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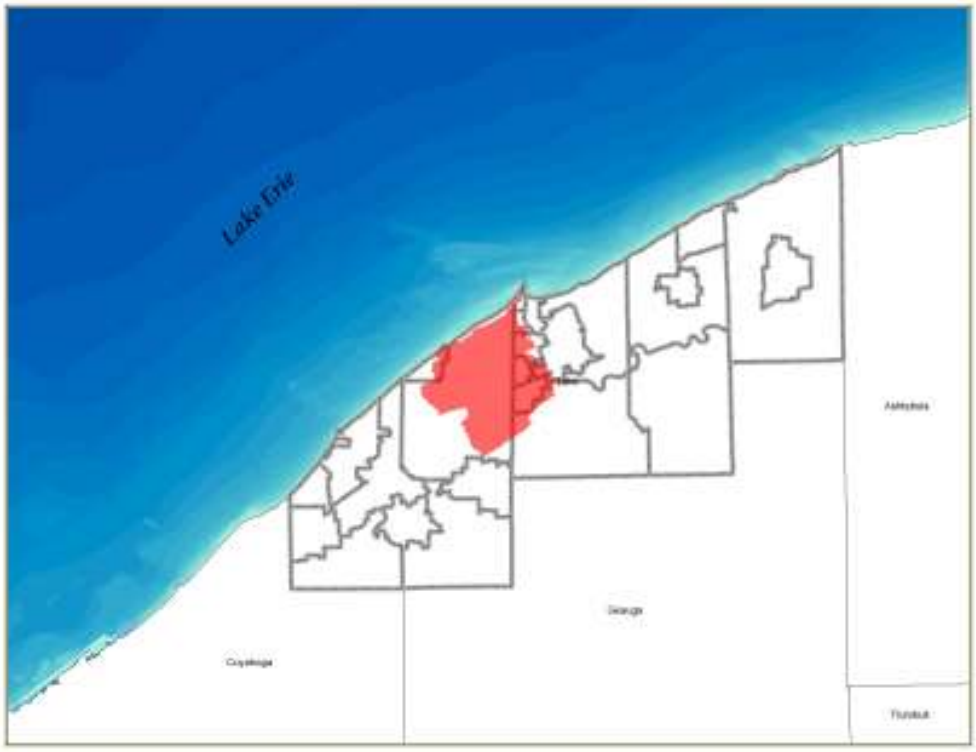
Mentor Marsh Watershed Action Plan



Lake County Soil and Water Conservation District
125 East Erie Street
Painesville, Ohio 44077

(440) 350-2730 phone
(440) 350-2601 fax

www.lakecountyohio.org/soil

Contact: Chad Edgar
cedgar@lakecountyohio.gov

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Appendices (on enclosed CD)

Davey Resources Mentor Marsh Area Special Areas Management Plan CD
-includes SAMP, Issues Characterization, as well as most other documents created during the SAMP process by the MARC and/or Davey Resources.

Acknowledgments

The members of the Marsh Area Regional Coalition should be most acknowledged for their development of the Issues Characterization and Special Areas Management Plan. Their vision for the watershed and its natural resources is truly special.
Other partners who assisted in the creation of this document:
Matt Scharver, Lake SWCD
Dan Donaldson, Lake SWCD
Pam Brown, Lake SWCD
Jim Bissell, Cleveland Museum of Natural History
Keith Moran, Cleveland Museum of Natural History
Kurt Kraus, City of Mentor
Brad Shawhan, City of Mentor
Darrell Webster, Lake County Planning Commission
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Paul Anderson, OEPA
Ana Burns, Davey Resources
Dana Oleskiewicz, OSU, Wooster
Aaron Lantz, ODNR – DSWC, Columbus
Chris Kasselmann, ODNR-DSWC, Columbus
Thomas Sorge, ODOT, District 12
John Motl, ODOT, District 12

Distribution List

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Hard copies of the Mentor Marsh Watershed Action Plan, upon endorsment, will be distributed to City Administrators (or appropriate representative), MARC officers, the Morley Public Library, Lake County OSU Extension, Lake County Soil and Water Conservation District, Cleveland Meuseum of Natural History, Lake County Planning Commission and the Mentor Marsh Advisory Board. Other persons interested in obtaining a copy of the plan are encouraged to download it from the MARC website.

http://www.lakecountyohio.org/planning/marc/

Endorsement

Upon endorsement by Ohio Environmental Protection Agency and Ohio Department of Natural Resources, representatives from communities in the watershed, MARC officers and selected stakeholders will be asked to sign and approve the final plan and agree to pursue implementation of this Watershed Action Plan.

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City of Mentor on the Lake

City of Mentor

City of Painesville

Village of Fairport Harbor

Painesville Township

Concord Township

Lake County Planning Commission

Ohio State University Extension

Lake County Soil and Water Conservation District

Cleveland Museum of Natural History

Mentor Marsh Advisory Board

MARC, Chair

MARC, Vice Chair

MARC, Secretary

Calendar of Events

2006 Coastweeks

Ecotour of the Lagoons	Sept. 7	Brad Shawhan
Stargazing at Mentor Lagoons	Sept. 9	Bill Heinrich
A Botanical Walk in the Woods	Sept. 10	Keith Moran
Coastweeks Beach Clean Up	Sept. 16	Bonnie Rice
Coastal Dunes of Lake County	Sept. 16	Charlotte McCurdy
Bird Walk at Headlands	Sept. 17	Jim McConner
Who was Here First?	Sept. 17	Brian Redmond

2007 Coastweeks

Family Paddle Trip	Sept. 8	No Instructor
Stargazing at Mentor Lagoons	Sept. 8	No Instructor
Coastweeks Beach Clean Up	Sept. 15	Bonnie Rice
Bird Walk at Mentor Lagoons	Sept. 16	Jim McConner
Harnessing the Power of Wind:	Sept. 19	Tim Denbow

2008 Coastweeks
PENDING

MARC MEETING DATES (future meeting dates will be announced on the MARC website)
September 21, 2004
January 18, 2005
February 15, 2005
March 15, 2005
April 20, 2005
May 18, 2005
June 15, 2005
July 13, 2005
September 21, 2005
November 16, 2005
January 18, 2006
February 15, 2006
March 15, 2006
April 19, 2006
May 18, 2006
July 20, 2006
September 20, 2006
November 15, 2006
January 17, 2007
March 21, 2007
April 18, 2007
June 20, 2007
September 26, 2007
October 17, 2007
November 28, 2007
December 19, 2007
Educational Programs

Rice Elementary Soils Program	March 8th and 24th, 2004 October 12th, 2004
Hooked on Fishing	June 28th, 2004 July 9th and 16th, 2004 June 8th, 2005
Wonders of Watersheds	June, 2004 August, 2005
Lake Elementary Enviroscape	November 8th, 2004
Orchord Hollow Elementary Web Of Life	March 23rd, 2005
Orchard Hollow Elementary Fred The Fish	April 6th, 2005
Garfield Elementary Soils Program	April 20th, 2005
Rain Garden Workshop	April 27th, 2006 September 12th, 2007 September 19th, 2007
Memorial Junior High Quest Program	October 31st, 2006 November 1st, 2006
Mentor Marsh Nature Center Project Wet	June 26th, 2007

List of Acronyms

305(b)	Ohio Environmental Protection Agency Water Quality Report
319	Section 319 of the Clean Water Act
BGI	Balanced Growth Initiative
BMP	Best Management Practices
CFS	Cubic Feet per Second
CPP	Continuing planning process
CWH	Coldwater Habitat
ERU	Equivalent residential unit
EWH	Exceptional Warm Water Habitat
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
GLC	Great Lakes Commission
GPM	Gallons Per Minute
HB	House Bill
HHEI	Headwater Habitat Evaluation Index
HSTS	Household Sewage Treatment Systems
HUC #	Hydrologic Unit Code Number
IBI	Index of Biotic Integrity
ICI	Invertebrate Community Index
LCGHD	Lake County General Health District
LCSMD	Lake County Stormwater Management Department
LEPF	Lake Erie Protection Fund
LPA	Land Protection Agencies
MiWB	Modified Index of Well Being
MRCC	Midwestern Regional Climate Center
MS4	Municipal Separate Storm Sewer Systems
NASA	National Aeronautics and Space Administration
NEFCO	Northeast Ohio Four County Regional Planning and Development Organization
NOACA	Northeast Ohio Areawide Coordinating Agency
NPDES	National Pollution Discharge Elimination System
NPS	Non Point Source Pollution
NRCS	Natural Resource Conservation Service
OCAP	Ohio Capability Analysis Project
ODNR	Ohio Department of Natural Resources
Ohio EPA	Ohio Environmental Protection Agency
OLEC	Ohio Lake Erie Commission
POS	Point of Sale
QHEI	Qualitative Habitat Evaluation Index
RM	River Mile
SPSDS	Semi-Public Sewage Disposal Systems
SSH	Seasonal Salmonid Habitat
SWCD	Soil & Water Conservation District
TMDL	Total Maximum Daily Load
USEPA	United States Environmental Protection Agency
USGS	United States Geological Society
WMSC	Water Management and Sediment Control
WPCLF	Water Pollution Control Loan Fund
WQM	Water Quality Management

WWH	Warmwater Habitat
WWTP	Wastewater Treatment Plant

Mentor Marsh Watershed

General Characteristics

The Mentor Marsh Watershed drains 22.6 square miles of central Lake County in Northeast Ohio (Figure 1) The central resource of the watershed is the 868-acre Mentor Marsh. The Marsh is a wooded wetland/swamp complex that formed in an abandoned channel of the Grand River and was isolated from Lake Erie by the accretion of beach sand. "As the largest marsh in northeast Ohio, it serves as an important nesting ground for birds, spawning area for fish, and habitat for aquatic invertebrates." (Whipple, 1999) Its landscape has changed drastically in recent history. The most marked change is in the composition of the vegetation. The marsh is now largely composed of Common Reed (*Phragmites*), a salt-tolerant invasive species. There are several streams that contribute surface water to the Marsh. Marsh Creek is the largest of these tributaries, located in the western portion of the watershed. It has two smaller tributaries, Martin Ohm and Heisley Creek. Together these tributaries collect a large portion of the surface water drainage to the Marsh. Black Brook Creek is located in the eastern portion of the watershed. The watershed is unique in that it has two surface water outlets. The direction of flow paths within the marsh is not well known. Seiche events can be readily observed in the eastern portion of the marsh in the harbor area. These seiche events along with surface water inputs from various tributaries would largely account for flow directions within the marsh. "Today, the water in the eastern section of the marsh flows to the east, through the relict meander bend within several ditches, culverts, and a concrete trapezoidal channel and joins with the Grand River just upstream from its confluence with Lake Erie. The water in the central and western section of the marsh flows to the west and enters Lake Erie through the old point of confluence at Mentor Harbor. The divide in flow direction occurs at the old mouth of Blackbrook." (Fineran, 2003) Mentor Harbor, more often called Mentor Lagoons, was partially developed in the early 1920's by local affluent residents who wished to create a "Venice of the North". The project never occurred, and today the area is an active marina owned by the City of Mentor. The watershed crosses the boundary of four municipalities. The largest is the City of Mentor, followed by somewhat similar and smaller portions of the City of Painesville, the City of Mentor-on-the-Lake, and Grand River Village. Small portions of Concord Township and Painesville Township are located in the upper reaches of the watershed. The watershed is largely urban, with all communities participating in the NPDES Phase II Stormwater Program.

Those familiar with watershed action plans will immediately become aware of the unique differences in the Mentor Marsh Watershed Action Plan. With a relatively small urbanized watershed, many of the Appendix 8 Sections are not applicable. For instance, the watershed is largely serviced by sanitary sewers. A detailed inventory and management measure for home sewage treatments systems is not relevant. In addition, the EPA has not developed a standard for developing TMDLs on wetlands. Calculating load reductions on wetlands was discussed with EPA Wetland Biologist John Mack during the development of the watershed action plan. However, at this time, there is no standard.

History of Mentor Marsh Watershed

The human habitation of the Mentor Marsh Watershed has been well documented. Accounts from fur-traders and those that surveyed the land for the Connecticut Western Reserve indicate that pre-European settlement of the area was sparse. The land was largely used as hunting grounds for a number of different tribes of Indians with a more seasonal habitation of the land rather than any established settlements (Fineran, 2003). The Mentor Marsh Watershed is located in the Connecticut Western Reserve, approximately 3 million acres of land in northeast Ohio that the State of Connecticut retained

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after forfeiting most of its western land to the federal government. This land was bought from the state by the Connecticut Land Company in 1795 and survey crews began the process of surveying the area the following year. The land was then sold to settlers who began moving to the area as early as 1797. The landscape and ecology of the area also begins to change in response to the rapid population growth (Fineran, 2003). The first landscape change occurs during these early times as the wooded uplands surrounding the almost 900-acre wetland change to agriculture and the development of small populated villages. In the early 1800's, a port is developed on the nearby Grand River at Fairport Harbor. With the development and subsequent improvements to the harbor, land use along the river changes to industrial use. The development of the harbor also has a significant affect on the Marsh itself. The eastward migration of sand along the shoreline of Lake Erie is disrupted by the pier extending into the lake. "Overall, the efforts to maintain a clear shipping channel at Fairport Harbor resulted in approximately 1130 feet of beach accretion to the west of the piers, north of Mentor Marsh, between 1826 and 1872. This isolated the marsh from Lake Erie and dammed the stream that drained the eastern basin in pre-settlement times."(Fineran, 2003) By the end of the 1800's, the watershed landscape had changed significantly from agricultural use to industrial use. Perhaps the most significant events would be the development of salt brine wells and the salt landfill located within the watershed in the 1950's. The pollution associated with these two activities is largely responsible for the current condition of the Mentor Marsh. "The effect of Fairport Harbor's development on the Mentor Marsh basin between 1796 and the early 1900's seems to have been isolated to the process of beach accretion…. But when activities associated with the industries located in the Fairport Harbor vicinity began to operate within the watershed of Mentor Marsh, major intrusions of salt pollution to the marsh basin occurred affecting the ecological condition of the marsh." (Fineran, 2003) The watershed is now largely developed, with little open space remaining. The land use has once again changed from largely industrial to more residential and commercial retail.

