Eighteenmile Creek Comprehensive Watershed Management Plan Concept Document

Eighteenmile Creek Restoration Project
Niagara County, New York

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Prepared for:

NIAGARA COUNTY DEPARTMENT OF ECONOMIC DEVELOPMENT

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Preface

The Eighteenmile Creek Concept Document has been developed under the existing grants and corresponding budget available for the Eighteenmile Creek Restoration Project, on behalf of the Niagara County Department of Economic Development. This document has been prepared to initiate the process of creating a Comprehensive Watershed Management Plan (CWMP) specific to the Eighteenmile Creek Watershed. The effort of initiating the planning process is also being supported by the U.S. Army Corp of Engineers – Buffalo District (USACE). The USACE will be providing data and analysis on sediment samples collected from the creek and will be developing a sediment-transport model. This latter information will also be instrumental in the development of the Eighteenmile Creek CWMP.

As written, this document is intended for use as a tool to develop a watershed management plan specifically for Eighteenmile Creek. Guidance provided in the public participation and administrative organization section can be used to begin to identify key players for the planning process for the Eighteenmile Creek CWMP. Once key stakeholders have been identified, the information provided in the overview of watershed history, regulatory environment, and existing conditions sections (Section 2) can be used to initiate planning discussions. Section 2 is considered to represent the initial information gathering tasks of watershed management plan development. As the planning continues, additional information can be added and a mission statement can be developed.

The remaining sections of this document (Sections 3 - 7) have been included to provide guidance for those steps in the CWMP process, and to provide example text for illustrations purposes. The example portions can be replaced with the specific issues and opportunities, goals, management actions, and monitoring and assessment identified by the stakeholders in the future.

Watershed Management

Watershed management involves a landscape approach to water resource use that recognizes the interconnectedness of all the physical and biological components of the landscape, including human communities (http://ohioline.osu.edu/ws-fact/0001.html). Watershed management planning necessarily involves various stakeholders, who attempt to establish a working framework for managing resources that takes into account the needs and desires of a diverse group of interested parties that may be affected by management decisions. The stakeholders work together to solve the perceived problems of the watershed and to bring about the most acceptable solutions.

Watershed Management and Eighteenmile Creek

Lower Eighteenmile Creek is one of the 43 Great Lakes Basin Areas of Concern (AOC), as identified by the United States and Canada as part of the Great Lakes Water Quality Agreement. Many steps are necessary to remediate and restore the creek system. Because the creek and the associated ecosystems are not isolated within the landscape, a watershed management plan can be an effective tool to support the restoration of Eighteenmile Creek and its tributaries. A CWMP will assist in ensuring that factors affecting, and affected by, any corrective actions are addressed and that the solutions implemented take into account the needs and desires of a diverse group of stakeholders.

In 2002 the Niagara County Department of Economic Development (formerly the Department of Planning, Development, and Tourism) received several grants to conduct restoration activities in the lower creek and initiate the development of a watershed management plan. As stated in the grant application document submitted to the New York State Department of State (NYSDOS), the main goal of the project is to begin the restoration of the chemical, physical, and biological integrity of the Eighteenmile Creek ecosystem. A portion of this effort has been accomplished through restoration activities that already have occurred in the area of the creek between Burt Dam and the Fisherman's Park Access, through the development of baseline habitat characterization reports for areas in the lower and upper creek, through the preparation and hosting of a restoration and sustainability public workshop, and through the development of this concept document.

Purpose of the Concept Document

The purpose of this report is to provide a document specific to Eighteenmile Creek that will lay the foundation for initiating the watershed planning process, and will provide a framework for de-

veloping a CWMP for the Eighteenmile Creek Watershed. This Concept Document also presents:

- existing watershed information for Eighteenmile Creek, which will support the early stages of the planning process,

- guidelines, based upon literature sources, for the development of the other components of a CWMP, which will serve as a framework for a future Eighteenmile Creek CWMP.

It is understood that this document is a precursor to an actual CWMP and therefore does not attempt to meet all of the requirements of such a plan.

This document has been prepared to:

- Provide readily available information that specifically applies to the Eighteenmile Creek watershed;

- Provide an overall framework for a CWMP that can be followed once the planning process begins; and

- Offer example text to demonstrate the content of specific sections of the Eighteenmile Creek CWMP, once a plan is developed (i.e., Watershed Management Actions).

The development of this document involved compiling an Existing Conditions section (Section 2) that can largely be inserted into a future Eighteenmile Creek CWMP. Sections 3 through 7 illustrate how watershed management planning works and what types of information are included the corresponding sections of a CWMP. These sections can be considered templates for the types of information that should be included in a watershed management plan. The full detail of content will be dependent on events in the planning process that have not yet occurred.

A table of contents has been developed to represent what a completed CWMP for Eighteenmile Creek might look like (see Appendix A). The example table of contents is being provided to give a sense of the entire CWMP document by including the specific headings for the sections and subsections. It is understood that these will be subject to change once the actual plan has been developed.

In short, this document begins the process of establishing a CWMP by providing information on existing conditions and the regulatory

framework, and by defining some of the issues, as currently known, within the watershed. The remainder of the document is a guide to future completion of a CWMP. In addition, this document is intended to provide the foundation and planning materials necessary to obtain additional funding for developing a CWMP.

Literature Review and Elements of a Watershed Plan

Preparation of this document began with a review of existing watershed management plans in order to define the universal components of a CWMP. Additional planning materials were reviewed to formulate general approaches for developing the components of a CWMP.

The watershed plans reviewed included:

- Alameda Watershed Management Plan (SFPUC 2001),
- Cayuga Lake Water Restoration and Protection Plan (GFLRPC 2001),
- Scajaquada Creek Watershed Management Plan (Scajaquada Creek Watershed Advisory Council, 2002),
- Oneida Lake Watershed Management Plan, and
- Irondequoit Bay Harbor Management Plan (Dufresne-Henry 2003).

Other information sources consulted included:

- *NYS Framework for Local Watershed Management Plans*
- *An Assessment of Watershed Planning in Corps of Engineers Civil Works Projects* (Hansen and Fischenich 2002)
- Illinois Watershed Management Clearinghouse (http://www.watershed.uiuc.edu/)
- Ohio State University Fact Sheet for Community Based Watershed Management (http://ohioline.osu.edu/ws-fact/0001.html)
- Other guidance for watershed, restoration, and open space planning.

Review of these documents and guidance revealed that watershed management plans include the following general elements:

- Explanation of why the watershed management plan was developed; often culminating in a mission statement,
- Description of key players and their roles in the planning process,
- Summary of the history of the subject watershed,
- Description of the regulatory environment within the watershed,
- Definition of the watershed and characterization of existing environmental and socioeconomic conditions,
- Identification of perceived problems/conditions and opportunities within the watershed,
- Identification of the desired future of the watershed; typically in the form of watershed management goals,
- Identification of potential solutions for the perceived problems, including preventive and corrective solutions,
- Potential methodologies for implementing solutions that include variables such as responsible parties, scheduling, and cost, and
- Methods of measuring success and making adjustments.

The review also revealed that watershed planning affects diverse groups of interested parties that live, work, regulate, own property, or conduct business within a watershed. A recurring theme in the literature is the importance of early involvement of stakeholders in the planning process that can lead to management decisions based on a general consensus of stakeholders, can facilitate resolution of conflicts, and can increase stakeholder/participant motivation.

Review of existing CWMPs indicates that the components of a watershed management plan are inter-related and require logical organization, allowing for crosschecks to ensure consistency between and across planning stages. Consistency and awareness of earlier and future phases increases the likelihood that a plan will address the perceived problems, take into account the existing conditions and values of stakeholders, be achievable, meet the stated goals of

the planning process, and ultimately achieve the stated mission of the plan.

CWMP Framework Development

Once the major components of the watershed management plan are identified, the task of organizing the parts into a functional framework is the next step. The organization of the plans reviewed varied and appeared to be related at least in part to the purpose for developing the plan and the number of municipalities within the area to be managed. One plan, the *Alameda Watershed Management Plan* (EDAW 2001), stood out in terms of organization and internal cross-checks. The organization of this document has been based primarily on the organization of the Alameda Plan, which incorporated the common watershed management plan elements listed above.

Compiling watershed-specific information such as a description of the history of the Eighteenmile Creek watershed, the legal and regulatory environment, and existing conditions are some of the initial steps in the planning process. These are presented in this document (Section 2.0). That information will act as a springboard once the watershed management planning process has been formally initiated. Additional information with regard to these topics may be required as the planning process proceeds and suggestions for additional information requirements have been made.

Stakeholder input and the earlier phases of the planning process lay the groundwork for subsequent stages of plan development. The corresponding sections of this framework provide guidance for proceeding with the watershed management planning process and for completing the corresponding sections of a CWMP. Sections of this document that are intended to provide guidance include the sections on Management Plan Participation and Administrative Organization (Section 1.2.1), Watershed Management Issues and Opportunities (Section 3.0), Watershed Management Goals and Policies (Section 4.0), Watershed Management Actions (Section 5.0), Phasing and Implementation (Section 6.0), and Monitoring and Assessment (Section 7.0). This concept document does not fully develop the necessary information for these sections but does provide suggestions and example text for the purposes of illustration.

Although not provided in this Concept document, it is recommended that an Executive Summary be prepared for the CWMP document. This section of the plan will provide summary details regarding: the projected life of the plan, the stakeholders involved,

the statement of goals and objectives, and recommendations and priorities for implementation.

Note on figures in this document: given the preliminary nature of this Concept document, figures have been developed from readily available resources that present a variety of the physical, spatial, infrastructure, and natural resources within the Eighteenmile Creek watershed. As indicated in Section 1, once the development of a CWMP is underway, mapping of the watershed will include the subwatersheds and the resources of interest within each. For instance, analysis of topography, hydrology, water quality, land use, impairments, etc. will all occur at the subwatershed level.

1 Introduction

1.1 Purpose and Vision for the Watershed Management Plan

"Watershed management is not a single strategy, but is a general approach to water resource use and/or protection that recognizes the interconnectedness of all the physical and biological components of the landscape, including human communities" (http://ohioline.osu.edu/ws-fact/0001.html). Similarly, there is no single methodology to follow in defining a watershed plan, rather there are typically a series of alternatives to reach the desired endpoint. Watershed management begins with an understanding of why the effort is being undertaken. Existing watershed management plans reveal a variety of reasons for developing a plan: to prioritize use within a watershed with many conflicting uses, to provide a procedure manual for resource managers within a watershed owned by a public utility, to bring multiple local municipalities together to work to improve and protect water quality, etc. Once the purpose of the watershed planning effort is understood, a mission statement must be developed. The mission statement establishes the foundation for developing a watershed management plan and provides an explanation of what the plan is intended to achieve (http://www.watershed.uiuc.edu/ getting_involved/developing_plans.cfm).

Lower Eighteenmile Creek is one of the 43 Great Lakes Basin Areas of Concern (AOC). The Great Lakes Water Quality Agreement requires cleanup of these AOCs (see Section 2.3.4.2 for more detailed discussion). Thus, the catalyst driving development of a watershed management plan for Eighteenmile Creek is likely to be water quality concerns, and a mission statement for the Eighteenmile Creek Watershed Management Plan is likely to focus on restoring the chemical, physical, and biological integrity of Eighteenmile Creek ecosystems.

"Watershed management" comprises all the activities that will achieve the goal of the plan, and a CWMP is a document that attempts to both describe and prescribe that coordinated effort. Essentially, a watershed management plan creates a framework for how, where, and when management improvement efforts will be applied.

As the CWMP begins to take form for the Eighteenmile Creek watershed, consideration should be given to specifying a projected time frame (20 years, 30 years, etc.) within which the goals and objectives of the plan are expected to be met. The anticipated "shelf life" of the plan can be determined from a number of elements, including:

- anticipated funding,
- identification of impairments and the resulting goals and objectives;
- expected population and development trends (that will indicate what the future of the watershed will look like from a land use perspective); and
- implementation plan(s).

1.2 Basic Components of a Watershed Management Plan

As noted above, watershed management plans are commonly initiated by groups, (organizations, agencies, academic institutions, or government entities) formed in response to existing water-related issues or problems or the desire to establish land use planning goals. Despite variations in watershed conditions, stakeholders, goals, funding and infrastructure, the critical steps and components of a watershed management plan are fundamentally the same for all watersheds.

Common elements of watershed management plans include:

- **Rationale for development of the CWMP.** This section should explain why the plan was developed, and what the purpose and mission statement of the plan are. Supporting detail of rationale provides the basis for initiating the effort and provides the context and need for the plan.

- **Delineation of the watershed boundaries.** Delineation of the watershed boundary and subwatersheds are important in defining the geographic extent of lands with the potential to affect conditions and in specifying the extent of the area to be covered by the plan. Watershed boundaries are depicted in Figure 1.

- **Overview of the history of the watershed.** An overview of the history of the watershed provides different dimensions of information. For instance, a historical overview may provide the context as to root causes and sources of some the watershed concerns and issues that are identified based upon past industrial practices. Also, a sense of history may help to identify those resources that could be considered for protection or preservation as part of a CWMP. An initial historical summary is provided in Section 2.2.11.

- **Characterization of the watershed (i.e., existing conditions).** Characterization of the watershed is fundamental to understanding the cause and effect relationships among ecosystem components and human uses. Characterization of the physical features (topography, geology, hydrology, and climate), chemical characteristics (water quality and hazardous/toxic waste sites), biological considerations (terrestrial and aquatic habitat, terrestrial and aquatic wildlife, threatened and endangered species and significant habitats), and socio-economic considerations (land use, proposed development, infrastructure, and cultural resources) are important for developing an understanding of the watershed. This information is often used to define problems or issues within the watershed, to identify changes and to analyze potential impacts of projects within the watershed. A relatively extensive characterization of existing conditions is provided in Section 2.

- **Description of the regulatory environment.** This section of the plan should outline existing federal, state, and local regulations and ordinances that govern activities in the watershed. Section 2 contains the applicable regulatory information.

- **Identification and involvement of key participants.** It is prudent during the identification of issues to involve stakeholders who have an interest in the outcome of the planning process as well as those who have the appropriate knowledge necessary to provide insight to the problems and issues of the watershed. The collective input of interested parties is required to develop goals that are feasible, ecologically sound, cost-effective, practical and consistent with the laws and social val-

ues of the watershed communities. Summary information is provided in Section 1.3.

- **Identification of problems and issues.** Development of a comprehensive list of issues in the watershed is a critical early step in the planning process. The issues identified during this stage of the planning depend on the existing physical and socio-economic conditions within the watershed. Identifying pertinent issues sets the stage for developing goals, policies, and actions needed to successfully manage the watershed's resources. To more clearly identify problems with the entire watershed, subwatersheds will be clearly defined. Subwatersheds will then act as the units for analyzing impairments, problems, and issues altering the health, character and quality of the overall watershed. Recommendations for remediating and restoring will be based upon the subwatershed analyses. Discussion and example text are provided in Section 3.

- **Identification of goals and policies.** Once the problems of the watershed have been identified and prioritized, the parties involved in the planning process can develop a vision of what the watershed should look like. They can use the issues identified to develop objectives that are specific and achievable. Once goals have been identified, solutions can be devised to reach those goals. The solutions should address the underlying problems of the watershed and should be achievable in light of the constraints identified (i.e., regulatory and cost constraints). The use of an iterative approach to setting goals and implementing actions to achieve standards is an integral part of the watershed management process (per the Elements of a Comprehensive Watershed Management Plan for the Restoration of the Rouge River; http://www.rougeriver.com). Discussion and example text are provided in Section 4.

- **Determination of actions and guidelines.** Goals and solutions must be further refined into concise actions that need to be taken to bring about the desired solutions. Using subwatersheds as the basis for identifying problems and establishing goals, aids in defining and developing concise guidelines for discrete, obtainable actions. Potential actions should be analyzed to identify the alternative most likely to meet the established goals, objectives, and projects constraints while incurring reasonable costs. Once actions have been identified, they should be evaluated and ranked. Using a set of evaluation criteria, actions/projects should be prioritized. Discussion and example text are provided in Section 5.

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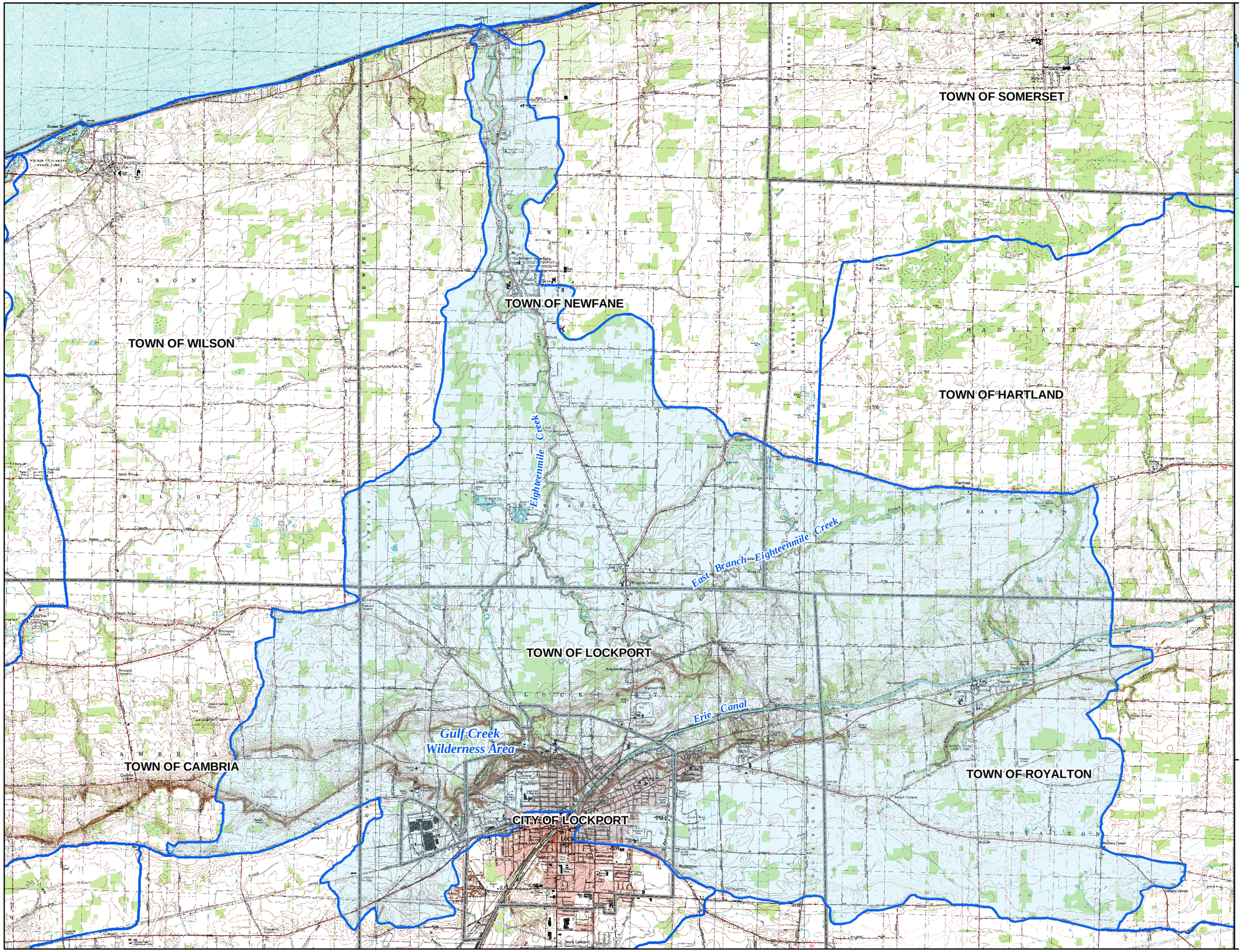

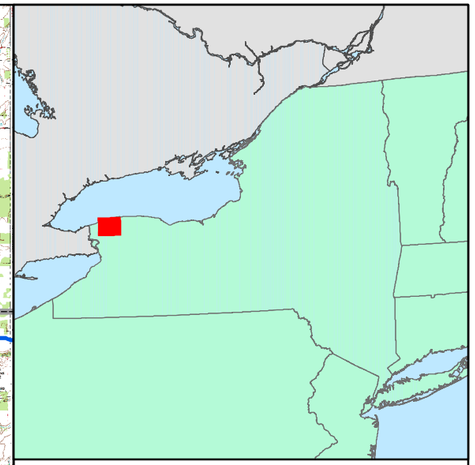

LEGEND

- Eighteenmile Creek Watershed
- Watershed Boundaries
- Municipal Boundaries

Portions of the following USGS Quad Maps are contained within the Eighteenmile Creek Watershed:

- Barker
- Cambria
- Gasport
- Lockport
- Newfane
- Wilson

N

Miles

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Figure 1

Eighteenmile Creek Watershed Topographic Map

Source: US Geological Survey, NYS Department of Environmental Conservation

- **Determination of phasing and implementation.** Phasing and implementation of actions involves determining priorities and the various phases of a management action. This also involves assigning responsibilities for the implementation of the CWMP. Discussion and example text are provided in Section 6.

- **Monitoring and assessment.** Monitoring plans and success-evaluation criteria should be developed along with development of the action and should be specifically related to project goals. Any time lag between implementation of the action and evidence of the desired result should be included, as should general steps for adapting the planned action. Discussion and example text are provided in Section 7.

1.3 Management Plan Participation and Administrative Organization

Watershed management plans are often initiated in response to problems and issues in the watershed coupled with a collective desire to develop a remedial response to problems. "Community-based watershed management is an approach to water-resource protection that enables individuals, groups, and institutions with a stake in management outcomes (often called stakeholders) to participate in identifying and addressing local issues that affect, or are affected by, watershed functions. Proponents of community-based watershed management maintain that involving local stakeholders results in more locally relevant solutions that take into account each community's unique social, economic, and environmental conditions and values. Stakeholder participation is also thought to create a sense of local ownership of identified problems and solutions, thus ensuring long-term support for resulting management plans" (http://ohioline.osu.edu/ws-fact/0001.html).

The benefit of a watershed management plan is that it brings multiple entities (agencies, organizations, academic institutions, municipalities, etc.) together to establish ways to solve these problems and to assist each other in developing remedies that will be acceptable to those with vested interests.

An effective watershed management plan should receive input from multiple sources but requires an organizational structure to be effective. Three groups are suggested to begin the watershed management planning process; additional groups and committees can be added as the planning moves forward. The initial groups typi-

cally include an administrative group, a planning committee, and a technical committee.

Administrative Group

The administrative group is the lead for the watershed management planning process. In some instances this group is made up of the municipalities (counties, cities, towns, and villages) that are included within the watershed and that have entered into an agreement to work together to solve the problems of the watershed. Municipalities can be effective administrative group members for plans in which the central focus is to identify priority issues and solutions on a watershed-wide basis and in which local governments and organizations in the watershed establish priorities and support efforts to implement the recommendations. However, this group can be made up of any mix of entities that can drive the planning process.

Establishment of a group to create the Eighteenmile Creek Watershed Management Plan should begin with identification of the administrative group (or focus group). This group should be relatively small in number, comprised of individuals who can act as a platform for initiating planning efforts. The major stakeholder categories are likely to include agencies, municipalities, representatives from the business community, and residents. The prominent issue driving the creation of the Eighteenmile Creek Watershed Management Plan is water quality and the related contamination issues. A first step could be to make inquiries regarding interest in participating in the administrative group of NYSDEC, the Niagara County Soil and Water Conservation Service, the U. S. Army Corps of Engineers, Niagara County, the planning departments of each of the six towns located within the watershed, business organizations for Lockport and Newfane, and residents of the watershed.

A Remedial Action Committee (RAC) was organized as part of the effort to implement the Remedial Action Plan (RAP) for Eighteenmile Creek. There is currently a renewed and revived effort to implement the RAP by the Niagara County Soil and Water Conservation Service. Part of that effort will involve some reorganization of the RAC. Representation has been, and may continue to include, representation from NYSDEC, the Niagara County Soil and Water Conservation Service, the U. S. Army Corps of Engineers, business interests, and concerned citizens. The people involved in the RAC represent the major agencies and some of the other stakeholder groups with an interest in water quality issues for Eighteenmile Creek. A first step should be to contact the RAC to

discuss coordination and inquire about volunteers who would like to participate in the Eighteenmile Creek Planning process and/or to solicit input on individuals/organizations who may be interested in participating. There would also be a question of where there will be overlap between the CWMP administrative group and the RAC, and what operative variables distinguish the two groups. However, the RAP is specific to portions of Eighteenmile Creek that are downstream of the Burt Dam.

Once information has been gathered from the RAC, an effort to identify those stakeholder groups and portions of the watershed that are underrepresented can be conducted. Residents of the watershed are the least likely to be included in groups that are already organized to participate in the process. There are a variety of ways to inform citizens of the planning effort in order to elicit interest in participating in the administrative group (or other planning and technical groups). For instance, a newspaper ad announcing the onset of the CWMP process and a call for residents interested in participating in the focus group may be a tool for eliciting interest.

As an alternative to this approach could involve the development of a survey, asking for opinions of perceived problems within the watershed and sent to agencies, municipalities, business owners, residents and other stakeholders in the watershed. The survey could include an explanation of the responsibilities and commitment required of the administrative or focus group and could request that respondents indicate interest in participating in such a group.

Planning Committee

The Planning Committee or committees consist of stakeholders who have an interest in or are affected by the actions recommended in the watershed plan. A diverse cross-section of community members should be involved at the beginning of the process to increase efficiency, enhance communication, and facilitate early identification of diverse views among the parties involved with the management plan. The Planning Committee should be involved in setting goals based on watershed issues and tied to the desired future of the watershed and reflective of the group's consensus. Multiple equivalent committees can be formed or a lead planning committee with multiple sub-committees can be formed, based on the needs and desires of those participating in the process.

Technical Committee

A Technical Committee or committees typically consists of individuals from diverse interests and areas of expertise who can pro-

vide technical and scientific support and analysis to the Administrative Group and to other committees. The Technical Committee should use the goals set by the Planning Committee to understand the group's direction and to analyze alternative solutions, select best management practices, write policies, and suggest management actions to implement changes. The committee should oversee data and information gathering and provide project review.

Depending on the primary land uses, stakeholder concerns, funding for the plan and the eventual remediation work, other committees could be formed. For example, a Public Participation, Outreach, and Education committee could organize public meetings to discuss/address stakeholders' concerns, ideas, issues, etc.

Table 1 below lists various organizations that could be a source of potential committee members, and Table 2 lists additional roles in the watershed planning process. Each list is based on information provided through the Illinois Watershed Management Clearinghouse website (http://www.watershed.uiuc.edu/getting_involved/completed_plans.cfm).

Table 1 Potential Committee Members

Local Representatives
Soil and Water Conservation District
Natural Resource Conservation Service
Cornell Cooperative Extension
Niagara County and Town, City and Village Officials
Niagara County and Town, City and Village Planners
Niagara County Health Department
Economic Development Councils
Parks and Recreation Staff
Road Commissioners
School Boards
Supervisors
State and Federal Agencies
New York State Department of Environmental Conservation
New York State Canal Corporation
NYS Office of Parks, Recreation and Historic Preservation
NYS Department of State
U.S. Environmental Protection Agency
U.S. Army Corps of Engineers
U.S. Fish and Wildlife Service
Niagara County Fisheries Board
Non-Profit Organizations
Recreation Groups

Table 1 Potential Committee Members

Volunteer Organizations
Private Sector
Engineers
Local Businesses
Financial Institutions
Builders/Developers
Home Builders Associations
Local Business Associations
Citizen Groups
Neighborhood Associations
Landowners
Youth Groups
Churches
Farm Organizations

Multiple roles are available for those who want to participate in the planning process but not as part of a committee. Table 2 lists some examples of additional roles (http://www.watershed.uiuc.edu/getting_involved/completed_plans.cfm).

Table 2 Additional Sources of Assistance in the Planning Process and Their Potential Roles

Who Can Be Involved?	What Can They Do?
Volunteers	perform various support functions such as stuffing envelopes for public outreach fliers or recording wildlife observations.
Landowners	allow tours highlighting a best management or conservation practice.
Business Owners	display flyers or donate items.
Teachers	add watershed and water quality segments to their curriculum.
Individuals, Organizations or Private Entities	make monetary contributions.
Individuals	write letters to editors or city, county, or state officials or agencies who have provided funding to inform them of the positive impact that the watershed plan has on their lives, community, and land.

2 Existing Conditions

This section has been developed to provide information on the existing conditions that occur within the Eighteenmile Creek watershed. It is essential to gain a well-grounded understanding of the existing, or baseline, conditions that occur in order to initiate a sound planning process and to determine what issues and impairments occur within the watershed. It is important to gather and review basic information as a starting point for developing a thorough watershed management plan. This kind of information includes ecosystem characteristics, possible stakeholders, economic resources, technical resources, and existing planning mechanisms.

As indicated in Section 1.2 development of baseline information should be accomplished on a subwatershed level. This section has been compiled based upon existing data and information on Eighteenmile Creek and areas within the watershed that are readily available, and at this point, have not been refined to a subwatershed level of discussion.

This entire section can be inserted into the future Eighteenmile Creek CWMP, and therefore -based upon the structure of subsequent sections of this document - can be considered “example text.”

2.1 Description of the Eighteenmile Creek Watershed

Delineation of the watershed boundary is important in defining the geographic extent of lands with the potential to affect conditions and in specifying the extent of the area to be covered by the plan. The watershed boundary of Eighteenmile Creek presented throughout this document is based on the New York State Hydrologic Unit Coverage developed through a cooperative effort by the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service, the New York State Department of Environ-

mental Conservation (NYSDEC) - Division of Water, and the U.S. Geological Survey (USGS) – Water Division (Figure 1).

The Eighteenmile Creek watershed is located along the southern shore of Lake Ontario in Niagara County, New York. Eighteenmile Creek flows generally to the north and discharges into Lake Ontario, through Olcott Harbor, approximately 18 miles east of the mouth of the Niagara River. The watershed has a drainage area of approximately 90 square miles and includes Eighteenmile Creek; the two main tributaries, the East Branch and the Gulf, and minor tributaries. In addition, much of the flow in the main branch of Eighteenmile Creek comes from water diverted from the New York State Barge Canal (Remedial Action Plan [RAP]; NYSDEC 1997).

The natural topography of the area can be characterized as two relatively flat plains at different elevations separated by the Niagara Escarpment. The southernmost portion of the watershed is at a higher elevation than the remainder of the watershed and is separated by the Niagara Escarpment along the northern portion of the City of Lockport.

The watershed lies entirely within Niagara County and encompasses portions of the Towns of Cambria, Lockport (including a portion of the City of Lockport), Royalton, Hartland, Newfane, and Wilson. The majority of the watershed can be characterized as a rural area comprising agricultural lands, with scattered residences along roadways, and rural villages; including Olcott, Newfane, and Gasport. A portion of one urban area, the City of Lockport, falls within the watershed and is the most densely populated area within the watershed. Commercial and industrial uses are concentrated in the City of Lockport (Figure 1).

The main branch of Eighteenmile Creek originates southeast of the City of Lockport, in the vicinity of Keck and Chestnut Ridge Roads, on the south side of the Niagara Escarpment. It travels northwest through the city and is diverted underground near Vine Street, travels north underground under the Canal to a point near Clinton Street, where it resurfaces. It continues generally north, descending approximately 240 feet over the Niagara Escarpment and flows north through the Town of Newfane before draining into Lake Ontario at Olcott Harbor (Figure 1).

The Gulf originates southwest of the City of Lockport, near Hinman and Lockport Junction Roads, and travels northeast and over the Niagara Escarpment before converging with the Main Branch

of Eighteenmile Creek approximately one mile north of the Canal (Figure 1).

The East Branch originates in the Town of Royalton, near Lincoln Avenue and Gasport Road, and travels generally north, through Mirror Lake and under the Canal continuing north to a point just south of Route 104 near Quaker Road in Hartland. From this point, the East Branch travels generally west to a point north of the City of Lockport, where it travels northwest before converging with the Main Branch of Eighteenmile Creek approximately five miles north of the Canal (Figure 1).

Two additional tributaries join Eighteenmile Creek from the west. The first originates in the Town of Cambria near Blackman and Upper Mountain Roads and flows generally northeast to its confluence with Eighteenmile Creek near Purdy Road in the Town of Lockport, approximately 3 miles north of the canal. This tributary was once known as Sherman Creek. The second originates in the Town of Wilson near Beebe Road and travels northeast to its confluence with Eighteenmile Creek near Ide Road in the Town of Newfane (Niagara County 1988).

2.2 Eighteenmile Creek Watershed Baseline Characterization

A critical task in establishing a CWMP involves developing a description of the existing environmental, social, regulatory, and geophysical conditions within the defined watershed area. Characterization of existing conditions provides the foundation for:

- Describing the number, types, and locations of resources in the watershed that affect and represent the chemical, physical, and biological integrity of the creek and surrounding areas;
- Identifying resources that directly and indirectly relate to the quality and use of the surface water resources;
- Listing the resources that are impaired; and
- Determining the potential causes of the watershed problems which provide a basis for developing solutions to the problems.

This section provides an overview of the existing conditions as they relate to topography, geology, soils, hydrology, climate, water quality, natural resources, land use, social and economic conditions, cultural resources, recreation, and air quality within the Eighteenmile Creek watershed. The information provided in this

section is based on a desktop review of available information and is not completely representative of the entire baseline of existing conditions. Rather, the data provided here is intended to show the type of information that is needed in a CWMP and, specifically, to initiate the characterization of existing conditions within the Eighteenmile Creek watershed for eventual inclusion in the final CWMP. Suggestions for additional information that could be developed further are also provided.

Such baseline information can be used to identify the factors that may be contributing to watershed issues or problems. For example, knowing that PCB contamination is found in surface sediments points to a likely continued source of contamination that would need to be identified and addressed in the CWMP.

2.2.1 Climate/Precipitation

The climate in Niagara County is influenced by its proximity to Lake Erie and Lake Ontario. The lakes act as heat sinks, which can delay the spring season and lead to a milder summer. Similarly, the warm lake waters in fall extend the frost-free period later in the season, particularly in areas close to the lakes. Lake Ontario largely remains ice-free in the winter, reducing the extreme cold temperatures that may occur in similar areas further inland. Usually during November and December, Niagara County experiences lake effect snowstorms. These storms are caused by air that has been warmed and charged with moisture as it passes over Lake Erie and, to a lesser extent, Lake Ontario. This moisture is then deposited over land in the form of heavy snowfall. These storms are variable year to year and tend to decrease later in the season as the ice cover on the lakes increases.

In general, Niagara County experiences warm summers and fairly long and cold winters. Precipitation levels tend to be relatively stable throughout the year, with no distinct periods of heavy precipitation or drought. Seven out of ten years the county will experience a high temperature of 91^{o}F or higher and a low of –2^{o}F. First freeze typically occurs in mid-October with the last freeze occurring in early May. The exact dates may vary depending on elevation and proximity to Lake Erie or Lake Ontario. Average monthly precipitation in Niagara County ranges from 2.4 to 3.2 inches. Average yearly snowfall is approximately 56 inches (U.S. Department of Agriculture 1972). Prevailing airflow is from the south and southwest. With the exception of an occasional heavy lake- effect snowstorm, severe and damaging storms are not a serious hazard in the area. Table 3 provides average monthly tempera-

ture and precipitation data over a 30-year period (1971 to 2000) for Buffalo, New York.

