Table 10: Summary of P Load Estimate for Land Cover, by Subwatershed (weighted to 0.25 for area >100m)

Subwatershed	Land Cover TP Load Estimate (kg/yr)	Percent of Total
Oatka Headwaters	2,860	16%
Pearl Creek	5,419	30%
White Creek	3,245	18%
Mud Creek	1,585	9%
Village of LeRoy	2,186	12%
Oatka Outlet	2,951	16%
Oatka Creek Total	18,248	

Estimates of phosphorus loading were made for two of the five municipal and industrial dischargers to Oatka Creek, based on data availability (Table 11).

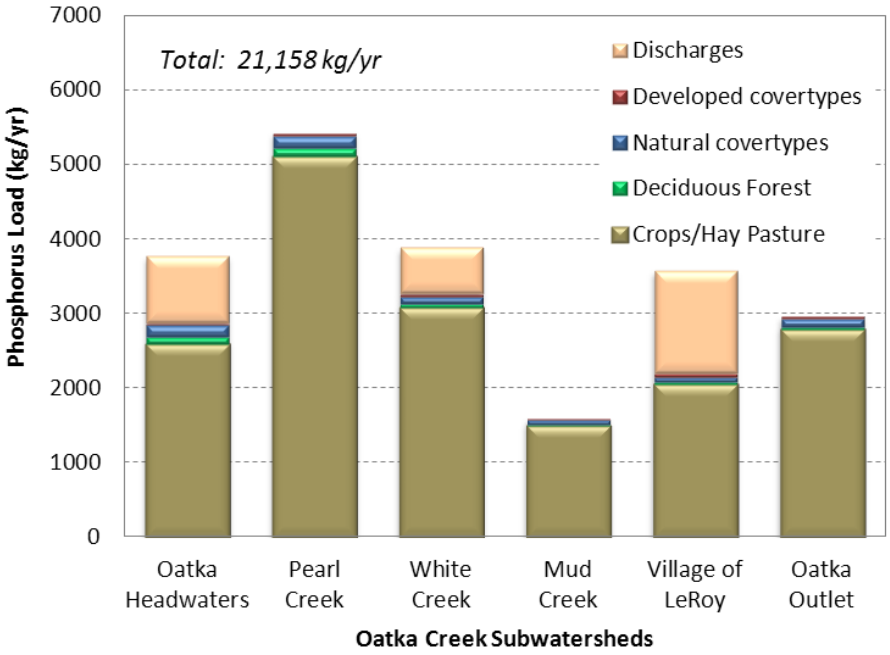
Table 11: Summary of P Load Estimate for Dischargers, by Subwatershed.

Subwatershed	Point Source TP Load Estimate (kg/yr)	Percent of Total
Oatka Headwaters	898	39%
Pearl Creek		
White Creek		
Mud Creek		
Village of LeRoy	1,382	61%
Oatka Outlet		
Oatka Creek Total	2,280	

Finally, these phosphorus loading estimates were compared with the USGS yields data. The initial analysis, using export coefficients representing average values from several sources, estimated the TP load substantially higher than that reported by the USGS. Weighting the land cover types farther than 100m from streams was conducted iteratively, until the phosphorus estimate calculated in this model approached the value obtained from the USGS yields. Ultimately, the weighting of one-quarter (0.25) of the export coefficient was applied for the land cover more than 100m from streams, which may be thought of as a quarter of the export from those areas actually reaches the stream (Table 12).

Table 12: Phosphorus Load Yield Estimates Compared to USGS Yield Data					
Subwatershed	Phosphorus Load From USGS (2003-2008) Tributary Yields (kg/year)	Estimated Non-Point Phosphorus Load From Land Use (kg/year)	Estimated Point Source Loading From SPDES Permits (kg/year)	Estimated Total (kg/year)	Difference in Measured vs. Estimated
Oatka Headwaters	--	2,862	898	3,760	--
Pearl Creek	--	5,419	--	5,419	--
White Creek	--	3,245	630	3,875	--
Mud Creek	--	1,585	--	1,585	--
Village of LeRoy	--	2,186	1,382	3,567	--
Oatka Outlet	--	2,951	--	2,951	--
Oatka Creek	18,446	18.248	2,910	21,158	2,712

Figure 3: Estimated P Loading, Oatka Creek Watershed



Water Quality Analysis

A consideration when prioritizing the Oatka Creek subwatersheds is the work done by Pettenski[8]. The objectives of the study are listed as:

Objective 1: Conduct segment analyses throughout the Oatka Creek watershed to identify sources of nutrients and sediment.

Objective 2: Evaluate nutrient and sediment load contributions of segments of Oatka Creek and its tributaries within the basin and to the Genesee River using discharge measurements and weekly water chemistry monitoring.

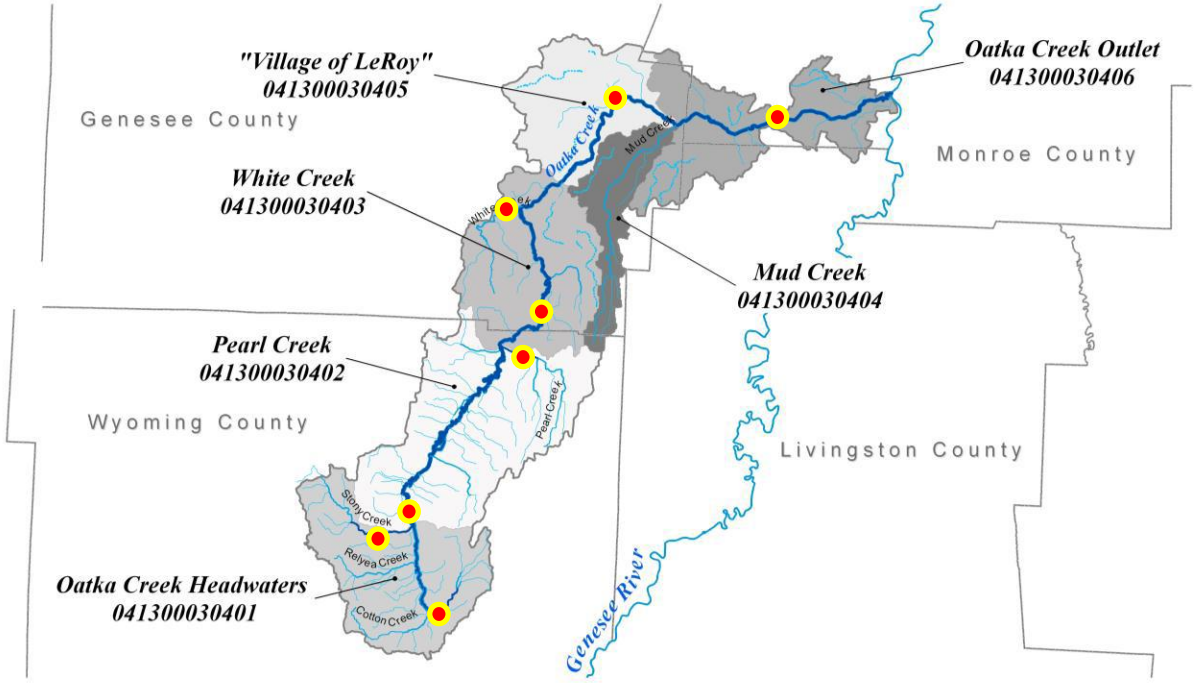
Objective 3: Create, calibrate and validate a Soil Water Assessment Tool (SWAT) model to evaluate allocated source contributions, and sources identified via segment analysis and flux (load) measurements and suggest remediation strategies to reduce phosphorus loads and concentrations in Oatka Creek.

The study design incorporates a comprehensive watershed–based approach to evaluate current water quality in the Oatka Creek Watershed. There are several components to the investigations that can be described as a series of "firsts", in terms of applying methods and techniques to the study of water quality and the sources contributing to its degradation in this watershed.

This is the first investigation to include in its design a set of sites that were routinely sampled weekly for an entire year. At these eight sites, water quality samples were collected for analysis to monitor levels of nutrients, sediment, and bacteria. The only prior study that has attempted a watershed-wide approach to monitoring the water quality in the Oatka Creek Watershed was also undertaken by researchers associated with SUNY Brockport. Makarewicz and Lewis[9] used the Stressed Stream Analysis technique to pinpoint sources of water quality impairment along the Oatka Creek mainstem and in the Stony Creek, Pearl Creek, and White Creek tributaries similar to Pettenski's sampling plan. However, the sampling done in 2003 and 2004 was limited to only a few samples at the most from any particular monitoring site and the entire sampling effort extended for only six months Sept–Nov 2003 and Mar–May 2004.

Map 6 shows the location of eight sampling sites in relationship to subwatersheds (12-digit Hydrologic Unit Code (HUC) that comprises the Oatka Creek watershed). Four of the sites are on the mainstem (main channel) of Oatka Creek and four sites are located on tributary streams flowing into Oatka Creek. Water samples were collected from each of the eight sites every week for a year from June 2010 through May 2011. The weekly samples were analyzed for soluble reactive phosphorus (SRP), nitrate, total phosphorus (TP), total nitrogen (TN), total, suspended solids (TSS), and total coliform bacteria. See Table 13 for information on these individual water quality parameters that were included in this study.

Map 6: Sample Sites



The 8 weekly sampling sites related to the HUC 12 digit subwatersheds in the Oatka Creek watershed. The four mainstem (circles) and 4 tributary (squares) were sampled weekly for a 12 month period from June 2010 through May 2011. Analysis of samples included: four nutrient parameters, total suspended solids, and total coliform bacteria. Also see Table 14, for other subwatershed classification systems.

Table 13. Parameters Included in Water Quality Monitoring, (Modified and Expanded from Makarewicz & Lewis (2004))

Total Phosphorus (TP) - A measure of all forms of the element phosphorus. Phosphorus is a nutrient required by plants and animals. It is naturally limited in most fresh water systems (lakes, ponds, streams, rivers, and wetlands) because it is not as abundant as carbon and nitrogen; introducing a small amount of additional phosphorus into a waterway can have adverse effects. Increases in nutrients like phosphorus and nitrogen can lead to eutrophication in waterbodies, where there is an overproduction of plants and algae growth. The excessive plant growth is accompanied by low dissolved oxygen levels in the water due the higher respiration rates of algae, bacteria, plants and animals and the decomposition of plant material. Sources of phosphorus include soil and rocks, wastewater treatment plants, runoff from fertilized lawns and cropland, runoff from animal manure spreading and storage areas, disturbed land areas, drained wetlands, water treatment, decomposition of organic matter, and commercial cleaning preparations. Some forms of phosphorus are more available to, and cause more immediate activity in, plants. Total Phosphorus concentration is usually given in micrograms of Phosphorus per liter (µg P/L). If in milligrams of Phosphorus per liter (mg P/L), a value of 10 µg P/L, would appear as .010 mg P/L.
Soluble Reactive Phosphorus (SRP) – SRP is a soluble form of phosphorus transported with water and is primarily present as orthophosphate. SRP, because it is soluble, is the form of phosphorus most easily used by algae and plants for growth. Usually reported as micrograms of Phosphorus per liter (µg P/L).
Total Nitrogen (TN) - A measure of all forms of the element nitrogen. Nitrogen is an essential nutrient for plants and animals. Total nitrogen is the sum of total kjeldahl nitrogen (ammonia, organic and reduced nitrogen) and nitrate -nitrite. Although nitrogen is essential to life, an excess amount of nitrogen in a waterway may lead to low levels of dissolved oxygen and negatively alter various plant life and organisms. Sources of nitrogen include: wastewater treatment plants, runoff from fertilized lawns and croplands, failing septic systems, runoff from animal manure spreading and storage areas, and industrial discharges that contain corrosion inhibitors. Usually reported in milligrams of Nitrogen per liter (mg N/L)
Nitrate + Nitrite (NO_3) - A measure of the soluble forms of nitrogen used readily by algae and plants for growth.

Sources of nitrates in the environment are many and include sewage, barnyard waste and fertilizer. Usually reported as milligrams Nitrogen per liter (mg N/L).
Total Suspended Solids (TSS) - A measure of the loss of soil and other materials suspended in the water from a watershed. Water-borne sediments act as an indicator, facilitator and agent of pollution. As an indicator, they add color to the water. As a facilitator, sediments often carry other pollutants, such as bacteria, nutrients and toxic substances. As an agent, sediments smother organisms and clog pore spaces used by some species for spawning. Concentrations usually reported as milligrams per liter (mg/L)
Total Coliform Bacteria - The presence of coliform bacteria in the water indicates that the water may have been contaminated with sewage or animal waste (i.e. manure). Coliform bacteria can be found in the aquatic environment, in soil and on vegetation; they are universally present in large numbers in the feces of warm-blooded animals. The result from a total coliform bacteria test is reported as the number of colony forming units in 100 milliliter (CFU/100 ml) sample.

In Pettenski (2012) the names given to the tributary sites are the names of roads and not the names of the streams sampled. See Table 14 for a comparison of the names used by Pettenski for his eight routinely sampled sites and the names that appear on USGS Topographic Quadrangle maps for the water features. Table 14 also provides, for each of the eight sites, the 12 digit Hydrologic Unit Code (HUC) Subwatershed and the NYS DEC watershed segment that the sites are located in.

Table 14: Sampling Site Names and Relationship to the Traditional USGS Stream Hydrographic Names and Drainage Features Found on Topographic Maps

	Pettenski (2012) Weekly Sampling Sites	Traditional USGS Stream Hydrographic Name & Drainage Feature	HUC 12 Subwatershed	NYS DEC WI/PWL Watershed Segment
DOWNSTREAM ← UPSTREAM	Evans Rd.	Oatka Creek Mainstem	Oatka Creek Headwaters	Upper
	Buck Rd. Tributary	Stony Creek Tributary	Oatka Creek Headwaters	Upper
	Warsaw	Oatka Creek Mainstem	Oatka Creek Headwaters	Upper
	Wyoming Rd. Tributary	Pearl Creek Tributary	Pearl Creek	Middle (Wyoming Co.)
	Ellicott Rd. (Rt. 63 Bridge in Hamlet of Pavilion)	Oatka Creek Mainstem	White Creek	Middle (Genesee Co.)
	Roanoke Rd. Tributary	White Creek Tributary	White Creek	Middle (Genesee Co.)
	Parmelee Rd. Tributary	No Name Tributary	Village of LeRoy	Middle (Genesee Co.)
	Garbutt	Oatka Creek Mainstem	Oatka Creek Outlet	Lower

Pettenski's 8 weekly sampling site names and how they relate to the traditional USGS Stream Hydrographic names and drainage features found on topographic maps. The table also identifies the sampling site's location related to whether the drainage area is delineated using 12-digit HUC subwatersheds or NYSDEC's Water Inventory (WI)/Priority Waterbody List (PWL) – Upper, Middle, and Lower Oatka Creek Watershed Segments.

The NYS Department of Environmental Conservation's (NYS DEC) Upper, Middle (Genesee County), Middle (Wyoming County) and Lower watershed segment designations for Oatka Creek are used in NYS DEC's Waterbody Inventory/Priority Waterbodies List (WI/PWL) that is found in the 2001 Genesee River Basin Report, published in 2003 (see Priority Waterbodies List (PWL) section above). Subsequent to NYS DEC's use of watershed segments, a system to map smaller subwatersheds was developed, called 12-digit Hydrologic Unit Code (HUC), which has now been incorporated into the standardized National Watershed Boundary Dataset used for GIS applications.

For the Oatka Creek Watershed, NYS DEC's Upper and Lower watershed segments are, respectively, the same as the Oatka Creek Headwaters and the Oatka Creek Outlet 12-digit HUC subwatersheds. NYS DEC's Middle (Wyoming County) watershed segment covers the same area as the Pearl Creek 12-digit

HUC subwatershed. Within NYS DEC's Middle (Genesee County) watershed segment are incorporated three of the Oatka Creek's 12-digit HUC subwatersheds: Mud Creek, Village of LeRoy, and White Creek.

For the purpose of this Report, Pettenski (2012) uses the USGS names for Oatka Creek's tributary streams and it will also relate the highlights of Pettenski (2012) to the 12-digit HUC Subwatershed names. The Parmelee Road Tributary name will be used because there is no other USGS name for this drainage feature.

At the 8 weekly sampling locations measurements were made of stream channel depth and width to calculate the cross-sectional area and then velocity measurements across the channel were made to determine the discharge in cubic meters per second. From multiple discharge calculations at the sites, rating curves were established to allow estimations of discharge by recording only the depth at a site. The concentrations of nutrients and total suspended solids derived from sampling and the discharge calculation allowed Pettenski to determine loadings of nutrients and suspended sediments at each of the eight sites. This study is the first time any comprehensive pollution loading information has been available for most of the length of Oatka Creek's mainstem or for its major tributaries.

A Stream Segment Analysis was performed, which included an initial one day sample of the 8 routine sites as well as an additional 15 sites covering the entire length of the main channel of Oatka Creek. Subsequent sampling was undertaken in areas where the initial sampling identified sources located in upstream locations and the process continued until the sources were identified. Separate sampling efforts were undertaken to identify impacts from point sources, principally the four Waste Water Treatment Plants (WWTPs) and important nonpoint sources like the activities of Confined Animal Feeding Operations (CAFOs).

Pettenski (2012) is also the first time a modellike the Soil Water Assessment Tool (SWAT) has been applied to the Oatka Creek Watershed. After calibrating and validating the model by using observed water quality, discharge and loading results from sampling sites, the Oatka Creek (OC) SWAT model was then used to quantify the contributions that individual point and nonpoint sources made to nutrient loads in the Oatka Creek Watershed. Model simulations also helped to determine an achievable target for reductions of the average watershed concentration of Total Phosphorus and the model was then used to determine what combinations of management options could be effective in reducing TP concentrations to meet the target concentration.

One last "first" in Pettenski (2012) was the use of biological monitoring to assess the degree of nutrient enrichment of Oatka Creek in the Lower Watershed Segment (Oatka Outlet Subwatershed) at the Garbutt mainstem sampling site. Following NYS DEC standard procedures for collection, subsampling and analysis of benthic macroinvertebrate samples from streams, two Nutrient Biotic Indices (one for Phosphorus and one for Nitrogen) were used to make an assessment of whether there was any impairment to the biological community at the Garbutt site.

As noted, this is a watershed dominated by agriculture and as such much of the issues evident in the evaluation and prioritization of the subwatersheds is based on that dominate land use.

Pettenski (2012) indicates the following watershed-wide:

- Past reports, Tatakis (2002)[10] and Makarewicz and Lewis (2004)[9], have identified the principal water quality concerns within the Oatka Creek Watershed as being nutrient enrichment, due to increases in concentrations of phosphorus and nitrogen containing compounds, and increases in sediment from soil and stream bank erosion. As a result of the yearly sampling from June 2010 through May 2011, the magnitude of the nutrient and suspended sediment losses experienced in the Oatka Creek Watershed can be calculated from the weekly samples collected and analyzed

from the furthest downstream Oatka Creek mainstem sampling site, at the Garbutt USGS gaging station, approximately 4.5 miles upstream from the confluence of Oatka Creek into the Genesee River. Annual losses observed were 15 Metric Tons (MT) for Total Phosphorus; 677.5 MT for Total Nitrogen; and nearly 5,007 MT for Total Suspended Solids.

- Of the 8 sites sampled weekly for a year, the annual average concentrations of Soluble Reactive Phosphorus (SRP), Total Phosphorus (TP) and total coliform were highest at: the White Creek tributary site in the White Creek Subwatershed (SRP: 32.5 µg P/L; TP: 86.8; total coliform: 11,129 CFU/100 mL); the Ellicott Road (a.k.a. NYS Route 63 at Pavilion) Oatka Creek mainstem site (SRP: 47.5 µg P/L; TP: 100.3 µg P/L; total coliform: 8,770 CFU/100 mL), also located in the White Creek Subwatershed; and the Pearl Creek Tributary site (SRP: 27.5 µg P/L; TP: 74.4 µg P/L; total coliform: 8,237 CFU/100 mL) in the Pearl Creek Subwatershed, when compared to the annual average concentrations found for all 8 sites (SRP: 20.2 µg P/L; TP: 61.0 µg P/L; total coliform: 6,977 CFU/100 mL). See Table 15.

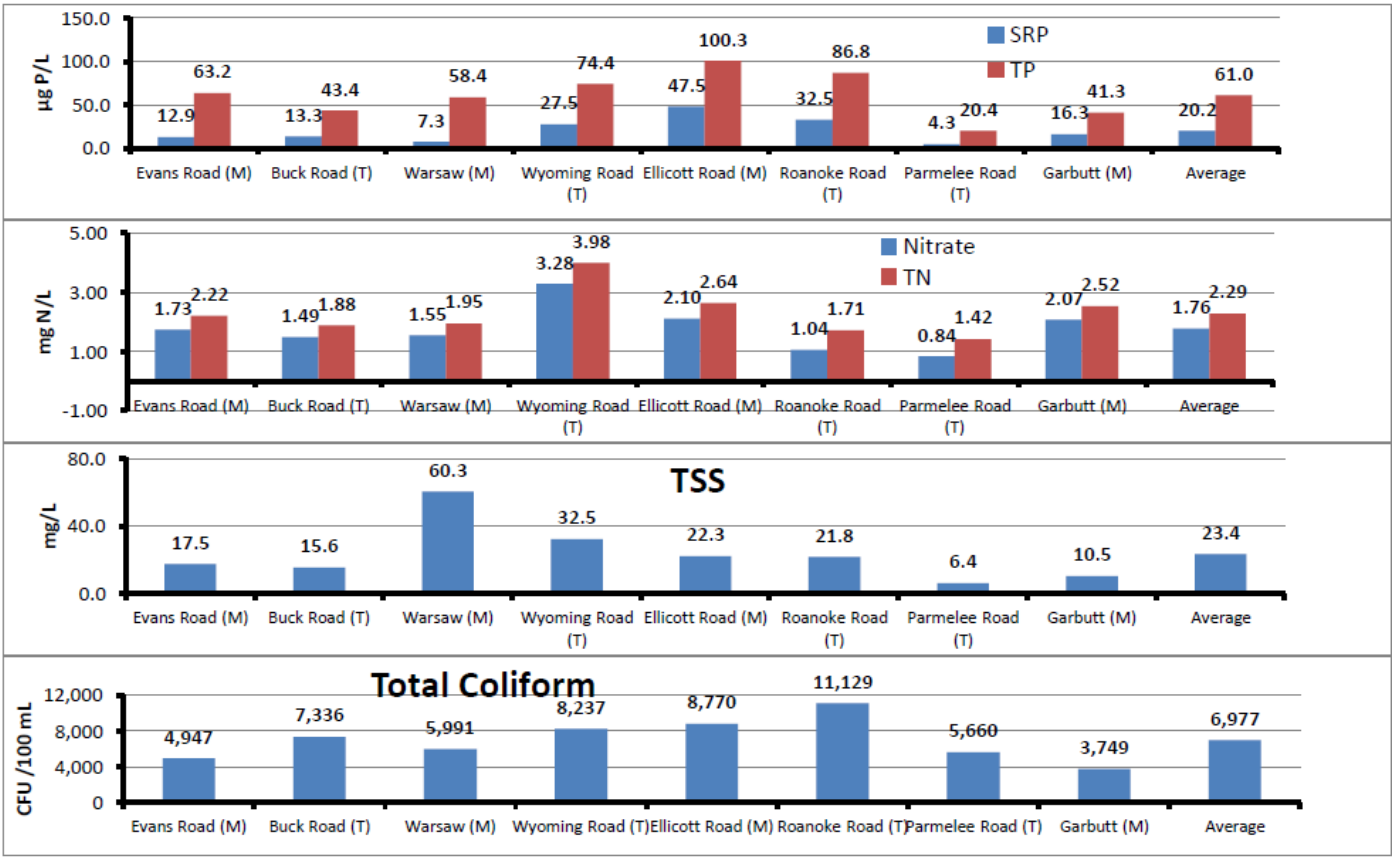
  Further evidence suggesting that Pearl Creek Tributary may be a concern are elevated annual average nitrogen concentrations (nitrate: 3.28 mg N/L; TN: 3.98 mg N/L) compared to the annual average for all eight sites (nitrate: 1.76 mg N/L; TN: 2.29 mg N/L).