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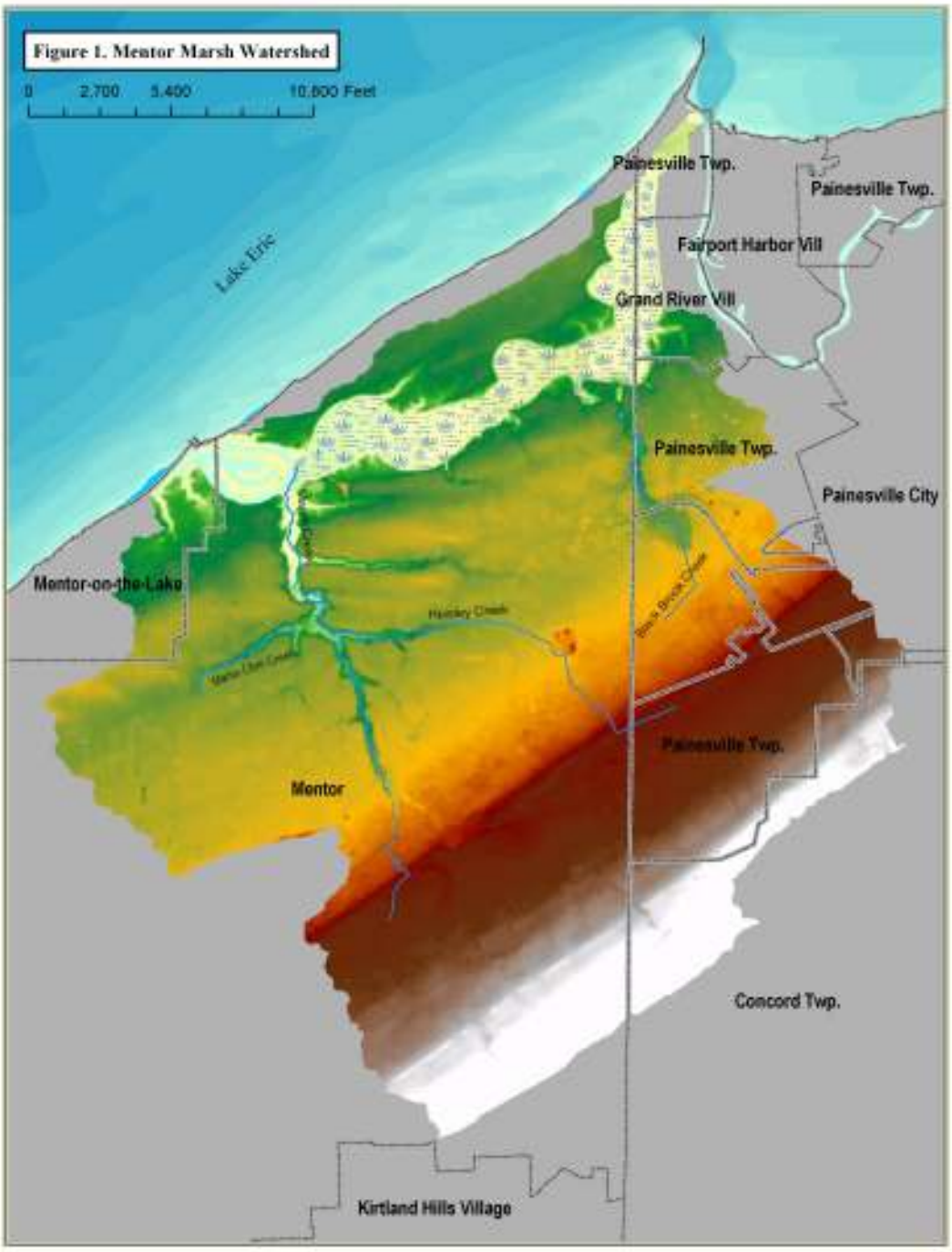
Figure 1. Mentor Marsh Watershed
0 2,700 5,400 10,800 Feet
Lake Erie
Painesville Twp.
Painesville Twp.
Fairport Harbor Vill
Grand River Vill
Painesville Twp.
Painesville City
Mentor-on-the-Lake
Painesville Twp.
Mentor
Painesville Twp.
Concord Twp.
Kirtland Hills Village

Demographics

The Mentor Marsh Watershed has experienced rapid growth in development similar to many watersheds around the state of Ohio. Census data shows that the population has increased by over 18,000 people since 1970. Figure 2 shows the location of the census tracts within the watershed boundary. The most rapid growth occurred between 1970 and 1980, with a population change of over 10,000. The growth rate has slowed as most of the watershed nears "built-out" conditions. However the population still grew over 3,000 people during the last census period. Population density from the 2000 Census is shown by tract in the Figure 3. Figures 2 and 3 of the Census Tracts have been digitally "clipped" to the boundaries of the watershed. Census data was obtained from calculations based on the entire Tract. However, since development patterns are relatively similar throughout the Tracts, the percentages and densities can be applied to the respective portions of each Tract within the watershed.

"The development rate for the SAMP region is approximately 205 to 225-acres per year, with an average of 42 lots per subdivision. Generally, this rapid residential growth stimulates positive economic change for the region's communities in the short term. This growth can improve the quality of life for community residents in the short run through an increased tax base and the provision of services that follow; however, in the long term it expands the demand for services beyond the increase in tax base." (Davey Resources, 2001)

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Figure 2. Census Tracts
0 2,700 5,400 10,800 Feet
Lake Erie
202800
204100
204600
202700
202500
Holiday Creek
204300
202600
203100
204700
202900
205002
203000
203500
205001
203400

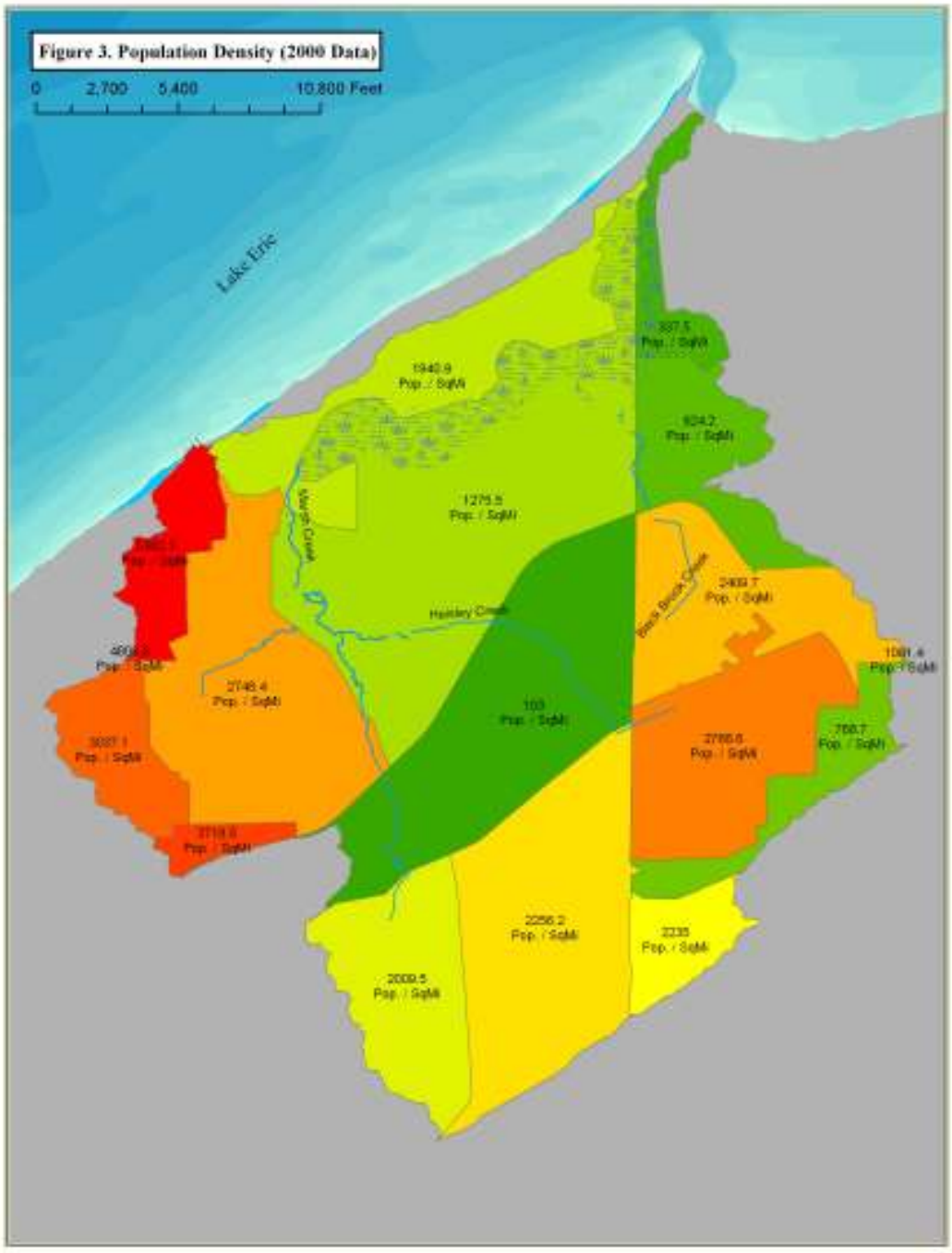
Figure 3. Population Density (2000 Data)
0
2,700
5,400
10,800 Feet
Lake Erie
1940.9
Pop. / SqMi
337.5
Pop. / SqMi
824.2
Pop. / SqMi
1275.5
Pop. / SqMi
Huntley Creek
2459.7
Pop. / SqMi
2746.4
Pop. / SqMi
103
Pop. / SqMi
2765.6
Pop. / SqMi
2256.2
Pop. / SqMi
2235
Pop. / SqMi
2009.5
Pop. / SqMi

(Lake County Planning Commission, unpublished data)

Tract	2000 Pop.	White	Black	Asian	Hispanic	Other	Households	Household Size	Family Size	Median Age
2025	4849	96.0%	1.3%	0.9%	1.4%	0.4%	2037	2.38	3.03	33.30
2026	4328	98.0%	0.2%	0.3%	0.5%	1.0%	1565	2.70	3.15	34.50
2027	5784	97.0%	0.5%	1.0%	0.5%	1.0%	1979	2.92	3.15	39.80
2028	6726	97.0%	0.5%	1.0%	0.8%	0.7%	2560	2.61	3.01	38.80
2029	2708	97.0%	0.4%	1.2%	0.6%	0.8%	100	2.70	3.13	28.30
2030	1635	96.3%	0.6%	1.6%	0.6%	0.9%	599	2.72	3.11	38.10
2031	510	98.0%	0.2%	0.9%	0.8%	0.1%	194	2.38	2.80	43.10
2034	3136	98.0%	0.7%	0.3%	0.6%	0.4%	1287	2.37	2.92	41.60
2035	5913	96.8%	0.9%	1.6%	0.7%	0.0%	1963	2.89	3.24	39.90
2041	165	99.0%	0.0%	0.6%	0.4%	0.0%	81	2.73	3.19	39.10
2043	1909	79.8%	11.8%	0.5%	7.7%	0.2%	730	2.52	3.10	30.20
2046	544	93.0%	3.1%	0.2%	3.6%	0.1%	204	2.66	3.14	33.60
2047	4761	95.0%	2.3%	0.7%	1.6%	0.4%	2062	2.26	2.80	42.30
205001	2418	97.5%	0.5%	1.0%	0.6%	0.4%	905	2.60	3.07	41.50
205002	1189	97.7%	0.6%	0.7%	0.5%	0.5%	471	2.57	2.94	41.00
Totals	46575	95.7%	1.5%	0.8%	1.4%	0.5%	17641	2.60	3.05	37.67

Previous Planning, Protection, and Management Activities

Appreciation of the Mentor Marsh started with the earliest settlers. Observations of wildlife within the area were being kept as early as the mid 1800's. The still active Burroughs Nature Club was one of the earliest groups to begin expressing the need for the preservation of land around the marsh. Charles Shipman was a member of the group in the 1930's and was very vocal about protection of the Marsh and it's ecological functions. "The Mentor Marsh State Nature Preserve" brochure produced by ODNR details previous efforts:

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> "Although Shipman himself did not live to see the realization of his dream, the preservation of Mentor Marsh was indirectly initiated in 1951 when the State of Ohio acquired 125-acres of beach, marsh and woodland for the site of Headlands Beach State Park. In 1956, the Division of Parks designated an area of the park encompassing the far eastern tip of the marsh as the "Shipman Wildlife Memorial," honoring the contributions of this pioneer in the movement to preserve Mentor Marsh. Organized efforts to preserve the entire marsh began in 1960 in response to a proposed plan for regional park development in Lake County. This plan suggested dredging the length of the marsh to make an inland waterway with docking facilities, picnic areas and playgrounds. The end result would have been total destruction of the natural ecosystem of the marsh. Coincidentally, a recently completed Department of the Interior survey of the Great Lakes shorelines had singled out Mentor Marsh as an exceptional natural marshland in Ohio, which deserved high priority for preservation in its natural state. Backed by the federal findings, the members of the Burroughs Nature Club, under the leadership of the club President Harold J. Zimmerman, spearheaded the formation of the Mentor Marsh Committee to seek preservation of the marsh. The Ohio Chapter of The Nature Conservancy, a national organization dedicated to preservation of significant natural areas, joined with the Committee in coordinating fund-raising and land acquisition activities. Organizations such as the Cleveland Museum of Natural History, Cleveland Metropolitan Parks Board, Holden Arboretum, Lake County Federation of Garden Clubs,

and the Cleveland and Blackbrook Audubon Societies, along with uncounted private citizens, also lent their support to the campaign. Two major industrial landowners opened the way for preservation of a large portion of Mentor Marsh. In 1965, the Morton Salt Company generously donated surface rights to 320-acres of marsh to the State of Ohio. In an equally generous move, the Diamond Alkali Company (Diamond-Shamrock) donated surface rights to 90 of its acres to The Nature Conservancy. Both companies stipulated that the land was to be maintained in its natural state. Successful completion of a $65,000 fundraising campaign in the same year by the Mentor Marsh Committee and the Ohio Chapter of The Nature Conservancy enabled the Conservancy to acquire a vital additional 80-acres of prime swamp forest which was being threatened by lumbering. After serious consideration, The Nature Conservancy and the State agreed to transfer custody of the newly created sanctuary to the Cleveland Museum of Natural History. The responsibility for day-to-day management and development of the marsh as a "living museum" and nature preserve was placed in the hands of the Mentor Marsh Committee. In 1966. Mentor Marsh received national recognition when it became one of the first areas in the country to be designated as a National Natural landmark by the U.S. Department of the Interior. The Registry of Natural landmarks encompasses outstanding natural areas possessing "exceptional value in illustrating the natural history of the United States." The federal National Natural landmark study of the Great Lakes shorelines noted that in Mentor Marsh "the channel slopes and marsh contain about 50 species of deciduous trees of the central forest region. making the area in terms of species the richest encountered on the survey. On May 19, 1970, the Ohio General Assembly passed the Natural Areas Act, which formulated procedures by which unique natural sites could be preserved for present and future generations. This act authorized the Ohio Department of Natural Resources to establish a statewide system of nature preserves to serve as living sanctuaries for scientific, educational, and aesthetic purposes. Mentor Marsh was one of the first four natural areas to be incorporated into the state nature preserve system. On May 10, 1973, 619-acres of the marsh were dedicated as an interpretive state nature preserve by the Cleveland Museum of Natural History, the first Ohio property owner to agree to dedicate its property under the Natural Areas Act. Today trails, access areas, and a small nature center, the Marsh House on Corduroy Road, have been developed by the Mentor Marsh Committee, opening the wonders of the marsh to countless visitors. Active and extensive educational programs sponsored by the Mentor Marsh Committee in conjunction with the Cleveland Museum have made the marsh a focal point for natural science classes from elementary to college levels. A wide variety of interpretive hikes and field trips are available to bird watchers, botanists, photographers, and casual visitors alike. The marsh is also the subject of serious scientific study. An understanding of the life cycles of the marsh may provide the key to its continued preservation."" (ODNR, ?)

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On June 3, 1999 members of the Ohio Coastal Management Program met with stakeholders. This meeting detailed the NOAA's enhancement programs and was the start of the Marsh Area Regional Coalition (MARC) and a concentrated effort to manage natural resources on a watershed scale. A Special Areas Management Plan (SAMP) was completed by the MARC in 2004. This document details natural resource and development issues, implementation plans, coordinating agencies, funding, and timelines for sensitive issues and/or areas in the watershed. The process through which the SAMP was completed very closely mimics the creation of "traditional" watershed plans. A core watershed group was formed (MARC) and mission and vision statements were also developed. A steering committee and special task forces, or work groups, were formed to define problems in the watershed. Once these problems were identified the MARC set goals and developed solutions to achieve those goals. Priorities and timeframes were developed and tasks were assigned to members of the MARC. Finally, performance measures and plans to review and update the plan were created.

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Marsh Area Regional Coalition (MARC) and Development of the Watershed Plan

Structure and Organization

The MARC is an all-inclusive watershed stakeholder group of active and dedicated constituents. Members of the MARC include federal, state, and local governing agencies, non-profit conservation groups, private companies, museums, schools, interest groups, scientists, planners, and individual concerned citizens. The membership consists of those communities, individuals, agencies, non-governmental groups, and organizations interested in the watershed and willing to work on the implementation of the Mentor Marsh Area SAMP. Officers and Executive Committee members are elected by the membership. Officers consist of Chair, Vice Chair, and Secretary. Election of officers is held at the fall meeting with terms beginning in January of the following year. Term of office is for two years. Membership of the Executive Committee consists of the Committee Chair, Vice Chair, Secretary, and two additional MARC board members elected by the MARC. The function of the Executive Committee is to transact any urgent business between regularly scheduled Committee meetings. The MARC is a voluntary coalition of individuals, agencies and communities working to advance the mission and goals of the SAMP. Each MARC participant contributes ideas, information, knowledge, and resources to the MARC as needed. Since its initial organization the MARC has operated on consensus. It continues to operate on consensus. Since the development of the SAMP the MARC has met quarterly and as needed to advance the mission and goals of the MARC. A cadre of interested MARC participants works to keep the MARC vision and mission moving forward. The MARC oversees the progress toward implementation of the SAMP. As issues and opportunities arise this MARC group of dedicated individuals in turn informs other MARC participants and partners so that they may proceed to implementation and action. The MARC is aided in its oversight task by ongoing partners such as the Mentor Marsh Board of Management (MMBM), an advisory body to the Cleveland Museum of Natural History (CMNH). The CMNH has the responsibility for the day to day management of the Mentor Marsh. The MMBM advises the CMNH on issues and opportunities that impact the Mentor Marsh. The City of Mentor is an active partner in the MARC. Both the MMBM and the City of Mentor are very cognizant of the opportunities and threats to the Mentor Marsh watershed.

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Mission and Vision

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The primary mission of the MARC is to develop and promote a management plan to protect and enhance the environmental, social, and economic assets of the Mentor Marsh area, including its watershed and related communities, for the benefit of present and future generations. The MARC's vision is to establish a dedicated partnership committed to ensuring the legacy of a diverse ecosystem and fostering economic and social well being in the marsh area and surrounding communities through innovative planning and stewardship.

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Operational Procedures and Bylaws

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Article I. Name

The name of this organization shall be the Marsh Area Regional Coalition, hereinafter referred to as the MARC.

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Article II. Mission and Vision

The primary mission of the MARC is to develop and promote a management plan to protect and enhance the environmental, social, and economic assets of the Mentor Marsh area, including its watershed and related communities, for the benefit of present and future generations.

The MARC's vision is to establish a dedicated partnership committed to ensuring the legacy of a diverse ecosystem and fostering economic and social well-being in the marsh area and surrounding communities through innovative planning and stewardship.

The MARC serves in an advisory capacity only. The MARC has no legal powers to put recommendations into action nor does it have any liability that may result from consequences of actions taken by MARC members. Its effectiveness and influence is achieved by the counsel, networking, coordination, and information sharing that the MARC provides rather than through legal authority.

Article III. Special Area Management Plan

The Mentor Marsh Area Special Area Management Plan (SAMP) promotes wise management and use of land and waters that have direct and significant impacts on the Mentor Marsh and Lake Erie coastal areas. This plan was created after careful study of the environmental and economic issues facing the area. It is the primary guidance for the activities of the MARC.

The Mentor Marsh Area SAMP is a comprehensive plan providing for natural resource protection and reasonable coastal dependent economic growth. The plan contains detailed comprehensive statements of policies, standards, and criteria to guide public and private uses of lands and waters as well as outlines of mechanisms for timely implementation in the Mentor Marsh SAMP study area.

The Federal Coastal Zone Management Act of 1972 [16 U.S.C.A. Section 1453 (17)]) established a mechanism of funding through the National Oceanic and Atmospheric Administration (NOAA) and state coastal programs to develop Special Area Management Plans (SAMP).

Article IV. MARC Member Roles and Responsibilities

Be familiar with the goals and vision of the MARC and the Mentor Marsh Area SAMP.

Understand that the Mentor Marsh Area SAMP plans are based on the needs of local citizens and coastal communities, current research and technical information, statewide needs and priorities, and national initiatives.

Advise the MARC and other primary coordinating agencies identified in the Mentor Marsh Area SAMP document in implementing phases of the SAMP. This includes attending and participating in the MARC's educational programs, representing the MARC's mission and vision in meetings with other groups and organizations, encouraging citizen participation at meetings, and helping to publicize the Mentor Marsh Area SAMP plans and educational efforts.

Assist with reviewing, updating, and revising the Mentor Marsh Area SAMP. Participate in setting priorities among new and existing program areas of emphasis, as well as encourage partnership efforts among the MARC participants. Help the MARC evaluate the results of its planning, implementation, and educational efforts and provide advice that will determine changes in program emphasis.

MARC participants will network and share information and provide two-way communication between the local coastal community and local, state, and federal agencies and organizations.

MARC participants will work to reach consensus agreements among members on all issues regarding the Mentor Marsh Area SAMP and operation of the MARC.

Article V. Membership

The MARC is an all-inclusive Mentor Marsh area stakeholder group of active and dedicated constituents. MARC members include federal, state, and local governing agencies, non-profit conservation groups, private companies, museums, schools, interest groups, scientists, planners, and individual concerned citizens. Membership will consist of those communities, individuals, agencies, non-governmental groups, and organizations interested in the MARC and willing to work on the implementation of the Mentor Marsh Area SAMP. Members may be community or agency representatives. As this is an ongoing program, the term of MARC members will be indefinite and will

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continue as long as the MARC provides mutual benefits to the respective participants. Membership is voluntary. Full participation is encouraged but not mandatory. Benefits to MARC participants will likely be in direct relation to the amount of participation and involvement in the implementation of the Mentor Marsh Area SAMP. No member will be excluded based on race, color, creed, religion, sexual orientation, national origin, gender, age, disability, or veteran status.

Article VI. Officers

Officers consist of Chair, Vice Chair, and Secretary. Election of officers will be held at the fall meeting with terms beginning in January of the following year. The Chair's and Vice Chair's terms of office will be for two years. The Secretary's term of office will be one year. The first election of officers shall occur at the September 21, 2004 meeting. The Chair and Vice Chair will not hold the same office for more than two consecutive terms. The Chair shall preside over all general, special, and Executive Committee meetings. The Vice Chair shall preside and perform Chair duties when the Chair is absent and unable to perform the functions of office. The Secretary shall provide adequate notice of upcoming meetings to MARC members, keep a record of member attendance, and provide a copy of the minutes for distribution to MARC members.

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MARC Chair
Darrell Webster
Director, Lake County Planning Commission
125 East Erie Street
Painesville, Ohio 44077
Phone 440-350-2739

MARC Vice-Chair
Frank Lichtkoppler
OSU Extension / Ohio Sea Grant
99 East Erie Street
Painesville, Ohio 44077
Phone 440-350-2267

MARC Secretary
Currently Vacant

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Article VII. Executive Committee

Membership will consist of the Committee Chair, Vice Chair, Secretary, and two additional MARC members elected by the MARC.

The function of the Executive Committee shall be to transact any urgent business between regularly scheduled Committee meetings.

The Chair or any two members of the executive committee may call special meetings of MARC to address emerging or priority issues that may need to be addressed immediately and can not wait for a regularly scheduled meeting of the MARC.

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Article VIII. Meetings

The MARC will meet a minimum of four times per year.

Meetings will be held in winter, spring, summer, and fall. The meetings will generally be on the third Tuesday of January, April, July, and September. The first quarterly meeting will be held September 21, 2004.

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Article IX. Amendments

Amendments to these guidelines may be made at any regular or special meeting by a consensus agreement of those members present, provided the proposed amendment was submitted in writing to the membership at least 30 days prior to the date of the meeting.

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Article X. Parliamentary Authority

The MARC will work to reach consensus on all matters brought before them. Should the need arise, Robert's Rules of Order, Newly Revised, shall govern the proceedings of the MARC.

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Article XI. Adoption

The above MARC Operational Guidelines were adopted on June 22, 2004.

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Other Partners and Stakeholders

Other agencies and organizations that have assisted the MARC in developing priorities for the watershed include the following:

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Non-Governmental Organizations

Western Reserve Resource Conservation and Development Council
Blackbrook Audubon Society
Cleveland Museum of Natural History
Coastal Resources Advisory Council
The Countryside Program
Davey Resource Group
EcoCity Cleveland
Fairport Harbor Rod and Reel
Grand River Watershed Partners
Lake County Visitors Bureau
Mentor Area Chamber of Commerce
Mentor Marsh Board of Management
Morton Salt Fairport Mine
The Nature Conservancy
Ohio Historic Preservation Office
Ohio Sea Grant College Program
The Ohio State University Extension
The Ohio State University School of Natural Resources
Painesville Chamber of Commerce

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State of Ohio

Ohio Department of Natural Resources
  Office of Coastal Management
  Division of Natural Areas and Preserves
  Division of Parks and Recreation
  Division of Soil and Water Conservation
  Division of Wildlife
Ohio Environmental Protection Agency
Ohio Department of Transportation

Local/Regional Agencies

City of Mentor
City of Mentor-on-the-Lake
City of Painesville
Concord Township
Fairport Harbor Port Authority
Grand River Council
Lake County General Health District
Lake County Planning Commission
Lake County Soil and Water Conservation District
Lake County Utilities
Lake Metroparks
Mentor Public Schools
Northeast Ohio Area Coordinating Agency
Painesville Township
Village of Fairport Harbor
Village of Grand River

Federal

U.S. Department of Defense, Army Corps of Engineers
U.S. Department of Interior, National Park Service
U.S. Department of Transportation, U.S. Coast Guard
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service

Partner Roles and Responsibilities

Water Quality Implementation Plan 1: Salt Contamination

The City of Mentor initiated the Section 206 program request to develop a Preliminary Restoration Plan and is the primary coordinating agency responsible for overseeing this activity's implementation.