Table 3 Climate Data for Buffalo New York, 1971 to 2000

Month	Normal Temperature	Average Precipitation
January	24.6	3.16
February	25.9	2.42
March	34.3	2.99
April	45.3	3.04
May	57.0	3.35
June	65.8	3.82
July	70.8	3.14
August	69.1	3.87
September	61.5	3.84
October	50.7	3.19
November	40.2	3.92
December	29.8	3.80
Yearly Average	N/A	40.54

Source: National Weather Service Forecast Office

2.2.2 Topography

Topography influences direction of surface and groundwater flow, land development patterns, vegetations community types, etc. An understanding of topography within the watershed is therefore important in determining the characteristics of the movement of surface water in the watershed, and the relationships between topography, land uses, and the surface water conditions. Topography also defines the limits of the watershed. The Eighteenmile Creek watershed is located within both the Ontario and Huron Plains, two relatively flat plains that are separated by the Niagara Escarpment, which runs generally east/west along the northern portion of the city of Lockport. Within the Ontario Plain (from Lake Ontario to the Niagara Escarpment) elevations range from 245 feet above mean sea level (amsl) at the shoreline to approximately 400 feet amsl at the toe of the escarpment (Figure 1). Within the watershed area the escarpment ranges from 100 to 175 feet high. The maximum elevations within the watershed occur within the Huron Plain in the southern portion of the watershed and are approximately 635 feet amsl in the southwestern portion and approximately 655 feet amsl along the southeastern extent.

Drainage within the watershed can be described as generally flowing to the north. The East Branch of Eighteenmile Creek initially flows to the northeast, before turning west and joining with the

main branch. This is caused by a topographic high point located in the southeastern portion of the watershed.

The Gulf and the main branch of Eighteenmile Creek are both located within a well-incised, steeply sloped channel for most of their lengths. The channel walls range in height, but average approximately 35 feet. The East Branch lacks the incised channel characteristic of the rest of Eighteenmile Creek.

2.2.3 Geology

The baseline geology of the watershed is important to the watershed planning process because geology provides the physical history of the watershed, contributes to understanding the constraints for development, and contributes to an understanding of potential groundwater movement.

2.2.3.1 Surficial Geology

The advance and retreat of glaciers during past ice ages have largely defined regional topography, geology, and soils. The surficial geology of the watershed consists mostly of glacial deposits formed about 10,000 to 15,000 years ago during the Pleistocene, when glaciers covered the area (Figure 2). These glacial deposits are generally less than 50 feet thick in the watershed area (La Sala 1968). The most common deposits found in the watershed area are glacial tills, and lacustrine silts and clays. Glacial and lacustrine (pertaining to lakes) are descriptors that indicate the conditions that the deposits formed in. The glacial tills were deposited beneath the glacial ice. They have a variable texture and consist of non-sorted clay, silt, sand, and gravel. The lacustrine silt and clay deposits formed as sediment settled out in lakes fed by melting glacial ice. The deposits generally consist of laminated silt and clay, and are usually calcareous with low permeability (New York State Museum 2004; La Sala 1968).

Less widespread glacial deposits in the watershed area include kame moraine, lacustrine beach and sand, and till moraine (Figure 2). The kame moraine was deposited at an active ice margin during the retreat of a glacier. It is composed of a variable texture, from boulders to sand, with calcareous cement. Lacustrine beach deposits were deposited at the shoreline of a glacial lake. They are generally well-sorted sand and gravel and are stratified, permeable, well-drained, and generally non-calcareous. Lacustrine sand deposits were generally laid down nearshore in proglacial lakes. (A proglacial lake is a body of water in a basin in front of a glacier, generally in direct contact with the ice.) The deposits typically consist of stratified, well-sorted quartz sand that is permeable. Till

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Lake Ontario

TOWN OF SOMERSET

TOWN OF NEWFANE

TOWN OF WILSON

TOWN OF HARTLAND

Eighteenmile Creek

East Branch Eighteenmile Creek

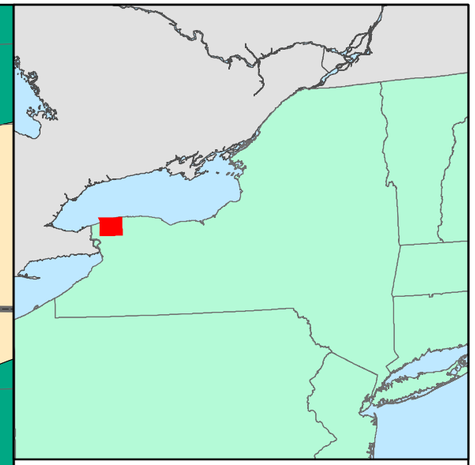
TOWN OF LOCKPORT

Erie Canal

TOWN OF CAMBRIA

CITY OF LOCKPORT

TOWN OF ROYALTON



LEGEND

- Eighteenmile Creek Watershed
- Municipal Boundaries

Surficial Geology

- Bedrock
- Kame deposits
- Lacustrine beach
- Lacustrine sand
- Lacustrine silt and clay
- Outwash sand and gravel
- Till
- Till moraine

N

Miles

1 0.5 0 1 2

Figure 2

Surficial Geology of the Eighteenmile Creek Watershed

Source: NYS Museum / NYS Geological Survey , NYS Department of Environmental Conservation

moraine was deposited adjacent to the glacial ice which has a variable texture and is generally low in permeability (New York State Museum 2004).

2.2.3.2 Bedrock Geology

The bedrock in the watershed consists of Ordovician and Silurian rocks that dip gently southward at 20 to 60 feet per mile (La Sala 1968). The bedrock found in the watershed from north to south (and also from oldest to youngest) includes the Queenston Formation, the Thorold Sandstone, the Irondequoit Limestone, the Decew Dolostone, and the Guelph Dolostone (Figure 3).

The Queenston Formation was deposited in the Upper Ordovician and is a member of the Richmond Group. During the Ordovician, as the Taconic mountains rose toward the east, the Queenston Formation is traditionally thought to have formed as sediments began eroding from the mountains. Thus, the Queenston consists of red non-marine or continental shale, siltstone and sandstone (New York State Museum 1991).

The remaining formations found in the watershed are part of the Niagaran Series. They are generally richly fossiliferous and were deposited in shallow inland seas during the Silurian. The Niagaran Series includes the Medina, Clinton, and Lockport Groups (Brett et al. 1995).

The Thorold Sandstone is in the Medina Group. It ranges in thickness from 4.5 to 2 feet, with an average of 12 feet. From Rochester to Lockport, it is a mottled pink to red, cross-bedded, channel sandstone with numerous trace fossils. From Lockport and west it consists of a light gray to white, massive, clayey, pelletal sandstone. It is typically interbedded with thin green silty shale layers whose number increases toward the top of the unit (Brett et al. 1995).

Irondequoit Limestone and Decew Dolostone are members of the Clinton Group. The Irondequoit Limestone is a thick- to massive-bedded, medium greenish-gray to pinkish-gray, dolomitic, fossiliferous limestone. Thin tongues of shale are common and increase in abundance in the upper portion of the unit. The Irondequoit ranges in thickness from 5 to 22 with an average of 15 feet (Brett et al. 1995).

The Decew Dolostone ranges in thickness from 8 to 12 feet with an average of 9 feet. It consists of variably bedded, dark-gray to olive gray, clayey to sandy, fine-grained dolomite. Its most characteris-

tic feature is soft sediment deformation features. Fossils are rare, but have occasionally been observed (Brett et al. 1995).

Guelph Dolostone is a part of the Lockport Group. It is a medium to dark gray laminated, fine-grained dolostone with partings of dark greenish-gray to nearly black shale. Both the shale and dolomite are petroliferous and sparsely fossiliferous. The Guelph can be as thick as 300 feet (Brett et al. 1995).

2.2.4 Soils

The Niagara County Soil Survey (USDA 1972) was reviewed to provide information about sensitive soil types occurring within the Eighteenmile Creek watershed. Sensitive soil types include hydric soils, prime farmland, farmland of statewide importance, and soils with high erosion potential. The soil survey identifies 94 soil types mapped as occurring within the Eighteenmile Creek watershed (see Table 4).

2.2.4.1 Hydric Soils

The Natural Resource Conservation Service (NRCS) defines hydric soil as "a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part" (NRCS 2004). Wetlands are likely to be found in areas where hydric soils are present. Wetland areas provide important functions within the watershed, including but not limited to flood storage, water purification, and wildlife habitat. Many of these wetland areas are protected by state and federal regulations that are administered by the New York State Department of Environmental Conservation (NYSDEC) and the U.S. Army Corps of Engineers (USACE). Additional information regarding wetland functions and regulations are provided in Sections 2.2.10.2 and 2.3.2 respectively). Areas with hydric soils that are not considered wetlands under state or federal jurisdiction represent an opportunity to create wetland habitat. In addition, because these areas are likely to have poor drainage, which may affect the way the land is used, areas with hydric soils should be considered sensitive areas that should be reviewed and carefully evaluated when developing and implementing a watershed management plan.

Approximately 14% of the land within the Eighteenmile Creek watershed is classified as hydric soil. An additional 20% contains soils with the potential for hydric inclusions, i.e., small areas of a hydric soil may be present within the larger mapped unit. Hydric soils and soils with the potential for hydric inclusions are noted in Table 4.

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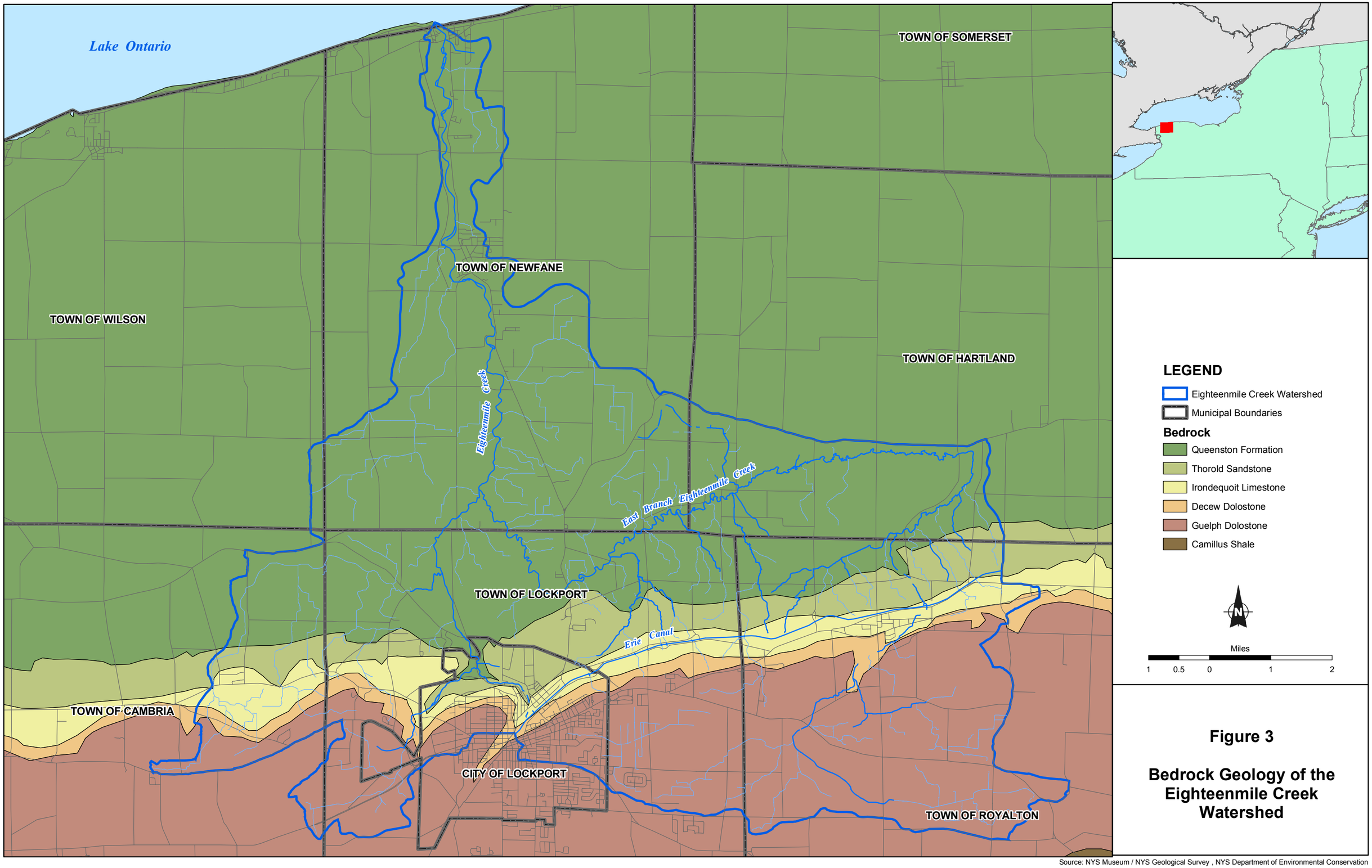

LEGEND

- Eighteenmile Creek Watershed
- Municipal Boundaries

Bedrock

- Queenston Formation
- Thorold Sandstone
- Irondequoit Limestone
- Decew Dolostone
- Guelph Dolostone
- Camillus Shale

N

Miles

1 0.5 0 1 2

Figure 3

Bedrock Geology of the Eighteenmile Creek Watershed

Source: NYS Museum / NYS Geological Survey , NYS Department of Environmental Conservation

Table 4 Soil Types Found Within the Eighteenmile Creek Watershed

Map Symbol	Name	Hydric	Prime Farmland	Farmland of Statewide Importance	Erosion Potential [1]	Adjacent to Eighteenmile Creek	Percent Coverage
Ad	Alluvial land	Hydric				*	6.50%
Af	Altmar loamy fine sand			*			6.17%
Am	Altmar gravelly fine sandy loam			*		*	4.60%
AnA	Appleton gravelly loam, 0-3% slope	Potential Inclusions	Drained areas only			*	4.31%
ApA	Appleton silt loam, 0-3% slope	Potential Inclusions	Drained areas only			*	4.16%
ArB	Arkport very fine sandy loam, 0-6% slope		All occurrences			*	3.50%
ArC	Arkport very fine sandy loam, 6-12% slope			*			3.43%
AsA	Arkport fine sandy loam, gravelly substratum, 0-2% slope		All occurrences			*	3.32%
AsB	Arkport fine sandy loam, gravelly substratum, 2-6% slope		All occurrences			*	3.30%
BoA	Bombay fine sandy loam, 0-2% slope		All occurrences			*	3.04%
BoB	Bombay fine sandy loam, 2-6% slope		All occurrences			*	2.97%
BrA	Brockport silt loam, 0-4% slope	Potential Inclusions		*		*	2.67%
Ca	Canandaigua silt loam	Hydric					2.53%
CcA	Cayuga and Cazenovia silt loams, 0-2% slope		All occurrences				2.18%
CcB	Cayuga and Cazenovia silt loams, 2-6% slope		All occurrences			*	1.99%

Table 4 Soil Types Found Within the Eighteenmile Creek Watershed

Map Symbol	Name	Hydric	Prime Farmland	Farmland of Statewide Importance	Erosion Potential [1]	Adjacent to Eighteenmile Creek	Percent Coverage
CcC	Cayuga and Cazenovia silt loams, 6-12% slope			*		*	1.96%
CeA	Cazenovia gravelly silt loam, 0-3% slope		All occurrences			*	1.76%
CeB	Cazenovia gravelly silt loam, 3-8% slope		All occurrences			*	1.72%
CgA	Cazenovia gravelly silt loam, shale substratum, 0-3% slope		All occurrences			*	1.61%
CgB	Cazenovia gravelly silt loam, shale substratum, 3-8% slope		All occurrences			*	1.56%
Ch	Cheektowaga fine sandy loam	Hydric	Drained areas only	*			1.54%
ClA	Churchville silt loam, 0-2% slope	Potential Inclusions					1.46%
ClB	Churchville silt loam, 2-6% slope	Potential Inclusions				*	1.36%
CmA	Claverack loamy fine sand, 0-2% slope		All occurrences				1.33%
CmB	Claverack loamy fine sand, 2-6% slope		All occurrences			*	1.24%
CnA	Collamer silt loam, 0-2% slope		All occurrences			*	1.21%
CnB	Collamer silt loam, 2-6% slope		All occurrences			*	1.18%
CoB	Colonie loamy fine sand, 0-6% slope		All occurrences			*	1.08%
Cs	Cosad fine sandy loam	Potential Inclusions	Drained areas only			*	0.98%
Cu	Cut and fill land	Potential Inclusions				*	0.97%
DuB	Dunkirk silt loam, 2-6% slope		All occurrences			*	0.86%

Table 4 Soil Types Found Within the Eighteenmile Creek Watershed

Map Symbol	Name	Hydric	Prime Farmland	Farmland of Statewide Importance	Erosion Potential [1]	Adjacent to Eighteenmile Creek	Percent Coverage
DuC3	Dunkirk silt loam, 6-12% slope, eroded				Eroded	*	0.81%
DvD3	Dunkirk and Arkport soils, 12-20% slope, eroded				Steep slope, eroded	*	0.81%
ElA	Elnora loamy fine sand, 0-2% slope		All occurrences			*	0.80%
ElB	Elnora loamy fine sand, 2-6% slope		All occurrences				0.80%
FaA	Farmington silt loam, 0-8% slope			*		*	0.79%
Fo	Fonda mucky silt loam	Hydric				*	0.79%
Fr	Fredon gravelly loam	Potential Inclusions	Drained areas only			*	0.75%
GnA	Galen very fine sandy loam, 0-2% slope		All occurrences			*	0.73%
GnB	Galen very fine sandy loam, 2-6% slope		All occurrences			*	0.70%
Ha	Hamlin silt loam		All occurrences			*	0.68%
HgA	Hilton gravelly loam, 0-3% slope		All occurrences			*	0.65%
HgB	Hilton gravelly loam, 3-8% slope		All occurrences			*	0.65%
HlA	Hilton silt loam, 0-3% slope		All occurrences			*	0.59%
HlB	Hilton silt loam, 3-8% slope		All occurrences			*	0.58%
HmA	Hilton and Cayuga silt loams, limestone substratum, 0-3% slope		All occurrences			*	0.53%

Table 4 Soil Types Found Within the Eighteenmile Creek Watershed

Map Symbol	Name	Hydric	Prime Farmland	Farmland of Statewide Importance	Erosion Potential [1]	Adjacent to Eighteenmile Creek	Percent Coverage
HmB	Hilton and Cayuga silt loams, limestone substratum, 3-8% slope					*	0.52%
HoA	Howard gravelly loam, 0-3% slope		All occurrences			*	0.51%
HoB	Howard gravelly loam, 3-8% slope		All occurrences			*	0.50%
HoC	Howard gravelly loam, 8-15% slope			*			0.50%
HsB	Hudson silt loam, 2-6% slope					*	0.47%
HtC3	Hudson silty clay loam, 6-12% slope, eroded						0.46%
HuF3	Hudson soils, 20-45% slope, eroded					*	0.45%
LaB	Lairdsville silt loam, 0-6% slope			*		*	0.45%
Lc	Lakemont silty clay loam	Hydric		*		*	0.43%
Ld	Lamson very fine sandy loam	Hydric	Drained areas only				0.43%
Lg	Lamson fine sandy loam, gravelly substratum	Hydric	Drained areas only				0.42%
Lo	Lockport silt loam	Potential Inclusions		*		*	0.42%
Ma	Madalin silt loam	Hydric		*			0.41%
Md	Madalin silt loam, loamy subsoil variant	Hydric		*		*	0.41%
Me	Made land	Potential Inclusions					0.41%

Table 4 Soil Types Found Within the Eighteenmile Creek Watershed

Map Symbol	Name	Hydric	Prime Farmland	Farmland of Statewide Importance	Erosion Potential [1]	Adjacent to Eighteenmile Creek	Percent Coverage
Mf	Massena fine sandy loam	Potential Inclusions	Drained areas only				0.35%
Mn	Minoa very fine sandy loam	Potential Inclusions	Drained areas only			*	0.34%
Ms	Muck, shallow	Hydric					0.34%
NaA	Niagara silt loam, 0-2% slope	Potential Inclusions	Drained areas only			*	0.32%
NaB	Niagara silt loam, 2-6% slope	Potential Inclusions	Drained areas only			*	0.32%
OdA	Odessa silty clay loam, 0-2% slope	Potential Inclusions				*	0.31%
OdB	Odessa silty clay loam, 2-6% slope	Potential Inclusions					0.28%
OnB	Ontario loam, 2-8% slope		All occurrences			*	0.26%
OnC	Ontario loam, 8-15% slope			*			0.25%
OnC3	Ontario loam, 8-15% slope, eroded						0.25%
OnD3	Ontario loam, 15-30% slope, eroded				Steep slope, eroded	*	0.24%
OoA	Ontario loam, limestone substratum, 0-3% slope		All occurrences				0.24%
OoB	Ontario loam, limestone substratum, 3-8% slope		All occurrences				0.24%
OsA	Otisville gravelly sandy loam, 0-3% slope					*	0.22%
OsB	Otisville gravelly sandy loam, 3-8% slope						0.21%
OvA	Ovid silt loam, 0-2% slope	Potential Inclusions	Drained areas only			*	0.19%

Table 4 Soil Types Found Within the Eighteenmile Creek Watershed

Map Symbol	Name	Hydric	Prime Farmland	Farmland of Statewide Importance	Erosion Potential [1]	Adjacent to Eighteenmile Creek	Percent Coverage
OvB	Ovid silt loam, 2-6% slope	Potential Inclusions	Drained areas only			*	0.17%
OwA	Ovid silt loam, limestone substratum, 0-3% slope	Potential Inclusions	Drained areas only			*	0.17%
OwB	Ovid silt loam, limestone substratum, 3-8% slope	Potential Inclusions	Drained areas only				0.14%
PsA	Phelps gravelly loam, 0-5% slope		All occurrences			*	0.12%
Pt							0.11%
Qu							0.11%
RbA	Rhinebeck silt loam, 0-2% slope	Potential Inclusions	Drained areas only				0.10%
RbB	Rhinebeck silt loam, 2-6% slope	Potential Inclusions	Drained areas only			*	0.10%
RoA	Rock land, nearly level						0.10%
RoF	Rock land, steep					*	0.09%
ShB	Schoharie silty clay loam, 2-6% slope					*	0.09%
St	Stafford loamy fine sand	Potential Inclusions		*			0.08%
Su	Stafford loamy fine sand, gravelly substratum	Potential Inclusions		*			0.08%
Sw	Sun silt loam	Hydric		*		*	0.07%
Ua							0.06%
W	Water	Hydric					0.05%
Wa	Wayland silt loam	Hydric				*	0.03%

Natural Resource Conservation Service (NRCS). 2004. www.nrcs.usda.gov. Accessed March 25, 2004.

[1] Erosion potential was assessed only for those soils located adjacent to Eighteenmile Creek, the Eastern Branch of Eighteenmile Creek, and the Gulf.

2.2.4.2 Prime Farmland and Farmland of Statewide Importance

Farmland is an important resource that is protected by New York State and by the federal government (information on state and federal regulations is included in Sections 2.3.2 and 2.3.3). Federal regulation of farmlands is based on soil types. The NRCS, the agency responsible for overseeing compliance with the Federal Farmland Protection Policy Act, designates certain soil types as *prime farmland, unique farmland, farmland of statewide importance, and additional farmlands of local importance*. In general, these soils offer a beneficial combination of chemical and physical characteristics for farm production. Therefore, these areas warrant careful consideration in the planning process.

Approximately 57% of the land within the Eighteenmile Creek watershed is classified as *prime farmland*. The USDA defines prime farmland as areas containing soils that have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. The majority of the prime farmland is found adjacent to Eighteenmile Creek and the major tributaries. Seventeen soil types within the watershed are designated as *farmland of statewide importance*. Farmland of statewide importance is farmland other than prime or unique farmland that is of statewide or local importance for the production of food, feed, fiber, forage, or oilseed crops, as determined by the appropriate state or unit of local government agency or agencies. These seventeen soil types comprise approximately 24% of the land area within the watershed, half of which is adjacent to Eighteenmile Creek and its major tributaries. Soils classified as prime farmland or farmland of statewide importance are noted in Table 4.

2.2.4.3 Soils With High Erosion Potential

Identifying areas with the potential for erosion and areas where erosion is present is an important part of developing a watershed management plan. For example, soils with a high potential for erosion that are located along Eighteenmile Creek and its tributaries have the potential to introduce sediment loads to surface water resources. Sediment introduced into the creek and the tributaries can then affect water quality, diversity of aquatic life, and availability of habitat.

An examination of the Niagara County Soil Survey indicated that there are three soils types next to Eighteenmile Creek, the Gulf, and the East Branch of the creek that are considered to have high potentials for erosion: Dunkirk, Arkport, and Ontario soils have a

high erosion potential because of their soil characteristics and the steepness of their locations. Dunkirk and Arkport soils (12% to 20% slope, eroded) and Ontario loam (15% to 30% slope, eroded) both display the potential for erosion due to their locations in steeply sloped areas and evidence of past and continuing erosion. Although Dunkirk silt loam (6% to 12% slope, eroded) is not necessarily located in areas with steep (>12%) slopes, this soil type displays historic and continuing erosion. Soils with high potential for erosion are noted in Table 4.

2.2.4.4 Additional Characterization Needs

The information presented above represents only initial information gathered to begin the process of characterizing the existing soil conditions in the Eighteenmile Creek watershed. Additional soil characterization may be needed in order to develop a more refined understanding of the relationships between water quality and soil conditions within Eighteenmile Creek and its tributaries.

2.2.5 Land Use

The Great Lakes Center at Buffalo State College updated land use/land cover (LULC) data layer for the Eighteenmile Creek watershed in 2004. The data layer was developed by overlaying 2002 Digital Orthophotography with USGS Historical LULC dataset. The images were manually inspected for inconsistencies, and the LULC was revised to create the updated layer. An additional analysis was conducted which involved comparing the analyses of 1992 LULC data and 1999 Niagara County parcel data. A description of land use within the watershed was developed based on the analyses.

Existing land uses within the Eighteenmile Creek watershed have been identified through desktop review of land-use data layers and Niagara County parcel data (1999). Land use data are depicted in Figure 4 and Figure 5, parcel data is depicted in Figure 6. Table 5 presents a comparison of the land use layers. The information presented below includes:

- 1992 LULC percentages generated from 1992 USGS/EPA Land Use and Land Cover Data (NLCD) developed through remote sensing with a spatial resolution of 30 meters (Figure 4);

- 2004 LULC percentages developed through manual inspection of 2002 Digital Orthophotography with spatial resolution of 2 ft overlain with USGS Historical Land Use Land Cover dataset (Figure 5).

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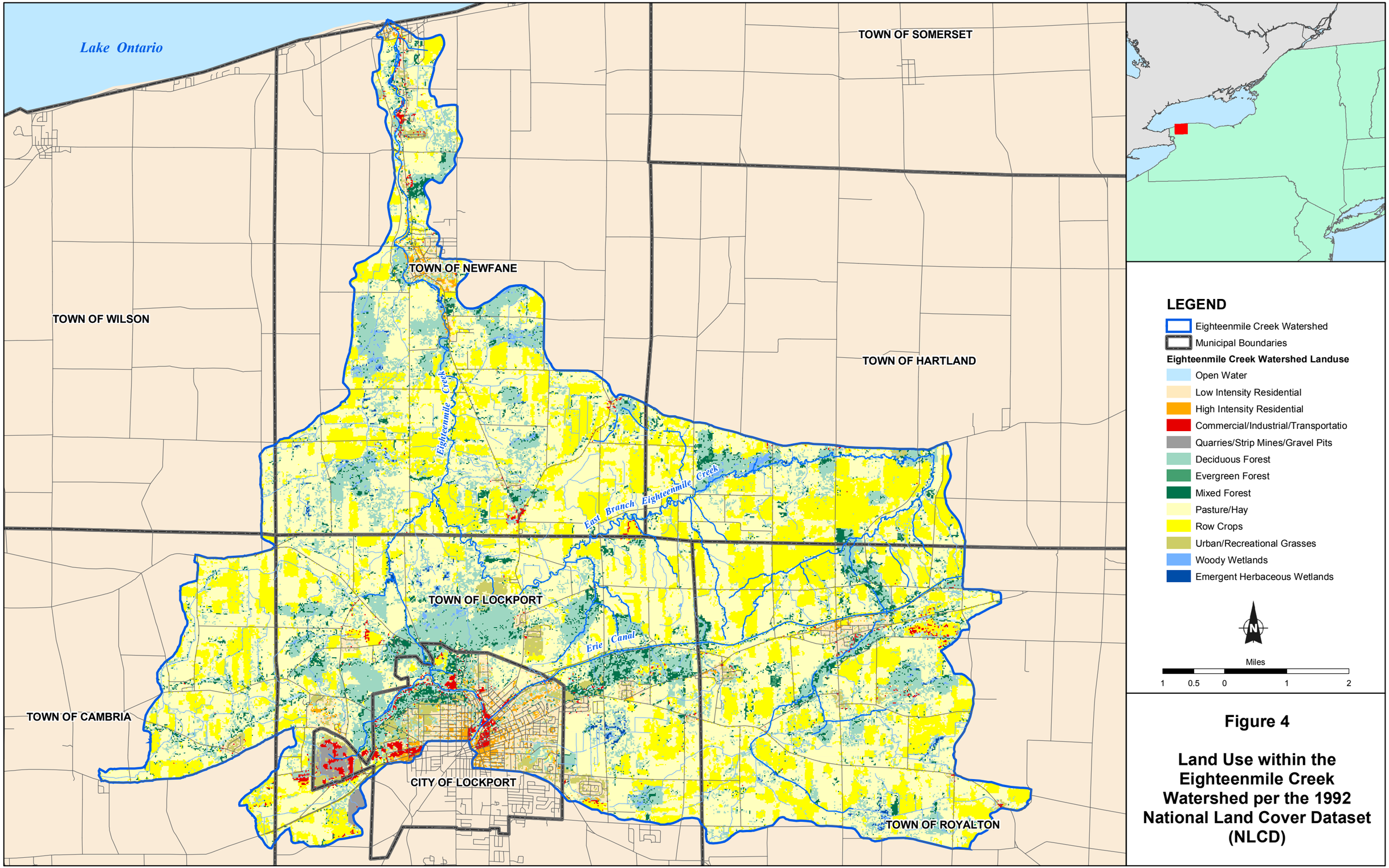

Figure 4

Land Use within the Eighteenmile Creek Watershed per the 1992 National Land Cover Dataset (NLCD)

Source: US Geological Survey / US Environmental Protection Agency, NYS Department of Environmental Conservation

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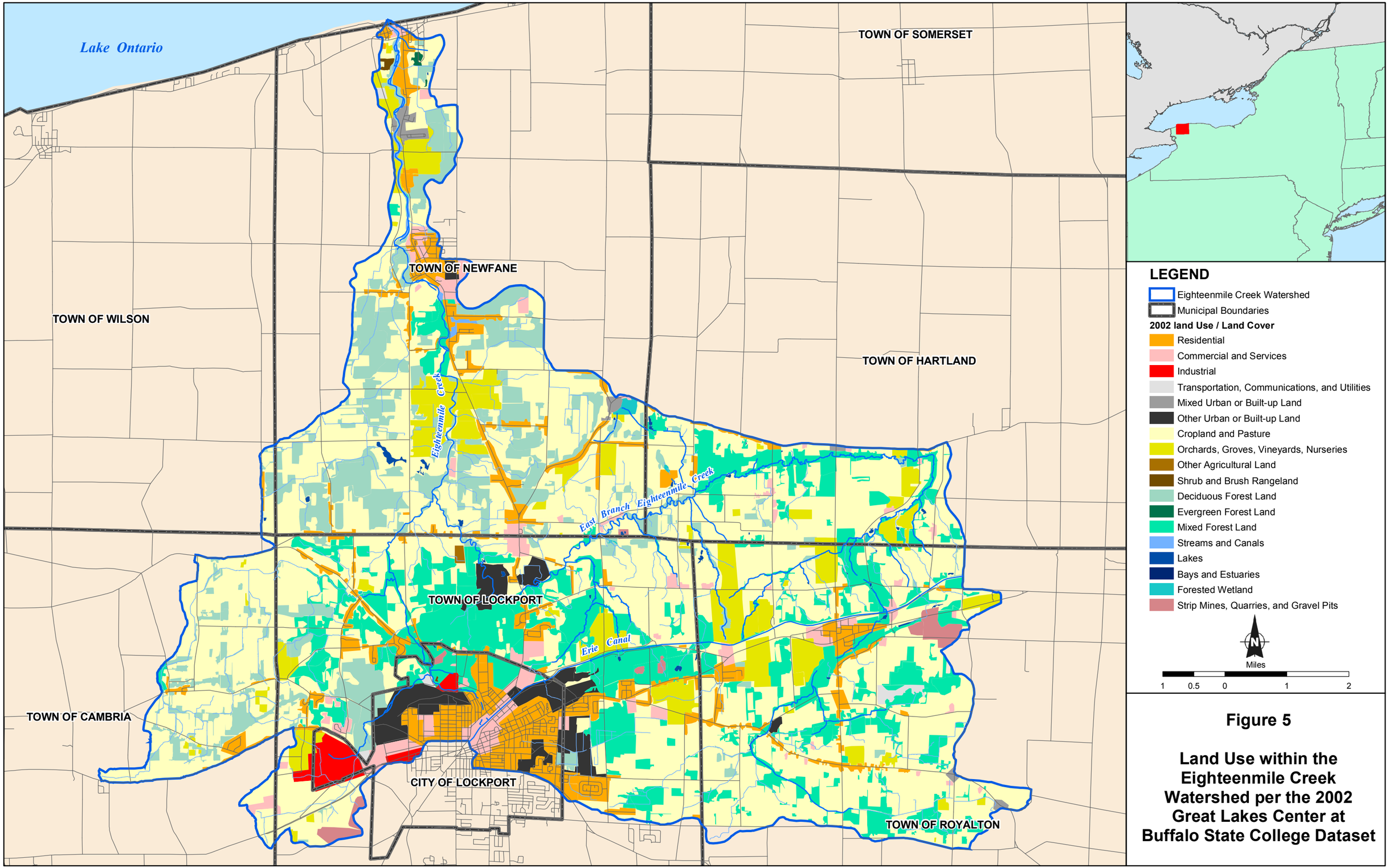

Figure 5

Land Use within the Eighteenmile Creek Watershed per the 2002 Great Lakes Center at Buffalo State College Dataset

Source: Great Lakes Center,Buffalo State College;
NYS Department of Environmental Conservation

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Lake Ontario

TOWN OF SOMERSET

TOWN OF WILSON

TOWN OF NEWFANE

TOWN OF HARTLAND

Eighteenmile Creek

East Branch Eighteenmile Creek

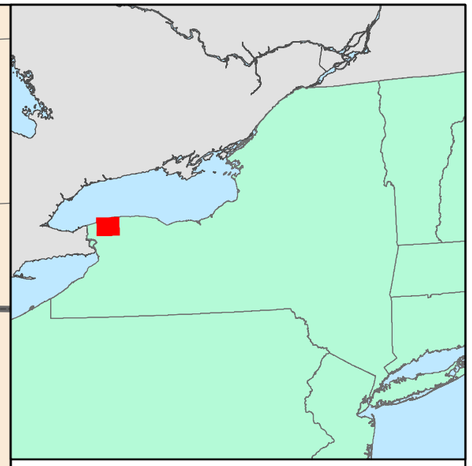
TOWN OF LOCKPORT

Erie Canal

TOWN OF CAMBRIA

CITY OF LOCKPORT

TOWN OF ROYALTON



LEGEND

- Eighteenmile Creek Watershed
- Municipal Boundaries

Tax Parcels

- Unclassified
- Agricultural
- Residential
- Vacant
- Commercial
- Recreation and Entertainment
- Community Services
- Industrial
- Public Services
- Wild, Forested, Conservation Lands and Public Parks

N

Miles

1 0.5 0 1 2

Figure 6

New York State Office of Real Property Services (NYSORPS) Property Classification within the Eighteenmile Creek Watershed

Source: Niagara County Department of Real Property Tax Services, NYS Department of Environmental Conservation

- Land use percentages based on 1999 Niagara County Parcel data (Figure 6).