  Although the Ellicott Road site is within the White Creek Subwatershed, it is located just 4 miles downstream from the boundary (immediately downstream from the confluence of Pearl Creek with Oatka Creek) between White Creek Subwatershed and the Pearl Creek Subwatershed. Water quality conditions at the Ellicott Road mainstem site would be expected to be affected by the upstream water quality within the Pearl Creek Subwatershed, particularly the Pearl Creek tributary.

- Nutrient loading (kg/yr) for each parameter (SRP, TP, Nitrate and TN) increased incrementally at each of the four mainstem site moving from upstream to downstream sites. Sediment loading (kg TSS/yr) did not follow this trend for mainstem sites. At Warsaw the TSS loading increased 1,882% over the load calculated at the upstream Headwaters site at Evans Road, but at the next downstream mainstem site at Ellicott Road there was a 51% decrease in TSS load, compared to Warsaw. Between Ellicott Road and the furthest downstream site at Garbutt, the TSS load increased by 78%.

  A reason for the apparent reduction in sediment load between Warsaw and Ellicott Road was not suggested in Pettenski's study. The reduction may be attributable to deposition in the low gradient Oatka Creek mainstem channel and its adjacent floodplain and wetland areas that are common features of the watershed segment between the Village of Warsaw and the Hamlet of Pavilion. Other possible features in the watershed that could provide temporary storage for both sediment and nutrients and therefore may affect both the observed and model predictions of downstream load calculations are the two impoundments on Oatka Creek's main channel in the Village of LeRoy.

Table 15. Average Annual Concentrations of SRP, TP, N, TN, TSS and Total Coliform Abundances



Average annual concentrations of soluble reactive phosphorus (SRP), total phosphorus (TP), nitrate, total nitrogen (TN), total suspended solids (TSS) and total coliform abundances at all eight weekly monitoring locations from June 2010 to May 2011, Oatka Creek. M = mainstem. T = tributary From Pettenski (2012). **See Table14 for the USGS waterbody names, 12-digit HUC Subwatershed names, and NYS DEC watershed segments associated with these site locations. Buck Rd = Stony Creek Tributary; Wyoming Rd. = Pearl Creek Tributary; and Roanoke Rd. = White Creek Tributary.**

- Seasonal trends in nutrient concentrations were investigated using monthly average concentrations from all eight sites sampled weekly for a year. Highest monthly concentrations of Total Phosphorus (TP) for the four mainstem sites occurred in December 2010, February 2011 and May 2011, due to the high amount of stormwater and melt water event runoff during the winter and spring. For the four tributary sites, a similar trend of high TP monthly average concentrations was associated with event conditions in winter and spring months, as well as in September 2010. At all sites, concentrations of SRP, TP, and TSS, as well as total coliform abundances showed large increases in concentrations during event conditions, compared to nonevent conditions. However, this was not indicated for nitrate and TN, which showed small increases and even lower concentrations during event conditions. In the case of TP, it is known that particulate (inorganic) phosphorus can become bound to soil particles and as TSS increases during a storm event, because of soil erosion and re-suspension of sediment, there will also be an increase in bound particulate P that will result in a higher concentration of total phosphorus being present in the water samples.

- The calibrated and validated Oatka Creek Soil Water Assessment Tool (OC SWAT) was used to predict the Oatka Creek annual Total Phosphorus loading allocations for the individual sources of

P in the watershed. The largest source, which contributes 31% of the downstream transport of phosphorus in the watershed, was agriculture-related activities [Agriculture Fields = 2,305 kg TP/yr (17.9%); Farm Animals (CAFO) = 1,310 kg TP/yr (10.2 %) and Tile Drainage = 438 kg TP/yr (3.4%)]. The four municipal wastewater treatment facilities operated by the Villages of Warsaw, LeRoy, Scottsville and the Town of Pavilion contribute 26.2 % (3,375 kg TP/yr) of the total phosphorus load from the watershed. On-site residential septic systems, urban runoff and the NYS DEC Caledonia Fish Hatchery contribute, respectively, 6.9% (890 kg TP/yr), 4.4 % (439 kg TP/yr), and 2 % (260 kg TP/yr) to the Total Phosphorus in Oatka Creek.

The above sources are all the result of human activities and are referred to as anthropogenic sources, which in this case, result in over 70 % of the total phosphorus entering the Oatka Creek Watershed. Natural sources of phosphorus also contribute. Groundwater was found to be the largest natural source, contributing 25.2 % (3,244 kg TP/yr), followed by stream bank erosion 4.4 % (563 kg TP/yr), and the combined contribution of forest and wetlands, which is 0.33% (37 kg TP/yr) of the Total Phosphorus load leaving the watershed.

- Water Quality impacts of the four Municipal Wastewater Treatment Plants (WWTPs) were investigated by collecting water samples from locations both upstream and downstream of the discharge point for the treated effluent from each these plants, as well as collecting a grab sample of their treated effluent.

  The Village of LeRoy WWTP, is a secondary treatment plant with the highest maximum discharge (3,785 m^3/day) and highest TP load (9.0 kg P/day) of the four WWTPs in the Oatka Creek Watershed. SRP, TP, nitrate, and TN were found to have downstream concentrations that were significantly higher than their concentration upstream of the plant's effluent discharge point. This WWTP discharges to Oatka Creek within the Village of LeRoy Subwatershed (12-digit HUC).

  The Village of Warsaw WWTP is a secondary treatment plant with the second highest discharge (2,650 m^3/day) and TP Load (4.9kg P/day). Concentrations of SRP, TP, nitrate, and TN found in the Oatka Creek downstream from this WWTP were significantly higher than upstream of the plant's treated effluent discharge. This WWTP discharges to Oatka Creek within the Pearl Creek Subwatershed (12-digit HUC).

  The Village of Scottsville WWTP is a secondary treatment plant with the third highest discharge (2,461 m^3/day) and TP Load (3.9 kg P/day). The analysis of the plant's treated effluent showed that it had the lowest concentrations of nutrients and total coliform abundances (SRP: 1,405.7 µg P/L; TP: 1,597.8 µg P/L; nitrate: 4.13 mg N/L; TN: 6.98 mg N/L; total coliform: 150,000 CFU/100mL) when compared to the other three plants. SRP, TN, and total coliform abundances found in Oatka Creek downstream from the WWTP were significantly higher than upstream of the plant's treated effluent discharge. This WWTP discharges to Oatka Creek within the Oatka Creek Outlet Subwatershed (12-digit HUC).

  The Pavilion WWTP, is a secondary treatment plan with the lowest maximum discharge (303 m^3/day) and the lowest TP load (1.1 kg/day). However, when the effluent sample was analyzed from this secondary treatment plant, it had the highest concentrations of nutrients and total coliform abundances (SRP: 3,425.9 µg P/L; TP: 3,591.8 µg P/L; nitrate: 19.09 mg N/L; TN: 20.44 mg N/L; total coliform: 52,000 CFU/100mL) compared to the other three plants. This WWTP discharges to Oatka Creek within the White Creek Subwatershed (12-digit HUC). Concentrations of SRP, TP, nitrate, TN, and total coliform abundances found in Oatka Creek

downstream from the WWTP were significantly higher than upstream of the plant's treated effluent discharge.

- The OCSWAT model was used to predict what changes in TP concentration and loading would result from either upgrading all WWTPs to tertiary treatment, or closing the WWTPs because the sanitary wastewater from the served communities could be transferred out of the Oatka Creek watershed for treatment. The tertiary treatment included chemical addition and a two-stage filtration system. This system is used at two WWTP in New York (Stamford WWTP, capacity .5mgd; Walton WWTP, 1.55 mgd). The WWTPs with this tertiary treatment had effluent concentration for phosphorus of 10 µg/L [11]

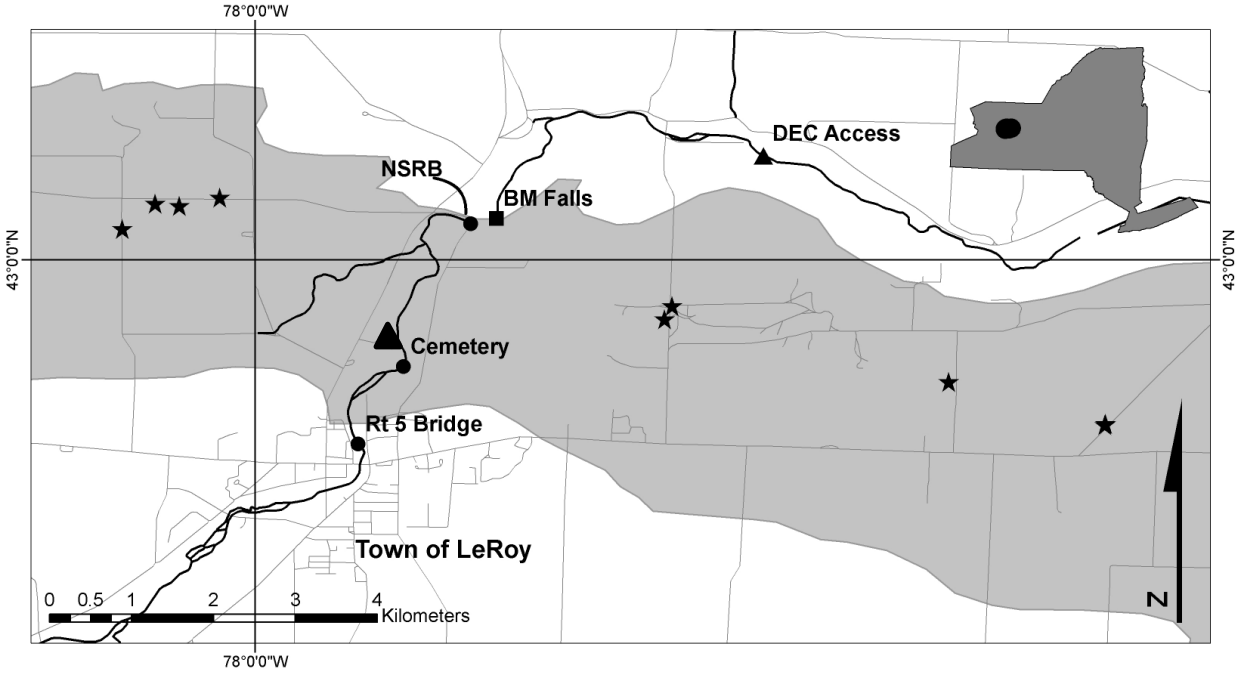
  The model simulation predicted that if all four WWTPs were upgraded to tertiary treatment, a 24.9 % reduction in TP loading in the watershed and a 38.8 µg P/L average watershed concentration could be achieved. Surprisingly, the model simulation associated with closing all of the WWTP resulted in almost the same predictions; a 25 % reduction in phosphorus loading and a 38.7 µg P/L average watershed concentration. The similar predictions probably result from the high level of phosphorus removal that is attributable to the tertiary treatment method. While the impact of closing or upgrading the WWTPS may have the same level of water quality improvements when phosphorus is considered, closing of WWTPs would result in many improvements, beyond just phosphorus, because all contaminants currently in their effluent discharges would not be entering Oatka Creek.

  The following information was not included in Pettenski (2012) but is important to a consideration of the current status and options potentially available for water quality improvements related to the WWTPs in the Oatka Creek Watershed. Transferring sanitary flows from an aging Municipal Wastewater Treatment Plant for treatment at another system has already occurred in the Village of Churchville in the Black Creek watershed, which is immediately adjacent to the Oatka Creek Watershed to the west and north. The Village's WWTP was closed in 2004 and flows were diverted to the Monroe County Pure Waters System, whose WWTPs discharge their treated effluent directly to Lake Ontario. In the Oatka Creek Watershed, the Village of Scottsville is in the process of completing the same type of transfer of its sanitary flows to the Monroe County Pure Waters System. A forcemain and pump station are in place and are being commissioned and tested, it is anticipated that diversion of sanitary flows will begin in the first half of 2014, with the subsequent closing of the Village of Scottsville WWTP.

  Even though OCSWAT modeling predicts that both upgrading WWTPs to tertiary treatment and total removal of WWTP effluent through diversion would have similar effects, some additional considerations in the case of the Village of Le Roy's facility may indicate the latter option offers additional water quality benefits to Oatka Creek. The discharge location for the Village of LeRoy's wastewater treatment plant is within that portion of Oatka Creek that flows over the Onondaga Escarpment, which is primarily limestone bedrock.

  The following information is from a report from Jill Libby[12] ,who as a student at SUNY–Brockport, investigated the surface water and groundwater interactions between Oatka Creek and the Onondaga Escarpment. The area of Oatka Creek underlain by the Onondaga Escarpment extends from a point immediately downstream of Route 5 Bridge in the Village of LeRoy to Buttermilk Falls, which has was created by Oatka Creek's erosion of the Escarpment. Map 7 is a map of the study area from Libby's 2010 report, which has been modified to add the location of the Village of LeRoy's WWTP. The Onondaga Escarpment is composed of limestones which contain fractures, joints, and bedding planes that allow surface water to enter the bedrock and the groundwater aquifer.

Map 7: Study Area Near LeRoy, New York.



Outcrop of the Onondaga formation is shaded gray. Stars represent wells that were used for groundwater sampling. Circles represent sites used for surface water sampling at Rt 5 Bridge, Cemetery and NSRB (North Street Road Bridge) sites. The square represents the location of Buttermilk Falls (BM Falls) and the triangles represent sampling at the DEC access site. The dark black line through these points is Oatka Creek. Light gray lines represent roads. The large black triangle located north of the Cemetery is the location of the Village of Leroy's WWTP. Modified from Libby, J. (2010) report.

The limestone of the Onondaga Escarpment is also easily dissolved and this process widens the fractures, joints and bedding planes and also causes large sink holes to form which enable larger amounts of water to enter the bedrock aquifer and to move quickly through the bedrock. The type of geology and terrain caused by the dissolution of limestone is referred to as karst. As Oatka Creek flows over the Onondaga limestone formation, it begins to lose water to the bedrock. This begins throughout limestone bedrock area, but a large sinkhole in Oatka Creek near the Cemetery on North Street and upstream from the Village's WWTP hastens the process. During the summer months, except during large storm events, the channel of Oatka Creek loses so much water to the bedrock that most of the channel between the WWTP and Buttermilk Falls becomes dry. Some water from the groundwater aquifer returns to Oatka Creek downstream of Buttermilk Falls and additional groundwater is discharged from springs and seeps that are located along Oatka Creek near Circular Hill Rd., as it flows through the town of LeRoy in Genesee County, on its way to the Town of Wheatland in Monroe County, where it receives its greatest input of water originating from groundwater when Spring Creek enters Oatka Creek in the Hamlet of Mumford. Although Oatka Creek regains flow downstream of Buttermilk Falls in the summer months, the rate of gain is less than the rate of loss of the flow that was available upstream of the effects of the Onondaga Escarpment.

The loss of Oatka Creek flow to the limestone bedrock aquifer that is described in Jill Libby's report would also apply to the loss to the bedrock aquifer of the treated effluent discharged by the Village of LeRoy's WWTP to Oatka Creek. If sanitary flows from LeRoy could be diverted to

and treated by Monroe County Pure Waters, any potential concern with contamination of the limestone aquifer from the plant's treated effluent discharge would be eliminated.

- Use of OCSWAT – Watershed-based Achievable TP limits, BMPs for nutrient, and Management Options.

  Achievable target concentrations for reducing Total Phosphorus in the Oatka Creek watershed were discussed in the Pettenski (2012). New York has an existing ambient water quality guidance value of 20 µg P/L for phosphorus applicable to ponds, lakes, and reservoirs. There have also been a series of three papers, which investigate the establishment of numerical nutrient (phosphorus and nitrogen) criteria for flowing waters, which have been co-authored by NYS DEC staff from the Department's Stream Biomonitoring Unit (Smith et al. 2007[13] ; Smith & Tran. 2010[14] ; and Smith et al. 2013[15]). In the 2007 paper a phosphorus concentration of 65 µg /L TP for wadeable streams was recommended. However, in the two later papers lower concentrations have been recommended. Smith & Tran 2010 proposed a phosphorus concentration of 30 µg/L TP for large rivers. In the Smith et al. (2013) paper, a phosphorus concentration of 17 µg/L TP was identified for streams in Ecoregion VII, which includes the Oatka Creek watershed. This low concentration was considered to be a protective level for aquatic life in streams because higher concentrations were found to have a higher probability of causing biological impairment through significant changes that occurred to the community structure of the aquatic life living in streams. The 2010 and 2013 papers were not available for review in conjunction with the studies covered in Pettenski (2012).

  In the case of Oatka Creek, the average concentration of Total Phosphorus from the eight main stem and tributary sites that were sampled on a weekly basis for a year, was 61 µg P/L (See Table 15), which is under the 65 µg P /L target concentration. If only the averages from the four mainstem sites are considered the average for the watershed is 65.8 µg /L, which just barely exceeds the target concentration. The OCSWAT model was used to simulate what the watershed's total phosphorus concentration would be if all human disturbances were removed and only natural vegetation cover (i.e. forest and wetland) was present. The predicted concentration for this "Natural" Model simulation was 22.9 µg P/L at the Garbutt site and this value was considered the minimal concentration that could be attained in the Oatka Creek watershed. It is possible that within the Oatka Watershed there are still areas which may have lower concentrations of TP, see average for the Parmelee Tributary in Table 15, or streams where wide forested buffers still exist, e.g. Cotton Creek in the Oatka Creek Headwater Subwatershed. Where they exist, these least disturbed areas of the watershed should be identified and protected as much as possible.

  Given the minimal attainable predicted concentration of 22.9 µg P/L and the observed average concentration for the watershed was at or below the 65 µg P/L target concentration, Pettenski (2012) decided to use the OCSWAT Model to run simulations to predict what set of management practices could achieve a median water quality target of 45 µg P/L for Total Phosphorus (TP) for the Oatka Creek Watershed. See Table 16 for a comparison of observed values and predicted values from the OCSWAT Base and Natural Model Simulations for TP concentrations at each of the four mainstem sites on Oatka Creek.

Table 16. Main Stem TP And TSS Concentrations From Measured Values, SWAT Base Model Simulated, and SWAT Natural Forested Simulated Data

Site Location on Oatka Creek Mainstem	TP (µg P/L) Observed	TP (µg P/L) Base Simulation	TP (µg P/L) Natural	TSS (mg/L) Observed	TSS (mg/L) Base Simulation	TSS (mg/L) Natural
Garbutt (Oatka Ck. Outlet Subwatershed)	41.3	51.6	22.9	10.5	21.1	20.8
Ellicott Rd. (White Ck. Subwatershed)	97.1	49.2	22.9	24.5	12.6	12.0
Warsaw (Oatka Ck. Headwaters Subwatershed)	58.4	81.4	41.5	60.3	95.0	96.5
Evans Rd. (Oatka Ck. Headwaters Subwatershed)	63.2	65.1	20.2	17.5	15.1	0.3

Main stem total phosphorus (TP) and total suspend solid (TSS) concentrations from measured values, SWAT "base model simulated, and SWAT natural forested simulated data. Modified from Pettenski (2012) by adding 12-digit HUC Subwatershed names.

Table 17 shows the management options that were chosen in the five simulation scenarios that did result in predicted phosphorus reductions sufficient to achieve watershed-wide total phosphorus concentrations lower than 45 µg P/L. Two of the scenarios involved applying one specific management option. The first scenario used the OCSWAT model to simulate reductions in TP from upgrading of the four WWTPs to tertiary treatment. This resulted in TP reduction that achieved a 38.8 µg P/L average watershed concentration. This scenario was already discussed above in conjunction with a more comprehensive discussion of impacts and potential improvements related to the four WWTPs in the watershed. The second scenario simulated the intensive use of grassed waterways, one of the agricultural best management practices (BMPs) for reducing nutrient concentrations and loads in the entire watershed. Using the OCSWAT model, use of grassed waterways was applied to all agricultural areas of the Oatka Creek Watershed. The model predicted that this scenario would result in reducing the average watershed TP concentration to 42.3 µg P/L.

Three scenarios involved combining management options and practices to achieve an average watershed concentration for TP below the 45 µg P/L target. The first of these was a very intense application of measures, including the tertiary treatment upgrade for all four WWTPs and the application of grassed waterways and buffer strips on all agricultural land in the Oatka Creek Watershed. The model prediction was that this scenario would result in a significant reduction of 53% in TP load and reduce the average watershed TP concentration to 29.6 µg P/L. While these results are impressive, Pettenski cautioned that this scenario would not be recommended for basin-wide management due to the cost and time it would take to implement. Rather the use of grassed waterways and buffer strips may be better utilized in areas where significant impairment exists and where intensive remediation is needed. The second combined management scenario is an example of this recommended use. Using the OCSWAT model the scenario implemented the use of cover crops (rye) throughout the entire Oatka Creek Watershed and also applied the use of grassed waterways and buffer strips to the significantly impaired tributary watersheds of Pearl Creek and White Creek. This scenario achieved a predicted average watershed TP concentration of 44.3 µg P/L, which is below the target concentration. The third combined management

scenario applied the use of cover crops and buffer strips to all agricultural land in the Oatka Creek Watershed and achieved a predicted average watershed TP concentration of 44.4 µg P/L.