The MARC is the primary coordinating agency responsible for overseeing the identification of all new and/or unmapped wells and brine facilities, including documenting their type, location, and status (e.g., active, inactive, and/or capped) and ensuring that all existing and/or abandoned wells and facilities are properly identified, sealed, and mitigated.

The Mentor Marsh Board and Ohio Sea Grant are the primary coordinating agencies responsible for overseeing the establishment of a Mentor Marsh monitoring program for chlorides and other pollutants and adjusting the program activities as required by the monitoring results.

Wetlands and Biodiversity Implementation Plan 1: Wetlands Mitigation

The Lake County SWCD is the primary coordinating agency responsible for overseeing the tracking of developments and permit requests to impact wetlands and streams in the Mentor Marsh watershed.

The MARC is the primary coordinating agency responsible for overseeing the following two activities:

- Identify willing cooperators for mitigation opportunities that include protection, restoration, and creation actions.

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• Work with developers to keep wetland mitigation projects and money within the Mentor Marsh watershed.

Wetlands and Biodiversity Implementation Plan 2: Flora Biodiversity Loss

The Cleveland Museum of Natural History and the ODNR Division of Natural Areas and Preserves are the joint primary coordinating agencies responsible for implementing and monitoring the following activities:

- Monitor for and address future introduction and spreading of exotic species in Mentor Marsh.
- Maintain and continue to update the comprehensive inventory of flora in the Mentor Marsh.
- Initiate habitat restoration projects to encourage native plant communities.
- Monitor target areas and project areas for success or failure.

Wetlands and Biodiversity Implementation Plan 3: Hydromodification

The MARC will be the primary coordinating agency responsible for overseeing the proposed installation of a check valve on the drainage ditch leading from the Grand River to Shipman Pond to prevent pollution from entering the Marsh area from the Grand River and to regulate water flow.

The Mentor Marsh Board is the primary coordinating agency responsible for overseeing educating and informing the public, both youth and adults, about the hydrology of Mentor Marsh and its impact on the living resources of the Mentor Marsh ecosystem.

History

The Marsh Area Regional Coalition (MARC) was formed in 1999 to aid in the development of a Special Areas Management Plan (SAMP) with the assistance of the Ohio Coastal Management Plan and the National Oceanic and Atmospheric Administration.

Watershed Plan Development

The development of the Mentor Marsh Watershed plan as a document was a collaboration of efforts by the Lake SWCD and various members of the MARC. Several readily available Master's theses, Doctoral dissertations, resource documents (Groundwater Resources of Lake County, Glacial Geology of Lake County, etc), a geographic information system, and watershed specific documents were utilized to document historic and current conditions.

The actual issues affecting the watershed and implementation plans addressing those issues had been detailed by the MARC by a process of open meetings, a landowner survey, consultant work, and special task forces. A description of that process is summarized in a fact sheet that was prepared for the MARC by Davey Resources:

> "In 2000, Ohio Department of Natural Resources, Office of Coastal Management, in cooperation with local agencies and volunteers throughout Lake County, initiated a planning process to develop a Special Area Management Plan (SAMP) for the Mentor Marsh area. A SAMP is a comprehensive plan that establishes:
> • Natural resource protection;
> • Reasonable coastal-dependent economic growth;
> • Statements of policies;

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- Standards and criteria to guide public and private uses of lands and waters; and
- Mechanisms for implementation.

The Marsh Area Regional Coalition was established to develop the Mentor Marsh Area SAMP. The SAMP is a multi-year planning effort designed to produce a comprehensive management plan to address growth management and natural resource protection in communities within the Mentor Marsh watershed and surrounding areas." (Davey Resources Fact Sheet, 2003)

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"A SAMP (Special Area Management Plan) is a comprehensive plan providing for natural resource protection and reasonable coastal-dependent economic growth. Such plans contain detailed comprehensive statements of policies, standards, and criteria to guide public and private uses of lands and waters as well as outlines of mechanisms for timely implementation in specific geographic areas within the coastal zone [Federal Coastal Zone Management Act of 1972, 16 U.S.C.A. Section 1453 (17)].

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The Mentor Marsh Area SAMP promotes wise management and usage of land and waters that have direct and significant impacts on the Mentor Marsh and Lake Erie coastal areas. This plan was created after careful study of the environmental and economic issues facing the area." (Davey Resources, 2004)

Implementation Plan

"After the completion of the *Issue Characterizations* document, the MARC proceeded with the process of developing the Mentor Marsh Area SAMP by identifying strategies to address the issues discussed. A total of 86 strategies were developed to address those issues. These strategies were organized based on the five critical themes and sub-issues previously identified by the MARC.

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The initial series of implementation plans for the Mentor Marsh Area SAMP are described in this document. These implementation plans were developed by MARC and are based on the strategies developed in August 2002 in the *Strategy Document.*

To select the eight implementation plans on which this document focuses, the MARC went through a multi-step process. First, the sub-issues within each theme were assigned high, medium, or low priority. High and medium priority issues were those that the MARC felt were the most time sensitive and activities that were not being actively pursued by other groups. Upon reviewing the sub-issues and prioritizing them, the MARC established that the primary focus of the *Public Understanding and Attitudes* sub-issue under *Wetlands and Biodiversity* was to educate and inform the public on all issues identified. Therefore, the MARC not only gave it a high priority but also intended to include in each implementation plan a public outreach component. Finally, the MARC decided to develop implementation plans to address each of the high and medium priority sub-issues. The issues were prioritized as follows:

1. Water Quality
   a. Salt Contamination—High Priority
   b. Waste Water Treatment—Low Priority
   c. Failing Septic Systems—Low Priority
   d. Oil and Brine Storage Lagoons and Wells—Low Priority
   e. Erosion and Sediment Control and Stormwater Management—Low Priority
   f. Hazardous Waste—Low Priority

2. Land Use and Economic Development
   a. **Uncoordinated Land Use Planning—High Priority**
   b. Projected Growth—Low Priority
   c. Development Pressures—Low Priority
3. Wetlands and Biodiversity
   a. **Biodiversity Loss—High Priority**
   b. **Hydromodification—High Priority**
   c. **Natural Disturbances—High Priority**
   d. **Public Understanding and Attitudes—High Priority**
4. Recreation and Public Access
   a. **Lack of a Strategic Recreation Plan—High Priority**
   b. Negative Impacts of Public Access—Low Priority
   c. Public Outreach—Low Priority
5. Shoreline Management and Nearshore Issues
   a. **Insufficient Sand Supply—Medium Priority**
   b. **Activities Landward of the Bluff Edge—Medium Priority**

Next, the MARC assessed the strategies that were developed in the strategy document for each of the high and medium priority sub-issues. As a whole, the MARC identified which strategies would be developed into action items for each plan. Suggestions were made as to what agency or organization would be best suited to be the primary coordinating agency responsible for overseeing implementation of the activities.

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To develop the implementation plans, the MARC divided into eight teams. Each team was responsible for identifying the final activities proposed and discussing how each activity would be implemented. In addition, the teams were responsible for identifying the primary coordinating agency for each plan. For some plans, one key agency was identified for each activity. These teams also identified other groups who would assist with the implementation plans.

During the process of developing the implementation plans for the Mentor Marsh Area SAMP, the MARC considered requesting the expansion of Ohio's Coastal Management Boundary to include the entire Mentor Marsh Area SAMP study area. There are several implications regarding the expansion of the Coastal Management Area. Primarily, an expansion of the boundary would extend the State's review authority on projects and increase the area within which Federal Consistency Requirements would be applied. In addition, entities within the expanded area would be eligible for federal funding for coastal-related construction and acquisition projects such as public access and resource protection activities. The following issues regarding the expansion of the boundary were discussed:

- May slow development within the SAMP area
- Would be an easy method to implement many of the SAMP strategies
- May overshadow the entire SAMP process
- Would require the support of all communities that would be affected
- May be strongly opposed by development and community interests" (Davey Resources, 2004)

Landowner Survey

In 2001 the Lake County Soil and Water Conservation District contacted over 800 landowners in the watershed with a survey. This survey was designed to gain an understanding of the issues

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affecting those landowners. The survey covered topics such as creek identity, rating the watershed, landowner interests, harming the watershed, protecting the creeks, general opinions, and Mentor Marsh Watershed opinions. The survey had a response rate of over 20%, signifying that landowners in the watershed are concerned about natural resource issues. The results of the survey were analyzed and a "Mentor Marsh Watershed Landowner Survey Summary" was created by the Lake SWCD for use by the MARC:

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Creek Identity

When asked to identify what the Mentor Marsh Watershed is best known for, the top four characteristics were identified as (1) attracting birds and other wildlife, (2) moving storm water, (3) flood control, and (4) it's beauty. The percentage of landowners identifying these four, as well as the other six characteristics from which they were given to chose, are depicted in the pie chart below. These responses seem to indicate that landowners recognize the wildlife potential afforded by the watershed, understand issues associated with moving storm water through the watershed, understand the importance of flood control measures, and take pride in the beauty that it offers.

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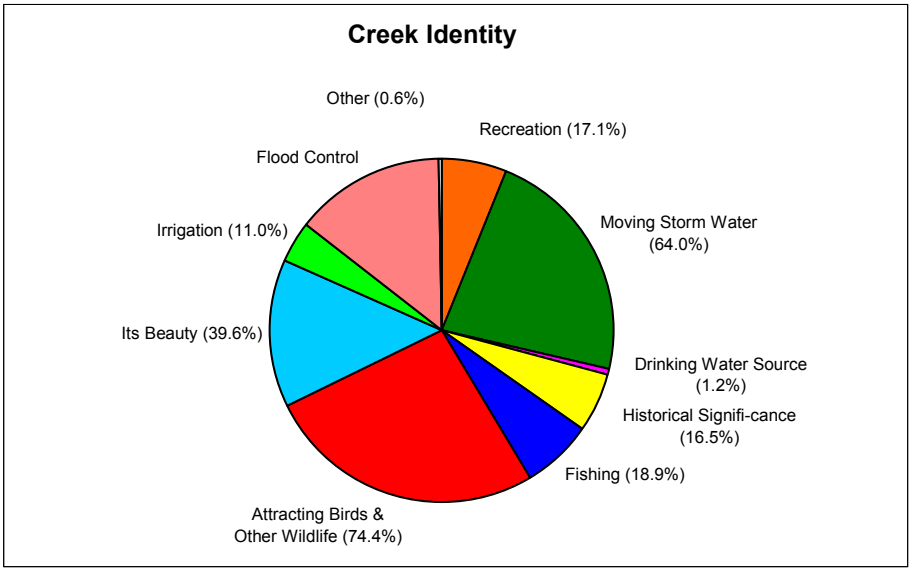
Graph 1. Creek Identity



Rating the Watershed

The initial survey question asked respondents to give their piece of the Mentor Marsh watershed an overall rating, or score. On average, landowners rated their stretch of the creek just above average (an average of 3.2 out of 5, with 5 being the highest quality). Of the other seven issues on which we asked respondents to rate the Watershed, flooding and odor were the least problematic, while trash and debris and water clarity tied for the items that were the most problematic.

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Graph 2. Rating the Watershed

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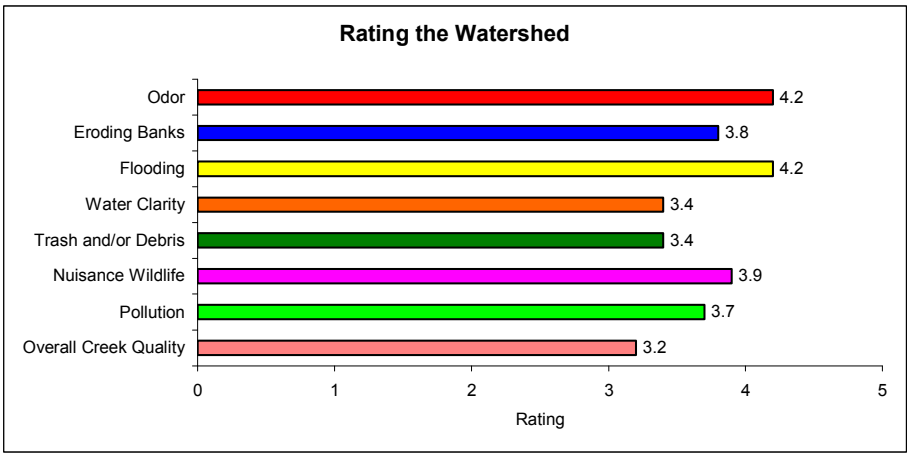

Landowner Interests

With respect to landowners' interests, the top two interests were receiving a newsletter about the watershed and preserving natural areas along the creeks. A large number of responders also indicated that creek workshops would be of interest, as would be attending a local creek meeting and helping with a neighborhood cleanup.