Table 5 Land Use-Land Cover Comparisons within Eighteen Mile Creek Watershed

Type of Land Use	Percent of Land Use		
	1992 LULC Data	2004 LULC Data	1999 Parcel Data
Agricultural Land	70.04	57.14	35.64
Residential Use	4.28	7.96	30.93
Commercial/Industrial	1.27	4.24	6.06
Other Urban/Transportation and Utility	—	3.13	—
Community and Public Services	—	—	2.15
Recreational	1.71	—	—
Recreation and Entertainment	—	—	2.65
Forest and Wetlands	22.3	26.96	—
Wild, Forested, Conservation Lands and Public Parks	—	—	0.63
Open Water	0.39	0.59	
Vacant	—	—	15.35
Unclassified	—	—	6.59

A comparison of 1992 and 2004 LULC data with 1999 parcel data may be useful as a crosscheck. Differences in the information may indicate that there are areas within the watershed that require closer inspection during the planning process.

Because the 1992 and 2004 percentages resulted from similar processes, the results could be useful in assessing potential changes in the watershed. The comparison shows a 12.9 percent reduction in agricultural use accompanied by an increase in residential use (+3.68%), commercial and industrial use (+2.97%) and forests and wetlands (+4.66). These changes may be the result of differences in resolution between the two data sets or changes in land use between 1992 and 2004. The changes may be the result of abandonment of agricultural land that was sub-divided and used for residential and commercial development and/or allowed to revert to wetlands and forest.

The 1999 parcel data is classified for tax purposes and is less likely to reflect cover type. Each parcel is designated with one classification for tax purposes and while land within any given parcel may actually be used for different purposes and have different cover

types, this is not reflected in the assignment. While LULC layers indicate that the majority of the land within the watershed is agricultural (57.14% based on 2004 LULC), a much lower percentage (35.64%) is taxed as agricultural land; a difference of approximately 21%. The percentage of land taxed as residential land (30.93%), is approximately 22.97% higher than land classified for residential land use in LULC datasets (7.96% based on 2004 LULC). This may be an indication that agricultural land is being abandoned and reused for residential purposes or it may indicate that land used for agricultural purposes is taxed as residential land.

Agricultural Land

According to the LULC datasets, agricultural land comprises the largest land use within the watershed. Agricultural land within the watershed is used for row crops, pasture, and orchards. The majority of the agricultural land is used for pasture and hay, however, fruit trees are also a common crop planted on the lake plain, below the escarpment.

Residential

Residential land is a mixture of high and low intensity development. According to the class definitions for Low and High Intensity Residential Land Use provided by USGS for the National Land Cover Data (NLCD), low intensity residential areas have a mixture of constructed materials and vegetation. Constructed materials account for 30-80 percent of the cover. Vegetation may account for 20 to 70 percent of the cover. These areas most commonly include single-family housing units. Population densities will be lower than in high intensity residential areas. High intensity residential areas include highly developed areas where people reside in high numbers. Examples include apartment complexes and row houses. Vegetation accounts for less than 20 percent of the cover. Constructed materials account for 80 to 100 percent of the cover.

The majority of residential land is located within the City of Lockport and to a lesser extent the small towns located throughout the watershed. High intensity development is largely located within the City of Lockport. Small areas of high intensity residential are located in Newfane and Gasport. The remainder of the residential land is typical of rural areas, with houses occurring in relatively light densities.

Commercial/Industrial

The City of Lockport is the major commercial and industrial center of the watershed area. This land use appears to be most dense in the western portion of the city, along the Niagara Escarpment.

Delphi-Harrison is a major industrial facility located in this area. Other areas of high commercial/ industrial development include Burt, Newfane, Wrights Corners, and Gasport. In these areas commercial/ industrial land uses tend to be located along major roadways such as Rt. 78 and Rt. 31.

Recreational

Recreational land uses are important areas of consideration within the watershed. These areas include parks and marinas. The parkland serves to maintain green space in areas of urban or commercial/ industrial development and also provide opportunities for hunting, fishing, swimming, and hiking. Examples of parks within the watershed include: the Rollin T. Grant Gulf Wilderness Area, Highland Park, Krull Park, Olcott Beach, and Royalton Ravine County Park. Other recreational land uses within the watershed include golf courses and marinas. Olcott Harbor, at the mouth of Eighteenmile Creek, is used to house many pleasure and fishing boats during the summer months. The Erie Canal is also an important recreational land use; providing fishing, boating, and hiking opportunities.

Forests and Wetlands

Forests and wetlands are important areas of consideration within the watershed. These areas provide habitat for a variety of species and provide other valuable ecological functions. These areas are discussed in greater detail in Sections 2.2.10.1 and 2.2.10.2.

Brownfields

Brownfields are areas where redevelopment or reuse may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant (Public Law 107-118 (H.R. 2869). Table 6 presents a listing of brownfields within the Eighteenmile Creek watershed, along with their past uses and current zoning. The location of each is depicted in Figure 7. An understanding of these areas is important to watershed planning and to planning in general because each area represents a site where more careful consideration may be required prior to development. Depending on the specifics of a site, it may not be suitable for certain types of redevelopment (i.e., development that would require excavation and potentially disturb contaminants) or may be preferred for some types of development (i.e., the same type of development

Table 6 Identified Brownfield Locations in the Vicinity of the Eighteenmile Creek Watershed

Label ID	Brownfield	Acres	Municipality	Address	Zoning Class	Past and Present
97	18 Mile Creek Junkyard	4.1	City of Lockport	330 Mill St.	Industrial	Auto Repair/ Junkyard
73	70 Mill St. Site	1.1	City of Lockport	70 Mill St.	340 Vacant Industrial	Past - Industrial Present
143	Agway	6.2	Royalton	7637 Canal Road	Industrial	Distribution, fertilizer
92	Bancroft Property	89	City of Lockport	400 S. Niagara	Single Family Residential	Past - ; Present -
75	Dussault Foundry Corp.	3.9	City of Lockport	2-4-6 Washburn St.	710 Mfg.	Past - Factory; Present -
76	Dussault Foundry Corp.	1.7	City of Lockport	10 Washburn	340 Vacant Industrial	Past - Factory; Present -
131	Elecktruck Battery	1.4	Lockport	4922 IDA Park Dr.	Mfg.	Mfg.
89	Flintkote	1.2	City of Lockport	198 Mill St. *	710 Mfg.	Past - Industrial Present
94	Flintkote	4.9	City of Lockport	300 Mill St. *	710 Mfg.	Past - Factory; Present -
80	Former Dahl Oil Site	1	City of Lockport	Bristol & Niagara	Commercial	Feed mill & oil distribut
116	Former Gas Station	1.1	Newfane	2097 Lockport Olcott Road	Village Business	Garage
118	Former Gas Station	82.5’ x 165’	Newfane	2780 South Main	Village Business	Garage
133	Former Gas Station	.25	Middleport	8503 Rochester Road	Residential	Garage/Diner
78	Former Lockport Cotton Batting Co.	5.75	City of Lockport	294 Elmwood Ave	R-3	Manufacturing - warehouse
79	Former Lockport Cotton Batting Co.	3.2	City of Lockport	331 Elmwood Ave	R-3	Manufacturing - warehouse

Table 6 Identified Brownfield Locations in the Vicinity of the Eighteenmile Creek Watershed

Label ID	Brownfield	Acres	Municipality	Address	Zoning Class	Past and Present
91	Former Lockport Cotton Batting Co.	0.56	City of Lockport	305 Elmwood Ave	R-3	Manufacturing/ Fitness Club
88	Former Power Generation Facility	27,000 sq.ft.	City of Lockport	109 Mill St.	340 Vacant Industrial	Parking Lot
96	Former Power Generation Facility	2.11	City of Lockport	89 Mill St.	340 Vacant Industrial	Power Generation Facility/?
93	Junkyard & Quarry	22.7	City of Lockport	Old Niagara Road		Quarry- Past Present - Ju
135	Kuglers Junkyard - active	108	Cambria	5222 Lockport-Junction	Industrial	Salvage & Processing of J
117	Lockport Felt Co.	15	Newfane	West Ave., Newfane	Industrial Park	Felt Mfg. Co./Storage
120	Lockport Felt Co.	15	Newfane	West Ave., Newfane	Industrial Park	Felt Mfg. Co./Storage
84	Old Upper Mt. Rd. site	1.3	City of Lockport	101 Upper Mt. Rd.	340 Vacant Industrial	Past - ; Present - Vacant
129	Old Upper Mt. Road Site	4.1	Lockport	5279 Old Upper Mt.	311 Residential Vacant	Farming - Haz. Waste Disp
90	Plaslok site	2	City of Lockport	225 Mill St.	710 Mfg.	Past -Factory Present - Vacant
83	South Niagara Quarry site	1.8	City of Lockport	456 S. Niagara	340 Vacant Industrial	Past - ; Present - Vacant
119	Taylors Hardware	2.3	Newfane	7121 Ridge Road	Rural Residential	Hardware Store/Gas
130	Town Landfill	18.4	Lockport	7250 Canal Rd.	Landfill & Dump	Past. - Farming & Landfill
74	White Transportation	1.1	City of Lockport	34 Mill St.	330 Vacant Comm.	Parking Lot for Trucks
81	White Transportation	25,218 sq. ft.	City of Lockport	38 Mill St.	447 Truck Terminal	Parking Lot for Trucks

Table 6 Identified Brownfield Locations in the Vicinity of the Eighteenmile Creek Watershed

Label ID	Brownfield	Acres	Municipality	Address	Zoning Class	Past and Present
82	White Transportation	7,451 sq. ft.	City of Lockport	30 Mill St.	438 Parking Lot	Parking Lot for Trucks
95	White Transportation	14,400 sq. ft.	City of Lockport	40 Mill St.	438 Parking Loot	Parking Lot for Trucks

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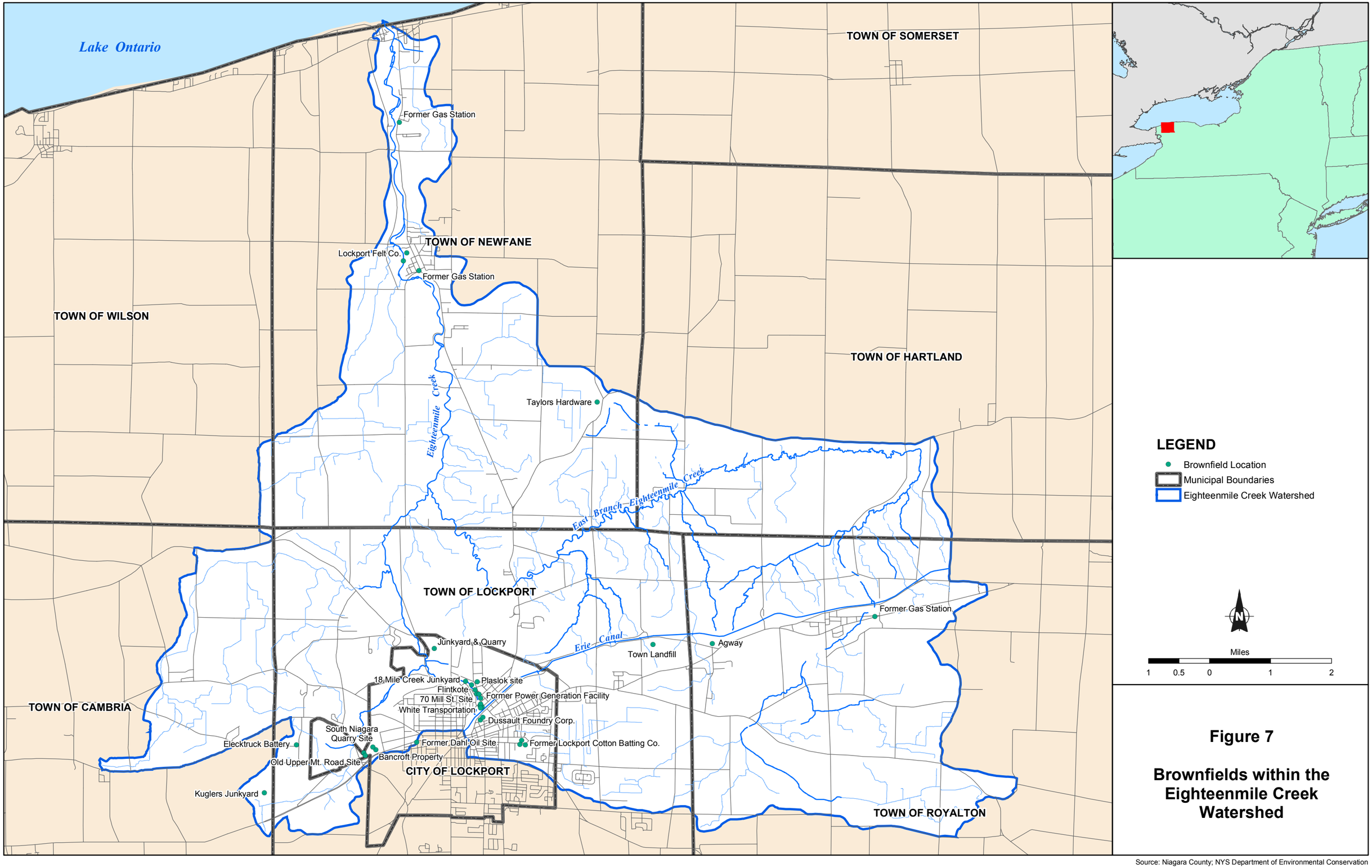

Figure 7

Brownfields within the Eighteenmile Creek Watershed

Source: Niagara County; NYS Department of Environmental Conservation

that the land was previously used for, thus avoiding impacting more pristine land).

2.2.6 Social and Economic Characterization

The information presented in this section was derived from statistics and mapping for Niagara County rather than for the Eighteenmile Creek watershed. Where possible, a visual inspection of available mapping was used to provide a general comparison of conditions within the Eighteenmile Creek watershed relative to conditions in Niagara County.

2.2.6.1 Demographic Profile

The information presented in this analysis is derived from the U. S. Census Bureau website Fact Sheet for Niagara County, New York with Highlights from the Census 2000 Demographic Profiles:2000 and from visual analysis of the maps associated with the website fact sheet (http://factfinder.census.gov/home/saff/main.html?_lang=en). Because the Census Bureau's geographical study areas are not sensitive to watershed boundaries, the analysis provided includes information for Niagara County and for a general analysis of the watershed area.

2.2.6.2 General Population Characteristics

The entire Eighteenmile Creek Watershed lies within Niagara County, and portions of six towns lie within the watershed. As of 2000, the total population of Niagara County was 219,846 people, with the greatest densities in the City of Lockport and the Niagara Falls area.

Figure 8 depicts population densities within the Eighteenmile Creek watershed. Population densities within the majority of the watershed range from 25 to 1,000 persons per square mile (p/sm). Population density rises to levels greater than 1,000 p/sm in portions of the City of Lockport, in the Village of Newfane, in Olcott, and in small areas within the Towns of Lockport and Royalton.

Within Niagara County the male-to-female ratio is nearly 1:1, with slightly more females (51.7% of the population or 113,724 women) than males (48.3 % of the population or 106,122 men). The male-to-female ratio within the Eighteenmile Creek watershed is consistent with the rest of Niagara County.

The median age in Niagara County is 38.2 years. The median age for the majority of the Eighteenmile Creek watershed is between 36.4 and 40.1 years. In the City of Lockport the median age is be-

tween 30.7 and 35.3 years, and the median age just east of the city is between 40.6 and 45.7 years.

The racial makeup in Niagara County is dominated by Caucasians (white); 90.7 % of the population is white, 6.1% is African-American, 0.9% is American Indian, 0.6 % is Asian, 0.4% are some other race, and 1.2% are biracial. Approximately 1.3% of the population is reported to be of Hispanic or Latino descent. Within the majority of the Eighteenmile Creek watershed, 92.8 to 98.9 % of the population is white, except in and around the city of Lockport where whites make up 83.0% to 90.8 %. African-Americans make up 0.1% to 1.3% of the population in most of the watershed, and 1.7% to 17.5% of the population in and around the City of Lockport. Native Americans make up 0.1% to 1. 9%; people of Asian descent make up 0.1% to 1%; and people of other races make up to 1.3% of the watershed population. Persons of two or more races make up 0.3% to 3.5% of the population of the watershed.

The average household size in Niagara County is 2.45 persons. In the northernmost portion of the Eighteenmile Creek watershed, north of the junction of Routes 78 and 104, and in the portions of the watershed within the City of Lockport, the average household size is between 2.46 and 2.65 persons. In the remainder of the watershed the average household size is between 2.68 and 2.86 persons.

Approximately 69.9% of the housing units in Niagara County are owner-occupied. In the portion of the Eighteenmile Creek watershed in the City of Lockport, only 45.2% to 62.4% of the housing units are owner-occupied; in the area east of the city 84.2% to 95.3% of the housing units are owner-occupied, and in the remainder of the watershed, 76.4% to 82.6% of the households are owner-occupied.

2.2.6.3 Social Characteristics

The population of Niagara County includes 147,153 people over the age of twenty-five. No comparison figure is available for the watershed. Of the people within the county over the age of twenty-five, 83.3% are high school graduates or better and 17.4% have a Bachelor's degree or higher level of education. Within the majority of the Eighteenmile Creek Watershed, people over the age of twenty-five with a high school diploma or better make up 81.7 to 88.8 % of the population; in much of the City of Lockport only 71.8% to 79.1% of the population have attained this level of

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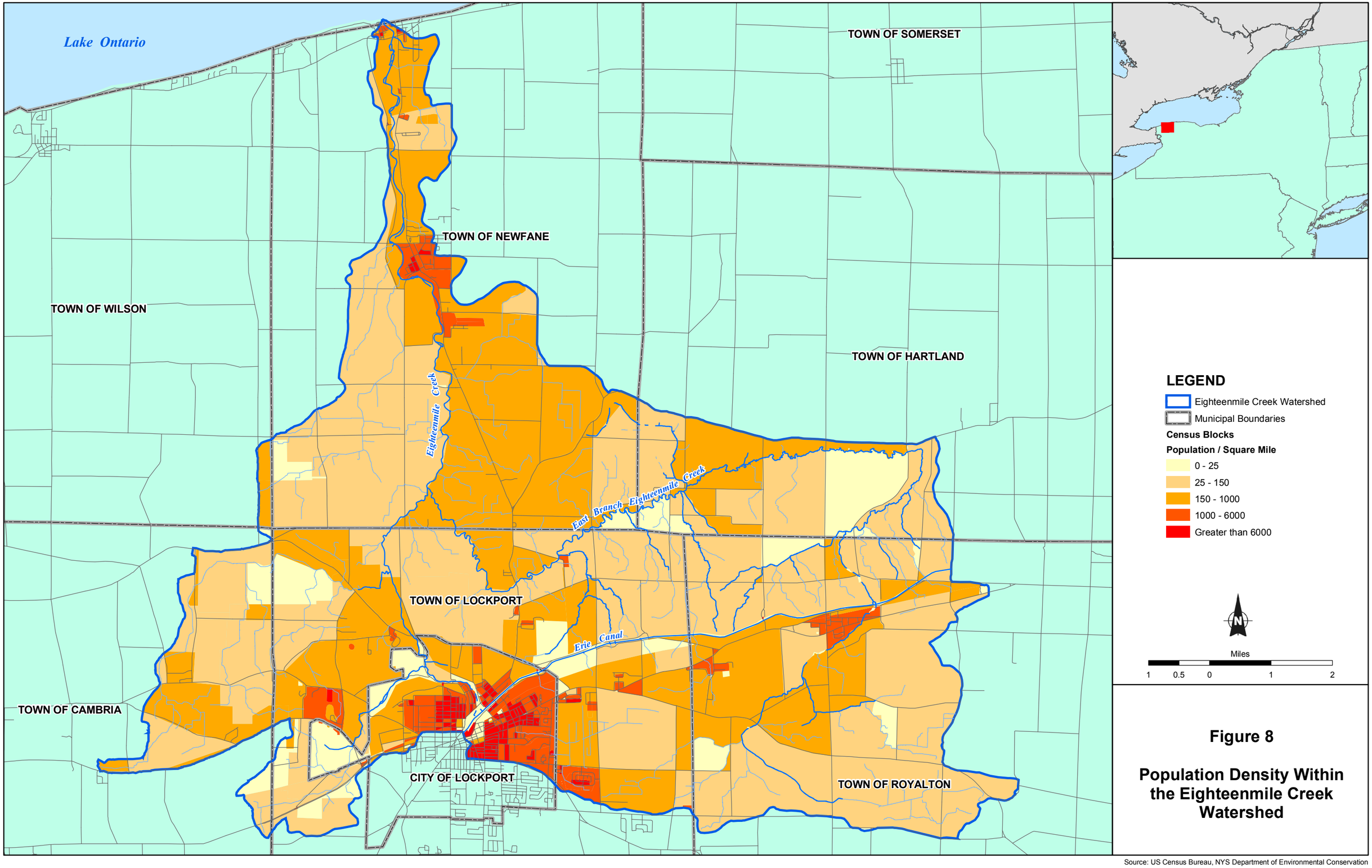

LEGEND

- Eighteenmile Creek Watershed
- Municipal Boundaries

Census Blocks

Population / Square Mile

- 0 - 25
- 25 - 150
- 150 - 1000
- 1000 - 6000
- Greater than 6000

N

Miles

1 0.5 0 1 2

Figure 8

Population Density Within the Eighteenmile Creek Watershed

Source: US Census Bureau, NYS Department of Environmental Conservation

education; and in the eastern portion of the city and the area immediately east of the city, 89.7% to 95% of the population are high school graduates or better. Within the majority of the Eighteenmile Creek Watershed, people over the age of twenty-five with a Bachelor's degree or better make up 13.9% to 24.9% of the population; within most of the City of Lockport, only 2.9% to 13.2% of the population have attained this level of education; in the eastern portion of the city and the area immediately east of the city, 27% to 37.1% have attained this level of education; and in the northernmost portion of the watershed, 9.3% to 13.2% of the population have earned Bachelor's degrees or better.

Approximately 14.5% of the population of Niagara County over twenty-five are civilian veterans while the percentage of veterans within the areas of Eighteenmile Creek watershed varies from 8.7% to 14.8% in and around the City of Lockport, 11.3% to 13.3% in the northern portion of the watershed, and 15.1% to 16.7% in the remainder of the watershed.

Approximately 18% of the population of Niagara County between the ages of 21 and 64 are disabled. Within the majority of the Eighteenmile Creek Watershed, disabled persons make up 13.6% to 20.4% of the population; in the City of Lockport the percentage of disabled persons increases to 16.6% to 39.2%. Approximately 53.4% of the population of Niagara County aged 15 years or more are married.

2.2.6.4 Economic Characteristics

Approximately 62.6% of the population of Niagara County aged 16 years or more are in the labor force and the mean travel time to work for these people is 20.1 minutes. The mean travel time to work within the watershed generally increases with distance from the City of Lockport and ranges from 16.9 to 27.6 minutes.

The median household income in Niagara County is approximately $38,136. The median household income for the majority of the watershed is between $35,100 and $52,125. The median income for the portion of the City of Lockport within the watershed is generally between $23,472 and $33,372. The median income in the area immediately east of the City of Lockport is generally between $57,411 and $65,457.

Per capita income for Niagara County is approximately $19,219. In the majority of the watershed, the per capita income is between $15,996 and $19,791. The per capita income of the area within the City of Lockport is between $10,392 and $15,774; the majority of

the area surrounding the city is between $20,109 and $24,406; and the area immediately east of the city is between $25,626 and $30,170.

Approximately 8.2% of families in Niagara County are living below the poverty level. In the most of the watershed area, 3.7% to 10.4% of the families live below the poverty level. The percentage of families living below the poverty level is highest in the City of Lockport (13.2% to 42.4%) and the percentage of families living below the poverty level is lowest in the northernmost portion of the watershed and in the area immediately east of the city (0.5% to 3.3%).

The median value of single family, owner-occupied homes within Niagara County is approximately $82,600. The median value of single family, owner-occupied homes within the majority of the watershed is between $68,600 and $100,000. In the City of Lockport the median value of single family, owner-occupied homes is between $52,700 and $66,500.

Economic resources within the Eighteenmile Creek watershed include agriculture, tourism and recreation, real estate, industry, and commerce.

The information presented in this section is derived from the 1997 Economic Census (http://factfinder.census.gov/servlet/GQRGeoSearchByListServlet?ds_name=E9700A1&_ts=99502809229).

Economic census information is reported for multiple economic sectors within Niagara County. Portions of three economic sectors fall within the Eighteenmile Creek watershed. The City of Lockport is reported as the Lockport, NY sector; the remainder of the Town of Lockport is reported as the Lockport town, NY sector; and portions of Niagara County not reported as part of Lewiston, Wheatfield or Lockport (town and city) are reported as the Balance of Niagara County. It is important to note that while portions of each of these sectors falls within the Eighteenmile Creek watershed, none of these sectors falls entirely within the watershed boundary.

In the Lockport, NY sector, the greatest numbers of establishments are in retail trade (96), followed by health care and social assistance (87) and accommodation and food service (76). Manufacturing employed the greatest number of people (8,183) followed by retail trade and accommodation and food service (each with 869). Manufacturing had the highest annual payroll ($454,901,000) fol-

lowed by health care and social assistance ($17,965,000) and retail trade ($12,464,000).

In the Lockport town, NY sector, the greatest numbers of establishments are in retail trade (93), followed by accommodation and food service (38) and other non-public administration services (26). Retail trade employed the greatest number of people (2,084) followed by accommodation and food service (530) and other non-public administration services (190). Retail trade had the highest annual payroll ($31,066,000) followed by accommodation and food service ($4,533,000) and other non-public administration services ($2,616,000).

In the balance of Niagara County, NY sector, the greatest numbers of establishments are in retail trade (238), followed by accommodation and food service (128) and other non-public administration services (65). Retail trade employed the greatest number of people (2,764) followed by accommodation and food service (1,155) and health care and social assistance (566). Retail trade had the highest annual payroll ($41,526,000) followed by health care and social assistance ($12,024,000) and accommodation and food service ($9,484,000).

2.2.6.5 Recreation and Tourism

Recreational Opportunities

Recreational opportunities abound within the Eighteenmile Creek watershed. The watershed is nestled in an area rich in natural and historic resources that provide recreational opportunities for people of all ages.

Lake Ontario, Eighteenmile Creek, and the Erie Canal provide ample opportunities to enjoy boating, fishing, and other water-related activities. Lockport and Gasport feature boat launch ramps to access the canal and access to Lake Ontario is available in Newfane and Olcott. Shore fishing opportunities abound within the Eighteenmile Creek watershed, particularly at Burt Dam and the lower portion of Eighteenmile Creek in Newfane, which was recently the site of a major improvement project. In addition to boating and fishing, beach access is offered in Olcott just east of the mouth of Eighteenmile Creek.

Sportfishing is a major economic resource in Niagara County. In 1982 it was estimated that sportfishing for salmonids generated $2.6 million for Niagara County's economy and more than 90 jobs were directly linked to the industry (Niagara County 1984).

The New York Sea Grant conducted a study in 1996 in an effort to update information pertaining to usage and expenditures related to fishing on waters of the Great Lakes in New York (Connelly 1999). According to the study, more than 35,000 anglers fished on the Great Lakes waters in Niagara and Orleans counties, contributing more than $7.6 million to local economies. Of these 35,000 anglers, 58% were from the Buffalo area, 18% were out-of-state residents, and 10% came from the Rochester area. Estimated angler effort for 1998 showed 65% of the effort focused on cold-water species, with the remainder being focused on bass or no specific type/other. Coho and Chinook salmon received the most effort of any species, comprising 34% of the total effort. Bass were the second most targeted group, receiving 15 % of the total effort.

The Eighteenmile Creek watershed is rich in history and historic properties, museums, and other facilities promoting the history of the area. In addition, parks and trails throughout the area offer opportunities for picnicking, hiking, wildlife viewing, biking, cross country skiing, and horseback riding. Numerous festivals, farm markets, antique shops, wineries, theaters and facilities for the arts exist within the watershed.

2.2.6.6 Additional Characterization Needs

To adequately characterize recreational opportunities within the Eighteenmile Creek watershed, additional information on the location, access, and types of recreational opportunities may be required, particularly with regard to areas adjacent to Eighteenmile Creek and activities that are dependent on the waterways (i.e., fishing).

2.2.7 Hydrology

Knowledge of significant characteristics of surface water and groundwater (i.e., amount, quality, flow, recharge, etc.) is central to developing a CWMP. To begin characterizing the surface water and groundwater in the Eighteenmile Creek watershed, topographic maps and the National Atlas (2000) were reviewed. These maps provided an overview of the hydrologic resources within the watershed. Analysis of surface water resources in this discussion is focused on perennial and intermittent streams. However, wetlands and ponds may also be placed this category. Wetlands are discussed in Section 2.2.10.2. The groundwater discussion is focused on the large aquifers that occupy the region. Future study of local groundwater resources such as local water tables and small, perched aquifers may be important for watershed management. Surface and groundwater resources are depicted in Figure 9.

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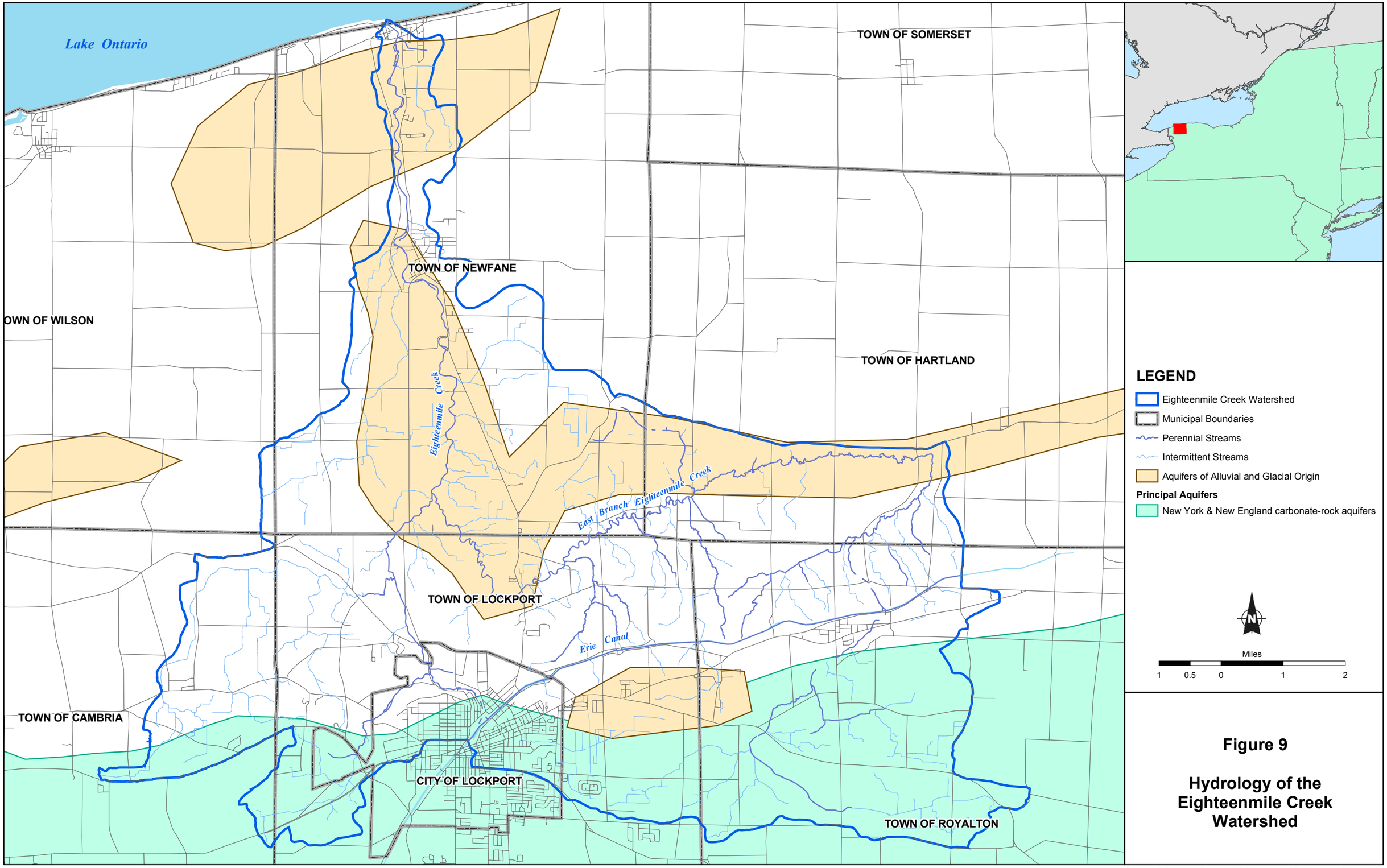

LEGEND

- Eighteenmile Creek Watershed
- Municipal Boundaries
- Perennial Streams
- Intermittent Streams
- Aquifers of Alluvial and Glacial Origin

Principal Aquifers

- New York & New England carbonate-rock aquifers

N

Miles

1 0.5 0 1 2

Figure 9

Hydrology of the Eighteenmile Creek Watershed

Source: US Geological Survey , NYS Department of Environmental Conservation

2.2.7.1 Surface Water

The Eighteenmile Creek watershed comprises approximately 230 miles of streams, both perennial and intermittent (see Figure 9 and Table 7). In general, the smaller tributaries drain to the east or west into the main branch of Eighteenmile Creek. Water then flows to the north into Lake Ontario. The exception is the Erie Canal, a manmade structure that runs east to west through the City of Lockport. During normal operations and drawdown periods water is discharged from the canal into Eighteenmile Creek, resulting in an increase in the natural flow volumes. During dry periods, the canal contributes the majority of the flow for Eighteenmile Creek in the City of Lockport (RAP).

Table 7 Stream Types within the Eighteenmile Creek Watershed

	Length (miles)[1]
Intermittent	156
Perennial	67
Erie Canal	9
Total	**232**

[1] Estimates were developed using GIS to calculate stream lengths from digital USGS topographic quadrangle maps.

2.2.7.2 Groundwater

Understanding groundwater is an important component of the watershed management planning process. Important aspects of understanding groundwater and watershed issues include acknowledging the value of the water stored, the interconnection of groundwater and surface water resources, and the dynamics (i.e. seasonality, frequency, volumes, etc.) of groundwater interactions with surface water resources. Groundwater use for agriculture, drinking water, and other uses are also important to note.

Four large aquifers are in the Eighteenmile Creek watershed: one carbonate rock aquifer and three unconsolidated sand and gravel aquifers (National Atlas 2000) (Figure 9).

The New York and New England carbonate rock aquifer is found in the southern portion of the watershed. This aquifer extends eastward from the shore of Lake Erie near the City of Niagara Falls to just south of Utica, New York and, within the project area, is bound on the north by the Niagara Escarpment. Carbonate rock aquifers are found most commonly in the eastern United States. Most consist of limestone; however, marble and dolomite may also be found. The productivity of carbonate rock aquifers varies from

very little water yield to being some of the most productive aquifers known.

Three unconsolidated sand and gravel aquifers also are found within the watershed: a small isolated aquifer at the toe of the escarpment east of Lockport, a larger isolated aquifer area near the shore of Lake Ontario, and a third area that encompasses much of the main branch of Eighteenmile Creek and spans an area from the confluence of the Gulf and the East Branch of Eighteenmile Creek northwest to Rochester. These aquifers were formed by glacial or alluvial deposition. Sand and gravel aquifers of glacial or alluvial origin are highly productive and can be local or regional (U.S. Geological Survey 2004). Groundwater flow is primarily local, originating from recharge areas near stream valley walls and discharging in the streams. Hydraulic conductivity (the capacity of the material to transmit fluids) of the unconsolidated sand and gravel aquifers is generally high. This high conductivity lends itself to a high susceptibility to contamination.