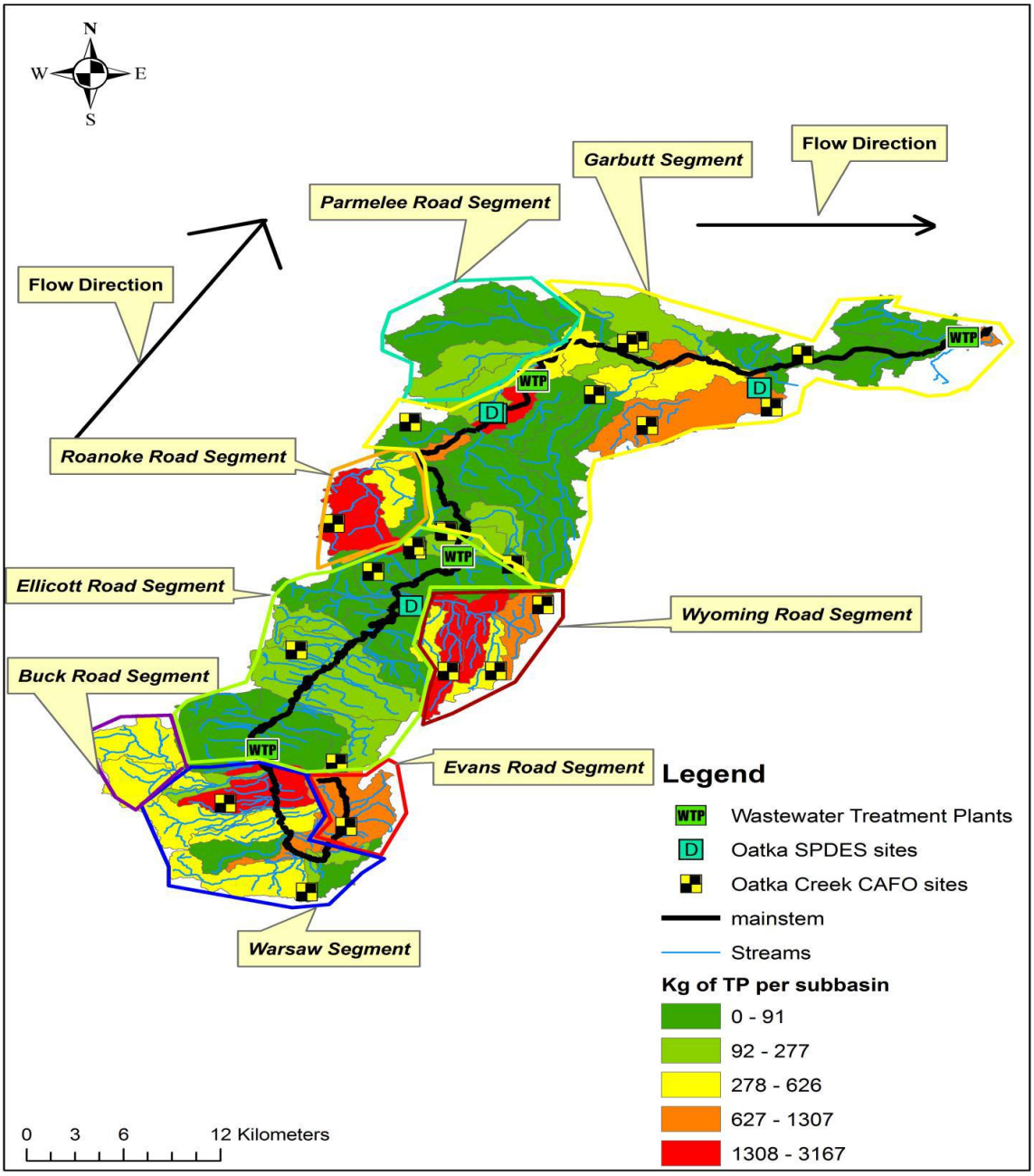
Pettenski's recommendations for reducing Total Phosphorus loading to Oatka Creek, would be to first set an average watershed target concentration of 45 µg P/L for Total Phosphorus. To achieve this target he suggests implementing two management approaches. The first and most effective would be to upgrade all WTWTPs to tertiary treatment. Then to address nonpoint sources he suggests implementing agricultural best management practices such as grassed waterways, buffer strips, and cover crops in the watersheds of the two most impaired tributaries to Oatka Creek, Pearl Creek in Wyoming County and White Creek in Genesee County.

Table 17. Phosphorus Load Reductions for Agricultural Management Scenarios

Management Scenario	Evans Road (Oatka Creek) (Load kg P/yr) Oatka Ck. Headwaters Subwatershed	Pearl Ck. Tributary (Load kg P/yr) Pearl Creek Subwatershed	White Creek Tributary (Load kg P/yr) White Ck. Subwatershed
Base Model	657.9	4,115.0	2,347.0
Buffer Strips	592.5 (9.9%)	3157.7 (23.3%)	1,527.9 (34.9%)
Grassed Waterways	500 (24.0%)	1016.4 (75.4%)	97.7 (95.8%)
Cover Crops	542.9 (17.5%)	3912.5 (4.9%)	2,816.2 (+20.0%)

Agricultural management scenarios conducted on Evans Road (Oatka Creek), Pearl Creek Tributary and White Creek Tributary watersheds. Percent TP load reductions are indicated for each scenario. Modified from Pettenski (2012) by adding USGS Stream Names and 12-digit HUC Subwatershed names.

Map 8: Phosphorus Loads in Oatka Creek Subwatersheds Resulting From OCSWAT Model



Graphical Comparison of Total Phosphorus Loadings from Subwatersheds in the Oatka Creek Watershed

Map 8 provides a graphical means to view the levels of phosphorus losses (kilograms of total phosphorus per year) from different subwatersheds (not 12-digit HUC) of Oatka Creek Watershed. The Map is Figure 60 on page 189 of Pettenski (2012) [8]. The map is generated with the help of the OCSWAT model and data from sampling undertaken in Pettenski's Theses investigations. A limitation of this kind of map is that it will only provide information on subwatersheds that have been investigated. Areas shown as having low TP loadings, may just represent areas where there has been no information added to refine the model because these areas are ones that have yet to be investigated. Still the map does help visualize the degree to which Total Phosphorus is a problem in different subwatersheds. In particular, Pearl Creek and White Creek Tributaries and the Oatka Creek Headwaters Subwatershed are areas for focusing remedial activities using the management practices discussed in the Table 17, above.

Oatka Creek Headwaters

For the purposes of this summary and subwatershed comparisons, the OC Warsaw site results will be discussed under the Oatka Creek Headwaters Subwatershed, even though this sampling site is 2000 feet downstream of the subwatershed boundary and actually in the Pearl Creek Subwatershed. OC-Warsaw site is considered to be in a very good location to indicate the overall water quality of Oatka Creek as it leaves the Oatka Creek Headwaters Subwatershed and the characteristics of the stream channel, in terms of its slope and stony bottom, is more similar to conditions in the Oatka Creek Headwaters than the Pearl Creek subwatershed.

Summary:

- The mainstem site in Warsaw, which was sampled on a weekly basis for a year, showed high TSS values. The annual average of all samples was 60.3 mg/l and the average for all event samples collected at this site was 207.7 mg/l. These were the highest averages seen for any of the 8 weekly sampled sites. Calculated annual sediment loading associated with these TSS concentrations was 5, 791.046 kg/yr (5791 MT) of sediment lost as a result of stream bank and soil erosion from the Oatka Creek Headwater Subwatershed.
- A soil erosion inventory was conducted on July 28 2011. The segment from Site C (Oatka Creek at Kenny Road, see Pettenski 2012, Figure 29, Page 158) downstream to the Warsaw Site, an area of agriculture and residential use that had showed most increase 203% in TSS during sampling, was compared to a segment from Site H (Rte. 19 crossing near Dutton Rd intersection, see Pettenski 2012, Figure 29, Page 158) to the Evans Rd. mainstem site, a forested area, which showed minimal increases (37%). The survey found that 27.3% (1.09 km of 4.00 km) of the stream bank between Site C and Warsaw site was highly erodible, while only 10% (0.40 km of 3.59 km) of the stream bank between Site H and Evans Rd. was highly erodible.
- There may be other portions of the Oatka Creek Headwater Subwatershed contributing to the TSS levels at the Warsaw site. On March 8, 2011, a runoff event stream segment analysis was undertaken on 15 mainstem and tributary sites in the subwatershed. The three highest TSS concentrations were at Relyea Creek (Site D, see Pettenski 2012, Figure 29, Page 158), 75.5 mg/l, Stony Creek at Buck Road, 97.3 mg/l, and at Warsaw, 123.8 mg/l.
- Using the OCSWAT Model, the most effective best management practices simulated for streambank erosion was streambank stabilization. Streambank stabilization techniques have already been implemented in some of the problem areas upstream from Warsaw. Including more of these techniques in the highly erodible areas will have a beneficial impact on reducing the TP and TSS loading in this segment of Oatka Creek.
- Two stream segment analyses were conducted to investigate unidentified sources of nutrient and sediment losses from this subwatershed. One involved 8 sites located in three stream segment subwatersheds upstream of the Evans Road mainstem site and the other involved using 15 sites to investigate the subwatersheds of the two upstream branches of Stony Creek, upstream of the Buck Road site (see Pettenski 2012, Figures 26-28, Pages 155-157).
- Sampling to collect stream water quality during runoff event and non-event periods were conducted at 9 sites (Evans Rd and 8 upstream sites). In the runoff event sampling (see Pettenski 2012, Figure 19, Page 148), the two sites (B & B-1) in Subwatershed # 1 contained the highest phosphorus concentrations SRP (B = 111.4 µg P/L; B-1 = 96.8 µg P/L) and TP (B=171.5 µg P/L; B-1= 122.7 µg P/L), compared to the averages for the remaining 7 sites of SRP= 29.5 µg P/L and ; TP = 42.8 µg P/L. Site B also had concentrations of Nitrate (5.30 mg/l) and TN (6.14 mg/l, that were more than 5 times higher than occurred at any of the other 8 sites. Also the sites with the highest total coliform were B (98,000 CFU/100 ml) and B-1 (50,000 CFU/100). Site B-1 (29.1 mg/l) had the highest concentration of TSS(29.1 mg/L) of all sites. Site B-1 is likely influenced by drainage from agricultural fields and Site B is immediately downstream of Double B Farms, a CAFO (Concentrated Animal Feeding Operation), from which the sampled stream would receive drainage during runoff events because its

channel flows adjacent to the CAFO property. Under nonevent conditions (see Pettenski 2012, Figure 21, Page 150) the stream that drains Subwatershed #1 had no flows, so only under runoff conditions would this watershed be a source of high loading of nutrients, sediment and bacteria.

- In Subwatershed #2 , upstream of Evans Road , the most upstream site D-2 (see Pettenski 2012, Figure 21, Page 150) had high phosphorus concentrations (SRP = 228.2 µg P/L, TP = 295 µg P/L) during non-event sampling. The high nutrients levels were determined to be from agriculture sources (i.e. field drainage). The phosphorus concentration decreased rapidly at two downstream locations, D-1 (SRP= 8.2 µg P/L, TP 53.7 µg P/L) and D (SRP= 6.0 µg P/L, TP 48.3 µg P/L). The decrease was attributable to a wetland located at site D-1, which served as a sink for the nutrients.

  Stony Creek (Buck Rd.) Tributary - Sampling on March 15, 2011 only investigated nonevent conditions in two subwatersheds located upstream of Stony Creek Buck Rd. site. For sampling site locations within the two subwatersheds and the water quality results for all samples see Figures 26, 27, and 28 in Pettenski (2012). In Subwatershed #1, two streams were sampled. The most upstream sampling site for each stream showed effects of nonpoint pollutants, but they were not the same. Site F-1 had high nutrient concentrations (SRP: 42.4 µg P/L; TP: 54.6 µg P/L; nitrate: 4.92 mg N/L;TN: 5.10 mg N/L) suggesting a likely source of nutrients upstream from site F-1.The most upstream site in the other stream, Site G-1, had a high TSS (23.8 mg /L) concentration, suggesting a likely source of erosion upstream from site G-1.

  In Subwatershed #2, nutrient and TSS levels were not as high as they were in Subwatershed #1. But two sites had elevated TSS concentrations [Site E-3 (13.3 mg/L) and Site D-1 (11.7 mg/L)] and another site higher nitrogen concentrations [Site C (nitrate: 2.91 mg N/L; TN: 3.03 mg N/L)], relative to the other sites in Subwatershed #2.

  Probable source areas upstream from sites G-1, F-1, and C were due to manure applications on cropland.

- On March 8, 2011, a segment analysis under event conditions was conducted on the Oatka Creek (OC) mainstem and tributaries upstream from Warsaw. Out of the fifteen samples taken, five mainstem (OC Evans Road, OC Warsaw, sites C, E, and H) and ten tributary sites [Stony Creek at Buck Rd. (a.k.a. Buck Road), sites A, B, D, F, G, I, J, K and L] were selected. See in Pettenski (2012) Figures 29 and 30 for site locations and sampling results.

  Concentrated animal feeding operation (CAFO) sites upstream from tributary sites B (Swiss Valley Farms) and L (Broughton Farm Operation) are likely causes of elevated soluble reactive phosphorus and TP concentrations at sites B (SRP: 30.3 µg P/L; TP: 223.6 µg P/L) and L (SRP: 32.5 µg P/L; TP: 109.1 µg P/L). The CAFO upstream from site B may be a proximate cause for high TP concentrations observed at Stony Creek at Buck Road (211.1 µg P/L) (Fig. 29, Pettenski (2012).

  Along the Oatka Creek mainstem, both TP and TSS concentrations concurrently increased at two locations. One upstream, Site H (TP = 36.5 µg P/L, TSS = 13.3 mg/L) to Site E (TP = 66.5 µg P/L, TSS = 48.3 mg/L) and one downstream from Site C (TP = 66.8 µg P/L, TSS = 40.8 mg/L) to furthest downstream site at OC Warsaw (TP = 103.3 µg P/L, TSS = 123.8 mg/L). The already identified contributions of phosphorus from Tributary B and Stony Creek, which enter the Oatka Creek mainstem between Site C and OC Warsaw would explain the downstream increase in TP.

  There was also a high concentration of TSS (97.7 mg/L) found at the Stony Creek-Buck Rd site that would have flowed into Oatka Creek upstream of the OC Warsaw site. The high TSS in the mainstem of Oatka Creek above Warsaw and its relationship to stream bank erosion was already discussed in an earlier bullet.

  Nitrate and TN concentrations were high at two tributary sites, Site A (nitrate: 5.89 mg N/L; TN:

6.05 mg N/L) and Site I (nitrate: 10.23 mg N/L; TN: 10.32 mg N/L). At the mainstem sites a 24.8% increase in nitrate was identified between upstream mainstem site OC Evans Road (nitrate: 2.62 mg N/L) and the downstream mainstem site H (3.27 mg N/L). The likely source of nitrate is tributary site I (nitrate: 10.23 mg N/L).

Pettenski gives no possible sources for the high nitrate levels in tributary I. Tributary I is a relatively short stream, under a mile long. A USGS Topographic Map with an aerial photo base map, shows that the upper reaches of tributary I flows through some agriculture fields, however just before entering Oatka Creek, its lower reaches flow through a relatively highly developed area including residences, the Wyoming County Public Works facility and other commercial property. While agricultural fields could be the source for the high nitrate levels, another contributing source could be from on-site wastewater treatment systems serving these properties.

- On March 15 2011, under nonevent conditions, a Segment Analysis of two CAFOs upstream from Warsaw was conducted along with sampling of four headwater streams (Pettenski 2012, Figure 31, Page 160).

  Stream water quality samples taken from the vicinity of the Swiss Valley Farms CAFO indicated that phosphorus levels and total coliform abundances downstream were lower than upstream, while nitrogen and TN concentrations significantly increased downstream (nitrate: 6.83 mg N/L; TN: 6.85 mg N/L), compared with upstream (nitrate: 0.14 mg N/L; TN: 0.37 mg N/L). This indicated that during nonevent conditions, Swiss Valley Farms was not a source of phosphorus and coliform bacteria, but was a significant major source of nitrogen. While TSS in the downstream sample (15.4 mg/L), compared to upstream (12.8 mg/l), this may not be as significant an increase as that found for nitrogen. The upstream value of 12.8 mg/l for TSS, is fairly high and likely indicates sources of sediment from upstream eroded area are present.

  Soluble reactive phosphorus and TP concentrations were high in Trib. L downstream from Broughton Farms Operation CAFO (SRP: 151.9 µg P/L; TP: 443.0 µg P/L) when compared to the headwater sites on the same day (mean – SRP: 11.0 µg P/L; TP: 53.6 µg P/L). Broughton Farms appears to be a likely source of phosphorus under nonevent conditions.

  Note that in the sampling on March 8, 2011, during a runoff event, the tributaries that flow from the Swiss Valley Farms, Trib. B, and Broughton Farm Operations, Trib. L, were both discharging high concentrations of phosphorus into Oatka Creek.

  Nitrate and TN concentrations were high at headwater stream site B (nitrate: 8.54 mg N/L; TN: 10.44 mg N/L) (Fig. 31. Pettenski 2012), when compared to the other three headwater sites (mean – nitrate: 0.65 mg N/L; TN: 1.01 mg N/L). Manure smell on cultivated cropland was noticeable upstream from headwater stream site B and is the likely source of nitrogen.

  The sampling conducted upstream from Warsaw indicates that cultivated fields and CAFOs are major sources of nutrients in the Oatka Creek Headwaters Subwatershed.

Pearl Creek Subwatershed

For the purposes of this summary and subwatershed comparisons, the OC Ellicott Rd. (Route 63) site results will be discussed under the Pearl Creek Subwatershed. Even though this sampling site is located within the White Creek subwatershed it is located just 4 stream miles from the Pearl Creek Subwatershed boundary and its water quality is very much influenced by the quality of water flowing from the Pearl Creek Subwatershed, particularly the contributions from Pearl Creek. For this reason, the Ellicott Road Site will be included in the Pearl Creek Subwatershed summary. The Pearl Creek Subwatershed extends from the point where Stony Creek enters Oatka Creek, near the southern area of the Village of Warsaw, to the point where the Pearl Creek Tributary enters Oatka Creek in the hamlet of Pearl Creek near the boundary between Genesee and Wyoming Counties. Influences of two Wastewater Treatment Plant (WWTP) facilities are included in this section of the Oatka Creek Watershed downstream of the OC

Warsaw, the Warsaw WWTP and the Pavilion WWTP. The discussions of these and other WWTP in the Oatka Creek Watershed can be found in the summary of watershed-wide highlights (see pages 25-27).

- When examining the annual average results for the eight sites (see Table 18), which were sampled weekly for a year, the Ellicott Rd. and Pearl Creek at Rte. 19 sites had the highest levels for most parameters. For phosphorus, Elliott Rd. had the highest level (SRP 47.5 µg P/L, TP = 100.3 µg P/L, and Pearl Creek at Rte. 19 had the third highest (SRP = 27.5 µg P/L, TP = 74.4 µg P/L) annual averages. For nitrogen , Pearl Creek at Rte. 19 had the highest level (Nitrate = 3.28 mg N/L, TN = 3.98 mg N/L) and Ellicott Rd. had the second highest level (Nitrate = 2.21 mg N/L, TN = 2.64 mg N/L). For TSS, Pearl Creek had the second highest level (32.5 mg/L) and Ellicott Rd. had the fourth highest (22.3 mg/L). For Total Coliform, Ellicott Rd. had the second highest level (8770 CFU/100 ml) and Pearl Creek at Rte. 19 had the third highest (8,237 CFU/100 ml).

  The Pearl Creek tributary had the highest areal tributary load for SRP, TP, nitrate, TN, and TSS (SRP: 311 g P per ha/yr; TP: 1,098 g P per ha/yr; nitrate: 27.7 kg N per ha/yr; TN: 34.5 kg N per ha/yr; TSS: 692.4 kg per ha/yr). This tributary is clearly a source and an area of concern for nutrients and soil erosion and represents an area to focus management practices.

- A Stream Segment Analysis was conducted on seven subwatersheds of the Pearl Creek Tributary (see Pettenski 2012, Figures 38-43, pages 167-172), under both runoff event and nonevent conditions. In Subwatershed 2a, the Bowhill Farms CAFO cow barn, which is upstream of the retention pond, drains runoff from the barn into the pond. This pond is the proximate source of nutrients and coliform bacteria in Subwatershed 2a, while the Bowhill Farms CAFO site is the ultimate source. The Logwell Acres Inc. CAFO upstream from Subwatersheds #6 and #7 and the Victory Acres CAFO site, located in Subwatershed #4, were also sources of nutrients and sediment in the Pearl Creek tributary's watershed. The dominant land uses in the watershed of the Pearl Creek tributary are related to agricultural activities and some of these activities are the causes of the degraded water quality in the watershed.

  White Creek Subwatershed
  The White Creek subwatershed extends from the confluence of Pearl Creek in the Town of Covington, Wyoming County, to the point where the first tributary enters Oatka Creek from the east bank, downstream of the Cole Road Bridge in the Town of LeRoy, Genesee County.

- On the White Creek (Roanoke Rd.) Tributary, the OC Roanoke Rd sampling site was one of the eight weekly sampled sites. This site had the second highest annual average for Total Phosphorus (86.8 µg P/L), the third highest annual average for Total Nitrogen (1.71 mg/l), and the highest annual average for Total Coliform (11,129 CFU/100 ml). Similar to the Pearl Creek Tributary, white Creek had high SRP (306 g P per ha/yr) and TP (877 g P per ha/yr) areal loads. As with Pearl Creek , these relatively high losses of phosphorus and other analytes from White Creek indicate areas of concern on which to focus management practices.

- A segment analysis was performed on the White Creek tributary to identify point and nonpoint sources of pollution. The main sources of nutrients, sediment, and coliform bacteria were from Subwatershed 2a where Barniak Farms is located upstream of site C-1. Barniak Farms is a likely cause for elevated nutrient and bacteria levels in the White Creek Tributary.

  Village of LeRoy Subwatershed
  The Village of LeRoy Subwatershed begins upstream of the Village of LeRoy at the point where the first tributary enters Oatka Creek from the east bank downstream of the Cole Road Bridge. This subwatershed includes all of the Village of LeRoy that drains to Oatka Creek. The subwatershed extends north of LeRoy, including the location of the Village of LeRoy WWTP and the carbonate bedrock area and

Buttermilk Falls, and then east past Circular Hill Road until the confluence of Mud Creek, where the Oatka Creek Outlet Subwatershed begins. The impact of the Village of LeRoy WWTP was discussed under the watershed-wide highlights found in Pettenski (2012).

- Of the four tributary sites that were sampled for a year, the Parmelee Rd. Tributary had the lowest areal contribution (SRP: 12 g/ha/yr; TP: 54 g/ha/yr; nitrate: 3.0 kg/ha/yr; TN: 4.0 kg/ha/yr) to the total losses of the watershed (see Table 15).

- A segment analysis was performed on the Oatka Creek Parmelee Road tributary to identify sources of coliform abundances previously encountered on July 12, 2010, June 7, 2011, and August 3, 2011 (see Pettenski 2012, Figures 49-51, Pages 178-180). Agriculture (corn) is listed as the dominant land use of this area, and a windshield survey in the Parmelee Road tributary confirmed that agricultural practices were widespread and the most likely cause for elevated nutrients and coliform abundances observed. However, a single residence was found to be a source of coliform bacteria and is also a partial source of nutrients in this tributary's watershed. The residence was again visited on August 10, 2011 and it was determined that the waste treatment method was a septic tank.

Oatka Creek Outlet Subwatershed

The Oatka Creek Outlet Subwatershed begins at the point where Mud Creek joins with Oatka Creek in the Town of LeRoy in Genesee County and extends to the point where Oatka Creek flows into the Genesee River, downstream from the Village of Scottsville in Monroe County. Within this subwatershed, in addition to Mud Creek, the main stem of Oatka Creek is joined by Beulah Creek, Spring Creek, Guthrie Creek and several other small, unnamed streams. Just prior to entering the Genesee River, treated effluent from the Village of Scottsville WWTP enters Oatka Creek. The influence of the Scottsville WWTP and other WTTPs in the watershed is presented under the watershed-wide highlights (See discussion on Pages 24-25 of this report).