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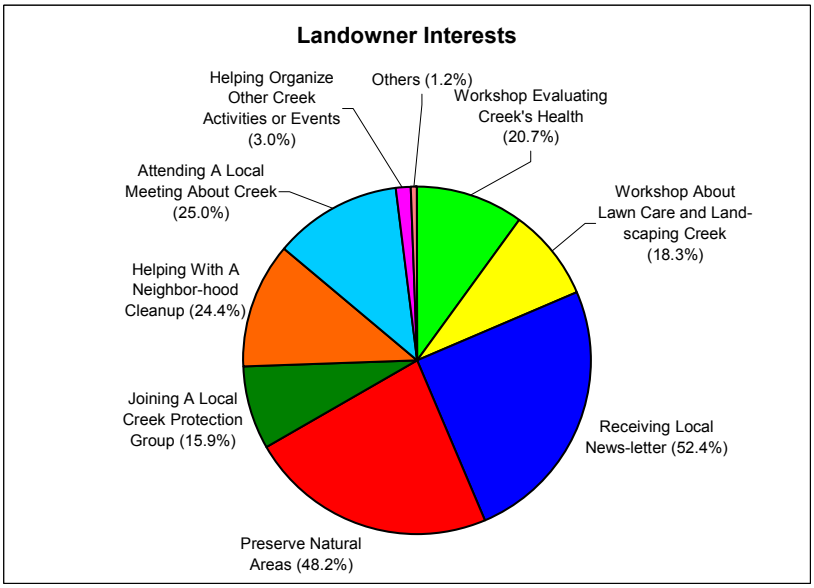
Graph 3. Landowner Interests



Harming the Watershed

Landowners in the Mentor Marsh watershed identified activities associated with construction and those of private landowners that do the most harm to creeks, major

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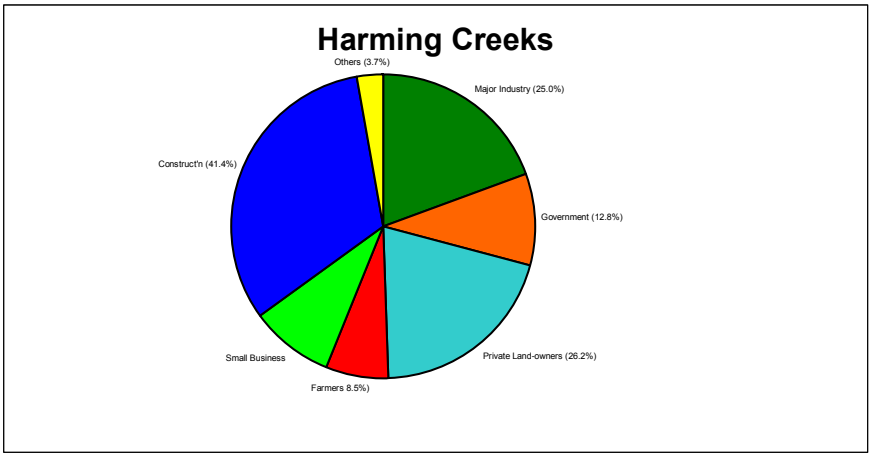
industries was also ranked very high. The 'other' category consisted of landowners that thought that the most harm is done by a combination of all the choices given.

Graph 4. Harming Creeks



Protecting the Creeks

When given the choice of who should be responsible for protecting creeks, it was suggested that government and private landowners should be the two groups most responsible for protecting them. The 'other' category consisted of landowners that thought that protecting creeks should be from all of the parties given as choices.

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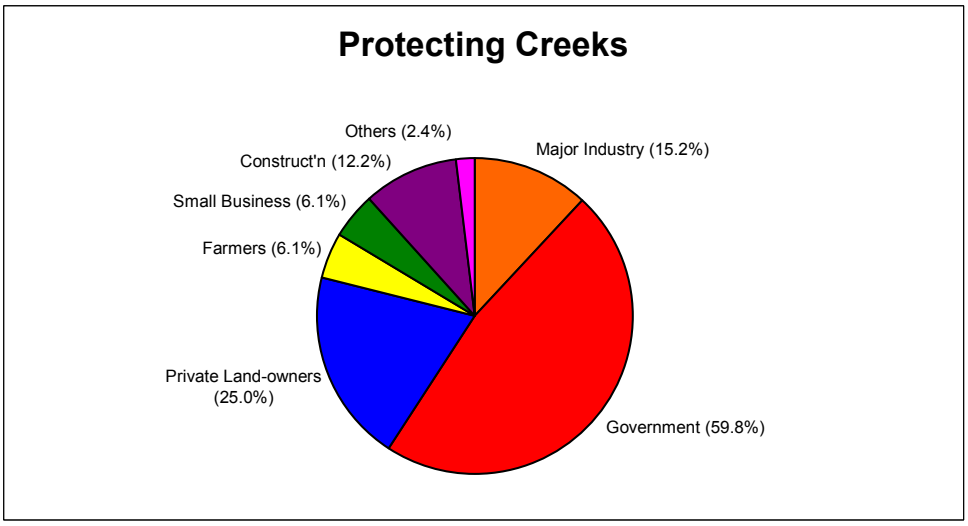
Graph 5. Protecting Creeks



General Opinions

An overwhelming majority of respondents recognized that protecting small creeks is necessary to the health of larger rivers. When asked if creeks were protected during development, the majority disagreed, but a vast majority agreed that new developments

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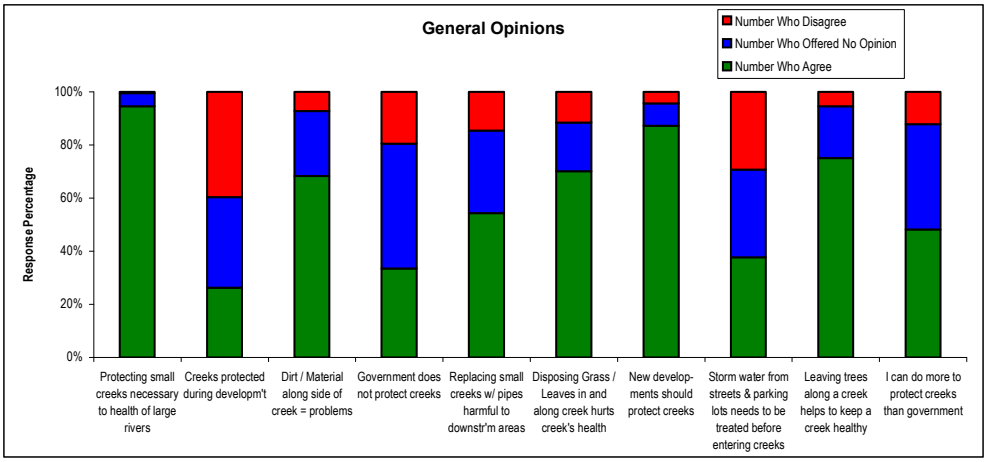
SHOULD protect creeks. A significant number of respondents recognized that placing dirt, grass clippings, leaves, or other material along or in a creek hurts the creek's health and causes problems. Further, it was encouraging to see that numerous respondents recognized that leaving trees along a creek's bank helps keep a creek healthy.

Graph 6. General Opinions



Watershed Opinions

A majority of respondents recognized that this is an important area for wildlife as well as a valuable nearby natural area. Also, a large number agreed that this helps to prevent flooding downstream. It was nice to see that a great number do not believe that this is a hazard. Significantly more agreed than disagreed with the statement that they would like the creek more if they knew what fish or animals were living in it. A significant proportion also agreed that the creek would be better if the banks were left natural. Although erosion can be quite problematic in some areas, it is important to attempt to keep the banks as natural as possible rather than armoring them with concrete, metal pilings, or other unnatural materials. Interestingly, there was no significant difference in the responses that indicated the creek has changed dramatically in the last few years as compared to those that indicated the creek has not changed dramatically.

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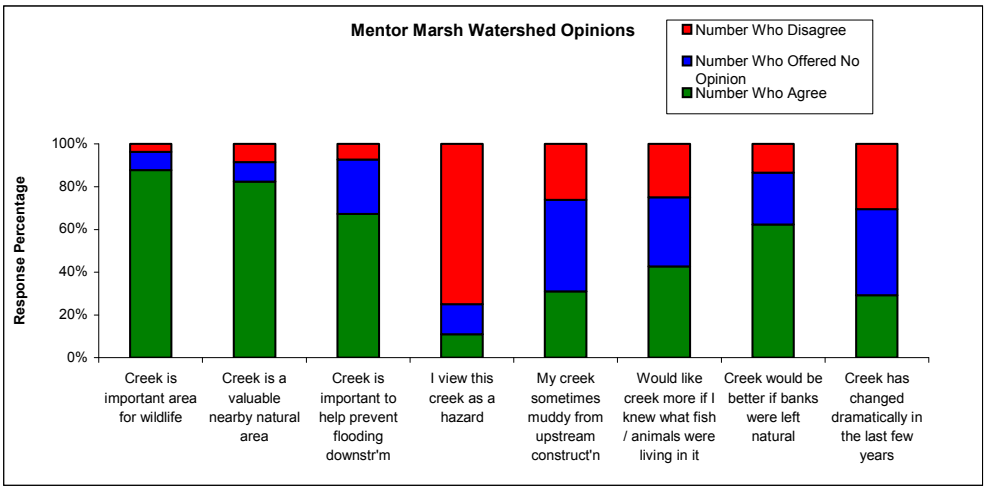
Graph 7. Watershed Opinions



Inventory of Natural Resources

Physiography and Geology

With the exception of a very small portion, the Mentor Marsh Watershed is located entirely within the Lake Plain Physiographic Region. The exception is a portion of an escarpment, or end moraine belt, which marks the boundary between the Lake Plain Region and the Allegheny Plateau (White, 1980). This escarpment is located along the 760 ft contour and is located in the southern portion of the watershed in Mentor and Concord Township (Figure 4). The surficial materials over the bedrock range in thickness from 20 to 40ft in the northeastern portion of the watershed to over 120ft along the escarpment. (Figure 5) The Lake Plain Region is typified by glacial sediment, overlaying Devonian shale, ranging from fine sand, silt and clay. (Figure 6)

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> "The Lake Plain is a level surface 3 to 5 miles wide and poorly drained in most places. The plain declines from an elevation of 760 feet at the base of the Painesville Moraine to 600-620 feet at the top of the cliff rising above Lake Erie. The surface is marked by several sand ridges, which contain some gravel and which mark the locations of shores of former higher levels of late-glacial Lake Erie. These ridges, which rise from 10 to 30 feet above the Lake Plain, are well drained, and from the earliest days main highways were located along North Ridge, South Ridge, and, at places, Middle Ridge." (White, 1980)

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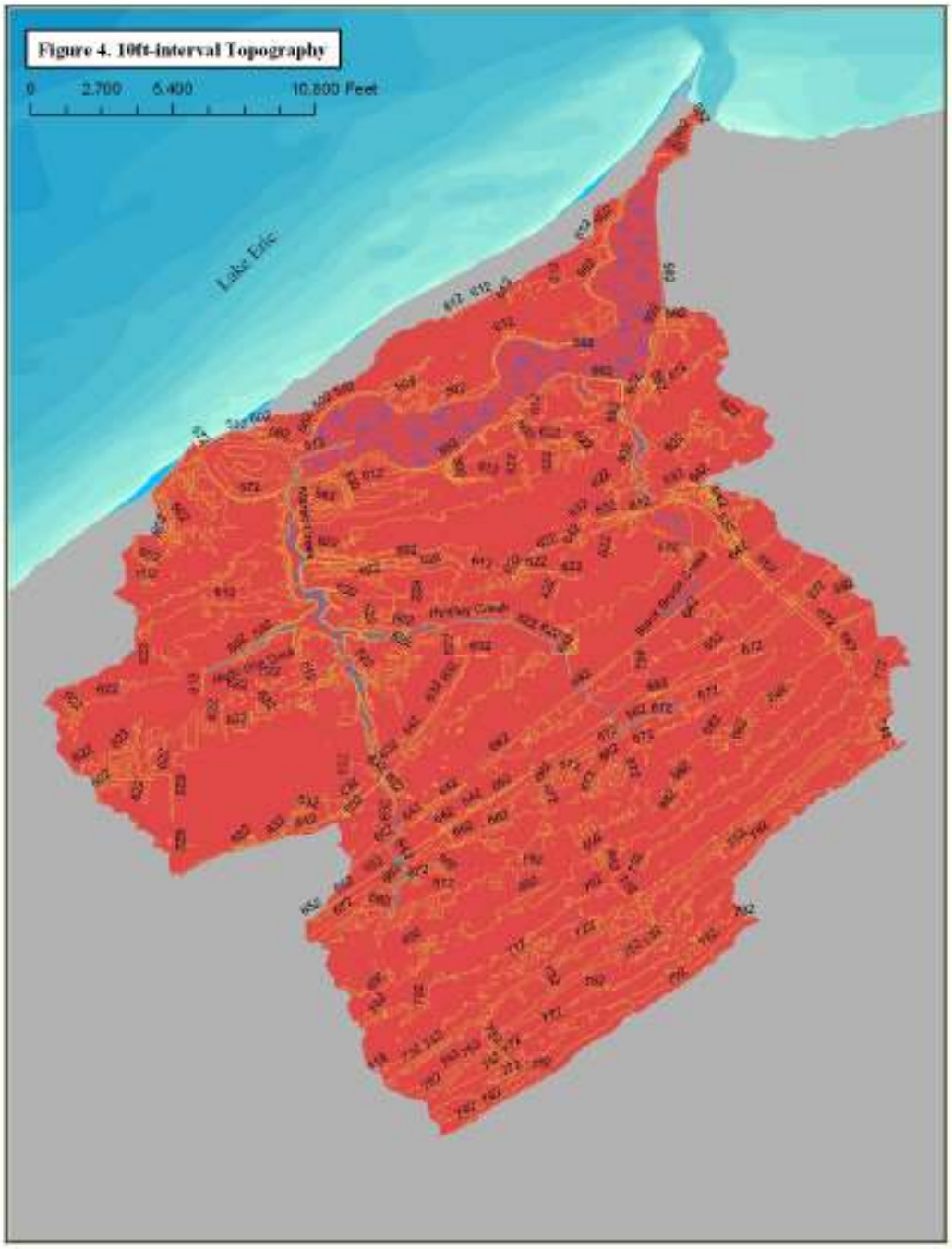
Figure 4. 10ft-interval Topography
0
2,700
5,400
10,800 Feet
Lake Erie