2.2.7.3 Floodplains

Floodplains are areas that will be inundated by a waterbody during periods of high water levels, typically caused by heavy precipitation. These areas are important as they dissipate excess flow and minimize potential damage further downstream. They also reduce erosion by reducing flow velocity and retaining silt and sediment carried in the water.

Undisturbed floodplains can contain diverse habitat types and distinct plant and animal communities. These floodplain ecosystems are of high biological diversity and provide important spawning, nesting, and feeding areas for a variety of fish, birds, and amphibians.

An initial floodplain assessment was conducted using USGS topographical maps and Federal Emergency Management Agency (FEMA) flood insurance mapping in order to determine the presence, extent, and orientation of FEMA-mapped floodplains within the Eighteenmile Creek watershed (Figure 10). The regulated floodway includes the channel of the stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood discharge can be conveyed without creating an increase of 1-foot cumulative rise in the 100-year floodplain. The floodplains are determined using statistical analyses of records of stream flow and rainfall; information obtained through consultation with the community; topographic surveys; and analyses using computer models. These areas are not static and may change based

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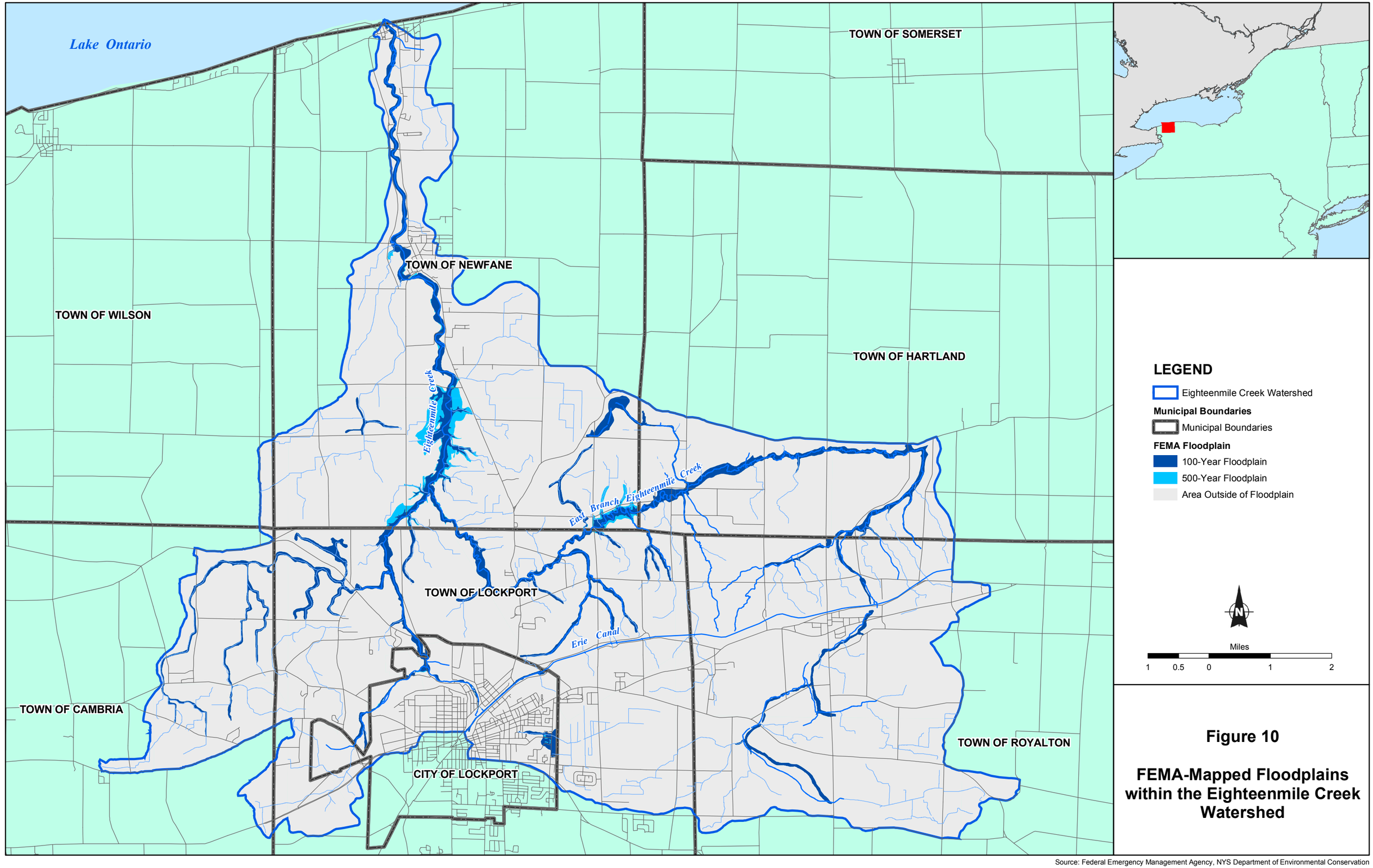

Figure 10

FEMA-Mapped Floodplains within the Eighteenmile Creek Watershed

Source: Federal Emergency Management Agency, NYS Department of Environmental Conservation

upon a number of variables, including development in areas upstream or physical changes to the stream channel.

Approximately 5 percent of the land area, or approximately 2,900 acres, within the watershed is considered to be within the 100-year floodplain. This is an area that statistically has a 1 percent chance of being flooded any given year. The 100-year floodplain areas tend to be centered on the major streams within the watershed.

An additional 1 percent of the land area, approximately 400 acres, falls within the 500-year floodplain. The 500-year floodplain includes the areas designated as 100-year floodplain. These are areas above the 100-year floodplain, which are subject to 0.2 percent chance of flooding annually. The mapped 500-year floodplains within the watershed are largely located in the southern portion of the Town of Newfane: both north and south of the confluence with the East Branch and in a small portion of the East Branch in the southeast corner of the town (see Figure 10).

2.2.7.4 Additional Characterization Needs

The information presented in this section represents an overview intended to begin the process of characterizing the existing hydrology conditions in the Eighteenmile Creek watershed. It does not include all existing information regarding hydrology within the watershed, nor does it include all of the information that may be required for use in developing a CWMP. Additional literature review and field work may be required to adequately characterize current hydrologic conditions within the Eighteenmile Creek watershed.

Additional literature review can occur to more thoroughly characterize water quality within the watershed and the interaction of the groundwater with surface water. Additional effort could also include sampling and analysis, and modeling groundwater movement.

2.2.8 Water Quality

An understanding of the quality of surface water within the Eighteenmile Creek watershed is central to any watershed planning effort because of the effects on other aspects of life in the watershed. Water quality has direct effects on the health of biotic systems within the watershed including habitat, fisheries, wildlife and human health. Those species that live in, consume things that live in, or come into contact with the water and sediment have the potential to be affected by any pollutants they contain. Water quality can also affect socioeconomic conditions and the quality of life in the

watershed. Within the Eighteenmile Creek watershed, hunting and fishing contribute to the economy of the communities and provide recreation for the inhabitants of the watershed. Improved water quality could result in a healthier fishery and the removal of restrictions on consumption of fish, waterfowl and turtles. Contact recreation (like swimming) also depends on the maintained health of aquatic systems. Protecting water quality is an important aspect of watershed planning.

The NYSDEC publishes water quality designations for rivers and streams as well as water quality standards (for physical and chemical parameters), to ensure that water quality is good enough for the designated best use. Water quality designations are based on existing or expected best uses, using a grading system from AA (highest quality) to D (most degraded). T or TS are used to describe waters with sufficient dissolved oxygen to support trout or trout spawning. Class C(T), C(TS), B, and A (or AA) are referred to as "protected streams" and are subject to additional regulation. Table 8 provides the best use for each water classification.

Table 8 New York State Department of Environmental Conservation Best Use Designations for Surface Water Resources

Class	Best Use
AA	Drinking (after chlorination)
A	Drinking (after chlorination and filtration)
B	Bathing
C(T)	Fishing (trout)
C	Fishing
D	Secondary contact recreation

Water quality concerns in Eighteenmile Creek include both the water column and the benthos or bottom sediments, which can contribute to and diminish water quality through the mobilization of contaminants. NYSDEC designates best-use classifications for water bodies within New York State and establishes water quality standards that must be met to ensure the designated use. The Eighteenmile Creek system is classified for many uses, including primary contact recreation and fish propagation and survival. Classifications for each segment of Eighteenmile Creek and its tributaries are depicted in Figure 11. However, several factors have impacted the water quality of this system and have caused impairments and diminished use. The area downstream of Burt Dam has been designated as one of the 43 Areas of Concern (AOC), localized areas identified as the most polluted areas in the Great Lakes,

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Lake Ontario

TOWN OF SOMERSET

TOWN OF NEWFANE

OWN OF WILSON

TOWN OF HARTLAND

Eighteenmile Creek

East Branch Eighteenmile Creek

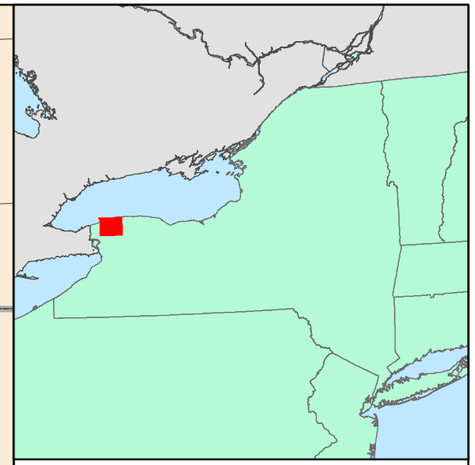
TOWN OF LOCKPORT

Erie Canal

TOWN OF CAMBRIA

CITY OF LOCKPORT

TOWN OF ROYALTON



LEGEND

- Municipal Boundaries

NYSDEC Water Quality Designations

- Class A
- Class B
- Class C
- Class D
- Eighteenmile Creek Watershed

N

Miles

1 0.5 0 1 2

Figure 11

NYSDEC Water Quality Designations in the Eighteenmile Creek Watershed

Source: NYS Department of Environmental Conservation

by the International Joint Commission. The Great Lakes Water Quality Agreement requires cleanup of local AOCs.

2.2.8.1 Sources Impacting Water Quality

Sources that have been primarily responsible for adversely impacting water quality within Eighteenmile Creek include industrial facilities and local municipal practices. Contaminants associated with these sources include polychlorinated biphenyls (PCBs), dioxins, furans, pesticides, and metals.

New York State Barge Canal

Previous water quality sampling efforts, which are outlined in Table 9 below, have indicated high levels of PCBs present in the New York State Barge Canal, which discharges to Eighteenmile Creek. Data also show that PCB concentrations in Eighteenmile Creek decrease downstream, indicating the contaminant source is localized in the Lockport area where the canal is located. Dioxins and furans have also been detected in canal sediments and exhibit the same concentration pattern as PCBs: decreased contamination with movement downstream, with contamination localized in the Lockport area. This pattern indicates a localized contaminant source that is likely impacting areas downstream.

Table 9 Results Summary of Water Quality Sampling within Eighteenmile Creek Watershed

Contaminants	Sample Type	Samples and Locations with Moderate to High Contaminant Levels
NYSDEC RIBS Study: Jacques Rd Bridge April 12, 1989 through November 9, 1989 and March 27, 1990 through November 13, 1990		
Lead	Surface grab sample	1989 mean exceeded standard. However 1990 mean and 2-year average were below standard.
Iron	Surface grab sample	1989 mean, 1990 mean and 2 year average all exceeded standard. However, may be result of naturally occurring iron in local rock.
NYSDEC Dioxin/Furan Sampling 1990: Jacques Rd. Bridge		
2,3,7,8-TCDD	Surface grab sample	Not detected
NYSDEC Lake Ontario Tributary Sampling 1993 and September through November 1994: Olcott Harbor (OH), Stone Rd (SR), N Transit Rd (NTR), Olcott St Bridge (OSB), Clinton St (CS), East Branch (EB), Gulf Below Niagara St (GBN), Gulf Above Niagara St (GAN), Barge Canal #1 (BC1), Barge Canal #2 (BC2)		
PCBs	PISCES	Sites OH, SR, NTR, CS, EB, GBN, GAN, BC1, BC2
PCBs	Pressure filtration	Sites OH, SR, OSB
Aldrin/Dieldrin and Endrin	PISCES	Sites OH, GAN

Table 9 Results Summary of Water Quality Sampling within Eighteenmile Creek Watershed

Contaminants	Sample Type	Samples and Locations with Moderate to High Contaminant Levels
Endosulfans	PISCES	Site GAN
Chlordane	Pressure filtration	Site SR
NYSDEC PCB Sampling July 23 through August 23, 1995: Barge Canal Overflow (BCO), North Transit (NT), Stone Rd (SR)		
PCBs	PISCES	Sites BCO, NT, SR
PCBs	Pressure filtration	Sites BCO, NT

Based on studies outlined in the *Eighteen mile Creek Remedial Action Plan* August 1997 (NYSDEC 1997)

Key:

NYSDEC = NYS Department of Environmental Conservation.
PCB = Polychlorinated biphenyl.
RIBS = Rotating Intensive Basin Survey.
PISCES = Passive water samplers.

Industrial and Municipal Wastewater Discharges

At the time of compiling information for this document, six industrial and municipal facilities are permitted to discharge to Eighteenmile Creek. These facilities contribute effluents to the creek system that could contain metals, organics, suspended solids, and coliform and could cause fluctuations of biochemical oxygen demand (BOD), temperature, and pH. However, this effluent is monitored per the requirements of current SPDES permits for these facilities, which list effluent limitations and monitoring requirements that must be adhered to avoid violation of water quality standards. Other permitted industrial effluent that enters the Eighteenmile Creek drainage basin includes stormwater discharges from eleven facilities. Stormwater discharges only require a stormwater management plan and are not routinely monitored for physical and chemical parameters. Runoff from a storm event could affect water quality as there may be residual contaminants and other physical conditions such as increased BOD and high turbidity.

Inactive Hazardous Waste Sites

A hazardous waste site has the potential to affect several media, including soil and groundwater. Contaminated soil and water have the ability to migrate off-site and affect the surrounding area. Currently, fifteen hazardous waste sites are within the Eighteenmile Creek watershed. These sites have all been investigated at the Phase I level according to NYSDEC regulatory requirements and Phase II investigations have been completed at all sites where hazardous wastes was found. At this time, all Phase II sites are being ranked for determination of need for a Remedial Investigation and Feasibility Study (RI/FS) which leads to potential remedial action

and clean-up by the responsible party. While this RI/FS process is under way, contamination from these sites could be affecting the Eighteenmile Creek watershed. Previous sampling investigations conducted during Phase I and Phase II evaluations at these sites indicate contamination from heavy metals, PCBs and polycyclic aromatic hydrocarbons (PAHs), all of which have the potential to migrate off-site and affect the water quality and sediment of Eighteenmile Creek (NYSDEC 1997).

2.2.8.2 Bottom Sediments

Stream bottom sediment contamination near the surface in a highly active creek system (i.e., characterized by variable flow regimes, subject to high velocities and volumes of flow due to extended precipitation events.), rather than buried below the surface, is an indication that contaminated sediments are presently being deposited. Active creek systems include areas where sediment is picked up by the current and carried downstream and depositional areas where water slows and sediment settles out of the water column. Depositional areas often receive sediment loads during storm events or high flow events. When the surface sediments in these depositional areas are contaminated, a continual source of contamination may be present. In a system where the contamination sources have been removed, clean sediment often is deposited over the contaminated sediment, burying the contaminated sediments.

When contaminated sediments are on the surface, they can be spread more easily and are more readily available to aquatic species such as bottom feeders. Several contaminants are often found at elevated levels at or near the surface in bottom sediments in the Eighteenmile Creek system, including metals, PCBs, dioxins and furans (NYSDEC 1997). Previous sampling has shown that the sediments below the Burt and Newfane Dam are less contaminated than those upstream in the reservoir areas. This is an indicator that there is a continual contamination source that may be upstream from Burt Dam and contaminated sediments may be migrating from these upstream areas during higher flow periods to areas below the dam.

City of Lockport Combined Sewer Overflows

The sewer system of the City of Lockport periodically discharges untreated stormwater overflow into Eighteenmile Creek during high flow events. This untreated water has contaminant levels similar to the influent to the waste water treatment plant. This influent contains contaminants that include heavy metals and PAHs. Sampling of the sewer system at manholes near sewer outfalls to the creek—where PCB contamination has been detected—and at

manholes that were not near the sewer outfalls to the creek—where dioxin and furan contamination was detected—indicate another contamination source that may be impacting the water quality during higher precipitation periods when overflow discharges directly to Eighteenmile Creek (NYSDEC 1997).

2.2.8.3 Assessment of Water Quality and Sediment Quality Impacts

The sources noted above are likely contributing to the status of the water quality and sediment quality in Eighteenmile Creek. Various studies and sampling work have helped characterize existing water quality conditions.

Water Quality Studies

Surface water quality studies of the source impacts have included the following surveys and sampling by NYSDEC:

- Stream surveys for water quality parameters such as biochemical oxygen demand, pH, temperature, nutrient levels, and coliform counts.

- Rotating intensive basin surveys (RIBS), which included sampling for a wide range of contaminants such as metals and organic compounds as well as physical water quality parameters.

- Dioxin and furan sampling (1990), which included a single sample taken from Eighteenmile Creek that tested for total dioxins and total furans; toxicity equivalence was compared to 2,3,7,8-TCDD.

- Lake Ontario tributary sampling in 1994, which included Passive In-Site Chemical Extraction Sampler (PISCES) and pressure filtration samples taken from various locations along Eighteenmile Creek and the NYS Barge Canal that were tested for dissolved phase PCBs and pesticides in the water column and contaminant levels associated with the suspended solids in the water column.

- PCB sampling in 1995 as part of the Lake Ontario tributary sampling program; tested specifically for PCBs from the discharge of the NYS Barge Canal into Eighteenmile Creek downstream to North Transit Road.

- Phenols and chlorinated benzene sampling and analysis in 1995, which did not detect any of these compounds.

The results of these water quality studies are summarized in Table 9.

Sediment Quality Studies

Sediment quality studies are also important in understanding the status of other factors in the water quality equation. Sediments can be a source of contaminants that move into the water column and impair benthic organisms (organisms that live on the bottom or burrow into the sediments). Many of these organisms, such as those that filter out sediment and decrease turbidity, play a role in water quality maintenance. Understanding the contamination levels in the sediment helps to understand the health of benthic communities.

Evaluation of bottom sediments can be a difficult task since the makeup of sediments is not uniform and may vary widely over small areas. The variability in contaminant concentrations is also affected by the variability of particle size and type (sand, silt, cobble) since pollutants adhere differently to different particle sizes and types. Sediment quality studies used to evaluate the sources impacting Eighteenmile Creek have included:

- NYSDEC's Olcott harbor sediment sampling in 1994 (Eighteenmile Creek AOC and upstream of AOC). This is the most comprehensive study of Eighteenmile Creek. Seven sediment cores and six surface samples were collected. Core samples were segmented and analyzed for metals, pesticides, PAHs, dioxins, furans and PCBs. Surface sediment samples were analyzed for metals, pesticides, PAHs, and PCBs.

- NYSDEC's Lake Ontario tributary sampling in 1994. One sediment core sample and one surface sample taken from Olcott Harbor were analyzed for mercury, PCBs, dioxin and furans. Additional samples were also taken from the upper part of Eighteenmile Creek, downstream of Clinton Street and William Street, and were analyzed for the common PCB congeners. (PCB is a category, or family, of chemical compounds formed by the addition of chlorine (Cl2) to biphenyl (C12H10). Any single, unique, well-defined chemical compound in the PCB category is called a "congener".

- NYSDEC sampling for dioxin and furan in 1990. Eight surface sediment samples were collected from both branches of Eighteenmile Creek, upstream and downstream of the NYS Barge Canal. In addition to analyses for dioxin and furans, samples were also analyzed for hexachlorobenzene and mirex.

- NYSDEC's RIBS sampling in 1990. Two surface sediment samples from the Jacques Road Bridge were collected and were analyzed for grain size, solids, sulfides, total organic carbon, metals, PCBs and pesticides.

- NYSDEC's sediment sampling in 1987. Core samples and surface sediment grab samples were analyzed for metals. The core samples were segmented for analyses at various lengths ranging from two to seven inches.

- The U.S. Army Corps of Engineers (USACE) studies in 1977, 1981, and 1987. In the earliest studies that sampled the sediments in Eighteenmile Creek, the same six locations were sampled during each of the three sampling events. The locations started from the outlet to Lake Ontario and to downstream of the Route 18 bridge. All samples collected were surface sediment grab samples and included one reference sample that was collected in Lake Ontario in 1987 and 1987. Samples were analyzed for several contaminants, including metals, pesticides, PAHs, PCBs, and physical parameters, including total solids, biochemical oxygen demand, and total phosphorus.

The U.S. Environmental Protection Agency (EPA) Great Lakes National Program sampling in 1981. Samples from four sites located in Lake Ontario, downstream of the Burt Dam, upstream of Route 18 and in Olcott Harbor were analyzed for metals, phenols, total solids, and biochemical oxygen demand (NYSDEC 1997).

The results of these sediment quality studies are summarized in Table 10.

Table 10 Results Summary of Sediment Sampling within Vicinity of the Eighteenmile Creek Watershed

Contaminants	Sample Type	Sample Locations with Moderate to High Contaminant Levels
NYSDEC Olcott Harbor Sediment Sampling 1994: Site 1 - Lake Ontario, Site 2 - Olcott Harbor, Site 3 - Olcott Harbor, Site 4 - Upstream of Rt. 18 Bridge, Site 5 - Downstream of Burt Dam, Site 6 - Upstream of Burt Dam, Site - 7, Site 8 - Clinton St.		
Cadmium, Copper	Surface Samples	Sites 2, 3, 4, 5, 6
Lead, Mercury	Surface Samples	Site 2, 3, 4, 5, 6, 7, 8
Silver	Surface Samples	Site 4, 6, 7, 8
Aroclor 1248 and Aroclor 1254	Surface Samples	Site 3, 4, 8, 5, 6, 7, 8
4,4'-DDE	Surface Samples	Site 3, 4, 5, 6
4,4'-DDD	Surface Samples	Site 7, 8

Table 10 Results Summary of Sediment Sampling within Vicinity of the Eighteenmile Creek Watershed

Contaminants	Sample Type	Sample Locations with Moderate to High Contaminant Levels
4,4'-DDT	Surface Samples	Site 6
Anthracene	Surface Samples	Site 6, 7, 8
Benzo(a)anthracene and Total PAHs	Surface Samples	Site 2, 3, 4, 5, 6, 7, 8
Chrysene	Surface Samples	Site 2, 3, 4, 6, 7, 8
2,3,7,8-TCDD	Surface Samples	Site 7
2,3,7,8-TCDD TEQ	Surface Samples	Site 7
Cadmium, Aroclor 1248 and Aroclor 1254	Core Samples	Site 6, 7, 8
Copper, Lead, Mercury	Core Samples	Site 2, 6, 7, 8
4,4'-DDE	Core Samples	Site 6, 7
4,4'-DDD	Core Samples	Site 7, 8
4,4'-DDT, Anthracene	Core Samples	Site 6, 7, 8
Benzo(a)anthracene and Total PAHs	Core Samples	Site 2, 6, 7, 8
Chrysene	Core Samples	Site 6, 8
2,3,7,8-TCDD	Core Samples	Site 6, 7, 8
2,3,7,8-TCDD TEQ	Core Samples	Site 2, 6, 7, 8
NYSDEC Lake Ontario Tributary Sampling 1994: Clinton St (CS), Downtown Clinton St (DCS), William St. Island (samples #1-4), Olcott Harbor (OH)		
Total PCBs	Surface Samples	DCS, #1, #2, #3
2,3,7,8-TCDD	Surface Samples	#3
2,3,7,8-TCDD TEQ	Surface Samples	#3, #4, OH
Mercury	Surface Samples	CS, #3, #4, OH
Mercury	Core Sample Segments	OH 1-1.5 in, OH 1.5-3 in, OH 3-5 in, OH 5-9 in
NYSDEC Dioxin/Furan Sampling 1990: Remic Pkwy (RP), Clinton St (CS), Transit Rd (TR), Condren Rd (CR), Newfane Dam (ND), Royalton Ravine (RR), Lower East Branch (LEB)		
Total PCBs	Surface Samples	CS, LEB
2,3,7,8-TCDD TEQ	Surface Samples	CS, TR, CR, ND, LEB
Mirex	Surface Samples	RP
NYSDEC Rotating Intensive Basin Survey 1990: Jacques Road Sample #1 August 16 and #2 August 22		
Cadmium, Copper, Lead, Mercury	Surface Sample	#1 and #2
4,4-DDD and 4,4-DDE	Surface Sample	#2
Aroclor 1242 and Aroclor 1254	Surface Sample	#1 and #2
PCBs	Surface Sample	#1 and #2
NYSDEC Sediment Sampling 1987: Olcott Harbor (OH), Estuary Route 18 Bridge (ER18), Reservoir West of Dam (WD), Reservoir Center of Dam (CD), Reservoir East of Dam (ED), Newfane Dam East (ND), Clinton St (CS), Gulf Confluence (GC), Rt 104 Bridge (RB)		
Cadmium	Core Samples	WD, CD, ED

Table 10 Results Summary of Sediment Sampling within Vicinity of the Eighteenmile Creek Watershed

Contaminants	Sample Type	Sample Locations with Moderate to High Contaminant Levels
Copper	Core and Surface Samples	OH, WD, CD, ED, CS, GC, ND, RB
Lead	Core and Surface Samples	ER18, WD, CD, ED, CS, GC, ND, RB
Mercury	Core Samples	WD, CD, ED, CS, GC, ND, RB
USACE Studies 1977: Sites 1, 2, 3, 4, 4a, 5, 6		
Cadmium	Surface Samples	Sites 1, 2, 3, 4, 4a, 5, 6
Copper, Lead	Surface Samples	Sites 1, 2, 3, 4, 4a, 6
Mercury	Surface Samples	Sites 1, 2, 3, 4, 4a
Total PCBs	Surface Samples	Sites 1, 2, 3, 4
USACE Studies 1981: Sites REF, DISP, 2, 2a, 3, 4, 5, 6		
Cadmium	Surface Samples	Sites DISP, 2, 2a, 3
Copper	Surface Samples	Sites REF, DISP, 2, 2a, 3, 4
Lead	Surface Samples	Sites 2, 2a, 3, 4
Mercury	Surface Samples	Sites REF, DISP, 2, 3, 4, 6
o,p-DDT	Surface Samples	Sites REF, 3, 5
Mirex	Surface Samples	Site 3
Total PCBs	Surface Samples	Sites REF, 4
USACE Studies 1987: Sites REF, 1, 2,3, 3a, 4, 5, 6		
Cadmium, Copper	Surface Samples	Sites REF, 1, 2, 3, 3a, 4, 5, 6
Lead	Surface Samples	Sites REF, 1, 2, 3, 3a, 4
Mercury	Surface Samples	Sites REF, 1, 2, 3, 3a, 4
USEPA Great Lakes National Program 1981: Sites 1, 1-DUP, 2, 3, 4		
Cadmium	Surface Samples	Site 1
Copper	Surface Samples	Sites 1, 3, 4
Lead	Surface Samples	Sites 1, 3, 4
Mercury	Surface Samples	Sites 3, 4
Aroclor 1248	Surface Samples	Sites 1, 1-DUP
p,p'-DDE	Surface Samples	Sites 1, 1-DUP

(NYSDEC 1997)

Key:

NYSDEC = NYS Department of Environmental Conservation.
USACE = United States Army Corp of Engineers.
DUP = Duplicate sample.
TEQ = Toxicity equivalent.
PAH = Polycyclic aromatic hydrocarbon.
PCB = Polychlorinated biphenyl.

As a component of the Eighteenmile Creek Habitat Restoration Project, the USACE - Buffalo District is conducting a sediment and bioaccumulation assessment in the creek to provide data for and calibrate watershed modeling efforts in the AOC. The sediment sampling involves continuous monitoring of storm-event and non-storm event sediment concentrations, monitoring water stage and developing stage-discharge relationships, and developing a sediment budget for the watershed at two to three locations in the creek. In addition, bioaccumulation studies will involve collecting surficial sediment samples from 18 sampling sites within the AOC and conducting 28-day bioaccumulation experiments using aquatic earthworms (*Lumbriculus variegatus*). These data will be used to determine the current exposure of sediment contaminants to the biological community, will be useful toward the development and evaluation of site-specific sediment quality criteria for cleanup in the AOC, and will be useful in the delineation and prioritization of remediation sites. The USACE is expecting to complete these studies in the early part of 2005.

2.2.8.4 Existing Water Quality

The data that has been collected for water and sediment quality and exceedances of standards and criteria indicates that the current water quality of Eighteenmile Creek, the East Branch of Eighteenmile Creek, and the Gulf is impaired. The Eighteenmile Creek Remedial Action Plan Status Report (NYSDEC 2001) indicated that progress has been made thus far toward eliminating or controlling the sources that are impairing the water quality of Eighteenmile Creek and its tributaries. However, many of these sources are still contributing a physical or chemical contaminant load. Continuing sources of physical or chemical contaminant load include:

- Reservoir sediments mobilized by flow over the Burt Dam;
- Contaminated creek bottom sediments at several locations, from the New York State Barge Canal to Olcott Harbor;
- The PCB contaminant source between Olcott Street and North Transit Road;
- Contaminated sediment that has been identified within the NYS Barge Canal that still requires remediation;
- The inactive hazardous waste site at the AKZO Chemicals Inc. chemical facility that has been identified through the RI/FS process as requiring further remedial action and that is a con-

tinued source through migration of contamination into Eighteenmile Creek;

- Continued industrial and municipal wastewater discharges that need to be monitored for compliance with water quality standards, along with continued implementation of best available technology and management practices;

- Combined sewer overflows that need to be assessed and improvements made to eliminate overflow discharges to Eighteenmile Creek and to determine if sewer overflows are a continued source of PCBs in the creek because PCBs were detected during past sewer sampling events (NYSDEC 2001).

2.2.8.5 Additional Characterization Needs

The information presented in this section represents initial information gathered to begin the process of characterizing the existing water quality conditions in the Eighteenmile Creek watershed. It does not include all existing information regarding water quality within the watershed, nor does it include all of the information that may be required for use in developing a CWMP. Additional literature review and field work that may be required to adequately characterize current water quality within the Eighteenmile Creek watershed are as follows (some of these activities are also listed in Section 2.2.10.4):

- Review of literature indicates that the creek was re-classified at some point from Class D to a combination of Class C and Class B segments. An upgrade of the classification lowers permitted contaminants levels. There may be a need to learn more about the permitted discharges and the relationship with the stream classification system.

- Several groups or agencies are evaluating or assessing water quality issues for Eighteenmile Creek. An open communication forum and information sharing would allow these entities to eliminate any overlap and to redirect efforts toward areas where data gaps exist.

- Sediment data indicates a continual source of contamination is entering the creek and, as long as contamination continues to be introduced, the water quality will continue to be affected.

- Fish tissue contaminant studies.

- Additional field surveys to verify the location, extent, quality, and functions of terrestrial, wetland, and aquatic communities.

- Additional field surveys to verify the location, extent, and use of habitat by threatened and endangered species.

- Additional field surveys to more specifically identify impairments within the watershed, and to record the relevant causes for the impairments, such as land use, erosion, stormwater flows, and sediment transport (the U.S. Army Corps of Engineers is in the process of developing a sediment transport model for Eighteenmile Creek; it is expected to be completed in 2005).

2.2.9 Air Quality

Pollutants entering the watershed from the air have the potential to affect the Eighteenmile Creek watershed and its ecosystems. Pollutants introduced to the atmosphere in other parts of the United States or in Canada may travel with air currents to the Eighteenmile Creek watershed. These substances may affect the ecosystem while in the atmosphere or may, when added to emissions that originate within the Eighteenmile Creek watershed, cause air quality criteria to be exceeded. In addition, the pollutants may drop out of the atmosphere and affect water quality within the watershed. Therefore, a solid understanding of what is being introduced into the atmosphere from sources within the Eighteenmile Creek watershed, as well as an awareness of the ambient (existing) air quality conditions, is important to the watershed planning process.

NYSDEC regularly monitors ambient air quality throughout the state to ensure that established air quality standards are being met. The air is sampled for ozone (O_3), sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), lead, and particulate matter (NYSDEC 2002). The general area encompassed by the Eighteenmile Creek watershed is considered to be an attainment area for the above-listed pollutants, with the exception of ozone (USEPA 2004). Attainment areas are those areas meeting national ambient air quality standards for a particular pollutant. Ozone nonattainment in New York, as in all northeastern states, is a problem resulting from the mix and transport of pollutants from distant sources and emissions from large urban areas. Ozone nonattainment in the Eighteenmile Creek watershed is generally a result of pollutants transported in from upwind states.

2.2.10 Natural Resources

The following discussions of terrestrial, wetland, and aquatic communities provide baseline information on habitat and potential wildlife use. The discussion of threatened/endangered species and protected habitats provides baseline information on species, and communities and habitats that are protected by federal and/or state regulations. This information will serve as a basis for future conservation plans and will allow potential appropriate permitting requirements to be determined. Note that the regulatory agencies should be contacted with current and appropriate site-specific information about any project that has the potential to impact natural or protected resources.

The description of the Eighteenmile Creek watershed terrestrial and aquatic ecological communities presented in this Concept Document are based upon the New York State Ecological Community Classifications (Edinger et al. 2002), which were developed as part of the New York State Natural Heritage Program (NHP) to provide a standard classification system for environmental impact statements. The wetland communities are based on National Wetland Inventory (NWI) classifications (Cowardin 1979).

2.2.10.1 Terrestrial Communities

This section provides an overview of terrestrial communities within the Eighteenmile Creek watershed. For the purposes of this discussion, terrestrial communities include upland communities such as forests, shrub/scrub areas, agricultural land and meadows.

Terrestrial Habitat

Terrestrial communities comprise the majority of the land within the Eighteenmile Creek watershed. Most of the upland communities in the watershed appear to have been affected to some degree by human disturbance and are in various stages of succession following agricultural or silvicultural disturbance. Based on the interpretation of 2001 aerial photographs and limited roadside ground-truthing, the agricultural community types (e.g., cropland, orchard) are the dominant communities within the watershed, comprising approximately 70% of the watershed area. The next most abundant community is forestland (approximately 21% of the land area), which is mostly limited to areas such as wetlands and ravines that could not be used for agriculture. One climax community, beech-maple mesic forest, was identified within the watershed. This community is present in the Rolin T. Grant Gulf Wilderness Park, inside the Lockport city limits.

Based on aerial photo interpretation and limited field observations, seven general ecological communities were identified in the water-

shed: beech-maple mesic forest, successional northern hardwoods, successional shrubland, successional old field, cropland (row/field crops), pastureland, and orchards. A detailed description of typical vegetation associated with each community type is provided below. A list of typical wildlife associated with each community type, according to Edinger et al. (2002) is provided in the respective sections.

Beech-Maple Mesic Forest. This hardwood forest occurs on moist, well-drained, acid soils. A broadly defined community with great variation, the beech-maple mesic forest is the predominant upland climax community in the glaciated portions of Western New York. The overstory in this community type is typically sugar maple (*Acer saccharum*), beech (*Fagus grandifolia*), black cherry (*Prunus serotina*), and eastern hop hornbeam (*Ostrya virginiana*) as common associate tree species. Less common tree species include basswood (*Tilia americana*), American elm (*Ulmus americana*), and red maple (*Acer rubrum*). Witch hazel (*Hamamelis virginiana*), ironwood (*Carpinus caroliniana*), northern arrowwood (*Viburnum recognitum*), and eastern hop hornbeam (*Ostrya virginiana*) are common in the understory and shrub layer. Common herbaceous species include white wood aster (*Aster divaricatus*), blue cohosh (*Caulophyllum thalictroides*), wood fern (Dryopteris spp.), and jack-in-the-pulpit (*Arisaema triphyllum).* Seedlings of the dominant tree species are also commonly found in the herbaceous layer.