Trout Fishery

For most of the distance that Oatka Creek flows through the Oatka Creek Outlet subwatershed, it supports a brown trout fishery of regional importance. Only the last 1.5 mile section of Oatka Creek, from the Rt. 251 Bridge in the Village of Scottsville to the Genesee River, is not considered a trout stream. The Spring Creek and Guthrie Creek tributaries are also trout streams. These tributaries drain portions of the Town and Village of Caledonia in Livingston County before flowing north to join Oatka Creek in the hamlet of Mumford in the Town of Wheatland, Monroe County.

One important reason for the success of a trout fishery in these streams is the cool groundwater being discharged from seeps and springs that supplement the stream flow in these streams. The addition of groundwater results in these streams having more consistent stream flows year round. Streams where the only significant source of stream flow is stormwater runoff from their watersheds are susceptible to having greatly reduced stream flow in the summer months, when rainfall events become infrequent.

In addition to constancy of stream flow in the summer months, groundwater entering streams will keep water temperatures much cooler, than the water in streams where there is no groundwater discharge and where summer water temperature is solely determined by the temperature of the air. Cooler water temperatures allow more oxygen to be dissolved in the water, than is possible at warmer temperatures. Trout require high oxygen levels and the cooler water, provided by the groundwater, is responsible for this habitat requirement being available for the entire year, including the warm summer months.

Spring Creek is such a dependable source of quantities of cold water that for almost 150 years it has served as the water source for a fish hatchery operation. In 1864, Seth Green, called the father of the science of fish culture, established his fish hatchery on the banks of Spring Creek in Caledonia. In 1870

the Caledonia Fish Hatchery was acquired by New York State and it is currently operated by the NYS Department of Environmental Conservation. [16]

The following is Seth Green's description of Spring Creek from the Appendix, entitled "Fish Farm in Caledonia NY", from his book called "Trout Culture", published in 1870. [17]

"Caledonia is noted for its creek, which rises entirely from springs, is fed along its whole course by springs in its beds, and at our fish-farm, which is about three-quarters of a mile from the source, it runs about eighty barrels of water per second, 4,800 per minute, or something over 200,000,000 of gallons in twenty-four hours. Quite a respectable quantity of water, and the whole of it available for our ponds, if we wish to use it. The ground in the neighborhood being very level, no surface drainage of any account washes into the creek, and the water looks pure as crystal. It is, in reality, slightly tinctured with lime and sulphur; but must agree with the fish, as the creek has always been noted for its Trout, and still abounds in them."

Using the On-Line Conversion website [18], the 200 million gallons per day would be equivalent to stream discharge of 309 cubic feet per second (cfs); and a barrel per second was found to be equivalent to 4.2 cfs, resulting in 80 barrels/sec equivalent to a stream discharge of 337 cfs. This is definitely quite respectable, especially if this streamflow was consistently maintained throughout the year. It would be interesting to compare the details of Seth Green's description to streamflows and other characteristics of Spring Creek and its watershed today.

Bedrock Geology

Before entering Oatka Creek, Spring Creek and Guthrie Creek in the Caledonia and Mumford area, groundwater flows through bedrock. Within the Oatka Creek Outlet Subwatershed, the most common types of bedrock and their components that underlie the soils are: Camillus Shale (shale, gypsum, dolomite), Akron Bertie limestone (limestone & dolostone), and Onondaga Limestone. Where all three occur together, the Onondaga Limestone overlies the Akron Bertie Limestone, which overlies the Camillus Shale. All these bedrock types are examples of sedimentary rocks and contain carbonate derived rocks to varying degrees. Carbonate rocks are formed from sediments rich in the minerals calcite and dolomite, i.e. limestone and dolostone [19].

In the western portion of the Oatka Creek Outlet subwatershed, between the confluence of Mud Creek and just west of Mumford and Caledonia, only the immediate valley of Oatka Creek and areas north of the Oatka Creek valley have Camillus Shale and Akron Bertie Limestone as bedrock types. In the eastern portion of the Oatka Creek Outlet Subwatershed, from Mumford and Caledonia (including Spring Creek channel) to the Genesee River, the Oatka Creek channel and the northern areas of the subwatershed are over Camillus Shale and the southern areas of the subwatershed are over Akron Bertie Limestone.

The Onondaga Limestone represents the cap of the bedrock, south of the Oatka Creek valley, in the western portion of the Oatka Creek Outlet Subwatershed, between Mud Creek and just west of Mumford and Caledonia. Onondaga Limestone is also the cap bedrock in portions of two other 12-digit HUC subwatersheds; Mud Creek subwatershed, where it occurs in the lower subwatershed, from the NYS Rt. 5 corridor to just south of the Oatka Creek valley, and the Village of LeRoy subwatershed, where it occurs from downstream of the falls at Rt. 5 Bridge in the Village to Buttermilk Falls north of the Village.

Onondaga Limestone can represent up to four overlying layers of different kinds of limestone, the entire group is called the Onondaga Formation. The limestone making up the Onondaga Formation is relatively resistant to erosion compared to the rock above and below it, so it commonly stands above the rest of the landscape as an escarpment that runs east to west across the State [19]. Because of its characteristic

hardness, the Onondaga Formation limestone is quarried extensively in New York, mainly for crushed stone, which is used in concrete and for other purposes [19].

Oatka Creek Shale of the Marcellus Formation becomes the cap bedrock at the southern extent of the Onondaga Formation. Oatka Creek shale underlies only a small area of the Oatka Creek Outlet Subwatershed and this area is located southwest of Caledonia. However, Oatka Creek Shale and other shales of the Marcellus Formation form the cap bedrock in the upper portions of both Mud Creek and the Village of LeRoy subwatersheds [21]. Oatka Creek Shale is the bedrock that forms the falls on Oatka Creek near the Rt. 5 Bridge in the Village of LeRoy [22].

For a depiction of the areal extent of the carbonate and shale bedrock underlying the Oatka Creek Watershed, see Map 15, page A-29 (Page 165 of complete pdf document), Appendix A of Oatka Creek Watershed Characterization [20]. More detail on bedrock geology in the Oatka Creek Outlet subwatershed can be found on the Niagara Bedrock Geology Map (scanned jpeg), which can be viewed and downloaded from the NYS Museum's GIS Webpage [21].

Movement of Contaminants and the Importance of areas influenced by the combination of Onondaga Limestone Karst Geology, Surface Water & Groundwater interactions, and Shallow Soils
The Onondaga Formation limestone has already been mentioned in this report, as it relates to the potential for groundwater contamination associated with the diversion of streamflow to the limestone bedrock along the Oatka Creek channel, immediately downstream from the Village of LeRoy WWTP. See pages 25-26 in the watershed-wide highlights from Pettenski (2012) study. This previous section included a summary of the findings of Jill Libby's investigation [12] of the groundwater-surface water interactions that occur in the Oatka Creek channel, both upstream and downstream from Buttermilk Falls, as a result of the dissolution of the limestone in the Onondaga Formation.

Although limestone is considered hard rock, it can be dissolved by water, weak acids naturally found in rain and soil water slowly dissolve the tiny fractures in the soluble bedrock, enlarging the joints and bedding planes. When limestone contains small fractures and joints, these can allow surface water or water infiltrating through soils to move into the limestone. Over time the passageways, provided by fractures and joints, become widened and can allow substantial quantities of surface water to be re-routed through the limestone and to travel considerable distances relatively quickly before re-entering surface water through seeps and springs. Other geological features that are associated with the dissolution of limestone include: disappearing and reappearing streams; springs; sinkholes; caves; and sometimes large caverns. The landscape including these features and resulting from the dissolution of limestone is called karst topography or karst terrain. Although karst landscape most commonly develops on limestone, it can develop on several other types of rocks, such as dolostone (magnesium carbonate or the mineral dolomite), gypsum, and salt [23].

Ms. Libby's investigation is one example of several thesis investigations of various aspects of the groundwater-surface water relationships characteristic of the karst hydrogeology associated with the Onondaga Formation, which have been undertaken between 2008 and 2010 by students under the direction of Professor Paul Richards, PhD in the Department of Earth Sciences at the State University of New York's Brockport campus. The work Dr. Richard's and his students (Richards et al 2010) have done has been brought together and summarized in a final report that was completed in April, 2010 and that is entitled, Prediction of Areas Sensitive to Fertilizer Application in Thin-soiled Karst [24].

Before proceeding with a more detailed discussion of Mud Creek and Spring Creek, it will be advantageous to consider what Dr. Richards and his students have learned about the hydrogeological characteristics of the karst topography found in the catchment areas of these two streams. Sufficient quantity and quality of water resources for the trout fishery, the fish hatchery, and for drinking water

provided by residential wells are dependent on the interactions of surface water and groundwater and the dissolution channels in the bedrock and the potential for contamination from a number of sources. Understanding and identifying the sources that can lead to contamination of surface water and groundwater is the first step, but this needs to be followed by implementation of best management practices and land use and development controls designed to ensure that the adverse impacts from sources of contamination are eliminated or significantly minimized.

The Richards et al 2010 report involved a careful analysis of surface depressions, fracture trace features, and aerial photography in conjunction with field surveys in order to identify karst features that are sensitive to groundwater contamination [24]. The need for finding better ways of identifying the location of these karst features was prompted by an incident in 2007 where bacterial contamination of 35 residential wells occurred in the Town of Stafford in Genesee County. The source of the contamination was determined to be manure applied to the land in an area where there was a small and inconspicuous depression that when more closely investigated contained a zone of fractured limestone. This instance was not located within the Oatka Creek watershed, but karst geology and soils are similar in both watersheds.

The area covered by the study included all of Genesee County over the Onondaga Formation and extended into Livingston County to include the Caledonia area.

Some of the findings from the study and associated investigations include:

- Sixty-three suspicious features were inspected in the field. These were separated into six categories: solution sinkholes, pattern ground sinkholes, glacially enhanced sinkholes, exposed bedrock, glacial depressions, and anthropogenic. Figure 4 of the report shows the location of the features, along with the location of fracture traces and shallow soil zones that occur within the Oatka Creek Watershed.
- Solution sinkholes are steep-walled depressions that commonly contain blocks of limestone floating in sediment at the bottom. Three are located in the Town of LeRoy at the intersection of fracture traces south of Gulf Road and between Church Road to the east and Mud Creek to the west. One of these is in the channel of Mud Creek south of Gulf Road. Another solution sinkhole is near Mackay Springs on Spring Street in Caledonia. Solution sink holes are interpreted as collapse features representing the mature stage of sinkhole development. All sites classified as solution sinkholes were in areas showing evidence for shallow bedrock.
- Pattern ground sinkhole depressions tend to be more rounded and less steep than solution sinkholes. They are an example of an immature stage of sinkhole development, where not enough material has dissolved to form a steep collapse feature. These features occur in areas with evidence of shallow soils. There are 7 examples of pattern ground sinkholes between Mud Creek and Caledonia. Two of the pattern ground sinkholes have swallets (an opening into which a stream goes underground) in them. Several of the pattern ground sinkholes flood in the spring.
- Exposed bedrock surfaces are areas where there is little or no soil where fractured rock is exposed at the surface. These are difficult to find because they do not have depressions associated with them, are usually covered with vegetation, and are not identifiable through aerial photography. They are commonly found in glacial outwash channels and are always associated with evidence of shallow soil. The only way to confirm their presence was by walking out in the field and observing them directly. Two areas with exposed bedrock surfaces were identified in the Oatka Creek Outlet Subwatershed.
- Anthropogenic depressions are thought to be caused by quarrying operations or other land use changes. Talking to residents that are familiar with local history is crucial for identifying these. Some of the features may be considered to be sensitive to surface runoff if fractured bedrock is exposed at their base.

- Glacial depressions are gently sloped topographic depressions with no evidence of shallow bedrock and are not located or aligned with fractures traces. They are interpreted to be depressions caused by glacial processes. They are not considered sensitive to surface runoff because of the presence of thick glacial overburden. One glacial depression feature was identified in the Oatka Creek Outlet Subwatershed. There were no Glacial Enhanced Sinkholes identified in the Oatka Creek Outlet Subwatershed.
- The Onondaga Formation in its position at the base of the Alleghany plateau and its capacity to intercept northward flowing streams has made it especially sensitive to groundwater contamination. Highlands to the south provide extensive recharge areas and high water table gradients which cause the Onondaga formation to intercept large groundwater flows. The Onondaga formation dips to the south. Overlying the Onondaga Formation to the south are Oatka Creek Shale, Stafford Limestone and Levanna shale. Groundwater flows from the highland areas following a series of northeast fracture traces and flowing in the top portion of the Oatka Shale, because the shales are not very permeable. When the groundwater flow meets the Onondaga Formation the major groundwater flow is to the east through fractures flowing towards the springs in Caledonia, which feed Spring Creek [25]. The Onondaga Formation is heavily fractured within the study area and a study by Fronk 1991 [26] suggested that many are wide (up to 10 cm. or almost 4 inches wide)
- In addition to groundwater flow from the highland areas in the south, fracture traces and sinkholes associated with the Onondaga Formation capture several north flowing streams and local runoff and reroute these flows to the groundwater zone. This water recharges the Onondaga Formation and moves down into the Akron Bertie and maybe the Camillus Shale where it moves east and re-emerges at the MacKay and Big Springs in Caledonia [27].
- Transducer data and water level measurements collected by this study suggest water tables are extremely dynamic, with water tables rising in the early spring as fast as 50 feet per day. These tend to occur between January and April. Not all wells show water table fluctuations of this magnitude, but many have water table rises that are 15 feet or more per day and all have large annual ranges. The precise timing of water table fluctuations in wells and sinkholes separated by large distances, combined with the lack of apparent relationships between karst related-flooding and precipitation and snow melt variables imply that these water table rises are a large scale (regional) phenomenon and not due solely to local hydrogeological characteristics.
- Capture and transport of contaminants, such as fertilizers, manure, and septic system effluents, can occur when surface runoff and snowmelt containing the contaminants is diverted in dissolution channels in the Onondaga Formation. But high water tables and flooding events can also cause soils and sinkholes to be flushed of these contaminants. This is particularly a concern in areas where there are thin soils associated with shallow depths to bedrock. The study identifies five hydrological mechanisms that are capable of moving nutrients into the groundwater table from karst-related features. They are: contact flooding, groundwater mounding, perched water table transfer, rapid recharge into vertical fractures, and swallet flooding.
- Sites classified as solution sinkholes, pattern ground sinkholes and fractured bedrock that are hydrologically active, should be considered priority targets for management measures.
- Sinkholes are associated with major fracture traces (evidence of fracture visible on rock surface). Large collapse-type sinkholes appear to be located at the intersection of major fracture traces. Therefore all intersections of fracture traces should be mapped and considered important locations of concern.
- Water quality analyses of groundwater fracture flow confirm that subsurface flowpaths are capable of transporting significant amounts of phosphorus [12] and several samples show suspended solid concentrations that are similar to concentrations in surface waters.

Subsequent to the completion of Richards et al 2010 final report, other documents were produced that show that the frequency of well contamination in the karst regions of Genesee County had resulted in more attention being paid to efforts to identify sensitive areas of thin soils, exposed bedrock and hydrologically active karst-related features.

In conjunction with the NYS DEC, USGS published a scientific investigation map and report developed by James Reddy and William Kappel, [28] which compiled existing hydrogeologic and geospatial data useful for the assessment of focused recharge to the carbonate –rock aquifer in the central part of Genesee County. This document includes the features identified in Richards, et al, 2010 report, as well as information from Federal and State agencies, local highway departments, and the Genesee County Soil and Water Conservation District. The study area includes only Genesee County and does not include portions of the carbonate-rock aquifer that occur in Livingston County. Maps accompanying the report show karst-related features, shallow soils with high infiltration rates, soils with lower infiltration rates, but that have a history of groundwater contamination, known locations of groundwater contamination, and land that is used for cropland/hay/pasture. While the report includes a caution that it should not be used as a substitute for site-specific hydrogeologic investigation, the information contained in the report would be useful as a guide in how to proceed with an inventory of sensitive areas that have not yet been mapped.

In 2011, new manure management practices for the karst area of Genesee County were outlined in Cornell University's Animal Science Public Series No. 240 [29]. They referenced the USGS publication identified above and listed some initial steps to be taken to identify whether fields used for manure spreading were in the karst area, whether the fields contained sensitive soils, and whether the fields contained sensitive karst features. The document presented NYS DEC's guidelines for Agricultural Environmental Management (AEM) planners providing services in Genesee County. AEM planners should: identify if fields are in a karst area; identify if any karst-related features are present; identify if fields are in drainage area for any karst-related features and update the farm's Comprehensive Nutrient Management Plan (CNMP) to reflect additional requirements. The additional requirements include: 100 foot setback from drinking water wells in karst area; providing a 30 foot vegetative buffer and 100 foot setback for sinkholes and swallet features, incorporation the same calendar day for manure that is less than 12% solids applied from January 1 to April 15 on fields with surface depressions that contain sensitive soils (Aurora, Benson, Newstead, Rubbleland, or Wassaic), or rock outcrops or shallow bedrock; or that contributes drainage to karst features (i.e. sinkholes, swallets, depressions), the specific soils listed above, rock outcrops, and/or shallow bedrock. The document includes additional precautionary measures that should be followed. The document indicates that these risk reduction practices may be effective in karst and other sensitive areas throughout New York State.

In 2010, NYS DEC revised its New York State Stormwater Design Manual [30], which is used for the design of Stormwater Management Practices to protect the waters of the State of New York from the adverse impacts of urban stormwater runoff. In the 2008 version of the manual there was only one reference to karst geology, in 2010 version there are five references. Principal concern is to avoid the use of large infiltration basins in areas with karst geology. Infiltration measures are typically used to meet runoff reduction criteria and to utilize local soils to provide some treatment before stormwater is recharged into groundwater. However it karst geology, thin soils and shallow bedrock will not provide the benefits normally expected from infiltration practices. The manual recommends a geotechnical assessment to determine whether small scale infiltration and recharge would be effective. Using porous pavement on karst geology would require a liner to be used and therefore the full runoff reduction value will not be provided by the practice. Also in karst geology, infiltration is not recommended as a practice to meet Enhanced Phosphorus Removal Standards without adequate geotechnical testing.

Karst topography represents an important element to address in the Oatka Creek Watershed Management Plan. It provides substantial groundwater resource to sustain fisheries and for drinking water, but at the

same time it is very susceptible to widespread contamination. Some watershed management recommendations could include: completing karst area inventories in Livingston and Monroe County to identify areas sensitive to contamination (karst-related features, areas of thin soils or soils with significantly high infiltration rates, and areas with shallow bedrock); implementation of management practices for agriculture-related activities; and adoption of project review procedures that would ensure that stormwater management measures are protective of both surface water and groundwater quality and that site has sufficient depth of soils and other conditions (soil infiltration rate) to provide time for treatment and assimilation of wastewater from leach lines.

Mud Creek Subwatershed

Mud Creek has two principal headwater streams, a west branch and an east branch. Both begin in the Town of Covington, Wyoming County. Flowing north, less than a mile, they enter into the Town of Pavilion in Genesee County. The west branch flows into and out of the LeRoy Reservoir, which has an area of approximately 48 acres. Although this waterbody is still labeled on maps as the LeRoy Reservoir, it is now privately owned and has no public water supply function. The west and east headwater branches join to form the middle portion of Mud Creek about ¾ of a mile downstream of the outlet for LeRoy Reservoir. Mud Creek continues to flow north and enters the Town of Leroy at the point it crosses under U.S. Route 20. From its headwaters to a mile south of NY Route 5 (East Main Street) in the Town of LeRoy, the middle portion of Mud Creek is flowing over primarily shale bedrock, but it then flows over Onondaga Limestone for the remaining 3.5 miles until its channel joins Oatka Creek.

Map 9 shows the lower portion of Mud Creek, with NYS Route 5 to the south and a small portion of the Oatka Creek channel to the northeast. The presence of the Onondaga Limestone is evident from the amount of land that has been devoted to quarry operations in this part of the watershed. In older topographic maps, the early quarries can be seen, but there was still a lot of natural terrain and there were tributary streams that flowed across the areas that are now part of the quarries. The ground water that is captured in the quarries typically must be pumped out so that quarry operations can continue. The water most likely would be pumped to Mud Creek. In Map-9 the closeness of the contour lines indicate that Mud Creek is passing through a relatively steep sided valley just before it reaches Oatka Creek. This is where Mud Creek's channel has eroded through the Onondaga Escarpment on its way to Oatka Creek. The channel has been impounded by the property owner and a pond is now located in the Mud Creek channel at this location.

Sinkholes in Karst Geology of Onondaga Limestone

The locations of two sinkholes are shown on Map-9. Professor Paul Richards, who is with the Department of Earth Sciences at SUNY Brockport, submitted comments on each of these as part of his responses on a review of a draft version of the Oatka Creek Watershed Characterization report in 2012. His comments are included in the following descriptions. In terms of the golf course sinkhole, Dr. Richards' comments were, "Flow in the stream just west and south of the Leroy Country Club enters a sinkhole on the first fairway. This site has been engineered to flow into the inactive Hanson quarry located behind it during excessively high stream flows. Some of it reemerges at a spring in this quarry with a very impressive travertine deposit. The flow goes back into the aquifer or evaporates. There is no direct connection with Oatka Creek except perhaps by groundwater flow paths."

Older maps of the area show that prior to the engineering work and quarry, this stream was probably a tributary of Mud Creek and when high flows occurred, that exceeded the sinkhole's capacity, they would have been able to flow on to Mud Creek.

Map 9: Lower Portion of the Mud Creek Subwatershed

The second sinkhole is located directly in the channel of Mud Creek, north of an abandoned railroad right-of-way and south of where Mud creek crosses Gulf Road. This sink hole has also been investigated by Professor Richards and he provided the following comments, "Most of the flow in Mud Creek is lost in a sinkhole just north of the Lehigh Valley Right of Way. Discharge measurements taken at the mouth of this stream, just before Mud Creek joins Oatka Creek, suggest that flows are very minor. The highest flow we measured there was a few cubic feet per second. Flow data we collected at the sinkhole suggests that only at very high water levels does water make it past this sinkhole. This can also be seen in discharge per unit watershed area graph based on our spring flow data. Hydrologic gradient is towards the east, which is also supported by the TCE plume, which is oriented toward the east. As a consequence phosphorus flux calculations are probably over estimated in Mud Creek in the report (refers to draft version of the Oatka Creek Watershed Characterization Report). Mud Creek is a minor player at best. No farming occurs at all downstream of this sinkhole."

1970 TCE Spill and Groundwater Flow Direction

As Professor Richards mentioned in his comments, the TCE Spill contamination also was found to be directed east as well. The following is some additional information regarding this spill which occurred 44 years ago.