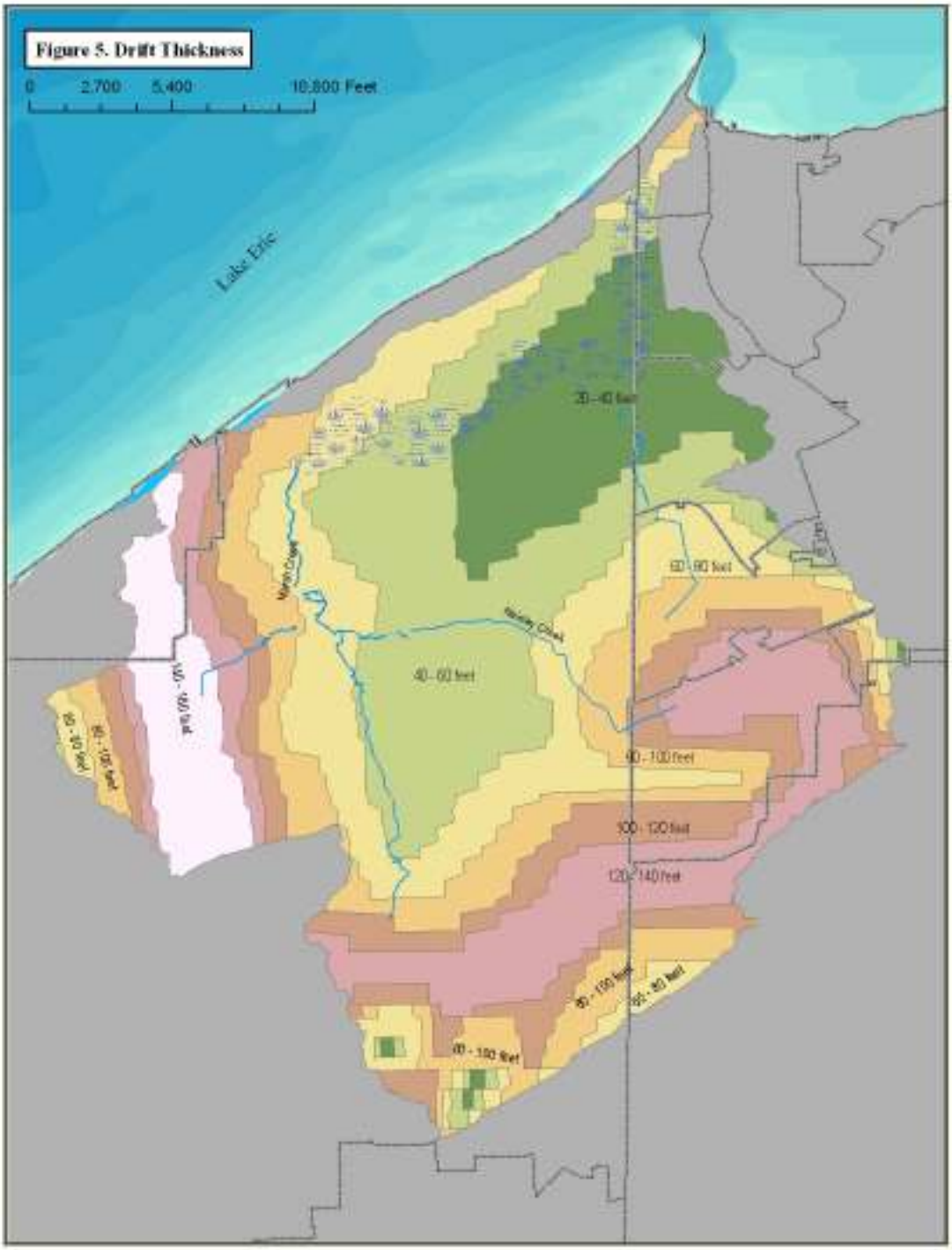
Figure 5. Drift Thickness
0
2,700
5,400
10,800 Feet
Lake Erie
30 - 40 feet
40 - 60 feet
60 - 80 feet
80 - 100 feet
100 - 120 feet
120 - 140 feet
140 - 160 feet
160 - 180 feet

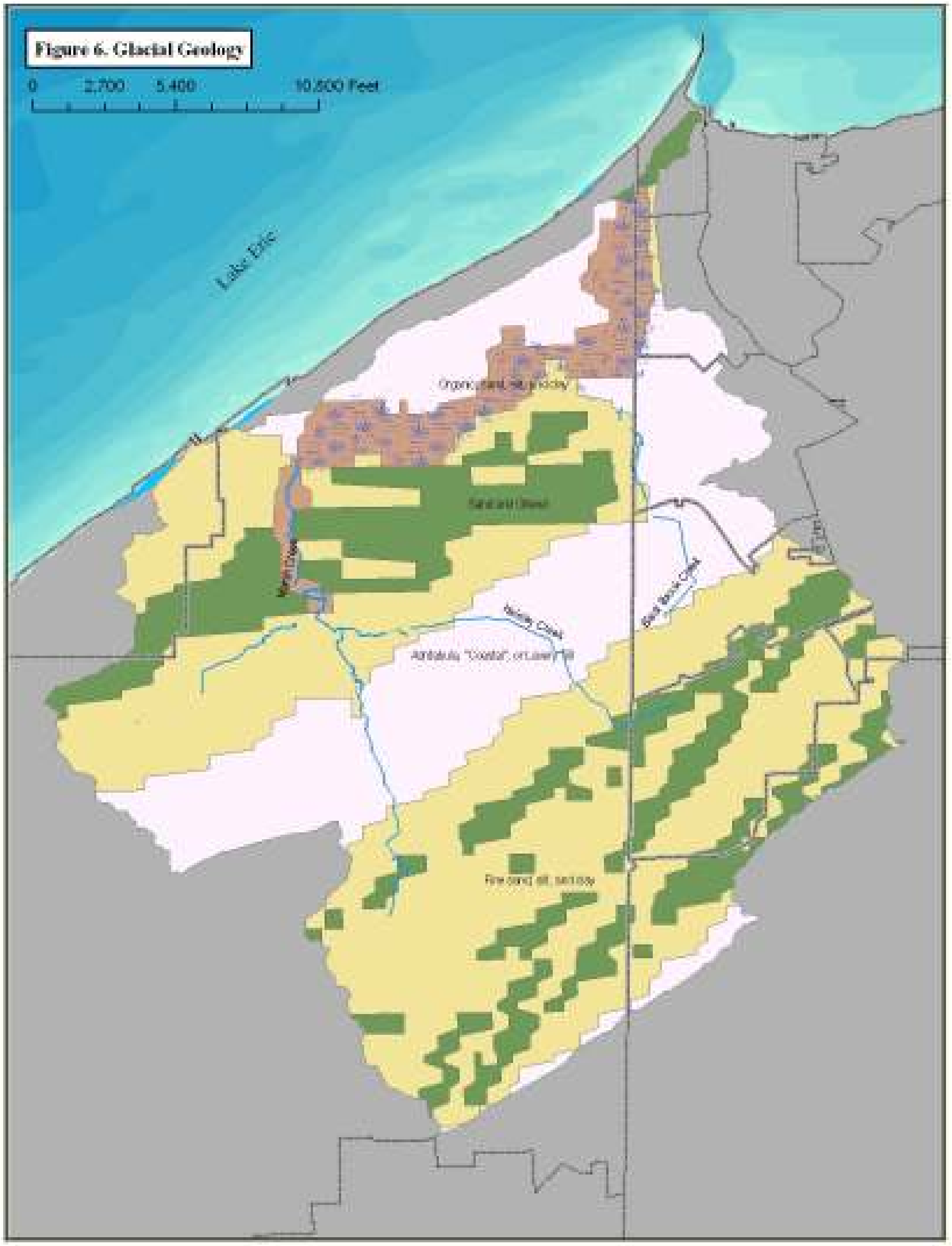

Figure 6. Glacial Geology

Soils

A total of 28 different soil types were identified in the Mentor Marsh Watershed. The Mentor Marsh is made up entirely of Carlisle Muck (Cg) which formed as the relic Grand River channel and floodplain became a wetland. The following is a description of each soil type of the Soil Survey of Lake County. The soils are listed with the amount of that particular soil type found in the watershed.

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CtA -- Conneaut silt loam, 0 to 1 percent slopes (2803.7-acres)

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This deep, level, poorly drained soil is the dominant soil on the lake plain. Areas are 0.5 to 1 mile wide.

This soil has a seasonal high water table near the surface for long periods in winter, spring, and early summer. It dries and warms slowly in spring. Permeability is slow, and available water capacity is high in the rooting zone. Rooting depth is related to the depth of the water table. The rooting zone is deep in drained areas. Organic matter content is moderately low. The surface layer and subsoil are very strongly acid to neutral.

Seasonal wetness and slow permeability severely limit use of this soil for building sites and sanitary facilities. Surface drains and storm sewers can be used to remove surface water. Local roads can be improved by using artificial drainage and suitable base material.

Table 2. CtA Limitations

CHARACTERISTIC/USES	LIMITATIONS
Dwellings without basements	Severe: wetness
Dwellings with basements	Severe: wetness
Local roads and streets	Severe: wetness, frost action & low strength
Septic tank absorption fields	Severe: wetness, percs slowly
Flooding frequency	None
High water table	Perched - Nov. thru June at depths of 0 - 1.0 feet
Bedrock depth	Greater than 60 inches

TyB -- Tyner loamy sand, 1 to 6 percent slopes (2682.4)

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This deep, nearly level and gently sloping, well drained soil is on the upper part of side slopes and crests of post-glacial beach ridges. Most areas are long and narrow in shape and range from 20-acres to several hundred acres in size.

This soil warms and dries early in spring. Permeability is rapid. Runoff is slow. Available water capacity is low in the deep rooting zone. This soil is droughty. Organic matter content is low. The subsoil is strongly acid to slightly acid, but the surface layer varies widely in reaction, depending on the amount of liming.

This soil is suitable for building sites. The possible contamination of ground water limits the use of this soil for sanitary facilities. Lawn seedings are difficult to establish during the drier part of the year. Lawns should be seeded early in spring; if seeded during dry periods, they should be mulched and watered.

Table 3. TyB Limitations

CHARACTERISTIC/USE	LIMITATIONS
Dwellings without basements	Slight
Dwellings with basements	Slight
Local roads and streets	Slight
Septic tank absorption fields	Slight
Flooding frequency	None
High water table	Greater than 6 feet
Bedrock depth	Greater than 60 inches

Pa -- Painesville fine sandy loam (2503.5-acres)

This deep, nearly level, somewhat poorly drained soil is on sandy, low ridges and slight rises on the lake plain. Slope ranges from 0 to 2 percent. Most areas are several hundred acres in size, but a few are as small as 20-acres.

A seasonal high water table is between depth of 6 and 18 inches for long periods in winter, spring, and other extended wet periods. In undrained areas the soil dries slowly in spring. Permeability is slow or moderately slow. Runoff is slow. The rooting zone is mainly above the water table. In drained areas the rooting zone is deep and available water capacity is high. Organic matter content is moderately low. The subsoil is strongly acid to slightly acid.

The seasonal high water table severely limits the use of this soil for sanitary facilities and for building sites. Houses without basements are better suited to this soil than those with basements. Mechanical measures may be used to help to prevent wet basements. Local roads can be improved by using artificial drainage and suitable base material. Wetness also limits use of this soil for recreation.

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Table 4. Pa Limitations

CHARACTERISTIC/USE	LIMITATIONS
Dwellings without basements	Severe: wetness
Dwellings with basements	Severe: wetness
Local roads and streets	Severe: frost action, wetness
Septic tank absorption fields	Severe: wetness, percs slowly
Flooding frequency	None
High water table	Perched - Jan. thru April at depths of 0.5 - 1.5 feet
Bedrock depth	Greater than 60 inches

CtB -- Conneaut silt loam, 1 to 4 percent slopes (1117.1-acres)

This deep, level, poorly drained soil is the dominant soil on the lake plain. Areas are 0.5 to 1 mile wide.

This soil has a seasonal high water table near the surface for long periods in winter, spring, and early summer. It dries and warms slowly in spring. Permeability is slow, and available water capacity is high in the rooting zone. Rooting depth is related to the depth of the water table. The rooting zone is deep in drained areas. Organic matter content is moderately low. The surface layer and subsoil are very strongly acid to neutral.

Seasonal wetness and slow permeability severely limit use of this soil for building sites and sanitary facilities. Surface drains and storm sewers can be used to remove surface water. Local roads can be improved by using artificial drainage and suitable base material.

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Table 5. CtB Limitations

CHARACTERISTIC/USES	LIMITATIONS
Dwellings without basements	Severe: wetness
Dwellings with basements	Severe: wetness
Local roads and streets	Severe: wetness, frost action & low strength
Septic tank absorption fields	Severe: wetness, percs slowly
Flooding frequency	None
High water table	Perched - Nov. thru June at depths of 0 - 0.5 feet
Bedrock depth	40 to 60 inches

RhA -- Red Hook sandy loam, 0 to 2 percent slopes (1084.9-acres)

This deep, nearly level, somewhat poorly drained soil is on low beach ridges and offshore bars on the lake plain. Most areas are long and narrow in shape and range from 10 to 500-acres in size.

In undrained areas this soil has a seasonal high water table at a depth of 6 to 18 inches during winter, spring and other extended wet periods. Permeability is moderate or moderately slow. Runoff is slow. Rooting depth is influenced by the water table. In spring, the rooting zone is mainly the upper 15 to 20 inches. Available water capacity is moderate. Organic matter content is moderately low. The subsoil is medium acid to neutral, but the surface layer varies widely in reaction, depending on the amount of liming.

The seasonal high water table severely limits the use of this soil for most sanitary facilities and for building sites. Ditches to control the water table are effective to some extent if outlets are available. Houses without basements are better suited to this soil than those with basements. Excavation is limited during winter and spring by the high water table and caving of banks. Wetness also limits use of this soil for recreation.