Successional Northern Hardwoods. These hardwood or mixed forests occur on sites that have been cleared or otherwise disturbed. A broadly defined community dominated by species that typically require long hours of sunlight (i.e., not shade tolerant) and spread throughout the landscape via wind-seed dispersal. This community type is well-adapted to disturbed conditions. The shrub and herbaceous layer may still comprised successional old field and shrubland communities. Typical overstory species include: red maple (*Acer rubrum*), cottonwood (*Populus deltoides*), black cherry (*Prunus serotina*), pin cherry (*Prunus pensylvanica*), yellow birch (*Betula alleghaniensis*), and green ash *(Fraxinus pennsylvanica*). The understory and herbaceous layers are composed of seedlings of the overstory tree species and successional old field communities.

Successional Shrubland. These communities occur on lands that were cleared or disturbed for agricultural, silvicultural, or development purposes but are no longer actively used. This habitat is generally a successional stage between successional old field and successional northern hardwood. Successional shrublands occur

where agricultural land has been abandoned for three to five years. Shrub species comprise at least 50% of the cover in this community. Typical species found in the shrub layer include red maple (*Acer rubrum*), chokecherry (*Prunus virginiana*), raspberry (*Rubus* spp.), sumac (*Rhus glabra, R. typhina*), and multiflora rose (*Rosa multiflora*). Species found in the herbaceous layer include blackberry (*Rubus* spp.), Canada goldenrod (*Solidago canadensis*), flat-top goldenrod (*Euthamia graminifolia*), bluegrasses (*Poa* spp.), quackgrass (*Agropyron repens*), smooth brome (*Bromus inermis*), orchard grass (*Dactylis glomerata*), bedstraw (*Galium* spp.), common chickweed *(Cerastium arvense*), common evening primrose (*Oenothera biennis*), old-field cinquefoil (*Potentilla simplex*), New England aster (*Aster novaangliae*), strawberry (*Fragaria virginiana*), Queen Anne's lace (*Daucus carota*), hawksweeds (*Hieracium* spp.), and dandelion (*Taraxacum officinale*).

Successional Old Field. This community is dominated by forbs and grasses and occurs on lands that have been cleared and plowed for agriculture or development and that have since been abandoned, usually for less than three years. This community has less than 50% shrub cover and quickly succeeds into successional shrubland and successional hardwoods. Common species in the shrub layer include dogwood species (*Cornus spp.*), sumac, arrowwood (*Viburnum recognitum*), and raspberry (*Rubus* spp.). Blackberry (*Rubus* spp.), bedstraw (*Galium* spp.), Canada goldenrod (*Solidago canadensis*), flat-top goldenrod (*Euthamia graminifolia*), bluegrasses (*Poa* spp.), quackgrass (*Agropyron repens*), smooth brome (*Bromus inermis*), orchard grass (*Dactylis glomerata*), common chickweed (*Cerastium arvense*), common evening primrose (*Oenothera biennis*), old-field cinquefoil (*Potentilla simplex*), New England aster (*Aster novae-angliae*), strawberry (*Fragaria virginiana*), Queen Anne's lace (*Daucus carota*), ragweed (*Ambrosia artemisifolia*), hawkweeds (*Hieracium* spp.), and dandelion (*Taraxacum officinale*) are common species found in the herbaceous layer.

Cropland: Row/Field Crops. The cropland/row crops community is agricultural land planted with row crops. Corn is the typical row crop found in the watershed area. This community also includes small residential vegetable gardens. The cropland/ field crop community is agricultural land planted with field crops. Field crops include alfalfa, wheat, timothy, and oats. Hay fields are the common field croplands in the watershed.

Pastureland. This community consists of agricultural land that has only recently been abandoned or is permanently maintained as pasture for livestock.

Orchard. This community consists of agricultural land containing stands of cultivated fruit trees. Grasses are the common ground cover in these areas. Apple and plum are commonly planted in the watershed area. Staghorn sumac, goldenrod, and poison ivy may be common in abandoned orchards.

Terrestrial Fauna. Typical wildlife species can be discussed in association with particular upland community types. However, many species have habitat requirements that overlap between community types or may have a respective habitat niche that comprises a small portion of the community.

Common mammal species likely to inhabit the various upland communities within the watershed include raccoon (*Procyon lotor*), opossum (*Didelphis marsupialis*), white-tailed deer (*Odocoileus virginianus*), gray squirrel (*Sciurus carolinensis*), red squirrel (*Tamiassciurus hudsonicus*), chipmunk (*Tamias striatus*), gray fox (*Urocyon cinereoargenteus*), red fox (*Vulpes vulpes*), woodchuck (*Marmota monax*), skunk (*Mephitis mephitis*), eastern cottontail rabbit (*Sylvilagus floridanus*) meadow vole (*Microtus pennsylvanicus*), least shrew (*Cryptotis parva*), hairy-tailed mole (*Parascalops breweri*), coyote (*Canis latrans*), and bats (*Lariurus* spp.). Common terrestrial reptiles and amphibians include woodland (*Plethodon* spp.) and dusky salamanders (*Desmognathus* spp.), red eft-phase of red-spotted newt (*Notophthalmus viridescens viridescens*), and toads (*Bufo americanus*), eastern garter snake (*Thamnophis sirtalis sirtalis*) and rat snake (*Elaphe obsoleta*).

Various species of birds are found in Niagara County and within the Eighteenmile Creek watershed, including many species of waterfowl, shorebirds, raptors, and songbirds. These species use multiple habitats within the watershed and have varying seasonal distributions. Some of the more common terrestrial species that can be observed in the area include the Killdeer (*Charadrius vociferous*), Ring-billed Gull, (*Larus delawarensis*), Herring Gull (*Larus argentatus)*, Cooper's Hawk (*Accipiter cooperii*), Red-tailed Hawk (*Buteo jamaicensis*), Osprey (*Pandion haliaetus*), Turkey Vulture (*Cathartes aura*), Wild Turkey (*Meleagris gallopavo*), Rock Dove (*Columba livia*), Mourning Dove (*Zenaida macroura*), Great-horned Owl (*Bubo virginianus*), Northern Flicker (*Colaptes auratus*), Downy Woodpecker (*Picoides pubescens*), Pileated Wood-

pecker (*Dryocopus pileatus*), Great Crested Flycatcher (*Myiarchus crinitus*), Eastern Wood pewee (*Contopus virens*), Tree Swallow (*Tachycineta bicolor*), Blue Jay (*Cyanocitta cristata*), American Crow (*Corvus brachyrhynchos*), Black-capped Chickadee (*Parus atricapillus*), White-breasted Nuthatch (*Sitta carolinensis*), Eastern Bluebird (*Sialia sialis*), American Robin (*Turdus migratorius*), European Starling (*Sturnus vulgaris*), Yellow Warbler (*Dendroica petechia*), Common Yellowthroat (*Geothlypis trichas*), American Redstart (*Setophaga ruticilla*), Chipping Sparrow (*Spizella passerina*), Song Sparrow (*Melospiza melodia*), Dark-eyed Junco (*Junco hyemalis*), Northern Cardinal (*Cardinalis cardinalis*), Eastern Meadowlark (*Sturnella magna*), Red-winged Blackbird (*Agelarius phoeniceus*), Common Grackle (*Quiscalus quiscula*), House Finch (*Carpodacus mexicanus*), American Goldfinch (*Carduelis tristis*), House Sparrow (*Passer domesticus*).

2.2.10.2 Wetlands: An Overview

Wetlands represent transitional zones between aquatic and terrestrial community types. Specific characteristics of wetlands can be similar to both terrestrial and aquatic environments. For example, floodplain wetlands may include tree species that are present in upland forests as well as emergent vegetation, which may be found in confined river communities.

Wetlands are areas of land where water covers the soil or is present either at or near the surface of the soil at least part of the year and that contain plants and animals that are adapted to these conditions. Marshes, swamps, and bogs are types of wetlands that many people can easily recognize as wetlands. Wetlands also occur along oceans, lakes, ponds, streams, and rivers as transitional areas between the aquatic and land environments. Wetlands can also be less obvious and can occur in any places where water is present for extended periods of time such as a low spot in a field that doesn't have an outlet for water to drain. Wetlands offer a variety of benefits and many are protected under federal and state laws (regulation of wetlands is discussed in Sections 2.3.2 and 2.3.3.

Wetlands provide many benefits including water quality improvements; flood control and shoreline erosion control; food and habitat for fish and wildlife; and opportunities for recreational activities.

Wetlands improve water quality by filtering out many pollutants such as excess sediment and excess nutrients (e.g., phosphorous and nitrogen from fertilizer runoff or sewage). Wetlands can support rich plant communities (including many grasses, sedges, herbs, shrubs and trees) that are adapted to hydrologic conditions

(water levels) that are intermediate between aquatic and terrestrial environments. These plants filter out excess sediment and absorb the excess nutrients.

Excess sediments are often picked up by rapidly moving water during storm events or flooding. An increase in sediments in the water column reduces the amount of light that penetrates through the water, which can have negative effects on aquatic life. Excess sediment in the water can also have detrimental effects on fish that filter water through their gills to breathe. The trunks, leaves, and stems of wetland plants slow the water and act as sediment traps, allowing excess sediments to settle out of the water column, protecting aquatic life downstream from negative effects.

Excess nutrients (i.e., nitrogen and phosphorus) in the water column can increase the growth of algae, which can lead to reduced oxygen in the water, which in turn can cause fish and other organisms to die off. Higher (morphologically complex) plants (like cattails, rushes, shrubs, and trees) absorb excess nitrogen and phosphorus and limit the growth of algae.

Plants absorb nitrogen and phosphorus from the soil and water and use it for tissue growth. The nutrients are removed from the environment and become incorporated in the plant tissues. Algae are relatively simple plants (morphologically) that grow and reproduce very quickly when water is enriched with excess nutrients and ample sunlight is available. When algae die, they are broken down (decomposed) by bacteria. The bacteria use oxygen from the water during the process of decomposition and oxygen levels may become severely depleted, leading to fish kills and die offs of other organisms that depend on oxygen from the water. Higher plants that grow in wetlands absorb some of the nutrients that could contribute to algal blooms and provide shade that reduces the sunlight available to algae for photosynthesis.

Wetlands can also provide flood control and protect shorelines from erosion. Wetlands function like big sponges, slowing down and absorbing excess water during storms. This combined action of slowing and storing water reduces flooding downstream and shoreline erosion.

Wetlands are some of the world's most diverse ecosystems. These communities provide food and habitat for fish and wildlife. Most species of freshwater fish are dependent on wetlands for breeding grounds, sources of food, and/or cover from predators. Many varieties of waterfowl and other birds depend on wetlands for feeding

and resting areas during their spring and fall migration and for nesting and as primary feeding areas. Other wildlife such as mink, muskrat, and beavers rely on wetlands, and many species of amphibians (turtles, snakes, frogs, and toads) live in and rely upon wetlands. Wetlands also provide habitat for a variety of insects, and at one time were thought of as waste lands for this reason. However, it is now understood that insects are an important food source for many waterfowl and other bird species as well as for reptiles, amphibians, and some mammals (i.e., bats).

Wetlands also offer many opportunities for educational and recreational activities. With their potential for diversity and their role as a transitional area between land and water environments, wetlands offer an excellent opportunity to study ecosystems and interactions between species and their chemical and physical surroundings. Wetlands also support a number of recreational activities such as hunting, fishing, hiking, bird watching, and photography.

In addition to federal and state regulatory protection, wetlands offer a number of ecological, social, and economic benefits. A further understanding of wetlands and the relationship of wetlands to the vitality and quality of the Eighteenmile Creek watershed is an important piece of the watershed management planning process.

Wetland Communities

U.S. Fish and Wildlife Service NWI maps and NYSDEC Freshwater Wetland maps were reviewed to describe the community types and acreages of wetlands occurring within the Eighteenmile Creek watershed (Figure 12). NWI maps provide wetland coverage estimates based on aerial photography and topographic map interpretation. These maps represent a preliminary estimate of wetlands under federal jurisdiction. However, any additional wetlands that meet the federal criteria for wetlands may be regulated regardless of whether they appear on NWI mapping. NYSDEC Freshwater Wetland mapping represents approximate locations of wetlands identified through aerial photography, soil surveys, other wetland inventories and, occasionally, field verification. NYSDEC's wetland maps represent an agency record of wetlands under state jurisdiction. However, wetlands larger than 12.4 acres in size or of local significance that are not currently mapped as regulated may be taken into jurisdiction by NYSDEC.

National Wetland Inventory Mapping. The wetlands depicted on NWI mapping are classified according to the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin 1979). This classification system is based on characteristics of the

individual wetland such as landscape position (i.e., lacustrine, riverine, palustrine, etc.), associated cover type (i.e., forested with broad leafed deciduous vegetation, shrub/scrub, emergent, etc.), hydrologic regime (i.e., semi-permanently flooded, seasonally flooded, etc.) and special modifiers/features (i.e., diked, excavated, impounded, etc.).

Review of the NWI mapping identified 367 wetland areas encompassing approximately 2,931.1 acres, or approximately 5% of the total watershed acreage (59,520 acres) (Figure 12 and Table 11). Thirty-four wetland habitat types are represented within the watershed. In general palustrine forested (PFO) wetland habitats comprise approximately 79% of the total wetland acreage in the watershed. The remaining types include palustrine emergent (PEM), palustrine scrub-shrub (PSS), palustrine unconsolidated bottom (PUB), palustrine aquatic bed (PAB), lacustrine (L), and riverine (R).

Table 11 National Wetland Inventory (NWI) Mapping within the Eighteenmile Creek Watershed

NWI Classification Label	Description	Number of Wetlands within the Watershed with this Classification	Total Area (acres)
L1UBH	Lacustrine, limnetic, unconsolidated bottom, permanently flooded	2	39.37
L2UBH	Lacustrine, littoral, unconsolidated bottom, permanently flooded	1	0.00
PAB5Zh	Palustrine, aquatic bed, unknown submergent, intermittently exposed/permanent, diked/ impounded	1	0.30
PEM5/UBF	Palustrine, emergent, persistent / unconsolidated bottom, semi-permanently flooded	3	6.41
PEM5/UBFx	Palustrine, emergent, persistent / unconsolidated bottom, semi-permanently flooded, excavated	1	1.74
PEM5A	Palustrine, emergent, persistent, temporarily flooded	4	5.82
PEM5Ad	Palustrine, emergent, persistent, temporarily flooded, partially drained/ditched	1	10.10
PEM5C	Palustrine, emergent, persistent, seasonally flooded	5	15.54
PEM5Cd	Palustrine, emergent, persistent, seasonally flooded, partially drained/ditched	2	0.89

Table 11 National Wetland Inventory (NWI) Mapping within the Eighteenmile Creek Watershed

NWI Classification Label	Description	Number of Wetlands within the Watershed with this Classification	Total Area (acres)
PEM5E	Palustrine, emergent, persistent, seasonally flooded/ saturated	16	53.95
PEM5Ed	Palustrine, emergent, persistent, seasonally flooded/ saturated, partially drained/ ditched	1	3.40
PEM5F	Palustrine, emergent, persistent, semi-permanently flooded	1	0.25
PFO1/SS1A	Palustrine, forested, broad-leaved deciduous / scrub-shrub, broad-leaved deciduous, temporarily flooded	8	50.20
PFO1/SS1Ad	Palustrine, forested, broad-leaved deciduous / scrub-shrub, broad-leaved deciduous, temporarily flooded, partially drained/ ditched	1	37.44
PFO1/SS1E	Palustrine, forested, broad-leaved deciduous / scrub-shrub, broad-leaved deciduous, seasonally flooded/saturated	3	31.26
PFO1A	Palustrine, forested, broad-leaved deciduous, temporarily flooded	96	1,421.99
PFO1Ad	Palustrine, forested, broad-leaved deciduous, temporarily flooded, partially drained/ ditched	3	101.46
PFO1C	Palustrine, forested, broad-leaved deciduous, seasonally flooded	20	335.29
PFO1E	Palustrine, forested, broad-leaved deciduous, seasonally flooded/ saturated	29	327.89
PSS1/EM5A	Palustrine, scrub-shrub, broad-leaved deciduous / emergent, persistent, temporarily flooded	2	32.75
PSS1/EM5Ad	Palustrine, scrub-shrub, broad-leaved deciduous / emergent, persistent, temporarily flooded, partially drained/ ditched	2	13.95
PSS1/EM5C	Palustrine, scrub-shrub, broad-leaved deciduous / emergent, persistent, seasonally flooded	3	30.70
PSS1/EM5E	Palustrine, scrub-shrub, broad-leaved deciduous / emergent, persistent, seasonally flooded/ saturated	17	47.48

Table 11 National Wetland Inventory (NWI) Mapping within the Eighteenmile Creek Watershed

NWI Classification Label	Description	Number of Wetlands within the Watershed with this Classification	Total Area (acres)
PSS1/EM5F	Palustrine, scrub-shrub, broad-leaved deciduous / emergent, persistent, semi-permanently flooded	1	1.25
PSS1A	Palustrine, scrub-shrub, broad-leaved deciduous, temporarily flooded	7	29.64
PSS1B	Palustrine, scrub-shrub, broad-leaved deciduous, saturated	1	3.70
PSS1C	Palustrine, scrub-shrub, broad-leaved deciduous, seasonally flooded	4	7.94
PSS1E	Palustrine, scrub-shrub, broad-leaved deciduous, seasonally flooded/saturated	12	36.61
PUBFx	Palustrine, unconsolidated bottom, semi-permanently flooded, excavated	45	15.72
PUBZ	Palustrine, unconsolidated bottom, intermittently exposed/permanent	3	3.34
PUBZh	Palustrine, unconsolidated bottom, intermittently exposed/permanent, diked/ impounded	20	25.87
PUBZx	Palustrine, unconsolidated bottom, excavated	49	57.87
R2UBH	Riverine, lower perennial, unconsolidated bottom, permanently flooded	1	48.93
R2UBHx	Riverine, lower perennial, unconsolidated bottom, permanently flooded, excavated	2	132.08
	Total	**367**	**2931.1**

The most commonly occurring habitat type is palustrine, forested, broad-leaved deciduous, temporarily flooded (PFO1A). Approximately 49% of the wetland acreage in the watershed is classified as PFO1A. Palustrine, forested, broad-leaved deciduous, seasonally flooded (PFO1C) and palustrine, forested, broad-leaved deciduous, seasonally flooded/ saturated (PFO1E) are the second most common types, representing approximately 11% of the wetland area.

NYSDEC Wetland Mapping. NYSDEC classifies wetlands according to function and value, ranging from Class I to Class IV. Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6NYCRR) Part 664 describes the system used to derive the individual classifications. The classifications are based on characteristics of the individual wetland such as

special features, associated cover type, hydrologic and pollution control features, ecological associations, distribution, and location.

Class I wetlands are those wetlands that are considered to be unique or of special value. Wetlands are designated a Class I wetlands if they provide habitat for endangered or threatened species or contain an endangered or threatened plant species; support an animal species in abundance or diversity unusual for the state or for the major region of the state in which it is found; provide flood protection for a substantially developed area; are associated with a body of water or aquifer that is used primarily for public water supply; or contain four or more of the Class II characteristics.

Wetlands are considered **Class II wetlands** if they contain emergent areas with less than two-thirds cover comprised of purple loosestrife and phragmites; are associated with a Class C(t) stream; are associated with a vulnerable species; provide flood protection for agricultural areas; provide tertiary treatment for sewage disposal systems; or are located in an urban area.

Wetlands are considered **Class III wetlands** if they are adjacent to fertile land; are a component of a surface water system with an open water component that receives significant pollution that may be processed by the wetland; occur on publicly owned land; or are visible from an interstate highway, a parkway, a designated scenic highway, or a passenger railroad and serve a valuable aesthetic or open space function.

Class IV wetlands are wetlands, that do not meet the qualifications for the other three classifications.

NYSDEC's Freshwater Wetlands mapping shows 42 NYSDEC wetlands within the Eighteenmile Creek watershed. The mapping also shows two upland areas associated with wetlands, GA-8 UPL and LP-37 UPL. The two largest wetlands within the watershed are GA-8 (177.34 acres), associated with the East Branch of Eighteenmile Creek, and LP-37 (174.25 acres), located near the eastern boundary of the city of Lockport. Based on topographic interpretation, LP-12 and LP-14 were the only wetlands identified with no apparent surface water connection.

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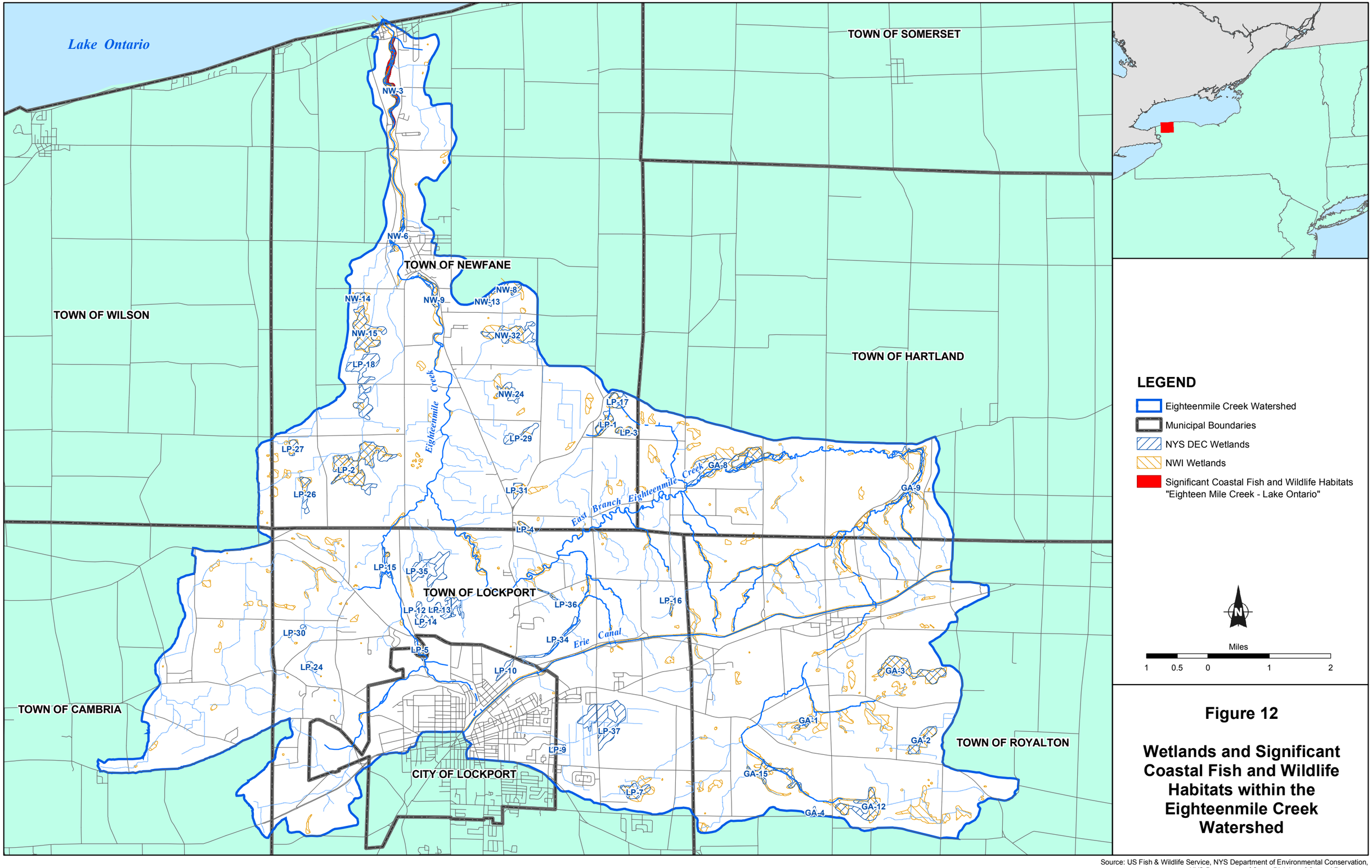

LEGEND

- Eighteenmile Creek Watershed
- Municipal Boundaries
- NYS DEC Wetlands
- NWI Wetlands
- Significant Coastal Fish and Wildlife Habitats "Eighteen Mile Creek - Lake Ontario"

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Miles

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Figure 12

Wetlands and Significant Coastal Fish and Wildlife Habitats within the Eighteenmile Creek Watershed

Source: US Fish & Wildlife Service, NYS Department of Environmental Conservation, NYS Department of State, Division of Coastal Resources

The results of the NYSDEC wetland mapping review are presented in Table 12 and Figure 12. Within the Eighteenmile Creek watershed, three NYSDEC Class I wetlands were identified. Wetland LP-5 is located adjacent to the northern boundary of the City of Lockport, north of the sewage treatment plant, along Eighteenmile Creek. Wetland LP-10 is located within the northeast portion of the City of Lockport, southwest of the Lake Ave./ Niagara St. junction. Wetland NW-3 is associated with the portion of Eighteenmile Creek between Burt Dam and Olcott Harbor. Twenty-four of the forty-two wetlands are ranked as Class II. The remaining fifteen wetlands are Class III. No Class IV wetlands were identified.

Table 12 NYSDEC Freshwater Wetland Mapping within the Eighteenmile Creek Watershed

NYSDEC Freshwater Wetland ID	NYSDEC Class	Total Area (acres)	Surface Water Connection	Associated NWI Wetland Types
GA-1	II	12.73	Apparent	PFO1A, PFO1C, PSS1A
GA-2	III	44.48	Apparent	PFO1A
GA-3	III	130.20	Apparent	PFO1A, PFO1C
GA-4	II	4.83	Apparent	PEM5Ed
GA-8	III	177.34	Apparent	PFO1A, PUBFx, PUBZx, PSS1/EM5E
GA-9	III	70.93	Apparent	PFO1A, PSS1/EM5E, PUBZh,
GA-12	II	89.90	Apparent	PFO1A, PFO1/SS1Ad
GA-15	II	57.14	Apparent	PFO1A, PFO1C, PSS1/EM5Ad
LP-1	II	35.69	Apparent	PFO1E, PSS1E, PEM5E
LP-2	II	208.40	Apparent	PFO1A, PFO1E
LP-3	III	16.60	Apparent	PFO1E
LP-4	II	11.85	Apparent	PFO1E, PFO1C
LP-5	I	18.75	Apparent	PFO1E, PFO1/SS1E
LP-7	II	44.10	Apparent	PFO1C, PUBZh
LP-9	II	23.49	Apparent	
LP-10	I	15.46	Apparent	
LP-12	II	14.37		
LP-13	II	54.34	Apparent	PUBZx
LP-14	II	16.15		
LP-15	II	33.93	Apparent	PEM5E
LP-16	III	12.88	Apparent	PFO1A
LP-17	III	38.74	Apparent	PFO1E, PUBZx
LP-18	III	136.17	Apparent	PFO1Ad
LP-24	II	13.58	Apparent	
LP-26	III	32.19	Apparent	PFO1A

Table 12 NYSDEC Freshwater Wetland Mapping within the Eighteen-mile Creek Watershed

NYSDEC Freshwater Wetland ID	NYSDEC Class	Total Area (acres)	Surface Water Connection	Associated NWI Wetland Types
LP-27	III	17.53	Apparent	PFO1A
LP-29	II	48.01	Apparent	PFO1E
LP-30	II	11.74	Apparent	PFO1A
LP-31	III	15.84	Apparent	PFO1A
LP-34	II	38.60	Apparent	
LP-35	II	113.82	Apparent	
LP-36	II	10.19	Apparent	PEM5E
LP-37	II	174.25	Apparent	
NW-3	I	56.08	Apparent	PSS1/EM5E, R2UBH, PFO1E
NW-6	II	14.13	Apparent	PSS1/EM5E
NW-8	III	27.90	Apparent	PFO1E
NW-9	II	34.63	Apparent	PSS1/EM5E, PFO/SS1E, PFO1C
NW-13	III	7.60	Apparent	PFO1E
NW-14	II	14.20	Apparent	PUBFx, PFO1A
NW-15	II	117.12	Apparent	PFO1A
NW-24	III	34.56	Apparent	PFO1A
NW-32	III	93.37	Apparent	PFO1Ad
Total Acreage		**2184.4**		

Wetland Fauna

Since wetlands represent transitional areas between aquatic and terrestrial environments, wetlands are used by a wide variety of species. The wetland areas throughout the watershed are likely to contain a mix of terrestrial and aquatic species. Mammal species common in the wetland habitats include beaver (*Castor canadensis*), and muskrat (*Ondatra zibethicas*). In addition, other mammals mentioned in the terrestrial section could occasionally use wetland habitats. Reptiles and amphibians are typically the species occurring in wetland areas. Frog species include leopard frog (*Rana pipiens*), spring peepers (*Pseudoacris c. crucifer*), wood frog (*Rana sylvatica*) and bullfrog (*Rana catesbeiana*). Common turtle species include painted turtle (*Chrysemys picta*) and snapping turtle (*Chelydra serpentina*). Various amphibians are also likely to occur. A variety of bird species also inhabit the wetlands and streams, including great blue heron (*Ardea herodias*), mallard (*Anas platyrhnchos*), wood duck (*Aix sponsa*), blue-winged teal (*Anas discors*), belted kingfisher (*Ceryle alcyon*), red-winged blackbird (*Agelaius phoeniceus*), and swamp sparrow (*Melospiza Georgiana*).

2.2.10.3 Aquatic Communities

A number of aquatic communities occur within the Eighteenmile Creek watershed. Limited, qualitative habitat characterizations were conducted as part of the pre-design of the aquatic habitat restoration efforts below Burt Dam and at site locations above the reservoir. These efforts have been documented in two reports separate from this document, including the *Eighteenmile Creek Restoration Project: Baseline Habitat Characterization and Threatened and Endangered Species Coordination (Ecology and Environment, Inc. 2003), and Qualitative Habitat Characterization within Eighteenmile Creek Watershed* (Ecology & Environment, Inc. 2004).

Aquatic Habitat

Aquatic habitat communities are described in this document in general terms using the Draft New York State Ecological Community Descriptions (Edinger et al. 2002) in order to provide consistency of description using a recognized convention. The communities identified are based on a desktop review and limited field surveys at specific locations in the watershed. The aquatic communities include intermittent stream, rocky headwater stream, marsh headwater stream, ditch/artificial intermittent stream, confined river, Great Lakes aquatic bed, eutrophic pond, and reservoir/artificial impoundment.

Intermittent Stream. A small, intermittent, or ephemeral streambed in the uppermost segments of stream systems where water flows only during the spring or after a heavy rain and often remains longer, ponded in isolated pools. These streams typically have a moderate to steep gradient and hydric soils.

Examples of this community type are the natural stream systems occurring in the headwater areas (i.e. Upper East Branch of Eighteen Mile Creek) that drain into Eighteenmile Creek.

Rocky Headwater Stream. A small- to moderate-sized perennial rocky stream typically with a moderate to steep gradient and cold water that flows over eroded bedrock, boulders, or cobbles in the area where stream systems originate. These streams are typically shallow, narrow, have a relatively small low flow discharge and usually represent a network of first to second order stream segments. These streams typically include alternating riffle and pool sections. Most of the erosion is headward, and deposition is minimal. Waterfalls, chutes, flumes, and cascades are typically present; these are treated as features of the more broadly defined community. The predominant source of organic energy in the stream is

terrestrial leaf litter or organic matter. These are allochthonous streams or streams that depend on materials introduced from some other source as the predominant source of energy. They are typically surrounded by upland forests and situated in a confined valley. Tree shade reduces primary productivity. These streams have high water clarity and are well-oxygenated.

An example of this community type in the Eighteenmile Creek watershed is the Gulf tributary in the Rolin T. Grant Gulf Wilderness Park. Additional studies would be required to define the extent and occurrence of this stream community type throughout the watershed.

Marsh Headwater Stream. Small, marshy perennial brooks with a very low gradient, slow flow rate, and cool to warm water that flows through a marsh, fen, or swamp where a stream system originates. These streams usually have clearly distinguished meanders (i.e., high sinuosity) and are in unconfined landscapes. Marsh headwater streams are typically shallow and dominated by runs with interspersed pool sections. They are typically shallow, narrow, and have a relatively small flow discharge and usually represent a network of first- to second-order stream segments. Most of the erosion is headward, and deposition is minimal. The substrate is typically gravel or sand, but some segments may be dominated by silt, muck, peat, marl deposits, and/or woody/leafy debris. These streams may have high turbidity and be somewhat poorly oxygenated and can vary in alkalinity and color.

An example of this community type in the Eighteenmile Creek watershed is the lower section of the East Branch of Eighteenmile Creek.

Ditch/Artificial Intermittent Stream. An artificial waterway constructed for drainage or irrigation of adjacent lands. Water levels either fluctuate in response to variations in precipitation and groundwater levels or are artificially controlled. The sides of the ditches are often vegetated with grasses and sedges are usually dominant; exotic or weedy species are common.

Examples of this community type in the Eighteenmile Creek watershed are some of the unnamed ditches that have been modified to drain agricultural lands and developed areas along the Eighteenmile Creek system.

Confined River. Relatively large, fast-flowing sections of streams with a moderate to gentle gradient. These streams have well-

defined patterns of alternating pools, riffles, and runs. Confined rivers usually have poorly defined meanders (i.e., low sinuosity), occur in confined valleys, and are most typical of the mid-reaches of stream systems. These streams are typically of moderate depth, width, and low flow discharge and usually represent a network of third- to fourth-order stream segments. Most of the erosion is lateral, creating braids, channel islands, and bars, and deposition is moderate with a mix of coarse rocky to sandy substrate. The predominant source of organic energy is generated in the stream. (These are autochthonous streams or streams that depend primarily on energy produced in the stream rather than on materials introduced from some other source). These streams have high water clarity and are well-oxygenated. They are typically surrounded by open upland riverside communities including riverside sand/gravel bar, cobble shore or one of the shoreline outcrop communities.

This community type is present in the lower Eighteenmile Creek segment, below Burt Dam. Lower Eighteenmile Creek is probably a third-order stream, but the majority of this segment is influenced by water levels from Lake Ontario that confound the classification.

Great Lakes Aquatic Bed. The protected shoals of the Great Lakes or Lake Champlain that occur in quiet bays that are protected from extreme wave action by islands, shoals, or barrier bars, and typically support large areas of "weeds" or aquatic macrophytes. These bays may freeze over in the winter and become inversely stratified. They are warm, mesotrophic, and alkaline. Substrate can vary among sand, silt, muck, and rock. Two variants are known: classical "aquatic beds" with abundant macrophytes and sparsely vegetated or unvegetated bays.

An example of this community type in the Eighteenmile Creek watershed is possibly Olcott Harbor and the lower portion of Eighteenmile Creek, which are dominated, in portions, by aquatic macrophyte beds. Water levels are extremely influenced by Lake Ontario.

Eutrophic Pond. This aquatic community includes small, shallow, nutrient-rich ponds. The water is usually green with algae, and the bottom is mucky. Eutrophic ponds are too shallow to remain stratified throughout the summer; they are winter-stratified, monomictic ponds. Additional characteristic features of a eutrophic pond include water that is murky, with low transparency; water rich in plant nutrients; high primary productivity; and a weedy shoreline.

Examples of this community type are the typical farm ponds that are visible from roadside areas throughout the watershed.

Reservoir/artificial impoundment. An artificial lake created by the impoundment of a river with a dam. Reservoirs are constructed to collect water for municipal and/or agricultural water use, to provide hydroelectric power, and to improve opportunities for recreational or development activities.

This community type is present in the Burt Dam Reservoir section above Burt Dam.