The December 9, 1970 Lehigh Valley Railroad Derailment spill occurred within the Mud Creek subwatershed. Between 30,000 and 35,000 gallons of Trichloroethene (TCE) was spilled from derailed cars, at a location approximately 500 feet northwest of the channel of Mud Creek and in the same general area of the large sinkhole, which is responsible for re-routing most of the stream flows in Mud Creek from surface water to groundwater. The location of both the TCE spill and the sink hole on Mud Creek are shown in Map - 9 of this report and they are also shown on Plate 6, Map 1-LeRoy of the USGS report by Reddy and Kappel, 2010. [28]

The most up-to-date information on this spill can be found in a summary fact sheet on USEPA's website[31]. The information includes: site description; threat and contaminants; cleanup approach; cleanup progress; and site repositories. The major effect of this spill was groundwater contamination, with TCE being ultimately detected in approximately 50 residential drinking water wells. Residences within the area

are now served by public water lines. The site of the spill, which remains the source of the groundwater contamination, is still being remediated. As determined from the location of residential wells where TCE has been detected and from samples collected from extensive array of monitoring wells, the areal extent of the groundwater contamination takes the form of a broad plume moving in an east and southeast direction. The plume extends four miles from the spill site and the leading edge extends to the west bank of Spring Creek, from Mumford to the north and Caledonia to the south. TCE was detected in Spring Creek in 1993 at a level less than 3.0 mcg/L (micrograms per liter, or, parts per billion) which is below levels of public health concern [32].

In 2008, Lehigh Valley Railroad (LVRR) began a vapor intrusion investigation and sampled thirty-five properties, eleven of which were found to need vapor intrusion mitigation systems. LVRR has continued its vapor intrusion investigation efforts and the mitigations have been found to be effective in controlling Site related vapors. EPA continues to require that homes which overlay the TCE groundwater plume area are monitored for vapor intrusion issues each heating season. The most recent vapor intrusion investigation and checks on existing mitigation systems was in March of 2013.

Water Quality Sampling In Mud Creek Subwatershed.
Two studies involving water quality assessments have included a monitoring location on Mud Creek at Gulf Road. This location is downstream from the sinkhole in Mud Creek. The two studies are Makarewicz and Lewis 2004 [9], and Pettenski 2012 [8]. Four visits to the site were made by Makarewicz and Lewis, three were visits during rainfall or snowmelt conditions and one was during nonevent conditions. Pettenski made one visit during nonevent conditions.

Table 18 provides the results of these sampling visits. For two of the four visits made to the Gulf Road site by Makarewicz and Lewis, the channel of Mud Creek was dry and no sample could be collected. In his only visit to Mud Creek, Pettenski could not collect a sample either because the channel was dry. All three instances of a dry channel at Gulf Road occurred during summer sampling period, Makarewicz and Lewis in September and Pettenski in July. Neither study mentioned the possibility of the sinkhole being responsible for the no flow conditions.

The two visits where Makarewicz and Lewis were able to collect samples were in November and March. Higher phosphorus and nitrate concentrations were found in the rainfall event sampling in November, than were found in the snowmelt sample in March.

Table 18: Results of Sampling Visits to Mud Creek at Gulf Road – Combination of both Makarewicz & Lewis 2004 [9] and Pettenski 2012 [8]

Sampling Date – Study and Stream Condition	Total Phosphorus (TP) (µg P/L)	Soluble Reactive Phosphorus (SRP) (µg P/L)	Nitrate (NO_3) (mg/L)	Total Kjeldahl Nitrogen (TKN) (µg/L)	Total Suspended Solids (TSS) (mg/l)	Sodium (Na) (mg/L)
Sept. 17 2003 (Makarewicz & Lewis) – Nonevent	DRY – NO FLOW IN CHANNEL					
Sept. 23 2003 (Makarewicz & Lewis) – Rain Event	DRY – NO FLOW IN CHANNEL					
Nov. 20 2003 (Makarewicz & Lewis) - Rain Event	155.7	52.5	4.26	180	10	15.8
Mar. 3 2004 (Makarewicz & Lewis) – Snow Melt	71.6	36.8	2.38	860	12.3	16.83
Jul. 12 2010 (Pettenski) Nonevent	DRY – NO FLOW IN CHANNEL					

Professor Richards' comment (see above under Mud Creek sinkhole discussion) and caution about using these sample results to estimate phosphorous fluxes (loadings) to Oatka Creek would seem warranted given his studies that indicate that significant flow from Mud Creek only infrequently during a year will make it to Oatka Creek because of the diversion of stream flow to groundwater through the sinkhole. Most of the time the nutrient loads carried by Mud Creek will be re-routed east as groundwater flowing through the Onondaga Limestone towards Spring Creek in Caledonia and Mumford. A portion of these loadings will likely make it to Oatka Creek but via Spring Creek, as a result of the groundwater discharge to Spring Creek from seeps and springs in Caledonia and Mumford.

Spring Creek

The length of the Spring Creek channel currently is less than 2 miles long. However, Spring Creek is dominantly groundwater fed and the area that contributes to its flow extends for a considerable distance west and southwest of Caledonia. Several of the streams that would appear to be flowing in the direction of Caledonia end abruptly in sinkholes with swallets. Based on previous information in this report the eastern flow of groundwater within the Onondaga Limestone would bring groundwater to Spring Creek that could have originated in several surface water streams, like Mud Creek, or was groundwater that originated in flow from the highlands to the south , which was intercepted in the Onondaga Limestone and flowed east. There are two main spring areas in Caledonia that contribute groundwater discharges to Spring Creek; these are the Mackay Springs, located on the west side of Spring Street near the intersection with NYS Route 5, and Big Spring, located adjacent to Tenant Park. Both of these sources are in the Village of Caledonia. There are probable more seeps and springs that discharge directly into Spring Creek between Caledonia and Mumford before Spring Creek enters Oatka Creek. Unpublished information provided by Professor Richards indicates, because its flows are mainly contributed by groundwater discharges, Spring Creek is not very responsive to meteorologic events, e.g. rainfall events do not result in large, short-term increases in stream flow. Also, Spring Creek has seasonal flows that are controlled by regional groundwater table and these are highest in the months from February through April.

Spring Creek Sampling – Pettenski 2012 report

Spring Creek, called Big Spring Creek in Pettenski (2012), was sampled three times during Pettenski's thesis investigations. On July 12, 2010, samples were collected from two branches of Spring Creek in the hamlet of Mumford approximately 1,000 feet upstream of the confluence with Oatka Creek. In his thesis, Dale Pettenski called the Hamlet of Mumford "Genesee Country Village", probably because of the signs he saw in Mumford for the Genesee Country Village and Museum facility that is located just to the west of the Hamlet. The July 12 samples were collected under nonevent conditions and on the same day as the initial set of 21 samples Pettenski collected for his watershed-wide segment analysis study. The average phosphorus concentrations (SRP = 5.65 µg P/L) and TP = 25.75 µg P/L) for the two Spring Creek samples were low compared to the average phosphorus concentrations (SRP = 34.4 µg P/L, TP = 70.5 µg P/L) for the other 21 samples collected on the same date from locations throughout the Oatka Creek watershed. The average nitrogen concentrations (Nitrate = 2.02 mg N/L, TN = 2.33 mg N/L) for the two Spring Creek samples were high compared to the average nitrogen concentrations (Nitrate = 1.15 mg N/L, TN = 1.84 mg N/L) for the other 21 samples collected on the same date from locations throughout the Oatka Creek watershed. The Spring Creek samples were also low in terms of Total Suspended Solids (3.95 mg/L) and Total Coliform bacteria (1550 CFU/100 mL), when compared to the average levels (TSS = 9.09 mg/L, Total Coliform = 8326 CFU/ 100 mL) for the other 21 samples collected on the same date from locations throughout the Oatka Creek watershed.

Follow-up segment analyses, under both nonevent and event conditions, were conducted on January 4, 2011 and May 3, 2011, respectively, for the Spring Creek tributary to further identify sources of the high nitrogen concentrations that were observed on July 12, 2010. Three sites were sampled, identified as A, B, and C, from downstream to upstream. Site A represented the location sampled initially on July 12,

2010 in the Hamlet of Mumford, which was located downstream from the Fish Hatchery wastewater treatment facility's discharge pipe. Site B was located in the Village of Caledonia and is upstream of the Fish Hatchery. Further upstream in the Village of Caledonia, Site C was located on Mill St. at the road culvert for the western outlet of Big Spring, one of the groundwater sources for Spring Creek. Another site, Site D, located further upstream from Site C, was added for the May 3, 2011 event sampling. [See Figure 53, page 182, and Figure 54, page 183 in Pettenski (2012) [8]]

Results for both nonevent and event sampling were similar to the earlier July 12, 2010 monitoring, in that, phosphorus, TSS, and Total Coliform bacteria levels were low and nitrogen levels were high when compared to the range found for each of these water quality parameters in watershed–wide sampling. However when the sampling locations in the Spring Creek watershed are compared relative to each other, they provide information on potential sources for contamination. In terms of phosphorus found in the Spring Creek sampling, under both non-event and event sampling, relatively high levels of SRP and TP were found at the upstream sampling site (Site C) and these levels decreased to their lowest levels in samples collected at Site B upstream from the Caledonia Fish Hatchery. At Site A, downstream of the hatchery, SRP and TP increased again in both nonevent and event conditions. In terms of nitrogen, in the nonevent sampling, the highest levels of Nitrate and TN were in the most upstream site (Site C= Nitrate: 2.73 mg P/L, TN: 2.86 mg P/L) and these levels slightly decreased at Site B and further downstream at Site A , where they were, Nitrate = 2.56 mg P/L and TN = 2.76 mg/L . Under event conditions, nitrogen levels were found to be higher at all sites, compared to nonevent conditions. The furthest upstream site, Site D, had Nitrate = 2.78 mg P/L and TN = 2.97 mg P/L. But the highest nitrate was found at Site B, 3.06 mg P/L, and the highest TN was found at Site C, 3.17 mg/L. Nitrogen levels during the event condition at Site A, the most downstream sample and the sample downstream of the Caledonia Fish Hatchery, were reduced (Nitrate = 2.80 mg P/L, TN = 2.85 mg P/L) compared to upstream samples. For both the nonevent and event conditions the highest TSS sample results for Spring Creek, were recorded from the furthest downstream location, Site A, and the second highest TSS sample results were from Site B, upstream of the Caledonia Fish Hatchery (Nonevent: Site B – TSS = 2.1 mg/L, Site A – TSS = 3.6 mg/L and Event: Site B – TSS = 3.0 mg/L, Site A - TSS = 11.1 mg/L). For Total Coliform Bacteria, under nonevent sampling, only Site A had a detectable level (400 CFU/100 ml). Under event conditions, the furthest upstream site, Site D, had the highest amount of bacteria 36,000 CFU/100 ml, site C had 1,800 CFU/100 ml, Site B had 200 CFU/100 ml, and the furthest downstream Site A had 500 CFU/100 ml.

A comparison of the results from the nonevent and event sampling of Spring Creek at Site B and Site A indicates that downstream (Site A) of the Caledonia Fish Hatchery wastewater treatment plant discharge, Spring Creek has higher phosphorus, TSS, and Total Coliform bacteria, but lower nitrogen, than upstream (Site B). Two sets of samples, on two separate days were collected from the fish hatchery's water intake pipe from Spring Creek and the fish hatchery's treated wastewater discharge pipe to Spring Creek. Table -19 compares the average levels of water quality parameters for the intake pipe and discharge pipe samples. Treated water leaving the fish hatchery has a 342 % increase in SRP, a 503 % increase in TP, and a 397% increase in Total Coliform Bacteria compared to the Spring Creek water pumped into the facility. Levels of Nitrate and TSS in the treated water discharge were lower by 3% and 35%, respectively, compared to the intake water from Spring Creek. TN was slightly higher (1 %) in the discharge pipe, compared to the intake water. Based on the analysis of both the samples from Spring Creek and the fish hatchery's discharge pipe, the Caledonia Fish Hatchery is a source of phosphorus, coliform bacteria and possibly TSS to Spring Creek.

Table 19: Water Quality of Influent and Effluent from Caledonia Fish Hatchery

SITE	SRP µg P/L	TP µg P/L	NITRATE mg/L	TN mg/L	TSS mg/L	TOTAL COLIFORM CFU / 100mL
Influent	3.85	8.25	1.58	1.89	1.3	6250
Effluent	13.15	41.5	1.54	1.94	0.85	24,800
% Difference	+ 342%	+503%	-3%	1%	-35%	397%

Comparing the average values from samples collected on September 1 and September 7, 2011. (Revised from Table 5 on Page 117, Pettenski 2012)

There is evidence that nonpoint sources exist in the Spring Creek watershed and are affecting the water quality at Sites B, C, and D. Relative to Site A, the furthest downstream site, higher nitrogen levels were found at Site B, C, and D. During event conditions levels of nitrogen, total coliform bacteria and phosphorus increased at the upstream sites, Sites C and B, while the highest abundance of coliform bacteria was found at the most upstream site, Site D. A potential source for higher nutrients and coliform could be agricultural field drainage that enters karst geology in the Onondaga Limestone Formation and enters Spring Creek via discharges of groundwater from the bedrock springs. Another possible source for the higher levels of nitrogen, phosphorus, and coliform could be septic systems. Sites C and B are located within the Village of Caledonia, where all residences are served by on-site wastewater treatment facilities with septic tanks and leach lines or pits. The Village does not have a municipal wastewater treatment facility. The high nutrients may be an indication that the wastewater treatment systems are failing, but it may be also an indication that there may be insufficient depth to soils to allow leaching effluent to be retained in the soils long enough to be acted upon by soil bacteria.

Benthic Macroinvertebrate Sampling at the Garbutt Sampling Location – Pettenski (2012)
On August 10, 2011, in the vicinity of the Hamlet of Garbutt weekly sampling location near the USGS Streamflow gaging station in the Town of Wheatland, Monroe County, a sample of benthic macroinvertebrates was collected from the channel of Oatka Creek. The purpose of the sample was to use biological monitoring techniques to assess the degree of nutrient enrichment of Oatka Creek in the Lower Watershed Segment (Oatka Creek Outlet Subwatershed). Using NYSDEC protocols[33], a random sample of 100 specimens were picked from the larger sample. Only 90 specimens were used, because the remaining 10 specimens were taxonomic groups for which nutrient tolerance values had not yet been established. Nitrogen and Phosphorus Nutrient Tolerance Values for macroinvertebrate taxonomic groups (mostly at the level of genus and species) are listed in NYSDEC procedures [33].

Using the nitrogen and phosphorus tolerance values for each kind of macroinvertebrate and the number of that kind of macroinvertebrate in the subsample, two Nutrient Biotic Index numbers for the subsample were calculated, one for Nitrogen and one for Phosphorus.

There is one Nutrient Biotic Index for Phosphorus (NBI-P) and one Nutrient Biotic Index for Nitrogen (NBI-N). The results, for both NBI-P and NBI-N are placed on a scale of eutrophication from 0 to 10 and are as follows: Oligotrophic 0-5, Mesotrophic 5-6, Eutrophic 6-10. Oligotrophic waterbodies have low amounts of dissolved nutrients and mesotrophic waterbodies have a moderate amount of dissolve nutrients. Eutrophic waterbodies, or water bodies that are in a condition of eutrophication, have become enriched in dissolved nutrients that stimulate growth of aquatic plant life usually resulting in the depletion of dissolved oxygen.

The results reported for the Garbutt site were a NBI-Phosphorus value of 5.9 and a NBI–Nitrogen value of 5.2, both indicating a mesotrophic condition.

Incorporation of biological monitoring to assess stream health and potential impacts on aquatic life uses in the Oatka Creek Watershed should be more comprehensively implemented throughout the watershed as part of the Watershed Management Plan.

End Notes

[1] A Guide to Oatka Creek. [Online] In Oatka Creek Watershed Committee. Last retrieved 2/2/11 from http://www.oatka.org/creekhistory.php
[2] Tatakis, Timothy A. *The Oatka Creek Watershed State of the Basin Report*. 2002, page 30.
[3] National Land Cover Database. [Online] In Multi-Resolution Land Characteristics Consortium (MRLC). Retrieved 12/13/10 from http://www.mrlc.gov/about.php.
[4] US EPA. Identifying and Protecting Healthy Watersheds. March 2011: pages 2-5. Retrieved 8/11/11 from http://water.epa.gov/polwaste/nps/watershed/hw_techdocument.cfm
[5] Review of Key Findings of Recent Research Examining the Relationship of Urbanization on Aquatic Systems. [Online] In Stormwatercenter.net/. Last viewed online 3/3/11 at http://www.stormwatercenter.net/monitoring%20and%20assessment/imp%20cover/impercovr%20model. htm .
[6] Center for Watershed Protection. Impacts of Impervious Cover on Aquatic Systems.
[7] Summary Listing of Priority Waters, [Online], NYSDEC, http://www.dec.ny.gov/docs/water_pdf/pwlgeneslist.pdf. Ont 117-25 and Ont 117- 25- 7-4-P24a
[8] Pettenski, Dale Matthew, "Oatka Creek Water Quality Assessment: Identifying Point and Nonpoint Sources of Pollution with Application of the SWAT Model" (2012). *Environmental Science and Biology Theses*. http://digitalcommons.brockport.edu/cgi/viewcontent.cgi?article=1037&context=env_theses
[9] Makarewicz, J.C., and T.W. Lewis. 2004. "Segment analysis of Oatka Creek." Report #192, Soil and Water Conservation Districts of Genesee and Wyoming Counties, New York, USA http://oatka.org/Reports/Oatka_Creek_SSA_Final_Report_August_2004.pdf Last Accessed 10/14/2013
[10] Tatakis, T.A. 2002. "State of the Basin Report: The Oatka Creek Watershed." Rochester Area Community Foundation, Rochester, New York, USA. Available at: http://www.oatka.org/Reports/StateofBasin.pdf Last Accessed 10/14/2013.
[11]United States Environmental Protection Agency. 2007. "Advanced wastewater treatment to achieve low concentration of phosphorus." EPA Report; 910-R-07-002. USEPA, Seattle, Washington, USA. http://www.epa.gov/region10/pdf/tmdl/awt_report.pdf Last accessed 10/14/2013.
[12] Libby, Jill. 2010. "Determining the Source of Conduit Flow at Buttermilk Falls LeRoy NY." http://www.oatka.org/Reports/Libby_J_2010_Determining_the_Source_of_Conduit_Flow_at_Buttermilk_Falls_LeRoy_NY.pdf Last Accessed 2/4/2014.
[13] Smith, A. J., R. W. Bode, and G. S. Kleppel. "A nutrient biotic index for use with benthic macroinvertebrate communities." *Ecological Indicators* 7, no. 200 (2007): 371-386.
[14] Smith, Alexander J., and Christopher P. Tran. "A weight-of-evidence approach to define nutrient criteria protective of aquatic life in large rivers." *Journal of the North American Benthological Society* 29, no. 3 (2010): 875-891.
[15] Smith, A. J., R. L. Thomas, J.K. Nolan, D.J. Velinsky, S. Klein, and B. T. Duffy. "Regional Nutrient Thresholds in Wadeable Streams in New York State protective of aquatic life." *Ecological Indicators* 29 (2013) 455 – 467.
[16] Caledonia Fish Hatchery Webpage HTM. http://www.cal-mum.com/fishhatchery.htm Last accessed 12/30/2013.
[17] Green, Seth. 1870. *Trout Culture* Appendix: "Fish Farm in Caledonia NY" http://www.biodiversitylibrary.org/item/93983#page/7/mode/1up
[18] Online Conversion website. http://www.onlineconversion.com/ Last accessed 12/30/2013.
[19] Isachsen Y. W., E. Landing, J.M. Lauber, L.V. Rickard, and W.B. Rogers, editors, *Geology of New York: A Simplified Account*, 2nd edition, New York State Museum Educational Leaflet No. 12, 2000
[20] Oatka Creek Watershed Characterization. 2012.Genesee/Finger Lakes Regional Planning Council. http://www.gflrpc.org/Publications/BlackOatka/Characterization/OatkaCreekWatershed/FinalOatkaCharacterization.pdf Last accessed 12/30/2013.
[21] Niagara and Finger Lakes Bedrock Geology Maps. NYS Museum GIS Webpage. http://www.nysm.nysed.gov/gis/#bedr Last accessed on 12/30/2013.

[22] USGS National Geologic Map Database -Geolex website. http://ngmdb.usgs.gov/Geolex/NewUnits/unit_3069.html Last accessed 12/30/2013.
[23] Kentucky Geological Survey, University of Kentucky's "Karst is a Landscape" Webpage. http://www.uky.edu/KGS/water/general/karst/karst_landscape.htm Last accessed 12/30/2013.
[24] Richards, P.L., Libby, Jill, Kuhl, Alex, Daniluk, T.L., and Lyzwa, Mike, 2010, "Prediction of areas sensitive to the fertilizer application in thinly-soiled karst" Final Report: Brockport, NY, State University of New York at Brockport, 27 p. (courtesy of Dr. Richards). http://oatka.org/Reports/Richards_P_2010-FinalReport.pdf Last accessed 2/19/2013.
[25] Richards, P.L. 2007 Karst Related Flooding between Leroy and Caledonia, 2007 Annual Conference of the Finger Lakes Institute, p32-35. http://www.hws.edu/fli/conference/2007/agenda07.aspx
[26] Fronk, A. M. 1991 "Lehigh Valley Railroad Spill: A Study of a Contaminated Carbonate Aquifer"
[27] Voortman, B. and Simons, G. 2009 Surface Water – Groundwater Interaction at the Allegheny Plateau, Joint Master's Thesis, Utrecht University, Holland and the College at Brockport, Brockport NY http://oatka.org/Reports/thesis_final_version_B&G.pdf
[28] Reddy, J.E., and Kappel, W.M., 2010, Compilation of existing hydrogeologic and geospatial data for the assessment of focused recharge to the carbonate-rock aquifer in Genesee County, New York: U.S. Geological Survey Scientific Investigations Map 3132, 17 p., 20 sheets, at http://pubs.usgs.gov/sim/3132/.
[29] Czymmek, K, L. Goering, J. Lendrum, P. Wright, G. Albrecht, B. Bower, and Q. Ketterings. 2011. Manure Management Guidelines for Limestone Bedrock/Karst Areas of Genesee County, New York: Practices for Risk Reduction. Cornell University Animal Science Publication Series No. 240. http://nmsp.cals.cornell.edu/publications/files/Karst_2_15_2011.pdf Last accessed 12/31/2013.
[30] NYS Department of Environmental Conservation. 2010. New York State Stormwater Design Manual. http://www.dec.ny.gov/chemical/29072.html
[31] United States Environmental Protection Agency-Region 2. 5/20/2013 update. Lehigh Valley Railroad Derailment, EPA ID#: NYD986950251. http://www.epa.gov/region02/superfund/npl/0203481c.pdf Last accessed 12/29/2013.
[32] NYS Department of Health. Public Health Assessment *Lehigh Valley Railroad Derailment Site*. NYD086950251 on Agency for Toxic Substances and Disease Registry Website. http://www.atsdr.cdc.gov/HAC/pha/PHA.asp?docid=229&pg=0 Last accessed 12/29/2013.
[33] Smith, A.J., Heitzman, D.L., Lojpersberger, J.L., Duffy, B.T., Novak, M.A., 2012. Standard Operating Procedure: Biological Monitoring of Surface Waters in New York State. New York State Department of Environmental Conservation, Division of Water, Albany, NY, p. 164. http://www.dec.ny.gov/docs/water_pdf/sbusop12.pdf

IDENTIFICATION AND DESCRIPTION OF MANAGEMENT PRACTICES, APPROACHES AND STRATEGIES FOR WATERSHED PROTECTION AND RESTORATION & IMPLEMENTATION STRATEGY AND SCHEDULE

This planning matrix, known more formally as the *Identification and Description of Management Practices, Approaches and Strategies for Watershed Protection and Restoration & Implementation Strategy and Schedule*, represents the culmination of deep research into the current conditions of Oatka Creek, both in the stream itself and across its surrounding watershed. The matrix shows specific steps and strategies needed to complete an action, the groups responsible for completing the actions, and the timeline by which the tasks must be completed.