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Table 6. RhA Limitations

CHARACTERISTIC/USE	LIMITATIONS
Dwellings without basements	Severe: wetness
Dwellings with basements	Severe: wetness
Local roads and streets	Severe: frost action, wetness
Septic tank absorption fields	Severe: wetness
Flooding frequency	None
High water table	Apparent - Dec. thru May at depths of 0.5 - 1.5 ft
Bedrock depth	Greater than 60 inches

Cg -- Carlisle muck (798.5-acres)

This deep, level, very poorly drained organic soil is in a marsh. It is subject to frequent flooding. Slope is less than 2 percent. This soil is in one large, elongated area about 800-acres in size.

This soil has water near the surface, and the surface is ponded for long periods. Permeability is moderately rapid in the organic layer and moderately slow in the substratum. The rooting depth is related to the depth of the water table. The rooting zone is mainly the upper 10 to 12 inches. Available water capacity and organic matter content are very high. The organic material is medium acid to neutral.

This soil is used as a natural area with cattails, reeds, sedges, and some water-tolerant trees near the periphery. It has poor potential for most uses other than wetland wildlife habitat.

Flooding, wetness, and low strength seriously limit use of this soil for building sites and sanitary facilities. This soil provides good habitat for ducks, muskrats, and other wetland wildlife.

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Table 7. Cg Limitations

CHARACTERISTIC/USE	LIMITATIONS
Dwellings without basements	Severe: wetness, low strength, floods
Dwellings with basements	Severe: wetness, low strength, floods
Local roads and streets	Severe: excess humus, wetness, floods
Septic tank absorption fields	Severe: floods, wetness
Flooding frequency	Frequent - long duration - Nov. thru May
High water table	Apparent- Sep. thru June at depths of 0 - 1.0 feet
Bedrock depth	Greater than 60 inches

UdD -- Udorthents, moderately steep (498.6-acres)

These soils are in cut and fill areas created by road construction. Where the soil material has been removed, the remaining soil is typically similar to the material in the subsoil or substratum of adjacent soils. In fill or disposal areas, the soil material has more variable characteristics because it usually consists of varying amounts of materials from the subsoil and substratum of nearby soils. Slope ranges from 12 to 18 percent.

Typically, these soils are shaly silty clay loam, clay loam, or silt loam in the upper 60 inches. Available water capacity varies, but is mostly low. Permeability is generally slow. The soils have poor tilth. Hard rains tend to seal the surface, reducing infiltration and restricting seedling emergence and growth. The rooting zone ranges from medium acid to mildly alkaline.

Most of the acreage of these soils is along highways and in borrow pits. About half of the areas lack any plant cover. They are poorly suited to grasses and legumes. The hazard of erosion is severe in areas that are bare of vegetation. A suitable plant cover is needed to reduce erosion.

OtB -- Otisville gravelly loamy sand, 1 to 6 percent slopes (412.1-acres)

This deep, nearly level and gently sloping, excessively drained soil is on the upper part of sides and crests of postglacial beach ridges. Most areas are long and narrow in shape and range from 20 to several hundred acres in size.

This soil dries and warms early in spring. Permeability is rapid, and runoff is slow. Available water capacity is low in the deep rooting zone. This soil is droughty. Organic matter content is low. The surface layer and subsoil are strongly acid or very strongly acid, except where the surface layer has been limed.

This soil is suitable for building sites. The possible contamination of ground water limits the use for sanitary facilities. Lawn seedings are difficult to establish during the drier part of the year. Lawns should be seeded early in spring; if seeded during dry periods, they should be mulched and watered. This soil is a good source of sand and gravel.

Table 8. OtB Limitations

CHARACTERISTIC/USE	LIMITATIONS
Dwellings without basements	Slight
Dwellings with basements	Slight
Local roads and streets	Slight
Septic tank absorption fields	Slight
Flooding frequency	None
High water table	Greater than 6 feet
Bedrock depth	Greater than 60 inches

PsB -- Platea silt loam, 2 to 6 percent slopes (380.1-acres)

This deep, nearly level, somewhat poorly drained soil is on slightly convex side slopes on the uplands. Most slopes are long with slight irregularities. Many areas are broad and commonly are more than 100-acres in size.

A perched seasonal high water table is above the very slowly permeable fragipan in winter, spring, and other extended wet periods. This soil dries slowly in spring. Runoff is medium. The rooting zone is mainly 24 to 28 inches deep over the fragipan. Available water capacity is low in the rooting zone. Organic matter content is moderately low. The subsoil above the fragipan is very strongly acid to medium acid, but the surface layer varies widely in reaction, depending on the amount of liming.

Seasonal wetness and the very slowly permeable fragipan severely limit the use of this soil for building sites and sanitary facilities. Houses without basements are better suited to this soil than those with basements. Local roads can be improved by using artificial drainage and suitable base material. Some areas are good pond sites.

Table 9. PsB Limitations

CHARACTERISTIC/USE	LIMITATIONS
Dwellings without basements	Severe: wetness
Dwellings with basements	Severe: wetness
Local roads and streets	Severe: low strength, wetness, frost action
Septic tank absorption fields	Severe: percs slowly, wetness
Flooding frequency	None
High water table	Perched - Jan. thru April at depths of 0.5 - 2.0 feet
Bedrock depth	Greater than 60 inches

Or -- Orrville silt loam (353.5-acres)

This deep, nearly level, somewhat poorly drained soil is on flood plains and is subject to flooding. Slope ranges from 0 to 2 percent. This soil occupies the entire flood plain in some narrow valleys and occurs as long, narrow strips on the flood plain in the larger valleys. Most areas range from 10 to 100-acres in size.

A seasonal high water table is near the surface for long periods in winter, spring, and early summer. Permeability is moderate, and runoff is very slow. Rooting depth is influenced by the water table. In drained areas the rooting zone is deep and available water capacity is moderate. Organic matter content is moderately low. The subsoil is strongly acid to slightly acid, but the surface layer varies widely in reaction, depending on the amount of liming.

Flooding and seasonal wetness seriously limit the use of this soil for building sites and sanitary facilities.

Table 10. Or Limitations

CHARACTERISTIC/USES	LIMITATIONS
Dwellings without basements	Severe: floods, wetness
Dwellings with basements	Severe: floods, wetness
Local roads and streets	Severe: floods, frost action, low strength
Septic tank absorption fields	Severe: floods, wetness
Flooding frequency	Common - very brief to brief - November thru May
High water table	Perched - Nov. thru June at depths of 0.5 - 1.5 feet
Bedrock depth	Greater than 60 inches

CyB -- Conotton gravely loam, 2 to 6 percent slopes (246.0-acres)

This deep, gently sloping, somewhat excessively drained soil is on the upper part of sides and crests of post-glacial beach ridges. Most areas are long and narrow in shape and range from 10 to 30-acres in size.

Permeability is rapid, and available water capacity is low in the deep rooting zone. This soil warms early in spring. Runoff is slow or medium. The organic matter content is low. The subsoil is very strongly acid to neutral, but the surface layer varies widely in reaction, depending on the amount of liming.

This soil is well suited to building sites. Possible contamination of ground water limits the use for sanitary facilities. Gravel interferes with most recreational uses. Lawn seedings are difficult to establish during the drier part of the growing season. Seeding should be done early in spring; if seeded during dry periods, lawns should be mulched and watered.

Table 11. CyB Limitations

CHARACTERISTIC/USE	LIMITATIONS
Dwellings without basements	Slight
Dwellings with basements	Slight
Local roads and streets	Moderate: frost action
Septic tank absorption fields	Slight
Flooding frequency	None
High water table	Greater than 6 feet
Bedrock depth	Greater than 60 inches

UdB -- Udorthents, gently sloping (210.0-acres)

These soils are in cut and fill areas. Where the soil material has been removed, the remaining soil is typically similar to the material in the subsoil or substratum of adjacent soils. In fill or disposal areas, the soil material has more variable characteristics because it usually consists of varying amounts of materials from the subsoil and substratum of nearby soils. Slope ranges from 2 to 6 percent.

Typically, these soils are silty clay loam, clay loam, or silt loam in the upper 60 inches. Available water capacity varies, but is mostly low. Permeability is generally slow. The firm and dense surface layer is commonly littered with shale fragments. The soils have poor tilth. Hard rains tend to seal the surface, reducing infiltration and restricting seedling emergence and growth. A seasonal high water table is in some areas, particularly where grading has resulted in depressed or bowl-shaped areas. The rooting zone is medium acid to mildly alkaline.

Most areas of these soils are at new construction sites. About half of the areas lack any plant cover. A few areas are in hay or pasture. The hazard of erosion is severe in areas that are bare of vegetation. A suitable plant cover is needed to protect these soils from erosion. The suitability of these soils for building sites and sanitary facilities is quite variable.

TzA -- Tyner Variant sandy loam (187.6-acres)

This deep, nearly level, moderately well drained soil is on low ridges on the lake plain. Slope ranges from 0 to 2 percent. Most areas are irregular in shape and range from 5 to 50-acres in size.

A seasonal high water table is at a depth of 18 to 36 inches in winter, spring, and other extended wet periods. Permeability is rapid. Runoff is slow. This soil is droughty. Available water capacity is low in the deep rooting zone. The organic matter content is low. The subsoil is

strongly acid or medium acid, but the surface layer varies widely in reaction, depending on the amount of liming.
Seasonal wetness and rapid permeability limit the use of this soil for building sites and sanitary facilities. It is better suited to houses without basements than to those with basements. Mechanical measures may be used to help to prevent wet basements. Because of seepage, contamination of ground water from sanitary facilities is possible. Sloughing is a hazard in excavations. If lawns are seeded during dry periods, they should be mulched and watered.

Table 12. TzA Limitations

CHARACTERISTIC/USE	LIMITATIONS
Dwellings without basements	Moderate: wetness
Dwellings with basements	Severe: wetness
Local roads and streets	Moderate: frost action, wetness
Septic tank absorption fields	Severe: wetness
Flooding frequency	None
High water table	Apparent - Jan. thru May at depths of 1.5 - 3.0 feet
Bedrock depth	Greater than 60 inches

Sw -- Swanton fine sandy loam (175.5-acres)
This deep, nearly level, poorly drained soil is in relatively broad, elongated strips on the lake plain. Slope ranges from 0 to 2 percent. Most areas range from 5 to 100-acres in size.
A seasonal high water table is near the surface for long periods. Permeability is moderately rapid in the subsoil and slow or very slow in the substratum. Runoff is very slow. Rooting depth is influenced by the water table and generally is restricted by the finer textured substratum. Available water capacity is moderate in the rooting zone. Organic matter content is moderate. The surface layer and subsoil are neutral to strongly acid.
The seasonally high water table severely limits the use of this soil for building sites, sanitary facilities, and recreation. The slow or very slow permeability in the substratum limits some uses. Local roads can be improved by using artificial drainage and suitable base material.

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Table 13. Sw Limitations

CHARACTERISTIC/USES	LIMITATIONS
Dwellings without basements	Severe: wetness, shrink-swell
Dwellings with basements	Severe: wetness, shrink-swell
Local roads and streets	Severe: wetness, frost action , shrink-swell
Septic tank absorption fields	Severe: wetness, percs slowly
Flooding frequency	None
High water table	Apparent - Nov. thru May at depths of 0 - 1.0 feet
Bedrock depth	Greater than 60 inches

Kf -- Kingsville fine sand (164.1-acres)
This deep, nearly level, very poorly drained, sandy soil is adjacent to beach ridges. Slope ranges from 0 to 2 percent. Most areas are long and narrow in shape and range from 5 to several hundred acres in size.
This soil receives seepage water from the beach ridges. It has a seasonal high water table near the surface in winter, spring, and other extended wet periods. Permeability is rapid, and runoff is very slow. Rooting depth is related to the depth of the water table. Available water subsoil is very strongly acid to slightly acid, but the surface layer varies widely in reaction, depending on the amount of liming.

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Wetness and rapid permeability severely limit the use of this soil for building sites and sanitary facilities. Sloughing is a hazard in excavations. Wetness also limits recreational use.

Table 14. Kf Limitations

CHARACTERISTIC/USE	LIMITATIONS
Dwellings without basements	Severe: wetness
Dwellings with basements	Severe: wetness
Local roads and streets	Severe: wetness
Septic tank absorption fields	Severe: wetness
Flooding frequency	None
High water table	Apparent - Jan. thru April at depths of 0 - 1.0 feet
Bedrock depth	Greater than 60 inches

E1F -- Ellsworth silt loam, 25 to 70 percent slopes (163.8-acres)

This deep, very steep, moderately well drained soil is on hillsides and sides of V-shaped valleys formed by deeply entrenched drainageways. Typically, slopes are short. Most areas are long and narrow in shape and generally are larger than 50-acres in size.

The water table is generally between depths of 1.5 and 3.0 feet during winter, spring, and other excessively wet periods. This soil dries slowly in spring. Permeability is slow or very slow. Runoff is very rapid. The rooting zone is moderately deep over glacial till. Available water capacity is moderate. Organic matter content is moderately low. The surface layer and upper part of the subsoil are very strongly acid to neutral, and the lower part of the subsoil is slightly acid to mildly alkaline.

This soil is moderately well suited to woodland. The hazard of erosion is severe. The very steep slope limits use of logging equipment. Construction of buildings and sanitary facilities is very difficult because of the very steep slope. Also, the hazard of erosion is very severe when vegetation is removed. Trails in recreational areas should be protected from erosion and established across the slope wherever possible.

Table 15. ElF Limitations

CHARACTERISTIC/USES	LIMITATIONS
Dwellings without basements	Severe: slope
Dwellings with basements	Severe: slope, wetness
Local roads and streets	Severe: slope, low strength, frost action
Septic tank absorption fields	Severe: slope, percs slowly, wetness
Flooding frequency	None
High water table	Perched - Nov. thru May at depths of 1.5 - 3.0 feet
Bedrock depth	Greater than 60 inches

TyC -- Tyner loamy sand, 6 to 12 percent slopes (120.9-acres)

This deep, sloping, well drained soil is on sides of post-glacial ridges. Slopes are short. Most areas are long and narrow in shape and range from 5 to 10-acres in size.