Aquatic Fauna. The Eighteenmile Creek watershed comprises approximately 230 miles of streams, both perennial and intermittent (see Table 7). The vast majority of the available habitat in these streams is ideal for warm-water species. The section of Eighteenmile Creek, from the Burt Dam to the mouth of Lake Ontario, is also ideal for adfluvial cold-water species, which spawn in the creek and spend the majority of their life in Lake Ontario. Natural reproduction of trout and salmon is believed to be virtually non-existent in Eighteenmile Creek, and the fishery is supported by the NYSDEC-stocking program (see below). In addition to containing a high-quality warm-water fishery, this area is an important location for major spawning runs of several Lake Ontario cold-water fish including chinook salmon, coho salmon, rainbow trout, and brown trout.

The coldwater fish populations that use Eighteenmile Creek for their spawning runs originate from NYSDEC's Lake Ontario Fish Stocking Program. The population of native coldwater species in Lake Ontario was virtually non-existent by the mid-1960s, due largely to over-harvesting and the effects of the introduced sea lamprey (Niagara County 1982). In the late 1960s, NYSDEC began stocking cold-water species in Lake Ontario and its tributaries. By the early 1970s NYSDEC began controlling the sea lamprey population to decrease the negative effects lampreys were having on the success of the stocked fish. Currently NYSDEC stocks between 184,000 and 188,000 chinook salmon, coho salmon, rainbow trout, and brown trout in Eighteenmile Creek and Olcott Harbor each year. Chinook salmon comprise the largest portion of this stocking effort, with 122,000 stocked annually in Eighteenmile Creek. NYSDEC stocking numbers for 1999 to 2003 are presented in Table 13.

Table 13 NYSDEC Fish Stocking Records, Number of Fish Stocked for Eighteenmile Creek: 1999 – 2003

Fish Species	1999	2000	2001	2002	2003
Chinook	122,000	122,000	122,000	122,000	122,000
Coho	26,400	30,000	30,000	30,000	30,000
Rainbow Trout	13,000	12,500	8,850	11,500	12,500
Brown Trout	23,750	23,800	23,800	21,550	21,900
Total	**185,150**	**188,300**	**184,650**	**185,050**	**186,400**

Source: NYSDEC 2003.

Warm-water species found in Eighteenmile Creek below Burt Dam include channel catfish, largemouth bass, smallmouth bass, black crappie, rock bass, perch, northern pike, sheepshead, bullhead, and panfish (Sander 2004). In June and July of 1989 NYSDEC conducted a boat-electrofishing survey to collect fish to be tested for contamination as part of their Rotating Intensive Basin Survey (RIBS) initiative (NYSDEC 2003). The most common species collected included American eel, carp, golden shiner, white sucker, brown bullhead, rock bass, pumpkinseed, alewife, and gizzard shad. Results of the survey are presented in Table 14.

Table 14 NYSDEC RIBS Sampling Results, June 27 and July 6, 1989

Species Name	Abundance	Species Name	Abundance
American eel	Common	Longnose gar	Rare
Gizzard shad	Common	Alewife	Common
Rainbow trout	Common	Muskellunge	Rare
Brown trout	Common	White perch	Rare
Northern pike	Rare	White bass	Rare
Carp	Common	Walleye	Rare
Goldfish	Rare	Channel catfish	N/A
Golden shiner	Common	Common shiner	Common
White sucker	Common	Bluegill sunfish	Common
Redhorse sucker	Common	Smallmouth bass	Common
Brown bullhead	Common	Largemouth bass	Common
Rock bass	Common	Black crappie	Common
Pumpkinseed sunfish	Common	Sheepshead	Common

The majority of Eighteenmile Creek (i.e., upstream of Burt Dam) receives only light fishing pressure. A combination of the cold-water spawning runs, the warm-water fishery, and the relative ease of access concentrates sport-fishing activities downstream of Burt Dam. The majority of this fishing pressure is focused on the cold-water (i.e., salmonids) species in the late summer through spring (Sander 2004).

The Erie Canal is a manmade waterway that passes through the Eighteenmile Creek watershed. Though it is not connected directly to any waterway, during dry weather it provides an input of approximately 50 cubic feet per second (cfs) into Eighteenmile Creek. The canal is operated from early May to early November. In November the canal is drawn down, temporarily increasing the inflow of water into Eighteenmile Creek. The canal sustains a warm-water fishery with species similar to those found in Eighteenmile Creek.

2.2.10.4 Threatened and Endangered Species and Protected Habitat

Federally listed threatened and endangered plant and animal species are protected by the Endangered Species Act of 1973, which is administered by the United States Fish and Wildlife Service (USFWS). State-listed threatened and endangered plant and animal species are protected by the New York State Environmental Conservation Law, Article 9 and Article 11, which are administered by NYSDEC. Significant coastal habitats are protected under the Federal Coastal Zone Management Act and in New York State are designated and mapped under the authority of the Waterfront Revitalization and Coastal Resources Act (Executive Law of New York, Article 42), which is administered by the New York State Department of State (NYSDOS). In addition to the legal protection afforded these species, they are important natural resources within the watershed. Threatened and endangered species and significant habitats warrant attention during the planning process.

The USFWS, NYSDEC's Natural Heritage Program, and NYSDOS were consulted to determine the potential occurrence of federal- and state-listed endangered and threatened species and significant and protected natural communities and habitats within the Eighteenmile Creek Watershed.

The USFWS and NYSDEC provided data detailing the known occurrences of threatened, endangered, and rare species within the general project area. In addition to these species protected by law, existing databases track legally unprotected species for which there is a concern for their well-being. In combination, these species are considered "species of concern." The existing databases also track significant community assemblages. Although not specifically protected by law, these areas are recognized for their rare/unique features as well as their greater likelihood of providing habitat for protected species. NYSDOS provided data on significant coastal habitats. The responses are discussed below.

Federally Listed Species

The USFWS indicated that except for the occasional transient individuals, no federally listed or proposed endangered or threatened species are known to exist within the area. In addition, there is no habitat in the area that is currently a designated or proposed critical habitat.

However, the USFWS did indicate that the Blandings turtle (*Emydoidea blandingii*) is found in the watershed. The USFWS considers the Blandings turtle a species of concern and its status is being monitored throughout much of its range. Although species of concern do not receive substantive or procedural protection under the Endangered Species Act, the USFWS encourages considering these species during project planning.

New York State-Listed Species

NYSDEC identified six species of concern within the project area and one significant habitat area. Table 15 lists the species reported and their state and federal status. A brief description of each protected species follows the table.

Table 15 New York State Species of Concern

Common Name	Scientific Name	Federal Status	State Status	Study Area Occurrence
Plants				
Yellow Giant-Hyssop (Herb)	*Agastache nepetoides*	—	T	
Pawpaw (Deciduous Tree)	*Asimina triloba*	—	T	
Animals				
Short-eared Owl (Bird)	*Asio flammens*	—	E	
Northern Harrier (Bird)	*Circus cyaneus*	—	T	
Blandings Turtle (Reptile)	*Emydoidea blandingii*	—	T	
Wabash Pigtoe (Bivalve Mollusk)	*Fusconaia flava*	—	U	

Key:

E = Endangered
T = Threatened
U = Unprotected

Yellow Giant Hyssop (T). Yellow giant hyssop (*Agastache nepetoides*) is an herb of the mint family, with pale greenish-yellow flowers that appear in summer. It grows in woods and thickets. The reported occurrences of this species within the watershed were in forested areas or thickets with rocky (limestone) soils.

Pawpaw (T). Pawpaw (*Asimina triloba*) is an understory tree, of the custard-apple family, that occurs on the rich moist soils of floodplains and wet woods. The reported occurrences of this species within the watershed were on wooded stream banks.

Short-eared Owl (E). The short-eared owl (*Asio flammens*) is a medium sized owl with small ear tufts that appear as two ridges along the top of the head. It feeds on small mammals and occasionally small birds. The young sometimes eat insects. It lives in open areas where small mammals are abundant and nests on the ground in a cup lined with grasses and down. Short-eared owls begin breeding in March and typically lay four to nine eggs that are incubated by the female for approximately one month.

Historically these owls bred in eight or more northeastern states but today they nest only in Massachusetts, New York, Vermont, and Pennsylvania, probably due to the loss of open habitat that has come with reforestation. "The conservation of short-eared owls in New York depends on protecting relatively large, open sites that support small rodents. Except for a few large marshes, most of the nest sites recorded in recent years have been found on farms, typically in active hayfields or pastures where the nests and young birds are sometimes mowed or plowed. Once abandoned, agricultural sites rapidly become unsuitable for owls because they succeed to woodlands or are replaced by development. In order to protect short-eared owls it will be necessary to identify suitable nesting sites that can be managed for small rodents and owls" (http://www.dec.state.ny.us/website/dfwmr/wildlife/endspec/seowfs.html).

Northern Harrier (T). The northern harrier (*Circus cyaneus*) is a 16-24 inch, slender-bodied hawk with a long tail and wings, long yellow legs, distinct facial disks and a conspicuous white rump patch. It feeds on rodents and small birds, which it detects using its extremely keen hearing. It winters in agricultural fields, abandoned fields, and salt marshes from southern Canada to northern South America and breeds in marshes, grasslands, and cultivated fields, preferring coastal habitats. The Northern Harrier builds a flimsy nest of sticks and grass on the ground, in dense vegetation or in an elevated position. It typically lays five eggs, which are in-

cubated for 30- 32 days. The young fledge in approximately 30-41 days and remain dependent for approximately three to four weeks.

Historically, northern harriers were widespread, but pesticides and loss of breeding habitat (reforestation and other changes in land use, wetland fill and coastal development) led to their decline.

"Protection of suitable habitat is the most vital need of northern harriers. Population size and reproductive success of this species are dependent upon prey populations. It has been well documented that northern harrier populations and populations of their prey follow similar patterns of fluctuation. It is important that any management allow for healthy prey populations and provide habitats that are suitable for them as well" (http://www.dec.state.ny.us/website/dfwmr/wildlife/endspec/nohafs.html).

Blandings Turtle (T). Blandings turtle (*Emydoidea blandingii*) is a medium-sized turtle with a shell length of approximately seven to ten inches, a domed upper shell with light or yellow flecks, and a bright yellow chin and throat. These turtles are omnivores and eat fish, plants, invertebrates, and carrion. Blandings turtles typically live in coves and weedy bays, ponds, and shallow marshes and overwinter in mud or under vegetation under or near water. They may live up to 70 years and take 18 to 22 years to reach sexual maturity. Nesting begins in early June with clutches of five to twelve eggs in New York.

"A major problem facing the Blanding's turtle in New York State is the destruction of its habitat through the construction of housing developments, shoreline property and other summer recreation facilities. Roads which cross migration routes between the ponds where the turtles hibernate and the areas where they nest are particularly hazardous to the species" (http://www.dec.state.ny.us/website/dfwmr/wildlife/endspec/bltufs.html).

Wabash Pigtoe (U). Wabash pigtoe (*Fusconaia flava*) is a bivalve mollusk. This species is not threatened or endangered and may be taken at any time without limit, but a license to take may be required.

NYSDEC reported one significant habitat area within the Eighteenmile Creek watershed. The habitat area is a warm water fish concentration area that includes the stream habitat of Eighteenmile Creek, and associated wetlands, from the Route 18 bridge south to the Burt Dam. This corresponds to the significant habitat area identified by NYSDOS and discussed below.

NYSDOS Significant Coastal Fish and Wildlife Habitats

NYSDOS was contacted to determine whether significant coastal fish and wildlife habitat occurs within the watershed. The portion of Eighteenmile Creek from the Burt Dam to Lake Ontario is identified and designated as significant fish and wildlife habitat (Figure 12). Eighteenmile Creek, which empties into Lake Ontario at the Hamlet of Olcott in the Town of Newfane, Niagara County, is the largest stream in Niagara County. It is one of ten tributaries in the Great Lakes region. "Undisturbed tributary streams that provide habitat for major spawning runs by salmonids and other lake-based fish populations are especially important in this region" (NYSDOS 2004). The estimated 65 acres of extensive beds of emergent and submergent aquatic vegetation is one of the largest coastal wetlands in the western portion of Lake Ontario.

Eighteenmile Creek is significant due to the large concentrations of coho and chinook salmon and brown trout that migrate into the creek from Lake Ontario each fall, when the salmonids ascend to the streams to spawn. In addition, steelhead migrate into the creek during the fall and between February and April. These fish are a result of the ongoing effort of NYSDEC to establish a major salmonid fishery in the Great Lakes through stocking. The area also supports a substantial natural reproduction of smallmouth bass, northern pike, rock bass, black crappie, brown bullhead and largemouth bass.

Unlike other Niagara County coastal regions, Eighteenmile Creek provides valuable habitats for wildlife. A variety of bird species inhabit the area, including the great blue heron, green-backed heron, mallard, wood duck, belted kingfisher, marsh wren, common yellowthroat, red-winged blackbird, and swamp sparrow. Other wildlife species that inhabit the Eighteenmile Creek area include resident furbearers such as muskrat, mink, and raccoon.

Eighteenmile Creek is also important for a significant amount of recreational use. Fishermen from all over the area come to fish in the creek, primarily because of the large salmonid runs in the area. Small boats and canoes are used to fish for the abundant warmwater species in the area.

Additional Characterization Needs

The information presented in this section has been gathered to begin the process of characterizing the existing natural resources in the Eighteenmile Creek watershed.

The following additional steps may be required to adequately characterize habitat within the watershed:

- Additional field surveys to verify the location, extent, quality, and functions of terrestrial, wetland, and aquatic communities.

- Additional field surveys to verify the location, extent, and use of habitat by threatened and endangered species.

- Additional field surveys to more specifically identify impairments within the watershed, and to record the relevant causes for the impairments, such as land use, erosion, stormwater flows, and sediment transport (the U.S. Army Corps of Engineers is in the process of developing a sediment transport model for Eighteenmile Creek).

- In addition, prior to activities occurring with NYSDOS Significant Coastal Fish and Wildlife Habitat, the NYSDOS has stipulated that a habitat impact analysis would need to be conducted. The following information has been provided by NYSDOS regarding the specifics of a habitat impairment test.

A habitat impairment test must be met for any activity that is subject to consistency review under federal and State laws, or under applicable local laws contained in an approved local waterfront revitalization program. If the proposed action is subject to consistency review, then the habitat protection policy applies, whether the proposed action is to occur within or outside the designated area.

The specific habitat impairment test that must be met is as follows.

In order to protect and preserve a significant habitat, land and water uses or development shall not be undertaken if such actions would:

- destroy the habitat; or,

- significantly impair the viability of a habitat.

Habitat destruction is defined as the loss of fish or wildlife use through direct physical alteration, disturbance, or pollution of a designated area or through the indirect effects of these actions on a designated area. Habitat destruction may be indicated by changes in vegetation, substrate, or hydrology, or increases in runoff, erosion, sedimentation, or pollutants.

Significant impairment is defined as reduction in vital resources (e.g., food, shelter, living space) or change in environment conditions (e.g., temperature, substrate, salinity) beyond the tolerance range of an organism. Indicators of a significantly impaired habitat focus on ecological alterations and may include but are not limited to reduced carrying capacity, changes in community structure (food chain relationships, species diversity), reduced productivity and/or increased incidence of disease and mortality.

The *tolerance range* of an organism is not defined as the physiological range of conditions beyond which a species will not survive at all, but as the ecological range of conditions that supports the species population or has the potential to support a restored population, where practical. Either the loss of individuals through an increase in emigration or an increase in death rate indicates that the tolerance range of an organism has been exceeded. An abrupt increase in death rate may occur as an environmental factor falls beyond a tolerance limit (a rang has both upper and lower limits). Many environmental factors, however, do not have a sharply defined tolerance limit, but product increasing emigration or death rates with increasing departure from conditions that are optimal for the species.

The range of parameters that should be considered in applying the habitat impairment test include (but are not limited to the following):

1. physical parameters such as living space, circulation, flushing rates, tidal amplitude turbidity, water temperature, depth (including loss of littoral zone), morphology, substrate type, vegetation, structure, erosion and sedimentation rates;

2. biological parameters such as community structure, food chain relationships, species diversity, predator/prey relationships, population size, mortality rates, reproductive rates, meristic features, behavioral patterns and migratory patterns; and,

3. chemical parameters such as dissolved oxygen, carbon dioxide, acidity, dissolved solids, nutrients, organics, salinity, and pollutants (heavy metals, toxics and hazardous materials).

Although not comprehensive, examples of generic activities and impacts, which could destroy or significantly impair habitats are listed below to assist in applying the habitat impairment test to a proposed activity.

Any activity that substantially degrades water quality, increases temperature or turbidity, reduces flows, or alters water depths in Eighteen Mile Creek would adversely affect the fish and wildlife resources of this area. These impacts would be especially detrimental during fish spawning and nursery periods (late February-July for most warm water species and steelhead, and September-November for most salmonids), and wildlife breeding seasons (April-July for most species). Discharges of sewage or storm water runoff containing sediments or chemical pollutants (including fertilizers) could adversely impact on fish or wildlife species. Of particular concern are the potential effects of upstream disturbances, including water withdrawals, streambed disturbances, and effluent discharges. Hydroelectric facilities on the creek should only be permitted with run-of-river operations. Barriers to fish migration, whether physical or chemical, could have a significant impact on fish populations in the creek. Disturbances of wetland vegetation, including submergent beds, through dredging, filling, or bulkheading, would result in a direct loss of valuable habitat area. Enhancement of motorboat access to the area above Route 18 would significantly increase human disturbance of the habitat, reducing its potential value to many fish and wildlife species. Existing woodlands bordering Eighteenmile Creek should be maintained to provide bank cover, perching sites, soil stabilization, and buffer areas.

2.2.11 Cultural Resources

2.2.11.1 Historical Summary

The information below is a summary of the *Phase I Cultural Resources Investigation for the Proposed Burt Dam Habitat Rehabilitation, Hamlet of Burt, Town of Newfane, Niagara County, New York* (Hayward 2002). Additional information sources will need to be reviewed for inclusion in the Eighteenmile Creek CWMP.

Prehistoric Period

Three major cultural traditions manifested in western New York State during the prehistoric era including the Paleo-Indian (ca. 10,000 – 8,000 BC), the Archaic (ca. 8,000 – 1,500 BC), and the Woodland (1,000 BC – 1,600 AD) traditions. The earliest people were nomadic big game hunters, adaptations led to hunter gatherer societies, with a less nomadic lifestyle and a shift in technology. Later societies relied upon hunting and gathering combined with agriculture. A more settled village life arose with increased dependence on agriculture. At the same time, population increased, technology changed, warfare changed and social and political changes arose.

Historic Period

The earliest Europeans visited the Niagara Frontier area as early as the 1610s, however for most of the seventeenth and eighteenth centuries, European activities involved limited commercial, religious, and military endeavors. Settlement in the area began in the early nineteenth century, but the regions growth was slowed by the War of 1812.

The region received a tremendous economic boost when the Erie Canal was routed through what was to become the village of Lockport in 1829 (the first village in Niagara County) and later the city of Lockport in 1829 (the first city in Niagara County). By 1830, Niagara County had a population of 18,000 and the economy of the northern watershed included farmsteads and ancillary agricultural activities as well as milling and tanning industries.

Around 1835 rail lines began to supplement transportation provided by the canal and roads and farmers used railroads to ship lumber and food to markets east and west. Beginning in 1900, an electric trolley line was operated between Lockport and Olcott. Toward the end of the eighteenth century, roadways improved in some areas and bridges were erected and around the turn of the century, telephone service, cheap electricity, and reliable water supplies improved living conditions in the area.

Development in the watershed accelerated after World War II. Agriculture remains the dominant land use within the watershed to this day. Residential uses are concentrated in the City of Lockport and Village of Newfane and otherwise are confined to areas along roadways. Commercial and industrial uses are concentrated primarily in the City of Lockport.

History of Dams Along Eighteenmile Creek

The following information on dams along Eighteenmile Creek was taken from the *Eighteenmile Creek Watershed Literature Search* (Niagara County 1988).

During the 1800s, numerous millraces and millponds provided power for a variety of industries located along the banks of Eighteenmile Creek. Multiple mills for flour rolling and paper utilized the power of Eighteenmile Creek at its descent of the Niagara Escarpment as did the Cowells Electric Smelting and Aluminum Company. In the City of Lockport, clustered mill districts formed where millraces were constructed to take advantage of water from the canal traveling down the escarpment. The millraces flowed

into Eighteenmile Creek and the waterway provided power for pulp mills, grist-mills, tanneries, and saw mills.

Dams were constructed to provide power in more level areas near Newfane and in the Town of Royalton. A dam was built in the 1830's near the end of McKee Street and Ewings Road in Newfane to provide power for the Newfane mill district. In the 1850's, a mill was built by D. VanHorn, near Ide Road in Newfane to provide power for a saw-mill. The remains of this dam were still in existence in 1988. Around 1875, another dam was built near Condren Road in Newfane for a saw and grist-mill. The Burt Dam was built in 1924 creating a 95-acre reservoir within the creek gorge for approximately 2 miles upstream. The original mill generated power until the 1950's and was restored in 1988. In Royalton, two dams were built near Slayton-Settlement Road in the 1850's to provide power for mills. A wooden dam continued to provide power for a grist-mill into the late 1960's. Historic topographic maps of the project area are included as Figures 13 and 14 of this document.

2.2.11.2 Potential Existence of Cultural Resources

Numerous archaeological and historic properties are likely to exist in the Eighteenmile Creek watershed. Nomadic big game hunters inhabited western New York as early as 10,000 to 8,000 BC. These nomadic groups led to hunter-gatherer societies and eventually to settled village life with increased dependence on agriculture and increased populations. The earliest Europeans visited the Niagara Frontier area as early as the 1610s, and the area was a theatre for the War of 1812. The region received a tremendous economic boost when the Erie Canal was routed through what was to become the village of Lockport in 1829, and the population boomed after World War II. Economic development within the watershed clustered around water resources, including the canal and Eighteenmile Creek and its tributaries, with water dependent uses such as millworks prevalent. Based on the history of the Eighteenmile Creek watershed, numerous archeological and historic properties are likely to exist within the watershed.

2.2.11.3 Additional Characterization Needs

To better understand the historic context of the landscape and the historic and prehistoric relationships between people and Eighteenmile Creek, it is recommended that the planning process include further research to better characterize cultural and historic resources. The input and involvement of the local historical societies, local citizens, Native American tribes, and the State Historic Preservation Office (SHPO) are recommended.

2.3 Legal and Regulatory Environment

This section of the plan outlines existing federal, state, and local regulations that govern activities in the watershed. Some of the regulations provide background and insight on strategies and policies that have been developed to restore and protect the Great Lakes Basin and connecting waterways (i.e. Eighteenmile Creek). Other regulations govern daily activities that have the potential to impact waterways, like Eighteenmile Creek. This text is not exhaustive. Additional information on regulations affecting the watershed must be added, particularly with regard to local zoning, ordinances, and associated regulations.

2.3.1 International

Great Lakes Strategy 2002

Great Lakes Strategy 2002 was created by the U.S. Policy Committee (a group of senior-level representatives from federal, state, and tribal natural resource agencies) to help coordinate and streamline efforts of the many governmental partners involved with protecting the Great Lakes. The strategy focuses on basin-wide environmental issues and supports other existing efforts (see below), and addresses issues that are beyond the scope of these programs and helps integrate them into an overall basinwide context. The vision of the strategy involves creating a healthy natural environment for wildlife and people. Objectives have been established that will reduce contaminants and restore habitat within a defined timeline (http://www.epa.gov/glnpo/gls/glstoc.html).

Boundary Waters Treaty of 1909

The Boundary Waters Treaty provides the principles and mechanisms to help resolve or prevent disputes over water quality and quantity along the boundary between the U.S. and Canada. The treaty was signed 1909 and established an agreement between the U.S. and Great Britain to address questions arising over boundary waters between the U.S. and the Dominion of Canada.

The Treaty defined boundary waters as

> "…. the waters from main shore to main shore of the lakes and rivers and connecting waterways, or the portions thereof, along which the international boundary between the United States and the Dominion of Canada passes, including all bays, arms, and inlets thereof, but not including tributary waters which in their natural channels would flow into

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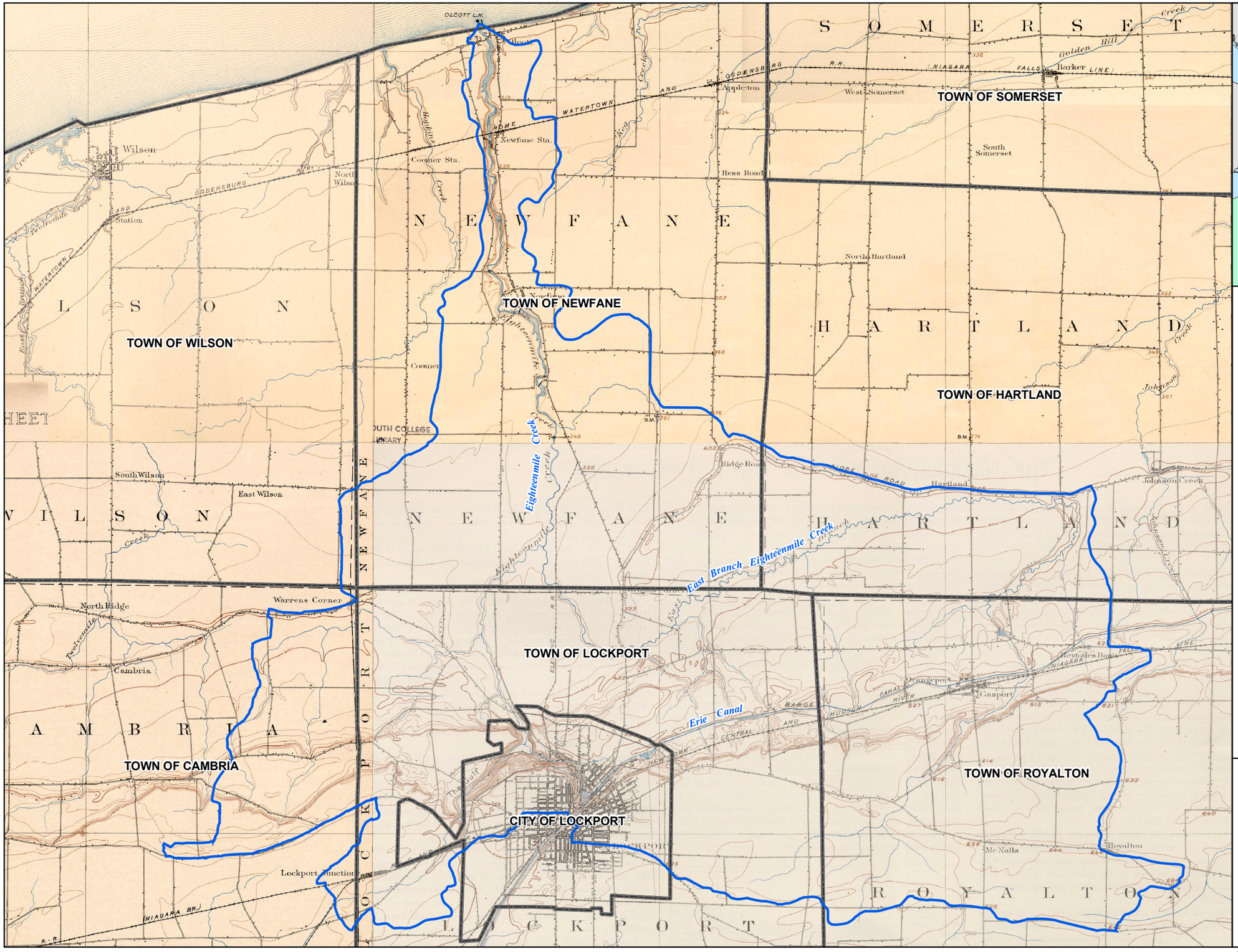

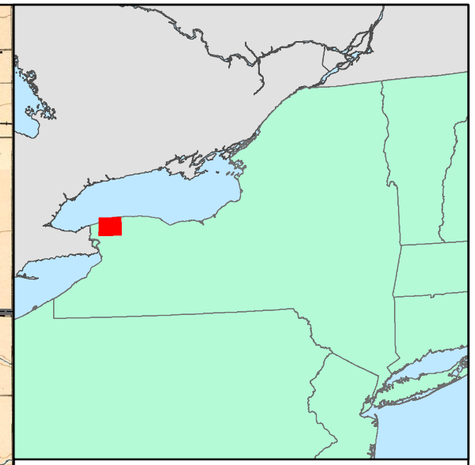

LEGEND

- Eighteenmile Creek Watershed
- Municipal Boundaries

Dates of Maps Shown:
Wilson Quad - 1894
Olcott Quad - 1897
Tonawanda Quad - 1900
Lockport Quad - 1902

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Miles
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Figure 13

Eighteenmile Creek Watershed Historic Topographic Map 1894-1902

Source: US Geological Survey, NYS Department of Environmental Conservation

001636.NO06.03
L:\Buffalo\eighteenmile\mxds\Historic_Topos_1948.mxd - 2/9/2005 - GIS

TOWN OF SOMERSET

TOWN OF NEWFANE

TOWN OF WILSON

TOWN OF HARTLAND

TOWN OF LOCKPORT

TOWN OF CAMBRIA

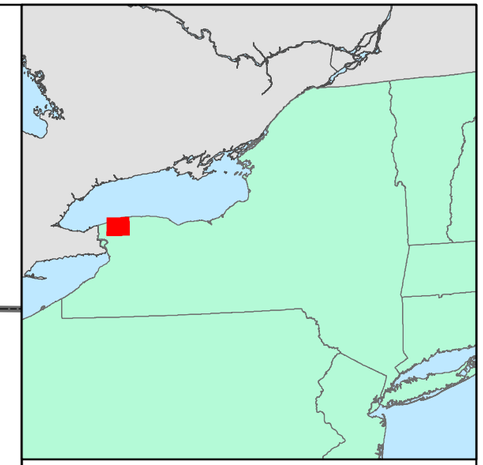
TOWN OF ROYALTON

CITY OF LOCKPORT

Eighteenmile Creek

East Branch Eighteenmile Creek

Erie Canal



LEGEND

- Eighteenmile Creek Watershed
- Municipal Boundaries

Note: Olcott Quad Not Available

N

Miles

1 0.5 0 1 2

Figure 14

Eighteenmile Creek Watershed Historic Topographic Map 1948

Source: US Geological Survey, NYS Department of Environmental Conservation

> such lakes, rivers, and waterways, or waters flowing from such lakes, rivers, and waterways, or the waters of rivers flowing across the boundary." (http://www.ijc.org/rel/agree/water.html)

Article IV of the Boundary Waters Treaty indicates that boundary waters and waters flowing across the boundary shall not be polluted to the point that property and health are injured on the other side of the boundary.

Article VII of the Boundary Waters Treaty establishes the International Joint Commission (IJC). The IJC is an independent international organization, made up of members from the U.S. and Canada, charged with preventing and resolving disputes over the use of waters shared by the United States and Canada. In addition, when requested by the two federal governments, the Commission provides advice on matters affecting the shared environment. Articles VIII, IX and X establish the role and responsibilities of the IJC (http://www.ijc.org/rel/agree/water.html).

U.S.-Canada Great Lakes Water Quality Agreement 1978

The Great Lakes Water Quality Agreement (Agreement) was first signed in 1972. Under the Agreement, the U.S. and Canada committed to control pollution in the Great Lakes and to clean up wastewaters from industries and communities that contributed to pollution in the lakes. The Agreement reaffirms the rights and obligations of each country under the Boundary Waters Treaty.

The Agreement was renewed in 1978 and the two countries committed "to restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes Basin Ecosystem." The Great Lakes Basin Ecosystem includes the interacting components of air, land, water and living organisms, including humans, within the drainage basin of the St. Lawrence River at or upstream from the point at which the river becomes the international boundary between Canada and the United States. To achieve this purpose, each country agreed to make a maximum effort to understand the ecosystem and, to the maximum extent practicable, to eliminate or reduce the release of pollutants into the Great Lakes Basin Ecosystem. Specific commitments were made to rid the Great Lakes of persistent toxic substances or substances that can remain in the environment for extended periods of time and can be harmful to people or other living things. The two nations agreed that the worst areas would be given priority attention. Subsequently, 43 areas were designated as Areas of Concern (AOCs) because they contained contaminated sediment and inland contami-

nated sites or degraded habitat to a greater degree than the rest of the Great Lakes.

The Agreement was amended by a Protocol signed in 1987. The aim of the amendments was to increase accountability for implementation of and strengthen the programs, practices and technology described in the 1978 agreement.

The Agreement was revised to require cleanup of the AOCs, the most polluted areas in the Great Lakes, where such things as beaches, the reproduction of wildlife, and the odor of drinking water had deteriorated. There are 43 AOCs; 26 in the U.S., 12 in Canada, and 5 located binationally. A portion of Eighteenmile Creek is listed as one of the 26 AOCs located within the U.S. Provisions were introduced to develop and implement Remedial Action Plans (RAPs) to improve these AOCs. The 1987 amendments also called for more focused attention on pollution from land runoff, contaminated sediment, airborne toxic substances, contaminated groundwater and research to support these efforts. A list of 14 potential impairments to beneficial use were provided for use in assessing the impact of toxic chemicals and other factors on the Great Lakes Ecosystem (http://www.epa.gov/glnpo/aoc/index.html).

Under the terms of the Agreement, the federal governments in the U.S. and Canada are expected to implement programs and report on their progress in restoring, preserving, and protecting the Great Lakes. These progress reports are reviewed and evaluated by the International Joint Commission (IJC), which was established under the Boundary Waters Treaty of 1909. In the United States, the U.S. Environmental Protection Agency (EPA) leads delivery on the Agreement and works in partnership with state and municipal governments.

The IJC also investigates and reports on transboundary air and water pollution, persistent toxic substances, exotic species, and other matters of common concern along the international boundary and approves projects, such as dams or water diversions, that affect water levels and flows across the boundary.

The Great Lakes Water Quality Board, made up of 20 senior program managers from the federal, state, and provincial regulatory and resource management programs, acts as advisor to the IJC on all matters related to the Agreement. Recently the Great Lakes Water Quality Board has focused on contaminated sediment, con-

taminant sources and pathways, and the future of RAPs for the AOCs.

The Great Lakes Science Advisory Board acts as the scientific advisor to the IJC and the Great Lakes Water Quality Board. The Board is made up of 18 members, from various disciplines that are recruited from industry, academia, government and non-government organizations. The Science Advisory Board assesses and advises on the Great Lakes Basin Ecosystem health, including the scientific underpinnings of public policy; reviews and evaluates science policy and programs related to the Parties' implementation of the Agreement; and identifies and evaluates emerging issues and future priorities.

The Council of Great Lakes Research Managers was established to enhance the ability of the Commission's Great Lakes Science Advisory Board to provide leadership, guidance, and evaluation of Great Lakes research programs. The Council compiles a research inventory identifying research needs and coordinates research projects. The 20 members cover a geographic area that extends to and includes the St. Lawrence River. Membership includes individuals managing and coordinating research programs of federal, state, and provincial governments in the United States and Canada, and representatives of private institutions.

The International Air Quality Advisory Board, made up of 10 members with expertise in air pollution effects and control, was established to identify and provide advice on air pollution issues with trans-boundary implications. Pollutants entering the Great Lakes from the air have the potential to affect the ecosystem of the basin. The International Air Quality Advisory Board analyzed the potential for air contaminants in one country to travel across the border, by prevailing winds, and impact the other country they used this information to define the airshed boundary (http://www.on.ec.gc.ca/glwqa/facts-e.html).

Niagara River Declaration of Intent 1987 (Lake Ontario Toxics Management Plan)

The Niagara River Declaration of Intent was signed on February 4, 1987, by the EPA; Environment Canada (EC); the New York State Department of Environmental Conservation (NYSDEC); and the Ontario Ministry of the Environment (MOE), in response to an identified toxics problem in the Niagara River and Lake Ontario.