The matrix includes priority assignments, actions, objectives, steps, strategies, anticipated reductions and water quality improvements, benefits, related issues, lead organizations, potential funding sources, long- and short-term measures, approximate cost, and regulatory approvals in the following areas of concern for Oatka Creek:

- Coordination, collaboration, and partnership recommendations
- Agriculture
- Stormwater management and erosion control
- Forestry and silviculture management
- On-Site Wastewater Management Systems (OWTS)
- Wastewater Treatment Systems and Management
- Hazardous Waste Management
- Roads and Highways
- Wetlands, Riparian Zones, and Floodplains
- Reduce nutrient inputs and contaminants to surface waters
- Natural resource and habitat protection
- Regulatory management

The *Identification and Description of Management Practices, Approaches and Strategies for Watershed Protection and Restoration & Implementation Strategy and Schedule* was reviewed by the PAC on April 17, 2014 and subsequently revised prior to prioritization by the Oatka Creek Watershed Committee on May 19, 2014. The PAC then reviewed the final draft of the *Identification and Description of Management Practices, Approaches and Strategies for Watershed Protection and Restoration & Implementation Strategy and Schedule,* Watershed Management Plan introduction, and draft Intermunicipal Organization Memorandum of Understanding (IO MoU) at the July 16, 2014 meeting. The draft Watershed Management Plan was then reviewed and revised based on input from the second Public Meeting on August 28, 2014 and approved September 25, 2014.

Recommendations have been developed in order to address a number of areas of concern. The matrix in this section represents the culmination of years of deep research into the current conditions of Oatka Creek. The matrix includes recommendations that are presented in the *Regulatory and Programmatic Environment Report* section, and shows specific steps and strategies needed to complete an action, the groups responsible for completing the actions, and the timeline by which the tasks must be completed.

The matrix includes priority assignments, actions, objectives, steps, strategies, anticipated reductions and water quality improvements, benefits, related issues, lead organizations, potential funding sources, long- and short-term measures, approximate cost, and regulatory approvals in the following areas of concern for Oatka Creek:

Coordination, Collaboration & Partnership Recommendations – This set of recommendations addresses the need for improved collaboration amongst watershed municipalities, citizens and stakeholders; addresses the need for continuous water resource related monitoring activities; and

identifies specific educational opportunities that exist. The strongest recommendations are to present information on achievements in watershed planning to municipal boards and to develop an intermunicipal organization. Shared practice allows for better design, better maintenance, and economic incentives that can deliver higher performance and lower cost.

Agriculture – Farming can have a negative effect on water quality through erosion of crop land, sedimentation, and runoff contaminated with fertilizers or animal wastes. This section includes some of the highest prioritized actions of all the recommendations in the watershed, including the creation of riparian buffer zones around streams adjacent to agricultural land, the encouragement of farm participation in NYS Agricultural Environmental Management (AEM) program and the development of Comprehensive Nutrient Management Plans (CNMPs) tailored to all farms in the watershed.

Stormwater Management & Erosion Control – Stormwater runoff contains pollutants such as nutrients, pathogens, sediment, toxic contaminants, and oil and grease, resulting in water quality problems. This section's highest recommendation is to restore severely eroded streambank segments, focusing on restoring these critical processes that form, connect, and sustain habitats. Protecting these stream banks is vital to controlling sediment loading and maintaining the rock structures. Vegetation helps prevent erosion. Thus the other highest priority in this category is the revision of land use laws to require new developments to maintain the volume of runoff at predevelopment levels by using structural controls and pollution prevention strategies.

Forestry and silviculture management – Loss of large trees to the creek and poor maintenance of existing trees along the creek edge highlights one of the top overall recommendations in the watershed: the encouragement of private landowners to apply sound forest management practices based on the NYS Forestry Best Management Practices for Water Quality guide. Sustainable forestry balances preserving the integrity of our forests with economic development and maintaining our diverse wildlife population while minimizing damage to the agriculture and rural communities. An array of tools is available from the New York State Cooperative Forest Management Program.

On-Site Wastewater Management Systems (OWTS) – The number one source of nonpoint source pollution in New York State is on-site wastewater treatment systems. The highest recommendation in this category is to secure a funding stream to bring substandard septic systems into compliance, based on the classification of substandard OWTS. Substandard OWTS are defined as systems that are piped directly to surface waters, in close proximity to the surface or groundwater, or discharging directly to the surface.

Wastewater Treatment Plant Systems (WWTPS) – One of the highest overall recommendations for the Oatka Creek watershed is to upgrade some WWTPs to tertiary treatment or consider closing and transferring sanitary flows. Further specific recommendations pertaining to wastewater treatment systems and management can be found in the Identification and Description of Management Practices, Approaches and Strategies for Watershed Protection and Restoration & Implementation Strategy and Schedule section.

Hazardous Waste Management – Highly-ranked priorities in the Oatka Creek watershed are determining the location of inactive or unpermitted landfills; implementing a watershed-wide hazardous waste pick-up or drop-off; and preventing discharge of pharmaceuticals through community collection programs and by promoting best management practices and process changes at health care institutions, livestock and food industries, and other manufacturers. Educating the public and providing an opportunity to safely dispose of hazardous products keeps dangerous wastes out of landfills, lowering the environmental risks associated with improper disposal.

Roads and Highways – The highest-ranked priority in this section is educating municipal and county highway departments on ditch and culvert design and stream bank stabilization methods. Paved development has the highest coefficient of runoff, and thus highway departments have a very important role in preserving watershed quality.

Wetlands, Riparian Zones, and Floodplains – Floodplains act as a check valve for streams; they allow water to be slowed down, to dissipate energy after a rainstorm or snow melt. The original analysis of the 100-year base flood elevation developed for the *Oatka Creek Watershed Characterization Report* indicated that 4.4% of the total land areas within the Oatka Creek watershed are within this zone, known as a Special Flood Hazard Area (SFHA). FEMA's 2014 draft Discovery report indicates an average annualized loss of $5.7B concentrated around Oatka Creek, Black Creek, the Genesee River, and Spring Creek, making this a critical recommendation area both environmentally and economically. The highest recommendation under this heading is for all municipalities that do not presently deal sufficiently with flood plain development within local law to adopt ordinances prohibiting development in 100-year floodplain, and further restricting the location of barnyards and manure pits.

Regulatory management – The highest recommendation is for the enforcement of the aforementioned floodplain development controls. Two other highly prioritized regulatory recommendations pertain to the building blocks of local land use: zoning and comprehensive plans. The highest recommendation is to adopt stream buffer setbacks to reduce the amount of harmful runoff and sedimentation caused by land use activities, achieved through an environmental protection overlay district (EPOD) or setbacks from waterbodies within the zoning code. Another highly prioritized action is the drafting (or revision) of comprehensive plans in municipalities without one, emphasizing the protection of local water resources and recognizing the importance of watershed planning efforts within the Oatka Creek watershed and other neighboring watersheds within the municipality. A number of municipalities within the watershed are utilizing obsolete or incomplete comprehensive plans.

Nutrient and contaminant inputs to surface waters – Continuing the emphasis on nutrient loading and sediment reduction strategies, this section covers recommendations ranging from the highest prioritized action, the development of nutrient and sediment reduction strategies for Oatka Creek sub-watersheds, to community outreach about green chemistry, safe disposal of household hazardous waste, and the assessment of contaminants present in fish and wildlife populations.

Natural Resource and Habitat Protection – The highest ranked priority is the preparation and implementation of a comprehensive invasive species management plan as well as leadership and support for further research and monitoring to improve early detection and management of invasive species. The Finger Lakes PRISM (Partnership for Regional Invasive Species Management) is a cooperative partnership in central New York focused on reducing the introduction, spread, and impact of invasive species through coordinated education, detection, prevention and control measures.

Priority	Action	Objective	Steps (e.g., feasibility, design, permitting, construction)	Strategy	Anticipated Reductions	WQ Improvements	Benefits	Related Issue(s)	Lead and Potential Responsible Organization(s) (including sponsor, partners)	Potential Funding Sources	Measures/Targets (e.g., short-, medium-, or long-term)	Approximate Cost	Regulatory Approvals
Coordination, Collaboration & Partnership Recommendations													
High	Short presentation to municipal boards on watershed plan	coordination, collaboration, partnership	prepare presentation highlighting achievements thus far, future opportunities and areas for improvement	Get on the agenda to discuss in all Oatka Creek Watershed municipalities	N/A	potentially high	educating a broad range of people to help carry out best practices	water quality, education	G/FLRPC, WQCC, OCWC, SCMC, FLLOWPA, SWCD	Environmental Protection Fund	100% within one year	$9,500	N/A
High	Development of an Intermunicipal Organization (IO)	coordination, collaboration, partnership	final MOU, municipal presentations, municipal approval	Intermunicipal Organization (IO) Memorandum of Understanding (see Appendix)	N/A	potentially high	facilitate partnership across political boundaries to promote the ecological vitality of the Oatka Creek Watershed	water quality, education	OCWC, Monroe, Genesee, Livingston, and Wyoming Counties and municipal governments that geographically fall within the Oatka Creek Watershed	Local Government Efficiency Program	all municipalities signed on to MOU	$2,500	all municipalities signed on to MOU
Medium	Provide opportunities for citizens to volunteer for specific projects	coordination, collaboration, partnership	coordination with OCWC, WQCC, SCMC	Get on the agenda to discuss at OCWC, WQCC, SCMC meetings	project-dependent	project-dependent	project-dependent	water quality	OCWC, FLLOWPA, SWCD, SCMC	N/A	Increase number of volunteers by 10% within a year	$2,500	N/A
Medium	Increase participation in volunteer monitoring program such as NYSDEC's WAVE program	strengthen local capacity for successful management and protection of watersheds by empowering volunteers	Training to be held in Wayne and Wyoming Counties in May and June of 2014	recruit participants with chemical, physical, and biological sciences background	N/A	potentially high	enable citizen scientists to collect biological data for assessment of water quality on wadeable streams	water quality	NYSDEC WAVE program, CCE, OCWC, WQCC, SWCD, SCMC	NYSDEC, CFA	Increase number of volunteers by 10% within 1 year	N/A	N/A
Medium	Identify stakeholders with respect to specific priority issues, such as local roads management, and facilitate funding applications to support joint projects	coordination, collaboration, partnership	coordination with OCWC, WQCC, SCMC	Develop benchmarks and criteria for measuring progress	project-dependent	project-dependent	project-dependent	water quality	G/FLRPC, OCWC, FLLOWPA, SCMC	Local Government Efficiency Program	Identify 3 significant joint projects and seek funding within one year	$1,500	N/A
Low	Apply for funding to implement local 2009 New York State Open Space Conservation Plan Priority Projects (or 2014 plan, currently in draft form; this or any subsequent draft)	protect priority projects	Bergen Swamp, Genesee River Corridor, The Genesee Valley Greenway (GVG), Ecological Corridors, Exceptional Forest Communities, Grassland Preservation and Restoration (specifically in the Towns of Covington and Middlebury in Wyoming County)	a combination of state and local acquisition, land use regulation, smart development decisions, land owner incentives and other conservation tools used in various combinations, will be needed to succeed in conserving these open space resources for the long term	project-dependent	potentially high	project-dependent	open space, water quality, recreation	NYSDEC, G/FLRPC, OCWC, FLLOWPA, SCMC, Bergen Swamp Preservation Society	CFA, NYS Environmental Protection Fund Title 9 funding to local governments	one priority project per year	$20,000-$2M	possible
Low	Initiate a process to further engage the County WQCCs and the Stormwater Coalition, including brief presentation about the county water quality strategies and current projects of the committee; b) identification of common goals and efforts; and c) application for joint funding to conduct work across the watershed	coordination, collaboration, partnership	coordination with OCWC, WQCC, SCMC	Get on the agenda to discuss at OCWC, WQCC, SCMC meetings	N/A	advance county water quality strategies	advance county water quality strategies	water quality, education	WQCC, OCWC, SWCD, SCMC, FLLOWPA	Local Government Efficiency Program	100% within one year	$2,500	all municipalities signed on to MOU
Agriculture													
Highest (*Top 5 overall)	Create and maintain riparian buffer zones for streams adjacent to agricultural land starting with the critical areas	Town of Chili, Village of Scottsville, Town of Wheatland, Town of Bergen, Town of Bethany, Town of Byron, Town of LeRoy, Village of LeRoy, Town of Pavilion, Town of Stafford, Town of Caledonia, Village of Caledonia, Town of Covington, Town of Gainesville, Town of Orangeville, Town of Perry, Town of Middlebury, Town of Warsaw, Village of Warsaw, Village of Wyoming	reduce heavy use pastured/barnyard areas in the riparian buffer in the Pearl Creek (30.1%) and White Creek (30.4%) subwatersheds, the two most impaired tributaries to Oatka Creek.	implement agricultural best management practices	potentially high	potentially high	water erosion control, wind erosion control, improved soil tilth, improved water quality and stream health	agriculture, stormwater, drinking water, water quality, sediment	USDA, NRCS, SWCD, CCE, landowners	cost-sharing for this program may be available through the Conservation Reserve Program	x% of defined critical areas within 10 years	$1,000,000	municipalities
High	Encourage all farms throughout the watershed to participate in AEM and implement BMPs	implement agricultural best management practices	Tier 1, 2, 3 and 3A , 4, 5 AEM plans	complete farm planning on all AEM farms	based on plan adoption	potentially high	improve profitability and competitiveness of farms while protecting the environment	agriculture, development, sustainability	SWCD, CCE, USDA, NRCS, landowners, academic institutions	NYSDAM, NRCS, SWCD	% of farms in AEM program tiers 3-5	determined by tier	determined by tier

Priority	Action	Objective	Steps (e.g., feasibility, design, permitting, construction)	Strategy	Anticipated Reductions	WQ Improvements	Benefits	Related Issue(s)	Lead and Potential Responsible Organization(s) (including sponsor, partners)	Potential Funding Sources	Measures/Targets (e.g., short-, medium-, or long-term)	Approximate Cost	Regulatory Approvals
High	Encourage all farms in the Oatka Creek watershed to develop a Comprehensive Nutrient Management Plan (CNMP) that meets the provisions of NRCS/New York State Standard 590	A Comprehensive Nutrient Management Plan includes specific recommendations tailored to individual producers and the conditions of soil type, drainage, cropping practices, and livestock density.	Encourage farms that need the plan to do it - look for funding to do this	Practices are selected based on site-specific conditions of soil type, topography, drainage, cropping practices, and livestock density.	based on plan adoption	potentially high	balance nutrients entering and leaving farms	agriculture, stormwater, drinking water, water quality, nutrient loading, pathogens, education, sustainability	SWCD, CCE, USDA, NRCS, landowners, certified planners, private consultants, Cornell Nutrient Management Spear Program	NYS Agricultural Nonpoint Source Abatement & Control Grant Program	% of farms in AEM program tier 2	$20/acre without soil testing	N/A
Medium	Preserve high quality and unique agricultural areas by guiding non-agricultural development into other areas of the watershed	Town of Chili, Town of Riga, Village of Scottsville, Town of Wheatland, Town of Bergen, Town of Bethany, Town of Byron, Town of LeRoy, Village of LeRoy, Town of Pavilion, Town of Stafford, Town of Caledonia, Village of Caledonia, Town of Covington, Town of Gainesville, Town of Orangeville, Town of Perry, Town of Middlebury, Town of Warsaw, Village of Warsaw, Village of Wyoming	actively identify and protect prime soils, encourage cluster development and transfer/purchase of development rights (TDR/PDR), update subdivision standards	Create land use policies and zoning regulations that support the economic viability of agriculture	potentially high	potentially high	NYSDAM PDR program will not only protect water quality but also protect farmland	agriculture, development, sustainability	WQCC, SWCD, County Farmland Protection Boards, municipalities, G/FLRPC, City of Rochester	NYSDAM, NRCS, SWCD	acres of farmland recovered	N/A	municipalities, NYSDAM
Medium	Implement vegetated filter strips (edge of field solutions) where appropriate	define and protect critical areas	help farms enter AEM program to take advantage of this technology	slow runoff from fields, trapping and filtering sediment, nutrients, pesticides and other potential pollutants before they reach surface waters	based on plan adoption	project-dependent	lower nutrient loadings	agriculture, stormwater, drinking water, water quality, sediment	USDA, NRCS, SWCD, CCE, landowners	cost-sharing for this program may be available through the Conservation Reserve Program	x% of defined critical areas within 10 years	$1,000,000	N/A
Medium	Identify or develop and distribute public information materials that discuss agricultural issues of concern to the entire watershed community	Develop educational materials for agricultural producers and the community at large	research available materials and customize to suit Oatka Creek	illustrate the factors affecting farm size, regulatory and voluntary measures to control agricultural pollution, and the relationships between agriculture and other amenities such as open space	N/A	potentially high	educating a broad range of people to help carry out best practices	agriculture, tourism, comprehensive planning, education	OCWC, agricultural boards, SWCD, counties, American Farmland Trust	NYSDAM, NRCS, SWCD	3 articles submitted to various media per year	$2,000	N/A
Medium	Document and disseminate successful strategies for nutrient management, manure handling, and erosion control	develop educational materials for agricultural producers and the community at large	research available materials and customize to suit Oatka Creek	Consider publishing reports in trade journals for the dairy industry.	N/A	potentially high	educating a broad range of people to help carry out best practices	agriculture, stormwater, drinking water, water quality, nutrient loading, pathogens, sediment, education, sustainability	SWCD, CCE, USDA, NRCS, landowners, academic institutions, Nutrient Management Spear Program	NYSDAM, NRCS, SWCD	Distribute information to farms participating in AEM type programs within 2 years	$1,500	N/A
Low	Promote nutritional management as a tool to optimize feed efficiency and ultimately reduce nutrient content of animal waste	implement agricultural best management practices	reduction of P in dairy rations to levels recommended by the National Research Council, fitting P ratio into management plan	proactive agricultural and environmental management	The 2002 statewide P balance decreased from +7.2 to +4.3 lb/acre when improvements in dairy nutrition were taken into account	potentially high	balance nutrients entering and leaving farms	agriculture, stormwater, drinking water, water quality, nutrient loading, pathogens, education, sustainability	SWCD, CCE, USDA, NRCS, landowners, Cornell Nutrient Management Spear Program	Nutrient management (590) cost sharing may be available through USDA NRCS Environmental Quality Incentives Program (EQIP) or Ag Nonpoint Source programs	100% of livestock operations by 2016	$35,000	N/A
Low	Ensure appropriate point source permits for nutrients are implemented and enforced for CAFOs within watershed	implement agricultural best management practices	research current point source permits for nutrients	decrease nutrient loadings	potentially high	project-dependent	lower nutrient loadings	agriculture, stormwater, drinking water, water quality, sediment	NYSDEC, SWCD	Environmental Protection Fund	CAFO farms kept up to date with annual DEC and EPA CAFO compliance reporting requirements	unknown	N/A
Low	Consider the feasibility of technologies that reduce the mass of animal waste material to be handled, particularly collaborative anaerobic digesters	capture livestock waste and convert to energy for heat and/or electricity; on-farm digestion would be preferred and the nutrients should stay in the same watershed they are generated in as much as possible	feasibility studies	Utilize NYSERDA PON 2828 $2 million in New York State Renewable Portfolio Standard (RPS) funding available through 2015 to support the installation and operation of Anaerobic Digester Gas (ADG)-to-Electricity Systems	project-dependent	project-dependent	potentially high	agriculture, stormwater, drinking water, tourism, water quality, nutrient loading, pathogens, sustainability	NYSERDA, NYSDAM, SWCD, WQCC, CCE, Cornell Manure Management, landowners	NYSERDA PON 2828 $2 million in New York State Renewable Portfolio Standard (RPS) funding is available through 2015 to support the installation and operation of Anaerobic Digester Gas (ADG)- to-Electricity Systems	number of farms using waste for power by 2020	engineering and project development $300,000	N/A

Priority	Action	Objective	Steps (e.g., feasibility, design, permitting, construction)	Strategy	Anticipated Reductions	WQ Improvements	Benefits	Related Issue(s)	Lead and Potential Responsible Organization(s) (including sponsor, partners)	Potential Funding Sources	Measures/Targets (e.g., short-, medium-, or long-term)	Approximate Cost	Regulatory Approvals
Low	Expand agricultural and soil health initiatives that provide technical assistance and incentives to implement practices such as cover cropping, nutrient management, conservation tillage, conservation cropping systems	improve profitability and competitiveness of farms while protecting the environment	research existing institutional offerings and body of research	utilize research done by Monroe, Genesee, Livingston, and Wyoming County SWCDs, Cornell nutrient management, soil science, etc.	potentially high	potentially high	Improve soil health to increase infiltration/water retention capacity; reduce stormwater runoff	agriculture, stormwater, drinking water, tourism, water quality, nutrient loading, pathogens, sustainability	NRCS, SWCDs, NYSDAM, CCE, Cornell Nutrient Management Spear Program	cost-sharing for this program may be available through the Conservation Reserve Program, GLRI	one priority project per year	$50,000	N/A
Low	Install exclusion fencing to keep livestock from critical areas, including streams and other water bodies	implement agricultural best management practices	identify critical areas	AEM program	based on plan adoption	potentially high	improved water quality and stream health	agriculture, stormwater, drinking water, water quality, sediment	NRCS, SWCD, landowners	cost-sharing for this program may be available through the Conservation Reserve Program, GLRI	100% of critical areas protected by 2020	3-5 strand HT is the minimum allowed by NRCS standards for critical area fencing for all livestock other than dairy cows; rates run $1.80-$2.50 for foot depending on post spacing	N/A
Low	Plant cover crops in regions with high leaching potential where nutrients need to be controlled.	implement agricultural best management practices	select cover crop types and varieties adapted to the region	Cover crops recycle nutrients that might otherwise be lost to leaching during the winter and spring.	Past research has shown that fields with winter cover plowed under in the spring have 55 percent less water runoff and 50 percent less soil loss annually than do fields with no winter cover	potentially high	water erosion control, wind erosion control, improved soil tilth, improved crop yield	agriculture, stormwater, drinking water, water quality, nutrient loading, pathogens, education, sustainability	SWCD, CCE, USDA, NRCS, landowners	Nutrient management (590) cost sharing may be available through USDA NRCS Environmental Quality Incentives Program (EQIP) or Ag Nonpoint Source programs	Identify 3 significant joint projects and seek funding within one year	$40-$70-per-acre range	N/A
Stormwater Management & Erosion Control													
Highest (*Top 5 overall)	Restore very severe streambank segments using ecologically-based stream restoration	focus on restoring processes that form, connect, and sustain habitats	debris removal, develop inventory and assessment protocol, prioritize remediation efforts, identify potential solutions including stream corridor/watershed management techniques and/or in-stream restoration techniques, train volunteer assessors	by highest Erosion Potential Index Number	reduced erosion, sedimentation	potentially very high	Ecologically-based stream restoration uses a mosaic of in-stream, riparian and watershed management and restoration techniques to reduce or eliminate stress on streams and improve ecosystem functions.	agriculture, stormwater, drinking water, water quality, sediment	SWCD, CCE, Great Lakes Commission, landowners, municipalities	GLRI	3 miles/year for 10 years	$50-$100/foot	N/A
High	Require new developments to maintain the volume of runoff at predevelopment levels by using structural controls and pollution prevention strategies	Town of Chili, Town of Riga, Village of Scottsville, Town of Wheatland, Town of Bergen, Town of Bethany, Town of Byron, Town of LeRoy, Village of LeRoy, Town of Pavilion, Town of Stafford, Town of Caledonia, Village of Caledonia, Town of Covington, Town of Gainesville, Town of Orangeville, Town of Perry, Town of Middlebury, Town of Warsaw, Village of Warsaw, Village of Wyoming	Provide municipalities with draft language.	Integrate into all zoning, subdivision, and/or site plan review controls	reduction of the total water quality volume by application of green infrastructure techniques and stormwater best management practices	reduction of sedimentation and runoff	Minimizing erosion to protect habitat and reduce stress on natural water systems by preserving steep slopes in a natural, vegetated state.	development, stormwater, drinking water, water quality, comprehensive planning	GFLRPC, county planning, municipalities	stormwater management fees calculated using a formula based on the square footage of impervious surface per lot	20% in 5 years of ones that presently do not have controls	combine with other tasks that revise local codes for efficiency. In combination with other local codes. $15,000	municipal
Medium	adoption of a Stormwater Management & Erosion Control Local Law and the enforcement of performance standards	Integrate into all zoning, subdivision, and/or site plan review controls: Town of Bergen, Town of Byron, Town of LeRoy, Village of LeRoy, Town of Covington, Town of Gainesville, Town of Orangeville, Town of Perry, Town of Middlebury, Town of Warsaw, Village of Warsaw, Village of Wyoming	Provide municipalities with draft language for zoning laws.	Sample Local Law for Stormwater Management and Erosion & Sediment Control	reduction of the total water quality volume by application of green infrastructure techniques and stormwater best management practices	reduction of erosion and sedimentation	reduction of large, impermeable parking lots and buildings to contribute more since they generate a disproportionate amount of runoff	development, stormwater, drinking water, water quality, comprehensive planning	GFLRPC, county planning, municipalities	GLRI	20% in 5 years of municipalities that presently do not have controls	$50,000	municipal
Medium	Update and apply for funding (e.g. Great Lake funding) for *Identification and Analysis of the Riparian Corridor in the Black & Oatka Creek Watersheds*	Maintain consistent and regular testing for comparison and monitoring	coordination with OCWC, WQCC, SCMC	Review and update existing streambank erosion assessments. Monitor and remediate (streambank stabilization) existing prioritized sites	N/A	necessary data	data to evaluate the health of the watersheds	coordination, collaboration, partnership	counties, municipalities, G/FLRPC, SWCD, BCWC, OCWC, , SCMC, WQCC, CCE, academic institutions	LWRP, Cleaner Greener Phase II	secure funding by 2016	$20,000	N/A

Priority	Action	Objective	Steps (e.g., feasibility, design, permitting, construction)	Strategy	Anticipated Reductions	WQ Improvements	Benefits	Related Issue(s)	Lead and Potential Responsible Organization(s) (including sponsor, partners)	Potential Funding Sources	Measures/Targets (e.g., short-, medium-, or long-term)	Approximate Cost	Regulatory Approvals
Medium	Provide education and training of local officials on erosion controls and stormwater management	strengthen local capacity for successful management and protection of watersheds by empowering decisionmakers	coordination with OCWC, WQCC, SCMC	begin with towns with most severely degraded streambank segments	N/A	high	reduced erosion, sedimentation	stormwater, drinking water, water quality, education	NYSDOS, NYSDEC, counties, municipalities, G/FLRPC, SWCD, , SCMC, WQCC, CCE, academic institutions	LWRP, Cleaner Greener Phase II	number of trainings held annually	$2,500	N/A
Low	Revise land use laws to limit development on slopes greater than 10%	limiting disturbance to consolidated areas of disturbance on the areas of least slope and to minimize changes in grade, cleared area, and volume of cut or fill on the site	Provide municipalities with draft language for zoning laws	Apply to existing natural or constructed slopes. Portions of project sites with slopes up to 20 feet in elevation, measured from toe (a distinct break between a 40% slope and lesser slopes) to top, that are more than 30 feet in any direction from another slope greater than 15% exempt from the requirements, although more restrictive local regulations may apply	reduced runoff	Improved water quality	better site planning, better design standards, conservation of natural areas and sensitive lands, buffering water resources	development, site planning, design standards	GFLRPC, county planning, municipalities	LWRP, Cleaner Greener Phase II	On-going - Long Term	combine with other tasks that revise local codes for efficiency. In combination with other local codes. $15,000	Each municipality to adopt amendments to zoning law.
Low	Conduct additional research into identification of effective IC within the urbanized areas	Villages of Warsaw, LeRoy, Caledonia and Scottsville	Identify the specific locations where impervious surfaces are contiguous and directly tied to adjacent waterbodies	These particular areas could be targeted for stormwater retrofit and mitigation projects in order to eliminate or reduce the negative impacts that they have on local aquatic health.	reduce impervious cover	Improved water quality	better site planning, better design standards, conservation of natural areas and sensitive lands, buffering water resources	development, comprehensive planning, site planning, design standards	GFLRPC, county planning, municipalities	LWRP, Cleaner Greener Phase II	Identify 3 significant joint projects and seek funding within one year	$10,000	N/A
Low	Create green infrastructure standards and integrate into site plan review criteria	Assist Town of Chili, Town of Riga, Village of Scottsville, Town of Wheatland, Town of Bergen, Town of Bethany, Town of Byron, Town of LeRoy, Village of LeRoy, Town of Pavilion, Town of Stafford, Town of Caledonia, Village of Caledonia, Town of Covington, Town of Gainesville, Town of Orangeville, Town of Perry, Town of Middlebury, Town of Warsaw, Village of Warsaw, Village of Wyoming	adoption of a Stormwater Management & Erosion Control Local Law and the enforcement of performance standards	Low Impact Development, such as Bioswales (roadside ditches) and bioretention areas (sunken gardens), French drains (retention trenches) and brick and cobblestone streets (pervious pavers); identify existing ponds/basins and retrofit them to enhance their performance and bring them to current standards	reduce impervious cover	potentially high	better site planning, better design standards, conservation of natural areas and sensitive lands, buffering water resources	development, comprehensive planning, site planning, design standards	counties, municipalities, G/FLRPC, SWCD, , SCMC, WQCC, CCE, academic institutions	USEPA, NYSDEC	% pervious surfaces	combine with other tasks that revise local codes for efficiency. In combination with other local codes. $25,000	municipal
Forestry & Silviculture Management													
Highest (*Top 5 overall)	Encourage private landowners to apply sound forest management practices to woodlands: NYS Forestry Best Management Practices for Water Quality	preserving the integrity of our forests balanced with economic development and maintaining our diverse wildlife population while minimizing damage to the agriculture and rural communities	apply forestry best management practices	sustainable forestry management, plan for conservation easements, protecting water quality and the forest and soil resources	project-dependent	project-dependent	Protecting water quality, forest and soil resources are among the most important aspects of a successful and environmentally sustainable timber harvest	stormwater, drinking water, water quality, sediment, education, sustainability	NYSDEC, CCE, Cornell Agroforestry Research Center, GFLRPC, municipalities, landowners	federal Stewardship Incentives, Forestry Incentives, Tree Assistance and Conservation Reserve Programs	Ongoing as appropriate for the program	N/A	N/A
Low	Coordinate with the New York State Cooperative Forest Management Program administered by the NYSDEC	preserving the integrity of our forests balanced with economic development and maintaining our diverse wildlife population while minimizing damage to the agriculture and rural communities	plantation establishment and care, the marking of timber, marketing assistance and silvicultural treatment of immature stands	sustainable forestry management, plan for conservation easements, protecting water quality and the forest and soil resources	project-dependent	project-dependent	increasing contact between landowners and professional foresters promotes wise stewardship of forest land	stormwater, drinking water, water quality, sediment, education, sustainability	NYSDEC, CCE, Cornell Agroforestry Research Center, GFLRPC, municipalities, landowners	federal Stewardship Incentives, Forestry Incentives, Tree Assistance and Conservation Reserve Programs	Ongoing as appropriate for the program	$3,000	N/A
On-Site Wastewater Management Systems (OWTS)													
High	Secure a funding stream to bring substandard septic systems into compliance	Identification and assessment of on-site waste water systems	research funding opportunities	Classify substandard OWTS. Substandard OWTS are defined as systems that are piped directly to surface waters, in close proximity to the surface or groundwater, or discharging directly to the surface	10% of phosphorus in Oatka Creek	potentially high	Reduce nutrient and pathogen runoff into groundwater and surface waters	OWTS, water quality, drinking water, education, pathogens	NYSDOH, SWCD, WQCC, county health department, county planning department	Clean Water State Revolving Fund (CWSRF)	x number of systems improved by 2016	unknown	N/A
Medium	Revise land use laws to require infiltration rates (perc. tests) for new development in areas without public sewer service	elevate quality of future OWTS, consider in relation to agricultural practices, land uses, and development	Require identification of Karst ideas in SEQR and site plan review process using already available bedrock geology maps	consider that there are soils with not enough perc, soils that have too much perc	potentially high	water quality restoration	Carefully directing development in soils with high runoff potential	site planning, design standards, open space	NYSDOH, SWCD, WQCC, county health department, county planning department	LWRP, Cleaner Greener Phase II	Medium Term	$25,000	Each municipality to adopt amendments to zoning law
Medium	Implement and promote programs to encourage homeowners to adopt best practices for septic system maintenance	educating a broad range of people to help carry out best practices	identify experts in OWTS and organize sessions	Contractors and others associated with septic system design and construction, municipal officials (elected, planning, zoning), homeowners	N/A	high	Reduce nutrient and pathogen runoff into groundwater and surface waters	OWTS, water quality, drinking water, nutrient loading, pathogens, education	NYSDOH, SWCD, WQCC, county health department, county planning department	unknown	50 homeowners and 30 professionals trained within 4 years	$5,000	N/A

Priority	Action	Objective	Steps (e.g., feasibility, design, permitting, construction)	Strategy	Anticipated Reductions	WQ Improvements	Benefits	Related Issue(s)	Lead and Potential Responsible Organization(s) (including sponsor, partners)	Potential Funding Sources	Measures/Targets (e.g., short-, medium-, or long-term)	Approximate Cost	Regulatory Approvals
Low	Hold educational/ training sessions targeted towards OWTS installers, owners, and municipal officials	elevate quality of future OWTS	identify experts in OWTS and organize sessions	Contractors and others associated with septic system design and construction, municipal officials (elected, planning, zoning), homeowners	N/A	potentially high	Onsite systems are effective when properly designed, installed and maintained.	OWTS, water quality, drinking water, nutrient loading, pathogens, education	G/FLRPC, CCE, SWCD, WQCC, counties, municipalities,	unknown	50 homeowners and 30 professionals trained within 4 years	$7,500	N/A
Low	Adopt uniform sanitary law throughout the Oatka Creek Watershed based on the Ontario County model or the model Local Law for On-Site Individual Wastewater Treatment	Assist Town of Chili, Town of Riga, Village of Scottsville, Town of Wheatland, Town of Bergen, Town of Bethany, Town of Byron, Town of LeRoy, Village of LeRoy, Town of Pavilion, Town of Stafford, Town of Caledonia, Village of Caledonia, Town of Covington, Town of Gainesville, Town of Orangeville, Town of Perry, Town of Middlebury, Town of Warsaw, Village of Warsaw, Village of Wyoming	Residences within 200 feet of streams should be considered in a critical environmental zone and subject to more frequent inspection. Substandard systems in this zone should be required to install holding tanks until systems can be brought into compliance.	Examine pros and cons of existing uniform sanitary laws in the region and in other collaborative septic programs	potentially very high	potentially very high	Reduce effluent disposal	OWTS, water quality, drinking water, education, pathogens	NYSDOH, SWCD, WQCC, county health department, county planning department	LWRP, Cleaner Greener Phase II	all towns signed onto uniform agreement by 2020	$15,000	municipalities
Low	Host technology transfer workshops for those responsible for evaluating alternative and innovative OWTS technologies	elevate quality of future OWTS	coordination with PAC, OCWC, WQCC, SCMC	Target audience is local code enforcement officers, design professionals, and representatives of State and County Health Departments	Reduce nutrient and pathogen runoff into groundwater and surface waters	potentially very high	Onsite systems are effective when properly designed, installed and maintained.	OWTS, water quality, drinking water, education, pathogens	NYSDOH, SWCD, WQCC, county health department, county planning department, CCE	OTN	Workshop offered watershed-wide annually through 2016	$12,000	N/A
Waste Water Treatment Plant Systems (WWTPS)													
Highest (*Top 5 overall)	Upgrade WWTP to tertiary treatment or consider closing and transferring sanitary flows	Village of LeRoy, Village of Warsaw, Town of Pavilion	evaluate existing wastewater infrastructure issues	Five-Year Capital Improvement Plan (CIP)	potentially high	potentially high	Reduce nutrient and pathogen runoff into groundwater and surface waters	water quality, comprehensive planning	G/FLRPC, WQCC, OCWC, SCMC, FLLOWPA, SWCD	Clean Water State Revolving Fund (CWSRF)	upgrades complete by 2020	$60,000	NYSDEC, municipalities, counties
Medium	locate and identify combined sewer overflows (CSOs)	CSOs are a major or contributing cause to precluded, impaired, stressed or threatened best usage in many receiving waters	identify regional experts in CSOs, such as Onondaga County's Save the Rain program	comprehensive stormwater management plan	high	CSOs may contribute significantly to receiving water degradation	project-dependent	water quality, drinking water, nutrient loading, pathogens, education, sustainability, infrastructure	G/FLRPC, WQCC, , OCWC, SCMC, FLLOWPA, SWCD	Clean Water State Revolving Fund (CWSRF)	upgrades complete by 2020	unknown	NYSDEC, municipalities, counties
Medium	Educate the general public on the role, process, accomplishments, needs, and future strategy of sewer districts and wastewater treatment facilities.	educating a broad range of people to help carry out best practices	identify experts in WWTPs, such as Ithaca WWTP operator Dan Ramer	stakeholder discussions to consider the potential for the effects of increased population growth and associated increased point source loading	N/A	N/A	educating a broad range of people to help carry out best practices	OWTS, water quality, drinking water, nutrient loading, pathogens, education, sustainability, infrastructure	NYSDEC, , CCE, SWCD, WQCC, educational institutions, wastewater treatment facilities, , county health departments, county planning departments, municipalities	LWRP, Cleaner Greener Phase II	Target high priority communities beginning in year 1. Offer assistance and materials as appropriate.	$10,000	N/A
Medium	Complete a characterization of WWTP effluent to assess levels of contaminants that are discharged	Assessment/Research	Quantify contaminant levels discharged from WWTPs	stakeholder discussions to consider the potential for the effects of increased population growth and associated increased point source loading	N/A	N/A	project-dependent	water quality, drinking water, nutrient loading, pathogens, education, sustainability, infrastructure	NYSDOH, NYSDEC	Clean Water State Revolving Fund (CWSRF)	complete characterization	$50,000	N/A
Hazardous Waste Management													
Medium	Conduct a study to determine the location of inactive or unpermitted landfills, dumps and hazardous material storage, as well as mined lands and petroleum bulk storage facilities	Determine dates of operation, the type of materials disposed at each and the vulnerability of water resources	develop inventory and assessment protocol, prioritize remediation efforts, identify potential solutions	Expand on list of Oatka Creek DEC Hazardous Waste Sites in Characterization Table 4.26	unknown	project-dependent	project-dependent	drinking water, water quality, pathogens, fertilizers, pesticides, organic compounds	USEPA, USGS, NYSDEC, SWCD, WQCC, GLOW Region Solid Waste Management Committee	NYSDEC	100% of counties and municipalities surveyed	$40,000	N/A
Medium	Implement watershed-wide pickup of hazardous wastes and obsolete/canceled use pesticides using the "Clean Sweep" model	reduce hazardous wastes in watershed	schedule pickups and publicize	coordination with OCWC, WQCC, SCMC	potentially high	potentially high	By providing the public with an opportunity to safely dispose of such hazardous products, we keep these products out of landfills and lower the environmental risks associated with such improper disposal.	agriculture, stormwater, drinking water, water quality, fertilizers, pesticides, organic compounds	NYSDEC, SWCD, CCE, landowners	NYSDEC administers state assistance programs for household hazardous waste (HHW) programs. Funding is provided on a 50% reimbursement rate for eligible costs.	regular program for hazardous waste disposal	$120,000	N/A
Medium	Prevent discharge of pharmaceuticals through community collection programs and by promoting best management practices and process changes at health care institutions, livestock and food industries, and other manufacturers	Education/Outreach	work with community partners to identify pharmaceutical drop off programs and locations	Promote new drop-off at Monroe County EcoPark Special Collections	discharges of pharmaceutical chemicals and by-products are reduced	lower toxic chemical burden in organisms in watershed	less potential harmful impacts from chemicals	drinking water, fish, wildlife, human health	NYSDEC, NYSDOH, communities, OCWC, WQCC	unknown	reduced chemical discharges into air, water, soil	unknown	N/A

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Low	Distribute hazardous spills information throughout the watershed to various community groups, fire departments, chamber of commerce, citizens, municipalities with names and numbers of the agencies and staff in charge and who has appropriate jurisdiction in emergency situations	strengthen local capacity for successful management and protection of watersheds by empowering decisionmakers	identify experts in hazardous waste management and organize sessions	organize sessions	N/A	N/A	strengthen local capacity for successful management and protection of watersheds by empowering decisionmakers	drinking water, water quality, organic compounds, education	NYSDEC, county planning department, county health department, SWCD, WQCC, emergency management organizations (EMOs)	unknown	number of trainings held annually	$2,500	N/A
Low	Identify or develop public educational materials to describe landfill issues, such as the difference between old and new types of landfills, threats to public health and water quality, and the need to ensure that sites are closed properly	educating a broad range of people to help carry out best practices	research available materials and customize to suit Oatka Creek	utilize and distribute research, organize training sessions	N/A	N/A	strengthen local capacity for successful management and protection of watersheds by empowering decisionmakers	drinking water, water quality, pathogens, fertilizers, pesticides, organic compounds, education	USEPA, USGS, NYSDEC, counties	unknown	Identify resources and share locations on web site and with collaborating agencies (6 months).	$3,000	N/A
Low	All wells to be tested with any transfer of property regardless of mortgage/sale requirements	Reduce number of contaminated wells	provide draft language (Schuyler County model) and have counties provide support/funding for this testing	reduction in contaminants	see reductions	Improved water quality	Reduce potential for groundwater contamination	drinking water, water quality, organic compounds, education	WQCC, SWCD	County funded	Medium Term	TBD	County Legislation
Roads and Highways													
Medium	Educate municipal and county highway departments on ditch and culvert design and stream bank stabilization methods.	Education of DOT's, Highway superintendents	Provide education to those working on ditch, culverts and streams	reduced runoff, sedimentation	project-dependent	Improved water quality	reduced erosion, sedimentation	design standards	SWCD, NYSDOT, County DOT, Highway Superintendents	604(b), WQIP	Medium Term	$5,000/year	N/A
Medium	Require special vegetative measures such as hydroseeding and mulching of roadside swales based on purchasing and sharing of hydroseeder and training and education of municipal, county, and state highway departments	repair cut, bare, and collapsing banks, exposed roots, and blow-out holes in ditch bottoms and gully erosion	assessment of most severe sites	Initial hydroseeding should occur on the very severe sites, based on a roadbank inventory	estimated soil erosion rates of 100 to 200 tons per bankside mile	potentially high	reduced erosion, sedimentation	development, stormwater, drinking water, water quality, sediment, comprehensive planning	NYSDOT, counties, municipalities	604(b), WQIP	20% of very severe ditches/year	$150,000	N/A
Medium	Increase training for highway officials in erosion control, hydroseeding, and road deicing	Education of DOT's, Highway superintendents, and Soil and Water conservation	Provide education to those working on ditch, culverts and streams	reduced runoff, sedimentation	project-dependent	project-dependent	reduced erosion, sedimentation	education	G/FLRPC, NYSDOT, counties, municipalities	604(b), WQIP	Medium Term	$5,000/year	N/A
Medium	Install recreational access to stream at bridge crossings with new construction or repair	increase pedestrian connectivity to recreational areas	coordinate with NYSDOT to determine construction schedule and advocate for recreational access	Increase the connectivity of parks, trails, and natural areas to form a well-established network of interconnected green space	N/A	unknown	recreation, connectivity, green matrix, network	development, comprehensive planning, site planning, design standards	NYSDOT, counties, municipalities, tourism boards, PAC, NYS Parks and Trails	LWRP, Cleaner Greener Phase II, NYSDOT Scenic Byways	N/A	unknown	NYSDOT, municipalities
Low	Conduct a follow-up salt survey study to determine the location of salt storage and application practices in the Oatka Creek Watershed	reduce the threat to the chemical and physical characteristics of the creek and reduce pollution of groundwater	develop (or assess previous) survey, identify municipal and private salt storage facilities, gather responses	reduce impact of salt application, mixing, or storing on Oatka Creek	potentially high	potentially high	reduction of threat to the chemical and physical characteristics of the creek and reduce pollution of groundwater	water quality	G/FLRPC, NYSDOT, counties, municipalities	LWRP, Cleaner Greener Phase II	long-term reduction of salt-only road de-icing, shift to more holistic approach	$15,000	N/A
Low	Use sensible de-icing material application procedure (e.g. intersections, posting of signs, driver education)	Develop guidelines and implement sensible deicing procedures	educate on best management practices for winter maintenance, including a salt management plan, development of an anti-icing strategy, and precision application techniques	Focus on hydrologically-connected roads – roads that are designed to contribute surface flow directly to a drainage channel – which have the greatest potential to deliver road-derived contaminants to streams	potentially high	potentially high	balancing cost with temperature at application	stormwater, drinking water, water quality, education	NYSDOT, counties, municipalities, highway departments	604(b), WQIP	long-term reduction of salt-only road de-icing, shift to more holistic approach	depends on materials used	highway departments
Wetlands, Riparian Zones, and Floodplains													
High	All municipalities that do not presently deal sufficiently with flood plain development within local law should adopt ordinances prohibiting development in 100-year floodplain and restrict location of barnyards and manure pits	Assist Town of Chili, Town of Riga, Village of Scottsville, Town of Wheatland, Town of Bergen, Town of Bethany, Town of Byron, Town of LeRoy, Village of LeRoy, Town of Pavilion, Town of Stafford, Town of Caledonia, Village of Caledonia, Town of Covington, Town of Gainesville, Town of Orangeville, Town of Perry, Town of Middlebury, Town of Warsaw, Village of Warsaw, Village of Wyoming	draft language, request review by NYSDAM if there is concern about conflict with existing Right to Farm law	reduce loss caused by floods and prevent animal waste from entering water bodies	potentially high	Improved water quality and diminished losses	Improved water quality and diminished losses	agriculture, development, stormwater, drinking water, water quality, organic compounds, fertilizers, pesticides, heavy metals, nutrient loading, pathogens, sediment, comprehensive planning	municipalities, landowners	EPA, 604(b), WQIP	20% within 5 years	combine with other tasks that revise local codes for efficiency. In combination with other local codes. $15,000	Adoption and enforcement of strategy by each municipality and/or each county.