The Niagara River Declaration of Intent required that a Lake Ontario Toxics Management Plan be developed to define the toxics

problem and to implement a plan to eliminate the problem. The Lake Ontario Toxics Management Plan was published in 1989 and updates were completed in 1991 and in 1993. The Plan identified 11 priority toxic chemicals in the lake and provided information regarding ongoing load reduction efforts.

In May 1996, the agencies signed a Letter of Intent agreeing that the Lake Ontario Lakewide Management Plan should provide the binational framework for environmental protection efforts in Lake Ontario. The commitments of the Lake Ontario Toxics Management Plan were subsequently reviewed and incorporated into Stage 1 of the Lake Ontario Lakewide Management Plan (http://www.epa.gov/glnpo/lakeont/summary.html).

Lakewide Management Plan for Lake Ontario

The Great Lakes Water Quality Agreement Amendments of 1987 called for the development of Lakewide Management Plans for each of the Great Lakes. The goal of each Lakewide Management Plan is to restore and protect beneficial uses in open lake waters, using a systematic and comprehensive ecosystem approach. In May 1996, the agencies signed a Letter of Intent agreeing that the Lake Ontario Lakewide Management Plan (the Plan) should provide the binational framework for environmental protection efforts in Lake Ontario.

The Plan includes four Stages. Stage I is a document that provides the definition of the problems in Lake Ontario. Stage II provides the schedule for reduction activities; Stage III provides the selection of remedial measures; and Stage IV provides results of reduction activities and remedial measures as documented by monitoring.

Stage I of the Plan was developed by Region II of the EPA; EC; the NYSDEC; and the MOE, in consultation with the public. Stages II through IV will be developed over time.

The Plan focuses on resolving Beneficial Use Impairments; issues with critical pollutants that are contributing to, or are likely to contribute to, these impairments due to their toxicity, persistence in the environment, or their ability to accumulate in organisms; and physical and biological problems caused by human activities.

The Plan will address sources of lakewide critical pollutants that are or are likely to contribute to use impairments. The lakewide critical pollutants that will be the focus of source reduction activities include PCBs, DDT and its metabolites, mirex, dioxins/furans,

mercury and dieldrin, due to their persistent and bioaccumulative nature. To prevent future impairments caused by other persistent, bioaccumulative toxics (in addition to those listed above) entering the lake, the Plan will address the persistent bioaccumulative toxics as a class.

Local use impairments are also identified in the document. However, these impairments will be addressed on a local level through the development and implementation of the RAPs and other local management efforts. The Plan will be coordinated with localized RAPs and other local efforts to avoid duplication of effort. Therefore, the Eighteenmile Creek RAP developed by the NYSDEC for the Eighteenmile Creek AOC is carried over and included as part of the Lake Ontario Lakewide Management Plan (http://www.epa.gov/glnpo/lakeont/summary.html).

2.3.2 Federal Regulations

Clean Water Act

The Federal Water Pollution Control Act Amendments of 1972 were the result of growing public concern for controlling water pollution. As amended in 1977, this law became commonly known as the Clean Water Act. The Act established the basic structure for regulating discharges of pollutants into the waters of the United States. It gave EPA the authority to implement pollution control programs such as setting wastewater standards for industry. The Clean Water Act also continued requirements to set water quality standards for all contaminants in surface waters. The Act made it unlawful for any person to discharge any pollutant from a point source into navigable waters, unless a permit was obtained under its provisions. It also funded the construction of sewage treatment plants under the construction grants program and recognized the need for planning to address the critical problems posed by nonpoint source pollution.

Over the years, many other laws have changed parts of the Clean Water Act. Title I of the Great Lakes Critical Programs Act of 1990, for example, put into place parts of the Great Lakes Water Quality Agreement of 1978, signed by the U.S. and Canada, where the two nations agreed to reduce certain toxic pollutants in the Great Lakes. That law required EPA to establish water quality criteria for the Great Lakes addressing 29 toxic pollutants with maximum levels that are safe for humans, wildlife, and aquatic life. It also required EPA to help the States implement the criteria on a specific schedule.

Under Section 401 of the Clean Water Act, state approval is required for any federally permitted action that impacts the Waters of the United States (Waters of the U.S.). Waters of the U. S. are defined by 40 CFR § 122.2 to include "(1) navigable waters; (2) tributaries to navigable waters; (3) interstate waters; and (4) intrastate lakes, rivers and streams (a) used by interstate travelers for recreation and other purposes, or (b) which are a source of fish or shellfish sold in interstate commerce, or (c) which are utilized for industrial purposes by industries engaged in interstate commerce." Within New York State, this Water Quality Certification is issued by the NYSDEC.

Section 402 of the Clean Water Act provides that storm water discharges associated with industrial activity from a point source system to waters of the U. S. are unlawful, unless authorized by a National Pollutant Discharge Elimination System (NPDES) permit. In New York State, this is accomplished through the administration of the State Pollutant Discharge Elimination System (SPDES) program.

Section 404 of the Clean Water Act requires that a permit be obtained for the discharge of dredge or fill material in the Waters of the United States, including wetlands. Waters of the United States are defined under 33 Code of Federal Regulations Part 328, and wetlands are specifically defined under 33 CFR Part 328.3(b). The U.S. Army Corps of Engineers (USACE) is the permitting agency for Section 404 permits and the Eighteenmile Creek Watershed is under the jurisdiction of the USACE Buffalo district (http://www.epa.gov/region5/water/cwa.htm).

Rivers and Harbors Act of 1899

The Rivers and Harbors Act of 1899 addresses actions that could impact designated navigable waters. Navigable waters are defined as all "Waters of the United States" (33 U.S.C.§ 1362(7)). Navigable waters of the U.S. are those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce (33 CFR 329). Eighteenmile Creek is navigable for 0.5 miles upstream from the NY Route 18 highway bridge in Olcott, NY.

Section 9 of the Rivers and Harbors Act prohibits the construction of any bridge, dam, dike or causeway over or in navigable waterways of the U.S. without Congressional approval. Administration of section 9 has been delegated to the U. S. Coast Guard.

Under Section 10 of the Rivers and Harbors Act, the building of any wharfs, piers, jetties, and other structures is prohibited without approval, as is excavation or fill within navigable waters. The USACE issues permits for activities regulated under Section 10 (http://laws.fws.gov/lawsdigest/riv1899.html).

Endangered Species Act of 1973

Federally listed threatened and endangered species are protected by the Endangered Species Act of 1973, which is administered by the U. S. Fish and Wildlife Service (USFWS). The Act provided for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife, and plants depend; authorizes the determination and listing of species as endangered and threatened; and prohibits unauthorized taking, possession, sale, and transport of endangered species. Threatened, endangered, and candidate species are identified in 50 Code of Federal Regulations, Parts 17.11 and 17.12. National Environmental Policy Act (NEPA) regulations require that this act be appropriately addressed by all Environmental Impact Statements (EISs) (for discussion of threatened and endangered species specific to Eighteenmile Creek see Section 2.2.10.4) (http://endangered.fws.gov/ESA/ESA.html).

National Historic Preservation Act of 1966

The National Historic Preservation Act of 1966 provides for the establishment of the National Register of Historic Places (NRHP) to include historic properties such as districts, sites, buildings, structures, and objects that are significant in American history, architecture, archaeology, and culture. Section 106 of the Act requires that federal agencies with jurisdiction over proposed federal projects take into account the effects of the undertaking on cultural resources that are listed or that are eligible for listing on the NRHP and afford the State Historic Preservation Offices and Advisory Council on Historic Preservation (ACHP) an opportunity to comment with regard to the undertaking. The NRHP eligibility criteria have been defined by the Secretary of the Interior's Standards for Evaluation (36 CFR 60). The New York State Historic Preservation Office oversees compliance with this Act (see state Section 1.6.3.9). Cultural resources within the Eighteenmile Creek watershed are discussed in Section 2.2.11 of this document (16 U.S.C. 470).

Safe Drinking Water Act

The Safe Drinking Water Act was passed in 1974 to ensure that water that comes from the tap in the United States is fit to drink and to prevent the contamination of groundwater, which serves as the source of drinking water for much of the population in the

United States. Responsibility for administration of the Act was assigned to the EPA.

The Act requires EPA to set national drinking water standards that must be met by those who supply drinking water. Groundwater protection programs include the Underground Injection Control Program (which regulates disposal of liquid wastes underground), and wellhead protection programs (which prevent contamination of areas surrounding public water system wells that supply drinking water). In addition, the Act allows EPA to designate sole source aquifers, or aquifers that are the principal source of drinking water for a community or communities. No federal financial assistance of any kind can be used for any projects that would contaminate designated sole source aquifers (http://www.epa.gov/safewater/sdwa/index.html).

Federal Farmland Protection Policy Act

The objective of the Federal Farmland Protection Policy Act is to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to agricultural uses. The Act also ensures that federal programs, to the extent practicable, will be compatible with state, local government and private programs and policies to protect farmland. Farmland is defined (in 7 CFR Part 657) as soils classified by the NRCS as prime farmland, unique farmland and farmland and other prime or unique farmland that is of statewide or local importance. The NRCS is responsible for overseeing compliance with the Federal Farmland Protection Policy Act and has developed rules and regulations for implementing the Act. Any federally funded project that involved the conversion of farmland would be regulated under the Federal Farmland Protection Policy Act. Soils within the watershed that have been designated as prime farmland, unique farmland or farmland of statewide importance are discussed in Section 2.2.4.2 of this document (http://www.nrcs.usda.gov/programs/fppa/).

2.3.3 State Regulations

State Environmental Quality Review Act

The State Environmental Quality Review Act of 1975 established an environmental review process for actions that are directly undertaken, funded, or approved by local, regional, and state agencies. SEQR requires a systematic, interdisciplinary approach to environmental review to avoid or minimize impacts on the environment. Coordination and review of the SEQR process is the responsibility of the lead agency, which is the governmental entity directly responsible for permitting the proposed project.

Projects reviewed under the SEQR process are categorized as Type 1, Type 2 or unlisted. The type of action determines the review process and requirements under SEQR. Projects may require no environmental review, preparation of a short Environmental Assessment Form (EAF), preparation of a full EAF, and/or preparation of an Environmental Impact Statement (EIS).

Type 1 actions are identified in Section 617.4 and are those actions that are more likely to require the preparation of an Environmental Impact Statement (EIS). For proposed actions that are determined to be Type 1 actions, a full Environmental Assessment Form must be prepared. This form is reviewed by the lead agency and based upon that review, the lead agency may or may not require the preparation of an EIS.

Type 2 actions are identified in Section 617.5 and are those actions that have been pre-determined to have no significant environmental impacts or to be otherwise precluded from environmental review. For proposed actions that are determined to be Type 2 actions, neither an EAF nor an EIS are required.

Unlisted actions are those actions that are not identified as Type 1 or Type 2 actions. For proposed actions that are unlisted, a short EAF must be prepared. The short EAF is reviewed by the lead agency and any further environmental assessments are identified.

The full environmental review process required for Type 1 actions includes the elements listed below. The process is abbreviated for unlisted actions.

- Notice of Intent;
- Scoping;
- Draft Environmental Impact Statement (DEIS);
- Notice of Completion;
- Public Input;
- Final EIS; and
- Findings Statement.

The Notice of Intent announces the lead agencies intent to prepare an EIS, if necessary and formally opens the public scoping process. Notices of Intent are published in the Environmental Notice Bulletin.

Scoping is the open process of determining the scope of the issues and identifying the significant issues related to a proposed action. Federal, state and local agencies and members of the public are encouraged to provide input. Public meetings are often arranged to provide an opportunity for members of the public to comment on the issues that need to be addressed in the EIS.

The Draft EIS is a draft report that documents the analysis of the socioeconomic and environmental consequences of a proposed action. The Draft EIS includes a description of the proposed action and its purpose and need; reasonable alternatives; the existing environmental conditions; and the environmental consequences of the proposed action. The Draft EIS may be supported by various environmental studies and analyses.

The Notice of Completion is a formal notice, placed in the Environmental Notice Bulletin, that a Draft EIS or a final EIS is available for review.

The Draft EIS is made available for public review. Federal, state and local agencies and members of the public are invited to provide comments on the Draft EIS. A public hearing is held to receive comments from the public and an announcement of the public hearing is published in the local newspapers. Reviewing agencies and members of the public may also provide written comments.

The Final EIS documents the comments received on the Draft EIS and includes a response to relevant comments. Responses may include clarifying text; supplementing, improving, or modifying the analysis; and factual corrections.

The lead agency will prepare a Formal Findings Statement within 30 days after the Notice of Completion of the Final EIS. The Findings Statement is provided to the appropriate agencies, organizations and individuals (6 NYCRR Part 617).

New York State Environmental Conservation Law Article 9

Article 9 of the New York State Environmental Conservation Law prohibits the take, import, transport, possession or sale of any pro-

tected plant species. Protected plant species include endangered, threatened, rare, and exploitably vulnerable species. Part 193 of 6 NYCRR lists prohibited actions and protected plants. Protected plant species present in the Eighteenmile Creek watershed are discussed in Section 2.2.10.4 of this document (6 NYCRR Part 193).

New York State Environmental Conservation Law Article 11

Article 11 of the New York State Environmental Conservation Law prohibits the take, import, transport, possession or sale of any endangered or threatened animal species including fish and wildlife. Part 182, Title 6, of the New York Code of Rules and Regulations lists all protected species. Protected fish and wildlife species present in the Eighteenmile Creek watershed are discussed in Section 2.2.10.4 of this document (6 NYCRR Part 182).

New York State Environmental Conservation Law Article 15

These regulations, known as the "Protection of Waters" program, are designed to regulate any activities that could impact protected watercourses within New York State. Protected waters include all waters classified as C(t) or higher and any navigable waters as defined in 6 NYCRR Part 608. Article 15 covers disturbances to streambeds and banks, disposal of fill material and excavation in navigable waters. Eighteenmile Creek water classifications are discussed in Section 2.2.8 of this document (6 NYCRR Part 608).

New York State Environmental Conservation Law Article 17

New York State Environmental Conservation Law Article 17 provides for the protection of water quality and quality of benthic life and provides guidance for the establishment of water quality criteria for stream segments.

Water Quality Standards are contained in Parts 700 through 705 of 6 NYCRR. The surface water and groundwater quality standards covered under Part 703 include narrative water quality standards and conventional water quality standards for physical and chemical parameters, including but not limited to pH, dissolved oxygen, color, turbidity, and toxic and other deleterious substances (6 NYCRR Parts 700-705).

The State Pollutant Discharge Elimination System (SPDES) program is used to regulate the discharge of pollutants into New York State waters. A SPDES permit is required for any outlet or point source discharge of sewage, industrial waste or other waste or ef-

fluent into New York State waters. Each SPDES permit provides discharge limitations based on water quality criteria and stream classification for the stream receiving the effluent. Water quality within Eighteenmile Creek is discussed in Section 2.2.8 of this document (6 NYCRR Part 750).

New York State Environmental Conservation Law Article 24

Article 24, the New York Freshwater Wetland Act, provides for regulation of certain activities that could adversely affect wetlands of 5 hectares (12 acres) or larger, and smaller wetlands identified as having an unusually significant local value. Activities that occur in such wetlands and/or within approximately 30 meters (100 feet) of the wetland boundary are regulated by the NYSDEC. To facilitate ease in identifying regulated wetlands and evaluating impacts, NYSDEC has compiled Freshwater Wetland Maps that identify wetlands protected under Article 24. Applications for a permit under Article 24 are completed jointly with the USACE permits under section 404. NY state mapped wetlands in the Eighteenmile Creek watershed are discussed in Section 2.2.10.2 of this document (6 NYCRR Parts 662-665).

Agriculture and Markets Law

The New York State Agriculture and Markets Law was enacted to protect the agricultural industry in New York State. Article 25AA of the Agriculture and Markets Law authorizes the creation of local agricultural districts for the purpose of encouraging 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. The Agricultural Districts Law protects farmers against local laws, which unreasonably restrict farm operations located within an agricultural district. Part 371 establishes the requirements and forms to be used to notify the state agricultural commissioner and the county agricultural and farmland protection board of an intent to undertake an action within an agriculture district.

State Historic Preservation Act

The New York State Historic Preservation Act of 1980 (Chapter 354 of Parks, Recreation and Historic Preservation Law) was modeled directly after the National Historic Preservation Act of 1966. The Act created the New York State Register of Historic Places. Section 14.09 of the Act established a review process for state agency activities affecting historic or cultural properties, requiring

state agencies to consult with the Commissioner of the Office of Parks, Recreation and Historic Preservation.

The guidelines governing the conduct of cultural resource investigations in New York State are contained in the *Standards for Cultural Resources Investigations and the Curation of the Archaeological Collections in New York State* (1994) formulated by the New York Archaeological Council and approved by the New York State Office of Parks, Recreation and Historic Preservation (OPRHP). These guidelines provide the appropriate sequence of cultural resource management procedures for identification and evaluation of historic properties; mitigation of adverse effects on these properties; resource documentation; and curation of archaeological collections. These guidelines also specify the appropriate content of archaeological reports.

2.3.4 Local Regulations and Plans

2.3.4.1 Local Zoning Regulations

Development in the project area is guided and controlled by local plans, proposals, and ordinances. Zoning ordinances for the municipalities along Eighteenmile Creek include specific regulations regarding land use types, underlying zoning designations and Special Zoning District overlays. The purpose of zoning is to regulate the use of land, density of land use, and to guide and control future development.

The Municipal Charter and Code of each municipality describes land use districts and designations as well as permissible land uses; design standards including setbacks, buffers, and height and density requirements.

Most zoning throughout the Eighteenmile Creek watershed region require Planning Boards to consider the impact of development on erosion, sedimentation, drainage, flooding, and water and sewer systems. Municipalities with zoning regulations generally share similar regulatory controls with respect to wetlands, shorelines, and watersheds. For example, wetlands, floodplains, or steep slopes are not normally considered appropriate for building; thus, work within a designated Conservation District may require local Planning Board approval of wetland/watercourse protection measures. Construction may not be allowed within the 100-yr floodplain, or specific setback requirements may exist for areas that carry water six months a year; buffers must be established along streams and watercourses; and any disturbances to these areas would require mitigation. Other typical regulatory controls can include the following:

- Wherever possible, trees, groves, watercourses, and waterfalls must be retained.

- Development may not be approved on uninhabitable land subject to flooding;

- Wetland preservation may be an identified priority;

- Construction and development must be adequate and in accordance with state and federal conservation law; and

- Wetlands must be left unaltered and protected by easements.

Where the zoning requirements set forth in the Charter and Code or the policies set forth in local land use plans do not include watershed protection measures, an inter-municipal agreement should be signed to regulate development along the Eighteenmile Creek watershed region.

2.3.4.2 Local Plans

Eighteenmile Creek Remedial Action Plan 1997

The Eighteenmile Creek Remedial Action Plan (RAP) was prepared by the NYSDEC and the Eighteenmile Creek Remedial Action Committee, in response to a recommendation, by the Water Quality Board of the International Joint Commission, that RAPs be prepared for the 43 Areas of Concern (AOCs) within the Great Lakes Basin. The Eighteenmile Creek AOC is located in the Town of Newfane, Niagara County, New York; along the shore of Lake Ontario approximately 18 miles east of the mouth of the Niagara River. The AOC extends from the mouth of the creek, upstream to the farthest point where backwater conditions exist during Lake Ontario's highest monthly average lake level.

The Niagara County Soil and Water Conservation District (NCSWCD) is proposing to serve as lead agency for the Remedial Action Plan (RAP) coordination and management for Eighteen Mile Creek located in Niagara County, New York. The NCSWCD Eighteenmile Creek RAP Management Project aims to make substantial progress towards the de-listing of the Eighteenmile Creek Area of Concern through strategic management of Creek remediation activities over a five-year period. The initial proposal will be for a two-year period with potential extensions to the grant anticipated, depending on availability of grant funds through GLNPO in

years 2006-2009. The project will focus on four main objectives, which include:

- Tracking and coordination of existing remediation efforts and projects aimed at eliminating beneficial use impairments;
- Developing programs and securing funding to perform remedial investigations and contaminant track-down and delineation projects to address gaps in the existing RAP data;
- Managing data to support RAP implementation and de-listing efforts; and
- Providing community outreach to actively engage all stakeholders in the RAP process

Purpose and Goals of the RAP. The mission of the RAP is to restore the chemical, physical and biological integrity of the ecosystem within the Eighteenmile Creek AOC. This is to be accomplished through the resolution of conditions causing impairment of beneficial uses. The Great Lakes Water Quality Agreement Annex 2 lists fourteen possible water use impairments and the NYSDEC assigns a Best Use classification for stream segments. In addition, specific concerns and goals for the Eighteenmile Creek AOC were identified by the public and the Remedial Action Committee. Finally, the RAP must be consistent with Great Lakes Water Quality Agreement requirements with regard to toxics in toxic amounts and persistent toxics.

Of the 14 possible use impairments listed in Annex 2 of the Great Lakes Water Quality Agreement, three potential use impairments are known to be impaired in the Eighteenmile Creek AOC. One is likely to be impaired and three other use impairments are of unknown status due to inadequate supporting information. The remaining seven potential use impairments are not considered impaired. A goal of the RAP is to resolve the known impairments and determine the status of unknown impairments to these uses. The potential use impairments and the respective status for each is listed below:

- Restrictions on Fish and Wildlife Consumption- Impaired
- Degradation of Fish and Wildlife Populations- Unknown
- Fish Tumors or Other Deformities - Unknown

- Bird or Animal Deformities or Reproductive Problems- Likely
- Degradation of Benthos- Impaired
- Restrictions on Dredging Activities- Impaired
- Degradation of Phytoplankton and Zooplankton Populations- Unknown (see Table 16).

In addition to the potential use impairments listed in the Great Lakes Water Quality Agreement, the NYSDEC designates best use classifications for waterbodies within New York State. The NYSDEC also establishes water quality standards that must be met to ensure the designated use. The NYSDEC best use classifications and water quality standards for the Eighteenmile Creek AOC are also incorporated into the RAP.

The NYSDEC has designated Eighteenmile Creek as Class B from the mouth to the first tributary and Class C from that point to the upstream limit of the AOC. The best use of water bodies designated as Class B is primary contact recreation and of those designated as Class C is fishing and fish propagation. The NYSDEC also establishes water quality standards that must be met to ensure the designated use. Based on studies conducted by the NYSDEC, New York State Water Quality Standards and Guidance Values for Class B and C streams as applied to conditions in Eighteenmile Creek, contaminant levels have exceeded water quality standards for Eighteenmile Creek. Contaminants exceeding water quality standards fall into five classes of substances that are potential causes for impairment. The classes include DDT and its metabolites, pesticides (dieldrin), PCBs, dioxins and metals.

The Public and Remedial Action Committee (RAC) members also provided input to be incorporated into the RAP. The public and the RAC expressed interest in goals to improve aesthetics; habitat enhancement; human health related to contaminated fish, ducks and turtles; human health with regard to recreational contact; and control of contaminated sediments from historic and existing pollution sources. Each of these goals are related to the fourteen Use Impairments in Annex 2 of the Great Lakes Water Quality Agreement.

Table 16 Great Lakes Water Quality Agreement Impaired Uses States for the Eighteenmile Creek AOC

1.	**Restrictions on Fish and Wildlife Consumption- Yes Impaired** New York State Department of Health advisories exist for consumption of fish, turtles and waterfowl for Eighteenmile Creek. Eighteenmile Creek is divided into two segments with regard to fish consumption advisories. The area below Burt Dam is populated by fish that migrate from Lake Ontario, therefore, the Department of Health advisory for Lake Ontario extends into this area. The advisory is based on PCBs, mirex and dioxins. No American eel, channel catfish, carp, lake trout, chinook salmon, rainbow trout, white perch, coho salmon over 21" or brown trout over 20" should be eaten from this area. In addition, no more than one meal per month of white sucker, coho salmon under 21", and brown trout under 20" should be eaten. No fish of any species should be eaten from the portion of Eighteenmile Creek above Burt Dam due to PCB levels in fish. Statewide Department of Health advisories exist for consumption of snapping turtles (due to PCB contamination) and mergansers (due to contamination with PCBs, mirex, chlordane, and DDT). No more than two meals per month of all other waterfowl is also advised.
3.	**Degradation of Fish and Wildlife Populations- Unknown**
4.	**Fish Tumors and Other Deformities - Unknown**
5.	**Bird or Animal Deformities or Reproductive Problems- Likely** Since many piscivorous birds and animals have access to Eighteenmile Creek; the DEC wildlife criteria for contaminant concentrations in adult fish flesh are exceeded for many substances in fish samples from Eighteenmile Creek; and known contaminants in the creek include those known to bioaccumulate and cause deformities or reproductive failures, bird or animal deformities or reproductive problems are likely to occur. Substances likely to cause these issues include PCBs, DDT and metabolites, dioxins and dieldrin.
6.	**Degradation of Benthos- Yes Impaired** Based on sediment toxicity analysis, sediment toxicity studies and inventories of benthic organisms, conducted by the NYSDEC and USACE between 1977 and 1994, Eighteenmile Creek was rated as moderately impacted with regard to benthic organisms. Impairment is likely due to contamination with PCBs and metals.
7.	**Restrictions on Dredging Activities- Yes Impaired** Based on multiple sediment sampling studies conducted by the NYSDEC and USACE between 1977 to 1994, restrictions have been placed (by NYSDEC and EPA) on disposal of sediments dredged from Olcott Harbor. Dredging restrictions are based on sediments contaminated with chromium, copper, cyanides, lead, manganese, nickel, zinc and dioxins.
13.	**Degradation of Phytoplankton and Zooplankton Populations- Unknown** No data is available on phytoplankton and zooplankton populations in Eighteenmile Creek.

The Great Lakes Water Quality Agreement includes a policy that states that, "The discharge of toxic substances in toxic amounts be prohibited and the discharge of persistent toxic substances be virtually eliminated." Therefore, a goal of the RAP is to reduce and eliminate such discharges.

Pollution Sources. Pollution sources in the Eighteenmile Creek watershed include: the New York Barge Canal, industrial and municipal wastewater discharges, inactive hazardous waste sites, bottom sediments, and combined sewer overflows (CSOs). These sources contribute five substances/classes of substances that are the potential causes for the impairments listed above. The classes include DDT and its metabolites, pesticides (dieldrin), PCBs, dioxins and metals. DDT, dieldrin, PCBs, and dioxins likely contribute to bird and animal deformities and reproductive problems. PCBs and dioxins contribute to restrictions on fish and wildlife consumption, PCBs and metals contribute to degradation of benthos, and dioxins and metals contribute to dredging restrictions.

Strategy to Address Impairments. A comprehensive strategy was developed to address impairments of use. The strategy includes plans to continue sediment contamination assessment; identify and address PCB sources; remediate inactive hazardous waste sites; address inflow of contaminants from NY Barge Canal; address unknown potential impairments; continue control of point and non-point pollution sources; and continue stream monitoring.

Stream monitoring is recommended every five years as part of the Rotating Intensive Basin Study (RIBS) and sampling is recommended to determine if flow through Burt Dam is contributing contaminated sediments to the AOC. Development of sediment criteria, assessment of AOC sediments, evaluation of remedial alternatives and additional sampling are recommended to facilitate correction of impairments caused by contaminated sediments. Comprehensive sampling of NY Barge Canal sediments and evaluation of remedial alternatives is recommended to address impairments entering from the New York Barge Canal. Continued remedial work in inactive hazardous waste sites and sampling and analysis for PCBs at the William St. Island are recommended to prevent inactive hazardous waste sites from contributing contaminants to the creek. Monitoring, enforcement, and renewal revisions to promote water quality enhancement are recommended to ensure that municipal and industrial wastewater discharges do not significantly contribute to impairment of the creek. System assessments, maintenance and improvements are recommended to minimize CSOs and ensure that CSOs do not significantly contribute to impair-

ments. It is recommended that study plans be developed to support the assessment of the following potential impairments: degradation of fish and wildlife; fish tumors and other deformities; and degradation of phytoplankton and zooplankton.

As part of the RAP, the NYSDEC committed to a number of actions recommended as funding allowed. The NYSDEC also committed to the production of biennial reports, issued in June of each reporting year, to discuss progress made and firm commitments for future activities.

2001 RAP Status Report

In June of 2001 the NYSDEC issued a status report outlining the progress made from conception through March of 2001 (NYSDEC 2001). According to the status report progress was made in the areas of stream water quality monitoring, bottom sediment sampling, investigations at inactive hazardous waste sites, discharge permit monitoring at municipal and industrial wastewater facilities, combined sewer system assessment, and fish and wildlife habitat. Highlights of these activities included:

- sampling of suspended sediments above and below Burt Dam to determine if impounded sediments were being transported and impacting downstream sediment and water quality,
- sediment sampling to assess levels and sources of PCB contamination,
- completing all Phase I and Phase II investigations of inactive hazardous waste sites within the Eighteenmile Creek basin,
- completion of remedial actions at 13 of 18 identified inactive hazardous waste sites within the basin,
- the monitoring of discharge permits and renewal activities to ensure compliance with water quality standards and technology requirements,
- a sewer sampling program was initiated to determine if there are any continuing sources of PCBs in the system, and
- plans to monitor fish contamination and phytoplankton and zooplankton population were developed and undertaken (NYSDEC. 2001).

Comprehensive and Other Plans: Overview

Five communities located in some portion of the Eighteenmile Creek watershed have developed comprehensive plans, or master plans. These include the towns of Hartland, Cambria, Lockport; the village and town of Wilson; and the City of Lockport. A cursory review was conducted as part of the process of preparing this concept document.

In addition to the municipal-based master plans, the Town of Newfane has a Local Waterfront Revitalization Program (LWRP), which is part of the NY State Department of State Coastal Management Program. The LWRP provides a conceptual plan for local economic development and revitalization of the Newfane Coastal Area (Olcott Harbor, Eighteenmile Creek, Hopkins Creek, and Keg Creek). This plan includes restoration and protection of the Eighteenmile Creek wetland.

Policies of the Newfane Local Waterfront Revitalization Program include: promoting the restoration of Eighteenmile Creek for recreational activities and wildlife habitat, protecting the Eighteenmile Creek – Lake Ontario Significant Fish and Wildlife Habitat from future pollution, encouraging the clean-up of hazardous sediment accumulation in Eighteenmile Creek, and enhancing access to local parks and the Eighteenmile Creek fishing areas downstream from Burt Dam. The Eighteenmile Creek Habitat Restoration Project, a component of this project, supports the LWRP by enhancing recreational opportunities in Eighteenmile Creek, and improving water quality (treatment of non-point source pollution) and aquatic habitat.

The City of Lockport is currently in the process of developing a LWRP and may be formalized by the time the CWMP process in initiated.

As relevant, the watershed management planning process will need to be aware, and account for, the master plans, all LWRPs within the watershed, and any other regional planning initiatives. At a minimum, the planning process will require the review of these plans and understanding the associated goals and objectives.

3 Watershed Management Issues and Opportunities

This section of the Concept Document has been drafted to begin determining what the problems and opportunities are that collectively create and define the issues identified within a watershed (on a subwatershed basis). This section in a CWMP should discuss watershed management issues and opportunities identified during the planning process and collected from a number of sources.

Sources of input for identification of issues and opportunities should include:

- technical site surveys and studies along with analyses of existing conditions;
- interviews with resource management professionals, landowners, and other stakeholders;
- input from various planning and regulatory entities;
- agency and public workshops/meetings; and
- surveys/questionnaires administered to the municipalities and public.

The issues and opportunities identified are developed from a thorough understanding of the existing conditions within the watershed/subwatersheds and the history of the watershed, and are based on the social values of the stakeholders. Identification and clarification of all pertinent issues and opportunities sets the stage for development of goals, policies, and actions required for successful management of watershed resources. Some potential issues have been identified in this document are based on the information presented in Section 2 and have been incorporated as example text below (see Text Box). See the example table of contents in Appendix A for a more complete listing of what may be included in the actual CWMP.

Stakeholder input is crucial to thorough identification of watershed issues. Stakeholder input is likely to be gathered through meetings and workshops but can also be gathered using a series of surveys. An initial survey could be structured to elicit opinions of perceived problems/issues/opportunities within the watershed. The responses to this survey and information from analyses of existing conditions could be combined to develop an unranked list of issues within the watershed. A second survey could be administered in which respondents are asked to rank the issues in order of importance. This survey methodology was utilized for the Scajaquada Creek Watershed Management Plan in Erie County.

Once issues have been identified by the stakeholders, it may be helpful to organize specific issues into general categories. Potential categories might include:

- water quality,
- human health,
- aesthetics,
- ecological resources,
- cultural resources,
- watershed activities,
- economics,
- recreation, and
- public awareness.

The management issues section of the watershed management plan could be divided into sub-sections with each sub-section devoted to a category. Within each category, specific issues could be identified and generally organized from highest to lowest priority. This grouping, of similar issues and opportunities, will facilitate later stages of the planning process (i.e., goal and policy development, development of management actions, determining implementation priorities).

3.0 Watershed Management Issues

Identification and clarification of all pertinent problems or issues within the watershed is crucial to the development of a successful plan for the management of watershed resources. This section includes a presentation of issues within the Eighteenmile Creek watershed that were developed during the planning process and were identified from a number of sources including site surveys and analyses, agency and public meetings, workshops, and surveys/questionnaires administered to the municipalities and public.

This section is organized into the following subsections: water quality, natural resources, cultural resources, public awareness, watershed activities and financial concerns. Within each subsection, watershed issues are identified and are organized in order of highest to lowest priority. Since watershed issues are highly complex and interrelated, issues have been included under the sub-section most closely associated with that issue.

3.1 Water Quality

Protection of water quality is important and is interrelated with many other watershed management issues. Water quality can be affected by a wide variety of variables including: land use, types and volumes discharges to the receiving waters, historic contamination, on-going inputs continuing contamination, non-point source pollution, etc. Activities throughout the watershed have the potential to affect water quality, not only in Eighteenmile Creek and its tributaries, but in Lake Ontario as well. In addition, water quality has the potential to affect fish, wildlife and plant communities, recreational opportunities and socioeconomic conditions (such as real estate values and quality of life) within and beyond the boundaries of the Eighteenmile Creek watershed

Watershed issues related to water quality are listed below under the following categories: existing contamination, erosion/sediment transport, land use practices and development, invasive species, water quality monitoring, and regulatory responsibilities.

3.1.1 Existing Contamination

- PCB and dioxin contamination pose threats to human health related to consumption of contaminated fish, waterfowl, and turtles.

- Presence of contaminants indicates potential threats to human health related to recreational contact with contaminated sediments and water.

- DDT and its metabolites, pesticides (dieldrin), PCBs, and dioxins, found in contaminated sediments within Eighteenmile Creek, may cause bird and animal deformities or reproductive problems.
- Contamination in sediments indicate potential for degradation of benthic communities.
- Dredging restrictions are imposed as a result of sediment contamination.
- Unknown pollution sources are affecting water quality.
- Non-point source pollution is entering the system that may be detrimental to natural resources (NYSDEC 1997).

3.1.2 Erosion/ Sediment Transport

- Increased turbidity and sedimentation in the creek resulting from erosion degrades water quality.
- The amount and intensity of recreational use of stream bank removes vegetation and increases erosion.
- Stormwater runoff from Olcott, Newfane and Lockport transports sediments and potential contaminants to the creek.
- Unstable steep slopes.
- Stream bank erosion.
- Non-point source pollution and stormwater runoff are contributing to erosion and sedimentation of surface water resources.

3.1.3 Land Use Practices and Development

- Encroachment on riparian corridors reduces vegetated buffers affecting biotic communities and reducing natural water quality buffer effects.
- Agricultural practices of extending crop fields to the tops of stream banks can contribute sediments, pesticides, and herbicides to watershed streams.
- Increases in impermeable surfaces reduces groundwater recharge which can affect base flows of watershed streams, and channels stormwater in to municipal sewer systems which can overtax the systems and lead to the release of untreated sewage.