Priority	Action	Objective	Steps (e.g., feasibility, design, permitting, construction)	Strategy	Anticipated Reductions	WQ Improvements	Benefits	Related Issue(s)	Lead and Potential Responsible Organization(s) (including sponsor, partners)	Potential Funding Sources	Measures/Targets (e.g., short-, medium-, or long-term)	Approximate Cost	Regulatory Approvals
Medium	Inventory all wetlands in watershed to establish priorities. Restore degraded wetlands (based on watershed-wide analysis of potential benefit to water quality, habitat, and hydrology)	Inventory all wetlands in watershed to establish priorities	prioritize wetlands for restoration	develop inventory and assessment protocol, prioritize remediation efforts, train volunteer assessors	absorb the forces of flood and tidal erosion to prevent loss of upland soil	potentially high	Protection of the areas surrounding wetlands improves the functions of the wetland	agriculture, development, stormwater, drinking water, water quality, organic compounds, fertilizers, pesticides, heavy metals, nutrient loading, pathogens, sediment, comprehensive planning	NYSDEC, USEPA, SWCD, NRCS	Environmental Protection Fund	20 acres/year at $5,000/acre	$50,000	N/A

Regulatory Management

Highest (*Top 5 overall)	Enforce floodplain development regulations	Reduce loss caused by floods.	Flood/Hazard mitigation strategy and code enforcement	Reduction of loss due to flood as well as erosion and sedimentation due to flooding	see reductions	Improved water quality and diminished losses	Improved water quality and diminished losses	agriculture, development, stormwater, drinking water, water quality, organic compounds, fertilizers, pesticides, heavy metals, nutrient loading, pathogens, sediment, comprehensive planning	County Emergency Management Councils, County Planning	EPA, 604(b), WQIP	Medium Term	TBD	Adoption and enforcement of strategy by each municipality and/or each county.
High	Adopt stream buffer / riparian setback regulations.	Town of Chili, Town of Riga, Village of Scottsville, Town of Wheatland, Town of Bergen, Town of Bethany, Town of Byron, Town of LeRoy, Village of LeRoy, Town of Pavilion, Town of Stafford, Town of Caledonia, Village of Caledonia, Town of Covington, Town of Gainesville, Town of Orangeville, Town of Perry, Town of Middlebury, Town of Warsaw, Village of Warsaw, Village of Wyoming	Provide municipalities with draft language for zoning laws.	Reduce the amount of harmful runoff and sedimentation caused by land use activities.	potentially high	Improved water quality	reduced erosion, sedimentation	Site Planning, design standards and Ag planning	G/FLRPC, County planning offices, municipal planning boards, Agricultural Protection Boards	LWRP, 604(b), WQIP, GLRI	Medium Term	combine with other tasks that revise local codes for efficiency. In combination with other local codes. $15,000	Each municipality to adopt amendments to zoning law.
Medium	Draft (or revise) a comprehensive plan emphasizing the protection of local water resources and recognizing the importance of watershed planning efforts within the Oatka Creek watershed and other neighboring watersheds within the municipality	Assist Town of Bergen, Village of LeRoy, Town of LeRoy, Town of Pavilion, Town of Caledonia, Village of Caledonia, Town of Covington, Town of Gainesville, Town of Perry, Town of Middlebury, Town of Warsaw, Village of Warsaw, Village of Wyoming	charrettes, gather widespread public input, draft initial comprehensive plan as strategic document that sets out the broad goals and vision of the community	adoption of a comprehensive plan	N/A	potentially high	public engagement with plan development process and solidification of watershed management and related topics such as water quality, stormwater management, and erosion and sediment control as municipal priorities	water quality, comprehensive planning	G/FLRPC, counties, municipalities	NYSERDA Cleaner Greener Communities program	updated comprehensive plans and zoning	$5,000-$100,000	municipalities
Medium	Counties and municipalities should consider agricultural protection and preservation while addressing associated land conservation and water quality concerns though various county, state and federal programs	review existing regional programs, collaboratives, and case studies for guidance	PAC should help to develop methods to assist in implementation of plans	conservation easements, viewshed analysis, scenic preservation, rural design guidelines, tax districts	potentially high	potentially high	strengthen local capacity for successful management and protection of watersheds by empowering decisionmakers	agriculture, development, tourism, comprehensive planning, sustainability, economic development	counties, municipalities	NYSDAM	Updated farmland and agricultural protection plans	$25,000	N/A
Low	All municipalities that have land use control ordinances should require review of disturbances within 100 ft of all natural wetlands and all municipalities should prohibit discharge of stormwater to wetlands without prior treatment	Assist Town of Chili, Town of Riga, Village of Scottsville, Town of Wheatland, Town of Bergen, Town of Bethany, Town of Byron, Town of LeRoy, Village of LeRoy, Town of Pavilion, Town of Stafford, Town of Caledonia, Village of Caledonia, Town of Covington, Town of Gainesville, Town of Orangeville, Town of Perry, Town of Middlebury, Town of Warsaw, Village of Warsaw, Village of Wyoming	preservation of wetlands as natural habitat for many species of plants and animals and for critical flood and stormwater control functions	evaluate through GIS and EAF Mapper by parcel, integrate into all zoning, subdivision, and/or site plan review controls	absorb the forces of flood and tidal erosion to prevent loss of upland soil	potentially high	Protection of the areas surrounding wetlands improves the functions of the wetland	agriculture, development, stormwater, drinking water, water quality, organic compounds, fertilizers, pesticides	municipalities, landowners	N/A	all municipalities with wetlands adjacent to riparian corridors	N/A	municipalities
Low	Each municipality and county agency should educate themselves about specifics of federal and state regulations and programs, and funding as they relate to nonpoint source pollution and water quality.	strengthen local capacity for successful management and protection of watersheds by empowering decisionmakers	coordination with PAC, OCWC, WQCC, SCMC	Representative of each municipality attend 2-3 workshops per year	potentially high depending on funding acquired	project-dependent	strengthen local capacity for successful management and protection of watersheds by empowering decisionmakers	agriculture, development, stormwater, drinking water, water quality, OWTS, wastewater treatment, water quality standards, education	, OCWC, FLLOWPA, county, municipalities	unknown	Representative of each municipality attend 2-3 workshops per year	$300 per municipality per year	N/A

Priority	Action	Objective	Steps (e.g., feasibility, design, permitting, construction)	Strategy	Anticipated Reductions	WQ Improvements	Benefits	Related Issue(s)	Lead and Potential Responsible Organization(s) (including sponsor, partners)	Potential Funding Sources	Measures/Targets (e.g., short-, medium-, or long-term)	Approximate Cost	Regulatory Approvals
Low	All municipal elected officials, enforcement officers, highway superintendents, boards, and related professional staff should attend training on Stormwater Phase II state and federal regulations	strengthen local capacity for successful management and protection of watersheds by empowering decisionmakers	coordination with PAC, OCWC, WQCC, SCMC	Representative of each municipality attend 4 workshops per year	N/A	project-dependent	strengthen local capacity for successful management and protection of watersheds by empowering decisionmakers	agriculture, development, stormwater, runoff, drinking water, water quality, sediment, erosion	county, municipalities	unknown	Four workshops a year	$6,000	N/A
Low	Municipalities consider adoption of aquifer protection laws.	Protect the drinking water from harmful contaminants.	Provide municipalities with draft language for land use law.	Protected water	Less water quality issues	Improved water quality	Improved water quality	water quality, comprehensive planning	G/FLRPC, County planning offices, municipal planning boards	LWRP, Cleaner Greener Phase II	Medium Term	Combine with other recommended land use law updates	Each municipality to adopt an aquifer protection law.
Low	Municipalities should encourage alternative agricultural uses of land within comprehensive planning and zoning structure	Update comprehensive plans and zoning to reflect this	review existing regional programs, collaboratives, and case studies for guidance	cluster subdivisions, LEED-ND	N/A	potentially high	public engagement with plan development process and solidification of watershed management and related topics such as water quality, stormwater management, and erosion and sediment control as municipal priorities	agriculture, development, tourism, comprehensive planning, sustainability, economic development	counties, municipalities	NYSERDA Cleaner Greener Communities program	updated comprehensive plans and zoning	$5,000-$100,000	municipalities, counties, NYSDAM
Low	open space conservation	site planning, design standards	site plan standards, decrease minimum lot sizes, increase density, cluster subdivisions, buffing water courses	Develop site plan standards including minimum lot size, increased density, cluster subdivision, and water course setback standards and options	Stormwater runoff, sediment, nutrients, reduce habitat fragmentation and degradation	potentially high	conservation of open space and farmland, water quality restoration	development, open space, local laws, design standards	County planning, regional planning, municipalities, PAC, Genesee Land Trust	LWRP	Developed land, farmland, residential density, infrastructure, water quality	$200,000	local law updates
Nutrient and contaminant inputs to surface waters													
High	Develop nutrient and sediment reduction strategies for sub-watersheds	Monitoring/Planning	coordination with PAC, OCWC, WQCC, SCMC	regular monitoring of phosphorus and suspended solids	Stormwater runoff, sediment, nutrients	potentially high	Reduced nutrient and sediment loadings	water quality, sediment	NYSDEC, SWCD, PAC, OCWC, WQCC, SCMC	GLRI	% reduction	$75,000	N/A
Medium	Identify areas of contaminated sediments and groundwater, and quantify discharge to Oatka Creek	Monitoring/Planning	Remediation of contaminated areas	Develop benchmarks and criteria for measuring progress	Stormwater runoff, sediment, nutrients	advance county water quality strategies	Reduced nutrient and sediment loadings	water quality, sediment	NYSDEC, research institutions	unknown	development of database	$150,000	N/A
Medium	Ensure safe disposal of e-waste and household hazardous waste through community education and collection programs, and the promotion of product stewardship initiatives	educating a broad range of people to help carry out best practices	Promote proper waste disposal	organize annual (or more frequent) events	reduction of pollutants entering Oatka Creek	advance county water quality strategies	improved water quality and stream health	water quality, collaboration, education	NYSDEC, OCWC, WQCC, SWCD, FLLOWPA, G/FLRPC, SCMC, academic institutions, Monroe County Environmental Services, GLOW	Environmental Protection Fund	# of participants	N/A	unknown
Low	Assess concentrations and significance of contaminants such as pesticides, trace metals, and persistent organic pollutants in fish, wildlife, and vulnerable fish-consuming populations	Monitoring/Planning	Better understanding of legacy and emerging contaminant exposure levels, and the sub-watershed and temporal trends of contaminants	recruit participants with chemical, physical, and biological sciences background	N/A	potentially high	improved water quality and stream health	water quality, collaboration	NYSDEC, NYSDOH, NYSERDA, academic institutions	Environmental Protection Fund	development of database	unknown	N/A
Low	Ensure information about no P fertilizers is distributed and known	educating a broad range of people to help carry out best practices	research available materials and customize to suit Oatka Creek	distribute widely through Oatka Creek watershed	N/A	potentially high	strengthen local capacity for successful management and protection of watersheds by empowering decisionmakers	water quality, nutrient loading, education	CCE, Planning, SWCDs	Environmental Protection Fund	web hits, events attended, # participants	$2,500	N/A
Low	Provide outreach and education to community, schools, and other institutions on green chemistry, green engineering, and other pollution prevention practices	Education/Outreach	Pollution prevention practices are implemented by target groups	distribute widely through Oatka Creek watershed	N/A	potentially high	strengthen local capacity for successful management and protection of watersheds by empowering decisionmakers	water quality, collaboration, education	NYSDEC, NYSPPI, SWCD, WQCC	Environmental Protection Fund	web hits, events attended, # participants	$2,500	N/A
Natural Resource and Habitat Protection													
Medium	Prepare and implement a comprehensive invasive species management plan	Early detection of species may prevent full invasion	Target highly probable areas	join the New York State Invasive Species Task Force, OCWC leadership receive training on Invasive Species Identification and Reporting for http://www.nyimapinvasives.org/	N/A	potentially high	Prevent ecosystem function disruption - e.g., disruption of native species	water quality, sustainability	Invasive Species Taskforce NYSDEC, Partnerships for Regional Invasive Species Management (PRISM), OCWC, WQCC, SWCD, FLLOWPA, G/FLRPC, Invasive Species Research Institute (ISRI)	EPA, 604(b), WQIP	reduction in new invasives per year	$50,000	N/A

Priority	Action	Objective	Steps (e.g., feasibility, design, permitting, construction)	Strategy	Anticipated Reductions	WQ Improvements	Benefits	Related Issue(s)	Lead and Potential Responsible Organization(s) (including sponsor, partners)	Potential Funding Sources	Measures/Targets (e.g., short-, medium-, or long-term)	Approximate Cost	Regulatory Approvals
Low	Establish a permanent leadership structure to coordinate invasive species efforts	Early detection of species may prevent full invasion	Target highly probable areas	join the New York State Invasive Species Task Force, OCWC leadership receive training on Invasive Species Identification and Reporting for http://www.nyimapinvasives.org/	N/A	N/A	Prevent ecosystem function disruption - e.g., disruption of native species	water quality, sustainability	Invasive Species Taskforce NYSDEC, Partnerships for Regional Invasive Species Management (PRISM), OCWC, WQCC, SWCD, FLLOWPA, G/FLRPC, Invasive Species Research Institute (ISRI)	EPA, 604(b), WQIP	reduction in new invasives per year	$5,000	N/A

Appendix
OATKA CREEK WATERSHED MANAGEMENT PLAN
MEMORANDUM OF UNDERSTANDING
FOR OATKA CREEK WATERSHED MUNICIPALITIES

This Memorandum of Understanding is among the four counties (Genesee, Livingston, Monroe and Wyoming) and municipal governments with jurisdictions that geographically fall within the Oatka Creek Watershed in the Finger Lakes Region of New York.

I. INTRODUCTION & BACKGROUND:

The Oatka Creek Watershed Management Plan was funded by a Local Waterfront Revitalization Grant (LWRP) through New York State Department of State. The work of the Oatka Creek Watershed Management Plan was overseen by a Project Advisory Committee and coordinated with the Oatka Creek Watershed Committee. With the culmination of the Oatka Creek Watershed Management Plan, it is in the best interest of the water quality of Oatka Creek to form an intermunicipal organization of the four counties and municipal governments within the Oatka Creek Watershed to implement the recommendations of the Oatka Creek Watershed Management Plan.

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II. RECITALS:

1. Each of the parties of this MOU is a local government or County having jurisdiction over a portion of the watershed of Oatka Creek.
2. The geographic boundaries of the Intermunicipal Organization shall be the entire Oatka Creek Watershed.
3. The parties desire to recognize that an intermunicipal organization can best facilitate partnership across political boundaries to promote the ecological vitality of the Oatka Creek Watershed.
4. It is to the parties' mutual advantage and benefit to develop and implement cooperative restoration and protection efforts throughout the watershed, and to promote a regional alliance among local governments and county programs.
5. The parties hereto plan to continue exploring joint local, state, federal and other funding opportunities; and to obtain public support for programs that implement the mission and goals of the Oatka Creek Watershed Management Plan.
6. The parties hereto recognize the value of using common resources effectively.
7. The parties hereto desire to be proactive in addressing watershed-based issues which affect areas beyond traditional political boundaries.
8. The parties hereto wish to communicate and coordinate on local, state and federal policies and programs that affect water quality in Oatka Creek.
9. The parties agree to share information and coordinate efforts to comply with regulatory requirements.
10. The parties hereto find that promoting stewardship of the Oatka Creek Watershed resources is in the public interest and for the common benefit of all within the Oatka Creek Watershed. The parties hereto desire to educate the communities in the Oatka Creek Watershed about the importance of watershed stewardship.

III. GENERAL PROVISIONS:

1. Definitions. As used in this MOU, the following words and phrases shall have the meanings set forth below unless the context clearly indicates otherwise.
    a) "MOU" shall mean this memorandum of understanding.
    b) "Member" or "members" shall mean the representatives from the local governments and four counties encompassed in the Oatka Creek Watershed.
    c) Watershed" shall mean the entire Oatka Creek Watershed. A map depicting the boundaries of the watershed is appended hereto.
2. Purpose. This MOU is to affirm each member's commitment to the mission, goals and objectives of the Oatka Creek Watershed Management Plan.
3. Establishment of the Intermunicipal Organization. There is hereby established the Oatka Creek Intermunicipal Organization. The geographic boundaries of the organization will be the Oatka Creek Watershed.

4. Vision. Watershed stakeholders, municipalities and government agencies will work together through implementation of the Oatka Creek Watershed Management Plan to maintain the common goal of clean water and sustainable watershed management for the future of the Oatka Creek Watershed. Sustainable watershed management must include local involvement in planning and the management of natural resources and be the shared responsibility of all stakeholders and watershed residents.
5. Organization Membership.
    a) Each of the four counties and municipal governments shall appoint one member to participate in regular meetings and report actions to their local government.
    b) One representative from the regional planning board (Genesee/Finger Lakes Regional Planning Council), one representative from each county Soil and Water Conservation District and one representative from the Oatka Creek Watershed Committee may be ex officio members of the organization.
    c) Membership: The total membership of the organization shall be constituted by the members appointed by the parties to this agreement. If a party to this agreement fails to appoint a member, then the count of total membership shall not include such member.
6. Voting: Each party to this MOU shall have one member and one vote.
7. Quorum. A majority of the members of the organization shall constitute a quorum for the purposes of transacting business.
8. Officers:
    a) On an annual basis, the organization shall elect by popular vote a chairperson, vice chairperson, and Treasurer, and Secretary.
    b) The Chairperson shall call and preside over meetings.
    c) The Vice Chairperson shall serve in the absence of the Chairperson
    d) The Treasurer shall maintain books tracking all organization funds, if any, and make reports on organization finances at each meeting.
    e) The Secretary shall take and distribute minutes of meetings and be responsible for the organization's correspondence.
9. Meeting Organization: All meetings shall be conducted according to Robert's Rules of Order, most current edition.
10. An annual plan of work, based on projects and initiatives in accordance with the Oatka Creek Watershed Management Plan, shall be approved by a quorum vote of organization members.

IV. AGREEMENT:

Intermunicipal Organization members agree to:

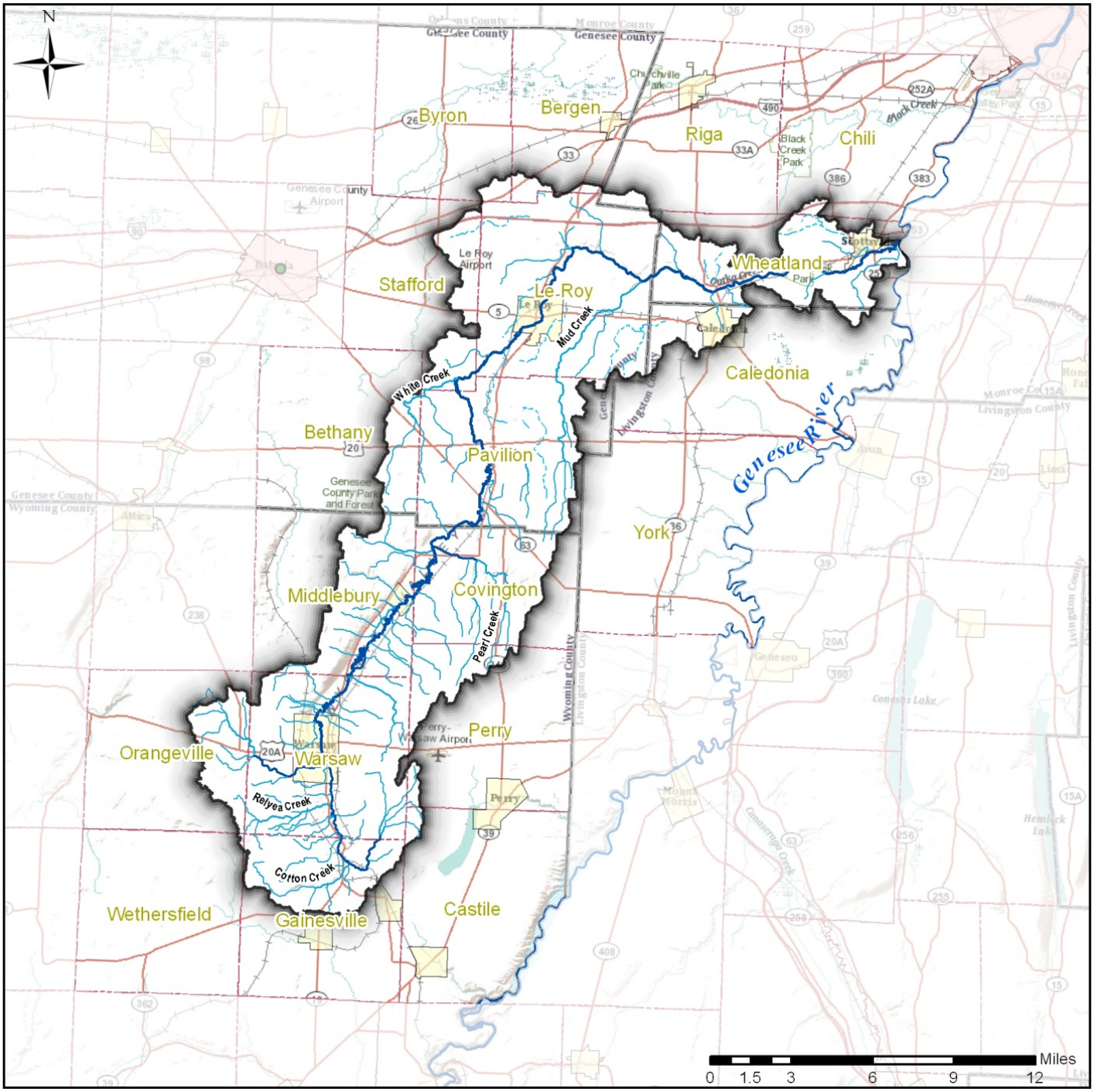
1. Work together to protect the water quality of Oatka Creek, which in turn protects the quality of life for residents and the economic viability of the region.
2. Participate in regular Intermunicipal Organization meetings.
3. Work to implement recommendations of the Oatka Creek Watershed Management Plan's goals and objectives.
4. Participate in and provide watershed stakeholders with meaningful training opportunities.
5. Seek funding opportunities to meet the goals and objectives of the Oatka Creek Watershed Management Plan.
6. Strive to update the Oatka Creek Watershed Management Plan at least every 10 years.

V. EFFECTIVE DATE:

This MOU shall become effective on the date of signature below. This MOU is ongoing unless it is terminated by a member upon written notice to the remaining membership of this Intermunicipal Organization. This MOU may be amended at any time by mutual accord.

Signed:
Dates
Witness:

Adapted from the Seneca Lake Watershed MoU



Municipalities of the Oatka Creek Watershed

(See Section 2.2, Municipalities in *Oatka Creek Watershed Management Plan: Characterization Report.* 2012. http://gflrpc.org/Publications/BlackOatka/Characterization/OatkaCreekWatershed/FinalOatkaCharacterization.pdf)