3.1.4 Invasive Species

- Zebra mussels (Dreissena polymorpha) attach to intake pipes, pilings, buoys and native mussels; and in so doing constrict flow, increase the rate of deterioration, sink navigational aids and interfere with the life cycles of native species.

- Glossy buckthorn (*Rhamnus frangula*) has very rapid growth rates, resprout vigorously after being cut, leaf out very early, retain their leaves late in the growing season, thereby shading out native wildflowers and out-competing native shrubs.

- Giant hogweed (*Heracleum mantegazzianum)* exudes a clear watery sap which sensitizes the skin to ultraviolet radiation. This can result in severe burns to the affected areas resulting in severe blistering and painful dermatitis. These blisters can develop into purplish or blackened scars. Proliferating populations in urban and suburban areas represents an increasing public health hazard (http://www.ecy.wa.gov/programs/wq/plants/weeds/aqua012.html).

- Purple loosestrife (*Lythrum salicaria)* out-competes beneficial native wetland species reducing biodiversity and natural community structure while providing little or no habitat value to fish or wildlife.

- Japanese knotweed (*Polygonum cuspidatum)* forms dense stands that crowd out all other vegetation, degrading native plant and animal habitat.

3.1.5 Water Quality Monitoring

- Need additional monitoring for PCBs and other types of contamination.

- Monitoring should not only focus on point discharges but non-point discharge sources as well.

- An investigation could be conducted to find out whether a true background (i.e., pre-industrialization/pre-contamination) for water quality can be developed.

3.1.6 Coordination Between Regulatory Agencies and Other Jurisdictions

- Operation and maintenance**.**

3.2 Water Level Management

The water levels within the creek are modified by various sources along the length of Eighteenmile Creek. Inputs include the Erie Canal at Lockport and the sewage treatment plants at Lockport and Gasport. Additionally, the reservoir/ pool above Burt Dam and the dam itself in Newfane greatly affect the character of flow, velocities of flow, and water depth up- and downstream of those locations.

- Sources and mechanisms of water level management and use of stream water should be reviewed to determine effects on base flow and flow regimes, and resulting effects on in-stream/near-stream plant and animal communities, and on water quality.

3.3 Natural Resources

The plants, wildlife and fishery resources on the watershed are all important to a healthy ecosystem. In addition they provide recreational opportunities and support recreation based business within the watershed. Issues related to natural resources are listed below under the following categories: aquatic habitat, terrestrial habitat, aquatic wildlife, terrestrial wildlife.

3.3.1 Aquatic Habitat Integrity

- Upstream aquatic habitat is separated from Lake Ontario by Dam structures.
- Lack of appropriate protection for sensitive habitat areas.
- Introduction of aggressive exotic species that displace native species and decrease biodiversity.
- In-stream structure and substrate types may reduce habitat diversity and integrity.
- Water quality may be limiting biotic diversity.

3.3.2 Terrestrial Habitat Integrity

- Impacts to riparian vegetation from the amount and intensity of recreational fishing use.
- Fragmentation and disruption of terrestrial habitat due to land use.
- Reduction and/or elimination of riparian zones can limit important transition habitats between uplands and watershed streams; this affects species diversity, floodplain function, and overall habitat structure and availability.

Narrative has been developed (see text box) for a number of the general categories of watershed issues listed above. This text is being provided to function as potential text for inclusion in the Eighteenmile Creek CWMP and for the purposes of illustration.

As indicated previously, the watershed management issues and opportunities will be identified and developed through the early stages of establishing the Eighteenmile Creek CWMP. Coordination will likely occur between Niagara County, municipalities occurring within the watershed, regulatory agencies, non-governmental organizations and alliances, and private citizens. The issues listed in this document are for illustrative purposes only, however, based upon some of the work that has been conducted to date it may be safe to assume that some of the example issues will be identified in the Eighteenmile Creek CWMP. Other categories not included in the example text that are likely to be identified as issue categories in the future (i.e., public awareness, cultural resources, aquatic wildlife, etc.).

4 Watershed Management Goals and Policies

This section of a watershed management plan establishes the groundwork for defining goals and policies for managing the watershed. The major components of this stage in the planning process is the development of:

- A listing of goals for the watershed; and
- A listing of policies to guide decision-making.

The following paragraphs include definitions and examples for goals and policies and some suggestions for organizing this section of the watershed management plan. Example text is also provided below for the purpose of illustration (see Text Box). The goals listed here are typical of goals common to many watershed management plans. However, the actual number and content of goals for the Eighteenmile CWMP will depend on input from stakeholders and their collective vision for the future of the watershed.

Goals

The word *goal* is defined as: "*The purpose toward which an endeavor is directed; an objective*" (http://education.yahoo.com/reference/dictionary/entries/83/g0168300.html). For the purpose of this watershed plan, a goal can be thought of as an objective for the future of the watershed. Goals should generally define the stakeholders' vision for the future quality and disposition of the watershed; they should state the desired changes in the watershed. Goals should relate to conditions within the subwatersheds and should relate to other aspects of the watershed management plan.

Goals should:

- Support the overall purpose/mission statement of the watershed management plan,

- Be formulated upon information derived from the analyses of the existing conditions in the subwatersheds,
- Should account for existing regulations,
- Be based upon the identified watershed issues or problems as identified by the stakeholders,
- Form a basis for policies and management actions designed to bring about the desired changes in the watershed,
- Be consistent with social, political, and economic values within the watershed (i.e., represent a consensus of the stakeholders); and
- Be measurable or quantifiable.

Each goal can be derived from an answer to the question "What do you want the watershed to be like in the future." For example, if in response to the question, planners review the existing conditions in the Eighteenmile Creek watershed in relation to the problems, they may surmise that many of the current problems relate to contamination. The review of existing conditions reveals that multiple contaminants have been introduced into the creek and its tributaries in the past and that contamination persists. Review of the issues, identified by stakeholders, reveals that these contaminants have resulted in restrictions on consumption of fish, waterfowl, and turtles; and potential impacts to fisheries and other aquatic life. A response to the question, based on this review, may be: "I want the watershed to be free of pollution." A goal associated with that answer might be: Improve and protect water quality.

Once stated, the goal can be reviewed for compatibility with the mission statement for the watershed, consistency with stakeholder values, and measurability. The goal can be used to form the basis of policies and management actions (discussed below and in Section 5). If goals are determined to be inconsistent with other aspects of the planning process, they can be revised as the planning process proceeds.

According to the literature review conducted, watershed management goals are typically very general, and list fewer than ten goals that sum up the desired future condition of a watershed.

Some examples of typical watershed goals, based on a review of existing watershed management plans, include:

- Improving and protecting water quality;
- Preserving and enhancing ecological and cultural resources of the watershed;
- Promoting compatible uses on watershed lands, including but not limited to, educational, recreational and scientific uses;
- Promoting economic sustainability and/or growth in balance with resource conservation;
- Providing fiscal framework that balances revenue generating activities and overall benefits, and an administrative framework that allows implementation of the watershed management plan; and
- Enhancing public awareness of water quality, water supply, conservation and watershed protection issues.

Goals can be used to focus planners and stakeholders on desired outcomes (e.g., clean water). As long as the goals are realistic and achievable, this can also be an important tool to motivate participants and stakeholders rather than emphasizing problems and who is causing them (http://ohioline.osu.edu/ws-fact/0001.html).

Policies

A policy is a general plan for achievement of a goal. *Policy* is defined as: *A plan or course of action, intended to influence and determine decisions, specific actions, and other matters* (http://education.yahoo.com/reference/dictionary/entries/20/p0412000.html). This definition is appropriate for a watershed plan because policies are intended to guide decisions about actions that will achieve the goals, and consequently to bring about the desired future of the watershed. Like goals, policies are a step in the planning process that is based on, and forms the basis for, other portions of the watershed management plan.

Policies should:

- Be based on preceding steps in the planning process (mission statement, existing conditions, issues identified by stakeholders, and the goals of the watershed management process),
- Act as a general framework for later steps in the planning process (management actions, and implementation),

- Be consistent with stakeholders values; and

- Be consistent with existing regulations (http://www.usda.gov/stream_restoration/newtofc.html).

While goals state the vision for the future of the watershed, policies are the beginning step toward achieving those goals. Policies can be derived from answering the question, "What do we need to do to bring about the changes that we want to see in the watershed?". However, they are general answers to this question rather than specific ones (specifics are incorporated into management actions). Continuing with the example from above, we begin with the goal of improving and protecting water quality that was derived from a review of existing conditions and issues identified by stakeholders. In order to figure out how to bring about this change we need to address the cause of the problem that, in the case of Eighteenmile Creek, involves the past and ongoing introduction of contaminants. A logical answer to our question of how to improve water quality, based on the cause of the problems, is to stop the introduction of more contamination and to clean up the contamination that is already there. This could lead to the development of two policies:

- Prevent the introduction of heavy metals, chemicals, pesticides and other deleterious substances into the waterways; and

- Clean up contaminated sites.

These policies provide a general idea of how to improve water quality, but do not go as far as describing a specific action or approach to prevent chemicals from reaching the waterway or to clean up areas that are already contaminated. Thus allowing for further study to create a variety of approaches to deal with these issues, while providing a basis for the development of more detailed approaches.

Detailed actions are discussed in Section 5 - Watershed Management Actions and are the subsequent step in the management planning process. Policies will serve as the basis for the management actions and management actions may serve to refine policies. For example, once studies are conducted to plan the clean up of contaminated sites, it may be determined that more harm will come from removing contamination than from leaving it in place but will require taking measures to ensure that it does not migrate to uncontaminated areas. Also, the further study of goals and policies may

lead to the prioritization of actions. Priorities may be established based upon imminent need due to identified ecological or health consequences that could arise from delayed action, on cost/funding issues, or a number of other variables. Given our example, the policy may be revised from "clean up contaminated sites" to "remediate contaminated sites".

While goals are typically general, fewer in number, and straightforward, policies are more detailed and more numerous in order to facilitate the planning process. As the planning process proceeds and information becomes more specific, the amount of information and organization of the material becomes more important.

Sample text for a watershed management plan is included below. In the sample, policies are grouped according to the general topic that the policy relates to and the goal from which they were derived is restated. This organization helps to focus the policies on the goals and serves as a cross check to ensure that policies are responsive to the stakeholders vision for the future of the watershed. The sample text is based on the review of existing watershed management plans and follows the format of the Alameda Watershed Management Plan chapter on goals and policies. There is a break in the sample text to allow the general flow of text to be illustrated and to provide an example that is related to a topic other than water quality. As indicated in Section 3, the example text is not intended to be exhaustive, rather to offer illustration. See the example table of contents in Appendix A for a more complete listing of what may be included in the actual CWMP.

4.0 Watershed Management Goals and Policies

This chapter identifies the goals and policies that will direct the management of the Eighteenmile Creek watershed. The goals were established during the course of the planning process and address the watershed issues and concerns identified in Chapter 3 (i.e., Watershed Management Issues and Opportunities). Policies have been developed from stated goals and will serve as the framework to guide ongoing decision-making with regard to the watershed.

4.1 Goals

Once the watershed issues were identified, stakeholder meetings were held to discuss the desired future of the watershed. Stakeholder coordination resulted in the identification of seven watershed management goals, as listed below.

Goals

- Maintain and improve water quality to protect public health and safety.
- Continue existing compatible uses and provide opportunities for potential compatible uses including education, recreation, and tourism.
- Preserve and enhance the ecological and cultural resources of the watershed.
- Provide a fiscal framework that balances financial resources, revenue-generating activities, and overall benefits and an administrative framework that allows implementation of the CWMP.
- Enhance public awareness of water quality, conservation, and watershed protection issues.

4.2 Policies

Once goals for the future of the watershed had been established, a general plan to bring about that future was required. Policies define how specific goals will be met and were developed to act as guidelines for management actions and decision-making throughout the watershed. To make the CWMP easier to use, the policies were organized into ten major topic areas. Each "Major Topic Area" and an abbreviated code for each is listed in Table 4.2-1.

Table 4.2-1 Major Topic Areas

Major Topic Area	Abbreviated Code	Section Number
Water Quality	WQ	4.2.1
Watershed Activities	WA	4.2.2
Vegetation	VG	4.2.3
Wildlife	WL	4.2.4
Cultural Resources	CR	4.2.5
Aquatic Resources	AR	4.2.6
Public Awareness	PA	4.2.7
Administrative and Finance	AF	4.2.8

The remainder of Section 4 details the policies under each Major Topic Area. Under each Major Topic Area heading, the most closely associated goal is restated and the policies agreed upon by the stakeholders are listed. The policies are arranged in groups according to policy sub-topics. The policies are numbered according to the Major Topic Area abbreviated code and order of listing. For example, the first policy listed under Watershed Activities is Policy WA1.

4.2.1 Water Quality

Goal: maintain and improve water quality to protect public health and safety.

Policies have been developed to address the threats to water quality within the watershed. The policies focus on remediation of existing contamination sources, prevention of future contamination, prevention of land use practices that result in adverse impacts to water quality, education regarding water quality, and coordination of water quality monitoring and protection efforts with applicable agencies, municipalities, and organizations.*

4.2.2 Watershed Activities (WA)

Goal: Continue existing compatible uses and provide opportunities for additional compatible uses including educational, recreational, and tourism.

Policies have been developed to address the multitude of existing and potential future activities within the watershed. The policies focus on public access to and use of the watershed, and coordination of planning and approvals with applicable agencies, municipalities, and organizations.

* It is likely that stakeholders will develop multiple policies associated with the goal of maintaining and improving water quality

Watershed activities polices are organized into the following topic areas:

- Prohibitions and restrictions on new activities and/or development
- Activities allowed by permit
- Recreational access
- Review process for proposed plans and projects
- Requirements for new facilities, projects, activities, and development
- Evaluation of existing activities
- Coordination

4.2.2.1 Prohibitions and Restrictions on New Activities and/or Development

Policy WA1: Prohibit activities that are detrimental to watershed resources. Prohibited activities include:

- Dumping and littering
- Unauthorized, non-permitted discharges to surface waters
- Removing vegetated riparian zones.

Policy WA2: Limit commercial, industrial, and residential development to that which is compatible with water quality protection, ecological resource conservation, agricultural conservation, cultural resource conservation, and recreational and visual aesthetics. Develop best management practices for those types of development.

Policy WA3: Restrict new utility lines to planned utility corridors.

4.2.2.2 Recreational Access

Policy WA4: Proposed recreational activities shall be compatible with their landscape setting, shall not adversely affect watershed resources, and shall comply with the goals and policies in this plan.

Policy WA5: Maintain existing public trails and monitor allowed activities. Encourage the most active trail use upon these trails (i.e., biking, hiking, walking, horseback riding, etc.).

Policy WA6: Develop new public access trails in zones of lesser resource vulnerability and risk.

Policy WA7: Support new trail connections that link to adjacent communities and to existing trail facilities in zones of lesser resource vulnerability and risk.

Policy WA8: Inform users of trail rules.

Policy WA9: Initiate and organize a volunteer program for litter collection along public trails.

4.2..2.3 Review Process for Proposed Plans and Projects

Policy WA10: To ensure that all future land management decisions and uses remain consistent with the goals and policies set forth in this Plan, all proposed plans and projects on the watershed shall be reviewed according to the defined process. All proposed plans and projects on the watershed shall be analyzed for compliance with the goals and policies set forth in the Plan and must undergo this review process prior to being approved or denied.

Policy WA11: Appropriate comments should be made for any proposed plan or project not in compliance to allow the applicant to revise the plan to be compliant.

4.2.2.4 Requirements for New Facilities, Projects and Development

Policy WA12: Proposals for new development should be:
Limited to zones of low vulnerability
Designed, sited, constructed and maintained to conform with the goals and policies set forth in this watershed management plan.

Policy WA13: All maintenance, operation and construction activities shall incorporate Best Management Practices.

5 Watershed Management Actions

Watershed management actions are specific approaches for implementing goals and objectives, and for addressing the factors that bring about solutions to identified watershed issues. Once the watershed issues have been identified, goals for the future condition have been set, and policies have been established to guide future actions and decisions; management actions must be devised to bring about the desired future. A CWMP should comprise a list of management actions; or actions that, when implemented, will result in the desired changes in the watershed. This section should answer the question: "How will it be done, and in what order?"

Specific actions and projects should be evaluated and ranked within each of the subwatersheds according to the relative return of benefit in meeting the watershed management goals and policies. For instance, actions can be ranked according to the anticipated reduction in non-point source pollution loading and water quality improvements, the potential effects on other resources including open space and sensitive species, cost, and technical feasibility of practices and the longevity of improvements. (Note: Language provided by DOS per example work plan for a watershed management plan.)

Criteria should be established to guide the process of prioritizing actions and projects. In this way criteria can be used to provide an objective format in which to determine when actions should occur and develop the rationale of why some actions are recommended for implementation before others. Criteria may include: cost, feasibility, determination of adequacy of existing data/continuing data needs, ecological risk/health, human risk/health, etc.

The evaluation and ranking of actions/projects will lead to developing recommendations and related rationales for prioritization of projects within the subwatersheds.

Organization of watershed management plans tends to become more complex as the process develops and more information is added to a plan. Some organizational suggestions for Section 5 are described here and illustrated in the example text provided later in this section.

Section 5 comprises a list of management actions and, like the policies listed in Section 4, the management actions are organized into various groups. The management action groups or topics are based on existing functional management activities. Potential management action topics include stormwater, waste, environmental compliance, fisheries, cultural resources, (to list a few).

The example text also includes a table that ties the management topics back to the goals and specifies whether implementation under that management action topic generally has a direct or indirect impact on achievement of the goals (see Text Box). This functions as a cross check to ensure that the management topics, and by association the actions included under these topic headings, address the goals of the watershed management plan.

An additional table is included that lists the management action topics along with subtopics covered under each topic and the page numbers on which discussion of that topic begins. This table functions as a reference to allow users to quickly locate the management action topic most closely related to the action for which they are interested in learning more about. Sample text detailing management actions for the Wildlife action topic is also included. See the example table of contents in Appendix A for a more complete listing of what may be included in the actual CWMP.

5.0 Watershed Management Actions

The previous chapter presented the goals for the future of the watershed and policies to be used to make decisions regarding watershed management. This chapter presents the management actions that serve to implement the goals and policies.

Management actions are specific tasks that are intended to guide landowners, agencies and municipalities in the day-to-day activities required to properly manage the watershed. Guidelines are provided for additional direction and clarification for selected management actions. Management actions are intended to be implemented over a number of years and are considered the most appropriate actions for watershed management at this time. For this reason, management actions may need to be revised as changes arise (new information comes to light, new technologies become available, etc).

This section is organized into functional management units called Management Action Topics. These include:

- Stormwater
- Vegetation and soil management
- Aquatic habitat protection
- Wildlife
- Fisheries
- Hazardous materials and contaminants
- Waste
- Cultural resources
- Environmental compliance

- Public outreach
- Fiscal framework
- Information management.

A matrix has been developed (Table 5-1) that identifies the relationships between management action topics and the goals that the actions are meant to achieve. The table lists the Management Action Topics and identifies the goals and policies from which they were derived. Since the management actions are meant to implement the goals and polices listed in Section 4, an indication of whether a management action directly or indirectly implements each goal and its policies is provided. A (D) indicates that implementation of the management actions under that management action topic generally have a direct impact on achievement of a goal while (I) indicates that implementation results in indirect impacts on achievement of a particular goal. A three letter abbreviated code for each management action topic is also included.

The matrix serves as a check to ensure that the management actions planned for the watershed are applicable to the goals identified by stakeholders. For example management actions under the stormwater topic directly impact achievement of the goal to maintain and improve water quality and have an indirect effect on the goal to preserve and enhance the ecological resources of the watershed. The matrix will also illustrate which, if any, goals lack reinforcement through management actions.

Table 5-1 Management Action Topic/ Goals Matrix

Watershed Management Action Topics	Watershed Management Goals				
	Maintain and improve water quality to protect public health and safety	Continue existing compatible uses and provide opportunities for potential compatible uses including educational, recreational, and tourism	Preserve and enhance the ecological and cultural resources of the watershed	Provide a fiscal framework that balances financial resources, revenue-generating activities, and overall benefits and an administrative framework that allows implementation of the Watershed Management Plan	Enhance public awareness of water quality, conservation, and watershed protection issues
Stormwater	D		I		I
Vegetation and Soil Management	D		D		I
Aquatic Zone Protection	I		D		I
Wildlife			D		I
Fisheries			D		I
Hazardous Materials and Contaminants	D		I		
Waste	D		I		
Cultural Resources			D		I
Environmental Compliance	D		I		D
Public Outreach	D	D	I		D
Fiscal Framework	I			D	
Information Management	I		I		

Table 5-2 lists 14 management action topics and associated subtopics, and indicates the section number in which a discussion of each topic is found and the page number where this section begins.

Section	Management Topic	Page Number
5.1	Stormwater (STO) ■ point discharge monitoring ■ non-point discharge runoff plan ■ stormwater facility capabilities study ■ use of best management practices ■ agricultural drainage management plan ■ road drainage management plan	5- _
5.2	Vegetation and Soil Management (VGS) ■ vegetation management plan ■ assessment prior to new activities ■ invasive species ■ sensitive, rare, threatened and endangered species ■ restoration ■ wetlands ■ soils management ■ integrated pest management ■ coordination and collaboration	5-_
5.3	Aquatic Zone Protection (AZP) ■ assessment prior to new activities ■ stream channels and banks ■ shorelines ■ monitoring ■ sediment management	5-_
5.4	Wildlife (WIL) ■ assessment prior to new activities ■ wildlife habitat ■ invasive species ■ sensitive, rare, threatened and endangered species ■ future studies and monitoring	5-_
5.5	Fisheries (FIS) ■ fish migration ■ habitat management ■ invasive species ■ future studies and monitoring	5- _
5.6	Hazardous Materials & Contaminants (HAZ)	5- _
5.7	Waste (WAS)	5- _

Section	Management Topic	Page Number
5.8	Cultural Resources (CUL) ■ assessment prior to new activities ■ protection of existing resources ■ future studies and monitoring	5- _
5.9	Environmental Compliance (ENV) ■ Environmental compliance responsibilities ■ assessment prior to new activities ■ mitigation measures ■ coordination and collaboration	5- _
5.10	Public Outreach (PO) ■ public education program ■ facilities and information ■ volunteer program ■ coordination and collaboration	5- _
5.11	Fiscal Framework (FSC) ■ costs and benefits of watershed activities ■ watershed management funding	5- _
5.12	Information Management (IMM) ■ watershed natural resources center ■ GIS operations and database maintenance ■ Watershed webpage maintenance ■ Coordination and collaboration	5- _

The remainder of Section 5 is divided into subsections; one for each management action topic. Each subsection includes a discussion of each management action topic, the subtopics under each and the management actions covered under that management action topic. Each management action is numbered using the three letter abbreviated code for the management action topic under which it appears and the order of appearance. For example, the first management action under stormwater would be Action STO 1.

In addition, referrals for actions related to the management action topic but more appropriately addressed under another management action topic are given. For example, public education efforts regarding stormwater are related to the Stormwater management action topic, but are more appropriately covered under Public Outreach.

5.1 Stormwater (STO)*

5.2 Vegetation and Soil Management (VGS)*

5.3 Aquatic Zone Protection (AZP)*

5.4 Wildlife (WIL)

Preserving wildlife species and their habitat is an integral part of maintaining ecological balance and sustainability of the watershed. The Eighteenmile Creek watershed is considered to contain a variety of wildlife species. The interrelationships between the watershed and wildlife are partially based upon available habitats and wildlife movement. The correlation between vegetation and wildlife including plant-animal interactions is well documented (Morrison et. al., 1998). Specifically, there are numerous spatial and geo-physical variables that influence habitats, wildlife population structure, and the long-term viability of populations. Therefore, central to the study and management of wildlife involves the analysis of the distribution and abundance of plants as a function of determining wildlife-habitat relationships (Morrison, et. al., 1998).

Simply stated, the occurrence, distribution, overall numbers, diversity, and, ultimately, viability of wildlife are dependent upon (but not limited to) such factors as:

- Reproductive ecology,
- Population genetics,
- Population dynamics, and
- Biogeography.

Human-induced disturbances on the landscape and within the Eighteenmile Creek watershed, however, have strongly influenced the availability, quantity, and quality of habitats and therefore on the types and distribution of wildlife species. It should be stated here as well that non-native (i.e., invasive, exotic) species introductions can radically alter local habitat structures, availability of forage and cover, and modify the balance of competition for resources. Invasive species known to occur in the watershed include Japanese knotweed, giant hogweed, garlic mustard, and the zebra mussel.

* Text will be developed during the planning process that will define and describe the management actions for each topic area.

Management actions have been developed based upon some understanding of species' responses to changes in environmental conditions. This section presents actions focused on monitoring and regulating new and existing activities within the watershed and restoration of wildlife habitat to ensure the long-term protection of wildlife.

The management actions for wildlife are divided into the following topics:

- Assessment Prior to New Activities (see Section 5.___)
- Wildlife Habitat (see Section 5.___)
- Sensitive, Rare, Threatened and Endangered Species (see Section 5.___)
- Future Studies and Monitoring (see Section 5.___)

Additional actions related to wildlife management but more appropriately addressed in other sections include:

- Public Education Regarding Wildlife (Section 5.__, Public Outreach)
- Actions Related to Maintaining a Current Watershed GIS Database (Section 5.__, Information Management)

5.4.1 Assessment Prior to New Activities

Action WIL1: Prior to construction, and in conjunction with the review and permitting process for development, assess the impact on wildlife.
Consolidate siting of linear facilities.
Design projects to maintain connectivity between habitat types.
Minimize stream crossings.
Avoid/minimize disturbance to nesting birds.

5.4.2 Wildlife Habitat

Action WIL2: Assess wildlife habitat availability, existing vegetative cover types, and connectivity within the watershed.

Action WIL3: Develop a wildlife corridor plan in conjunction with landowners.

5.4.3 Sensitive, Rare, Threatened and Endangered Species Future Studies and Monitoring

Action WIL5: Develop a database of sensitive species data for the watershed including known occurrence, potential species, habitat requirements and known existence of appropriate habitat.

Action WIL6: Periodically update sensitive species data for the watershed.

Action WIL7: Develop a multi-species habitat conservation plan.

6 Phasing and Implementation

The phasing and implementation of management actions is a critical component within the CWMP process. Implementation essentially represents the culmination, or the result, of all of the activities that have been conducted to date, such as: issue identification, determination of goals, and development of management actions and policies.

After management actions have been designed, evaluated, and prioritized additional planning is required to implement these actions. Specific considerations for implementing each action includes (but is not limited to):

- Securing funding for implementing management actions;
- Identifying tools for facilitating the implementation of management actions (i.e., conservation easements, donations, technical assistance, public outreach, etc.);
- Defining and determining responsibilities;
- Determining the implementation schedule;
- Conducting permitting compliance review and completing the necessary permit applications and obtaining permits, as needed;
- Communicating with affected property owners and the public in advance; and
- Securing access to properties affected by the implementation of an action.

In brief, by this stage of the planning process funding should be secured for each given action about to be implemented. Additionally, successful implementation also depends on constructing a responsibilities network, which assigns specific responsibilities to

those participating in the implementation action (FISRWG 2001 and Center for Watershed Protection 2004). Similarly, it is important to have a detailed idea of the sequence of implementing an action from design to construction, inspection, and monitoring and maintenance. This effort could involve Technical Committee members (see Section 1), in support of the Administrative Committee.

Over the course of developing a CWMP, an overall time frame for which the entire plan is to be implemented may be developed (i.e., all goals and objectives met within a 30 year period, by which time the plan will be considered complete; see brief discussion in Section 1.1). A review of the management actions will provide a sense of timing for when specific projects should occur. Series of projects may be assigned to given time periods (i.e., within 5 years, within 10 years, etc.), or separated into long-term and short-term categories based upon the perceived urgency by which certain actions should occur, or the perception (and reality) of when funding would be available to implement. Consequently, some management actions will be more immediate than others, some will need to take place during specific time periods, and others will be ongoing or reoccurring. Each specific management action should be developed with the understanding that it will be re-visited, reviewed, and updated over time. This approach injects flexibility as to how and when each action is implemented, who will conduct the work, and whether new technologies have been developed which could modify specific implementation measures.

The Phasing and Implementation section of a CWMP should include details for implementing each management action including:

- The priority and timing required
- The parties primarily responsible
- Other parties that will be involved and their roles and contributions
- Parties with regulatory authority
- Other parties that should be consulted
- Plans for securing funding
- Allocation of funds for each project (management action)

- Actual implementation measures (i.e., detailed restoration plan for restoration effort, detailed plan for educational outreach, etc.)

Example text below includes a table that summarizes the management actions detailed in the CWMP and provides key pieces of implementation information (see Text Box). (See the example table of contents in Appendix A for a more complete listing of what may be included in the actual CWMP). The table is meant to act as a vehicle to track the status of implementation of management actions. Ultimately, an interdisciplinary technical team should be involved in the planning, design, costing, and implementation of specific actions. Technical team members may come from federal, state, or local agencies; local governments; universities; consultants and contractors; and local citizens and volunteers.

The table is arranged according to priority, and therefore in chronological order relative to when particular management actions may be completed. In the example, priority codes have been established to indicate whether the action has been, or will be, initiated before the plan is adopted or by the end of the fifth, tenth or fifteenth [(1), (2), (3) or (4)] year after the Plan is adopted. Special modifiers are also listed to indicate whether an action should be repeated on a regular or as-needed basis.

To illustrate how a plan can be built around existing programs, the first two actions in the example table were taken from the *Eighteenmile Creek Remedial Action Plan: Status Report, June 2001* prepared by the NYSDEC (NYSDEC 2001). As stated in previous sections, the example material is provided for illustration purposes. The actual planning process for the Eighteenmile Creek CWMP will provide the necessary detail to ensure logical planning and implementation of management actions.

6.0 Phasing and Implementation

This Chapter provides a matrix for managing implementation of the management actions defined in Chapter 5. Implementation of these actions requires a determination of when the action should be undertaken and who (which agencies or individuals) is responsible for each action or those requiring coordination. The matrix includes this information (in a tabular format) as well as information on the status of the action and funding for the action. The following table acts as a summary of the status of the management actions called for in the CWMP.

Priority*	Management Action Number	Management Action Section	Description	Coordination	Funding	Status
(1)	HAZ3	5.6	Continue sampling of Eighteenmile Creek to determine the sources (or source areas) of PCBs.	NYSDEC		Completed
(1)	FIS1	5.5	Develop study plans for fish, wildlife and plankton to determine the status of deformities and degradation of populations as related to impairment indicators.	NYSDEC		Completed
(1)A	CUL5	5.8	Conduct appropriate reviews before undertaking activities involving disturbance below the surface or excavation to protect buried cultural resources.	Native American Groups, Historical Societies, Citizens, SHPO		
(2)	PUB10	5.10	Develop and implement an overall watershed education program.			
(3)B	PUB12	5.10	Publish informational fact sheets regarding best management practices.			
(4)	WIL2	5.4	Assess wildlife habitat availability and connectivity within the watershed.	Landowners, NYSDEC		

*

Phase (1): Pre-Plan adoption
Phase (2): within 5 years of Plan adoption
Phase (3): within 10 years of Plan adoption
Phase (4): within 15 years of Plan adoption
(A): on an as-needed basis
(B): at regular intervals

7

Monitoring and Assessment

Once management actions have been implemented, it is important to examine the results (monitor) and figure out whether the planned action is working the way it was intended to (assessment). If the desired outcome has not been obtained, or if the desired outcome has changed, the plan may be changed or adapted to reach the outcome.

Monitoring and assessment should answer the question “Did the implementation of the design result in the intended consequence, or condition?” or “Did we achieve what we set out to do?”. Monitoring plans and success evaluation criteria should be developed along with development of the management action and should be specifically related to project goals. General steps for modifying the planned action should also be included.

A monitoring plan should provide a reference to the CWMP, the project (management action) goals and objectives, and any specified performance standards or anticipated resulting condition. A list of the various elements, features, areas, etc. to be monitored should also be provided.

Monitoring tasks include data collection and observation; specific types of monitoring will depend on the action. Monitoring tasks for the pre-, during, and post-construction phases should be outlined in detail. There are a number of specific components that may be examined, including bank slope condition, water quality, substrate characteristics, sediment quality, soils and site erosion, vegetation community structure and quality. Photographic stations can be developed to help record the conditions before, during, and after construction. There are typically components of both stages (pre and post-construction) of monitoring on restoration projects in order to obtain a complete understanding of the change brought about by the management action, and to determine the success of the action (FISRWG 2001).

Monitoring can provide:

- information needed to establish baseline conditions;
- documentation of actions during implementation;
- documentation of conditions after implementation;
- changes over time;
- unexpected ancillary effects of implementation;
- problems with, or resulting from, implementation; and
- lessons learned that can be used in future projects.

Monitoring should be guided by a predetermined monitoring plan that details:

- what information will be gathered;
- when information will be gathered;
- quality control measures for information gathered;
- how information will be gathered (methodology);
- how information will be recorded;
- how often monitoring reports will be produced;
- what will be included in monitoring reports (FISRWG 2001).

Information collected during monitoring efforts should be evaluated and used to determine whether implementation of the management action has resulted in the desired outcome and ultimately in achievement of the goals of the watershed management plan. The technical analysis typically will be produced as a report or memorandum.

The report or memorandum may include:

- analysis of the success of the action in bringing about the desired outcome;
- the relation of the outcome to the goals of the watershed plan;

- problems or deficiencies associated with the management action; and

- suggestions for adaptations that may be required to achieve the desired outcome.

Changes or adaptations to the management action may be required based on the evaluation of information collected during monitoring. Adjustments may be based on new information and may require some trial and error. Errors may result in valuable information if acknowledged and may contribute to final solutions (FISRWG 2001). Performance monitoring of individual restoration projects within a watershed can be tracked to improve the design of future restoration areas (Center for Watershed Protection 2004).

A component of the Eighteenmile Creek Restoration Project was the development and implementation of a Restoration Monitoring Plan. The Eighteenmile Creek restoration monitoring was designed to provide a low-cost, qualitative assessment of the general condition of the restoration measures, with suggestions for short to long-term maintenance actions to facilitate the enhancements made as a result of the project. Monitoring involves periodic site visits to assess the condition of various measures. The more sophisticated measures (i.e. stepped rock wall) are checked for signs of instability. Certain measures (i.e. fibrous root mass replication) are not designed to provide long-term habitat enhancement capabilities. These measures may be maintained (i.e. yearly replacement with suitable materials), based on the maintenance support for the project, but are not crucial to greater enhancement of the entire restoration project.

The monitoring of the Eighteenmile Creek Habitat Restoration project may provide valuable insight into future restoration activities in the greater watershed. For instance, restoration measures utilized as part of the restoration project that are determined to function well may be suggested as possible approaches to other areas that have similar problems. Alternatively, those restoration elements that show problems may provide the basis for not using the same techniques within other areas in the watershed.

In conducting the tracking and assessment of CWMP actions, the aggregation of data will assist in monitoring improvements throughout the watershed. In this way, monitoring provides a quality assurance dimension to CWMP goals and objectives, design,

construction approaches, and implementation strategies. As sense of the overall condition of each action also will help to further define the ongoing management framework for the various management actions.

In addition to monitoring and assessment of individual management actions and their success in achieving the desired goals, an assessment of the cumulative effects of the plan should be monitored and evaluated to determine whether the management actions are achieving the mission statement of the watershed management plan. Adaptations to watershed management goals and management actions may be made in response to evaluation of the results of actions, changes in social values and/or changes in economic values.

8

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Example Table of Contents for the Eighteenmile Creek Comprehensive Watershed Management Plan