This soil warms and dries early in spring. Permeability is rapid. Runoff is medium or rapid. This soil is droughty. Available water capacity is low in the deep rooting zone. Organic matter content is low. The subsoil is strongly acid to slightly acid, but the surface layer varies widely in reaction, depending on the amount of liming.

Although slope limits the use of this soil for building site, many areas are good building sites. The possible contamination of ground water limits the use of this soil for sanitary facilities. Lawn seedings are difficult to establish during the drier part of the growing season unless they are mulched and watered.

Table 16. TyC Limitations

CHARACTERISTIC/USE	LIMITATIONS
Dwellings without basements	Moderate: slope
Dwellings with basements	Moderate: slope
Local roads and streets	Moderate: slope
Septic tank absorption fields	Moderate: slope
Flooding frequency	None
High water table	Greater than 6 feet
Bedrock depth	Greater than 60 inches

St -- Stafford loamy fine sand (96.8-acres)

This deep, nearly level, somewhat poorly drained soil is on low sandy ridges on the lake plain. Slope ranges from 0 to 2 percent. Most areas of this soil are irregular in shape and range from 10-acres to several hundred acres in size.

A seasonal high water table is near the surface for long periods in winter, spring, and other extended wet periods. Permeability is moderately rapid or rapid. Runoff is slow. Rooting depth is related to the depth of the water table. Drained areas have a deep rooting zone. Available water capacity is very low. The organic matter content is moderately low. The surface layer and subsoil are strongly acid to neutral.

The seasonal high water table severely limits the use of this soil for building sites and sanitary facilities. Ditches that control the water table are effective to some extent. Houses without basements are better suited to this soil than those with basements. Excavation is limited during winter and spring by the high water table and caving of banks. Local roads can be improved by using artificial drainage. Wetness and the sandy surface layer limit the use of this soil for recreation.

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Table 17. St Limitations

CHARACTERISTIC/USE	LIMITATIONS
Dwellings without basements	Severe: wetness
Dwellings with basements	Severe: wetness
Local roads and streets	Severe: wetness
Septic tank absorption fields	Severe: wetness
Flooding frequency	None
High water table	Apparent - Jan. thru May at depths of 0.5 - 1.5 feet
Bedrock depth	Greater than 60 inches

EnB -- Elnora loamy fine sand, 1 to 5 percent slopes (86.2-acres)

This deep, nearly level and gently sloping, moderately well drained soil is on knolls and low ridges on the lake plain. Most areas are irregular in shape and range from 5 to 100-acres in size.

A seasonal high water table is at a depth of 18 to 24 inches in late winter, spring, and other extended wet periods. Permeability is moderately rapid or rapid. Runoff is slow. Available water capacity is low in the deep rooting zone. Organic matter content is low. The surface layer and subsoil are very strongly acid to slightly acid.

Seasonal wetness and moderately rapid or rapid permeability limit this soil for building sites and sanitary facilities. It is better suited to houses without basements than to those with basements. Because of seepage, contamination of ground water by sanitary facilities is possible. Sloughing is a hazard in excavations. Seeding should be done early in spring; if seeded during dry periods,

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lawns should be mulched and watered. The sandy surface layer limits recreational use of this soil. This soil is a good source of sand.

Table 18. EnB Limitations

CHARACTERISTIC/USES	LIMITATIONS
Dwellings without basements	Moderate: wetness
Dwellings with basements	Severe: wetness
Local roads and streets	Moderate: frost action, wetness
Septic tank absorption fields	Severe: wetness
Flooding frequency	None
High water table	Apparent -Feb. thru May at depths of 1.5 - 2.0 feet
Bedrock depth	Greater than 60 inches

Bs – Beaches (62.2-acres)

Beaches consist of sand and gravel washed and re-washed by waves along the shore of Lake Erie. They are partly covered by water during periods of high runoff. A fairly steep escarpment borders the land side of most beaches. Permeability is very rapid, and available water capacity is very low.

Most beaches are used for recreation, wildlife habitat, and aesthetic or scenic purposes.

Gr -- Granby sandy loam (58.0-acres)

This deep, nearly level, very poorly drained soil is in basin-like depressions on the lake plain. Slope ranges from 0 to 2 percent. Most areas are irregular in shape and range from 5 to 100-acres in size.

Unless artificially drained, this soil has a seasonal high water table near the surface for long periods. Permeability is rapid. The rooting depth is related to the depth of the water table. The rooting zone is moderately deep or deep in most drained areas. Available water capacity is low. Runoff is very slow. Organic matter content is moderate. The surface layer and subsoil are medium acid or strongly acid except where the surface layer has been limed.

Prolonged wetness severely limits use of this soil for building sites and sanitary facilities. Sloughing is a hazard in excavation. Suitable base material and artificial drainage are commonly required for roads.

Table 19. Gr Limitations

CHARACTERISTIC/USES	LIMITATIONS
Dwellings without basements	Severe: wetness
Dwellings with basements	Severe: wetness
Local roads and streets	Severe: wetness
Septic tank absorption fields	Severe: wetness
Flooding frequency	None
High water table	Apparent - Nov. thru June at depths of 0 - 1.0 feet
Bedrock depth	Greater than 60 inches

PsA -- Platea silt loam, 0 to 2 percent slopes (56.2-acres)

This deep, nearly level, somewhat poorly drained soil is on broad flats on the uplands. The smaller areas, 5 to 10-acres in size, are oblong to oval in shape. The larger areas, 20 to 100-acres in size, are irregular in shape.

A perched seasonal high water table is above the very slowly permeable fragipan in winter, spring, and other extended wet periods. This soil dries slowly in spring. Runoff is slow. The rooting zone is mainly 24 to 28 inches deep over the fragipan. Available water capacity is low in

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the rooting zone. Organic matter content is moderately low. The subsoil above the fragipan is very strongly acid to medium acid, but the surface layer varies widely in reaction, depending on the amount of liming.
Seasonal wetness and very slow permeability severely limit the use of this soil for building sites and sanitary facilities. Houses without basements are better suited to this soil than those with basements. Building sites should be landscaped for surface drainage away from the foundation. Local roads can be improved by using artificial drainage and suitable base material. Wetness also limits use of this soil for recreation.

Table 20. PsA Limitations

CHARACTERISTIC/USE	LIMITATIONS
Dwellings without basements	Severe: wetness
Dwellings with basements	Severe: wetness
Local roads and streets	Severe: low strength, wetness, frost action
Septic tank absorption fields	Severe: percs slowly, wetness
Flooding frequency	None
High water table	Perched - Jan. thru April at depths of 0.5 - 2.0 feet
Bedrock depth	Greater than 60 inches

CxA -- Conotton loam, 0 to 2 percent slopes (21.9-acres)

This deep, nearly level, somewhat excessively drained soil is mainly on outwash terraces. A few areas are on post-glacial beach ridges. Most areas are long and narrow in shape and range from 5 to 30-acres in size.

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Permeability is rapid, and available water capacity is low in the deep rooting zone. This soil warms early in spring. Runoff is slow. The organic matter content is low. The subsoil is very strongly acid to neutral, but the surface layer varies widely in reaction, depending on the amount of liming.
This soil is suited to building sites. Possible contamination of ground water limits the use for sanitary facilities. Lawn seedings are difficult to establish during the drier part of the year. Seeding should be done early in spring; if seeded during dry periods, lawns should be mulched and watered.

Table 21. CxA Limitations

CHARACTERISTIC/USE	LIMITATIONS
Dwellings without basements	Slight
Dwellings with basements	Slight
Local roads and streets	Moderate: frost action
Septic tank absorption fields	Slight
Flooding frequency	None
High water table	Greater than 6 feet
Bedrock depth	Greater than 60 inches

ElC -- Ellsworth silt loam, 6 to 12 percent slopes (21.1-acres)

This deep, sloping, moderately well drained soil is on hillsides and on side slopes parallel to drainageways. Most areas are irregular in shape and range from 5 to 20-acres in size.

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A perched seasonal high water table is between depths of 1.5 and 3.0 feet during winter, spring, and other excessively wet periods. This soil dries slowly in spring. Permeability is slow or very slow. Runoff is rapid. The rooting zone is moderately deep over glacial till. Available water capacity is moderate. Organic matter content is moderately low. The surface layer and upper

part of the subsoil are very strongly acid to neutral, and the lower part of the subsoil is slightly acid to mildly alkaline.
Wetness, slope, slow or very slow permeability, and shrink-swell potential limit the use of this soil for building sites and sanitary facilities. Homes without basements are better suited to this soil than those with basements. Erosion is a serious hazard during construction, so cover should be maintained on the site as much as possible during construction. Trails in recreational areas should be protected from erosion and established across the slope wherever possible. Some areas are suitable sites for ponds.

Table 22. ElC Limitations

CHARACTERISTIC/USES	LIMITATIONS
Dwellings without basements	Moderate: slope, shrink-swell, wetness
Dwellings with basements	Severe: wetness
Local roads and streets	Severe: low strength, frost action
Septic tank absorption fields	Severe: percs slowly, wetness
Flooding frequency	None
High water table	Perched - Nov. thru May at depths of 1.5 - 3.0 feet
Bedrock depth	Greater than 60 inches

Po -- Pits, gravel (20.3-acres)
Gravel pits consist of surface-mined areas from which aggregate material has been removed for construction. Gravel pits are on beach ridges and out-wash terraces. Typically, they are associated with Conotton, Otisville, Tyner, and other soils that are underlain by gravel and sand out-wash. Most pits range from 2 to 50-acres in size. Actively mined pits are continually enlarged. Most pits characteristically have a high wall on one or more sides.
The material that is mined consists of stratified layers of gravel and sand of varying thickness and orientation. The kind and grain size of aggregate are relatively uniform with any one layer but commonly differ from layer to layer. Some layers contain a significant amount of silt and sand. Selectivity in mining is commonly feasible.
The material that remains after mining is poorly suited to plants. The organic matter content and available water capacity are low.
Most unused gravel pits can be developed as wildlife habitat or as recreation areas. They are commonly not used for farming or woodland.

Ur -- Urban land (14.5-acres)
Urban land consists of areas 10-acres or more in size that are covered by buildings, pavements, or other man-made surfaces. Included in Urban land are commercial and industrial areas, large factories, shopping centers, warehouses, and railroad yards. Slope ranges from 0 to 6 percent.
Much of the total area is covered by construction, leaving only a limited acreage of natural soil. This results in increased volume and rate of runoff from these areas. Urban land is a potential source of pollution to nearby streams.

Ad -- Adrian muck (6.4-acres)
This deep, level, very poorly drained organic soil is in depressional areas on the lake plain. It is subject to frequent flooding. Slope is generally less than 2 percent. Most areas are elongated in shape and are 5 to 20-acres in size.
This soil has a seasonal high water table near the surface, and the surface is ponded for long periods in winter, spring, and early summer. Permeability is rapid. Rooting depth is strongly influenced by the depth to the water table. The rooting zone is mainly the upper 12 inches.

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Available water capacity is high, and organic matter content is very high. The organic layers are strongly acid to slightly acid.
Most of the acreage of this soil is in natural vegetation, such as sedges and water-tolerant trees. This soil has poor potential for farming, building sites, and sanitary facilities. Undrained areas have good potential for wetland wildlife habitat.
Flooding, wetness, and rapid permeability seriously limit the use of this soil for building sites and sanitary facilities. Sloughing is a concern when making excavations. Some areas provide good sites for dugout ponds or wildlife marshes.

Table 23. Ad Limitations

CHARACTERISTIC/USES	LIMITATIONS
Dwellings without basements	Severe: wetness, floods, & low strength
Dwellings with basements	Severe: wetness, floods, & low strength
Local roads and streets	Severe: wetness, floods, & low strength
Septic tank absorption fields	Severe: wetness & floods
Flooding frequency	Frequent - long duration - Nov. thru May
High water table	Apparent - Nov. thru May at depths of 0 - 1.0 feet
Bedrock depth	Greater than 60 inches

PeC2 -- Pierpont silt loam, 6 to 12 percent slopes, moderately eroded (0.6-acres)
This deep, sloping, moderately well drained soil is on hillsides and side slopes parallel to drainageways. Most areas are irregular in shape and range from 10 to 200-acres in size.
A perched seasonal high water table is on the slowly or very slowly permeable fragipan in winter, spring, and other extended wet periods. Runoff is rapid. The rooting zone is mainly 18 to 30 inches deep over the fragipan. Available water capacity is low in the rooting zone. Organic matter content is low in the surface layer. The subsoil above the fragipan is strongly acid or very strongly acid, but the surface layer varies widely in reaction, depending on the amount of liming.
The slowly or very slowly permeable fragipan, slope and seasonal wetness limit the use of this soil for building sites and sanitary facilities. This soil is better suited to houses without basements than to those with basements. Cover should be maintained on the site as much as possible during construction to reduce the severe hazard of erosion. Local roads can be improved by using artificial drainage and suitable base material. Trails in recreational areas should be protected from erosion and established across the slope wherever possible.

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Table 24. PeC2 Limitations

CHARACTERISTIC/USE	LIMITATIONS
Dwellings without basements	Moderate: wetness, slope, low strength
Dwellings with basements	Severe: wetness
Local roads and streets	Severe: low strength, frost action
Septic tank absorption fields	Severe: percs slowly, wetness
Flooding frequency	None
High water table	Perched - Jan. thru April at depths of 1.5 - 3.0 feet
Bedrock depth	Greater than 60 inches

More than 8600-acres of the soil types found in the watershed, that is 60% of the surface area, are listed as having severe limitations for development. Figure 7 shows the location of the different soil types in

the watershed. Figure 8 shows the drainage characteristics of those soil types. Figure 9 shows the soils with steep slopes in the watershed. Figure 10 shows the soils with high water tables.

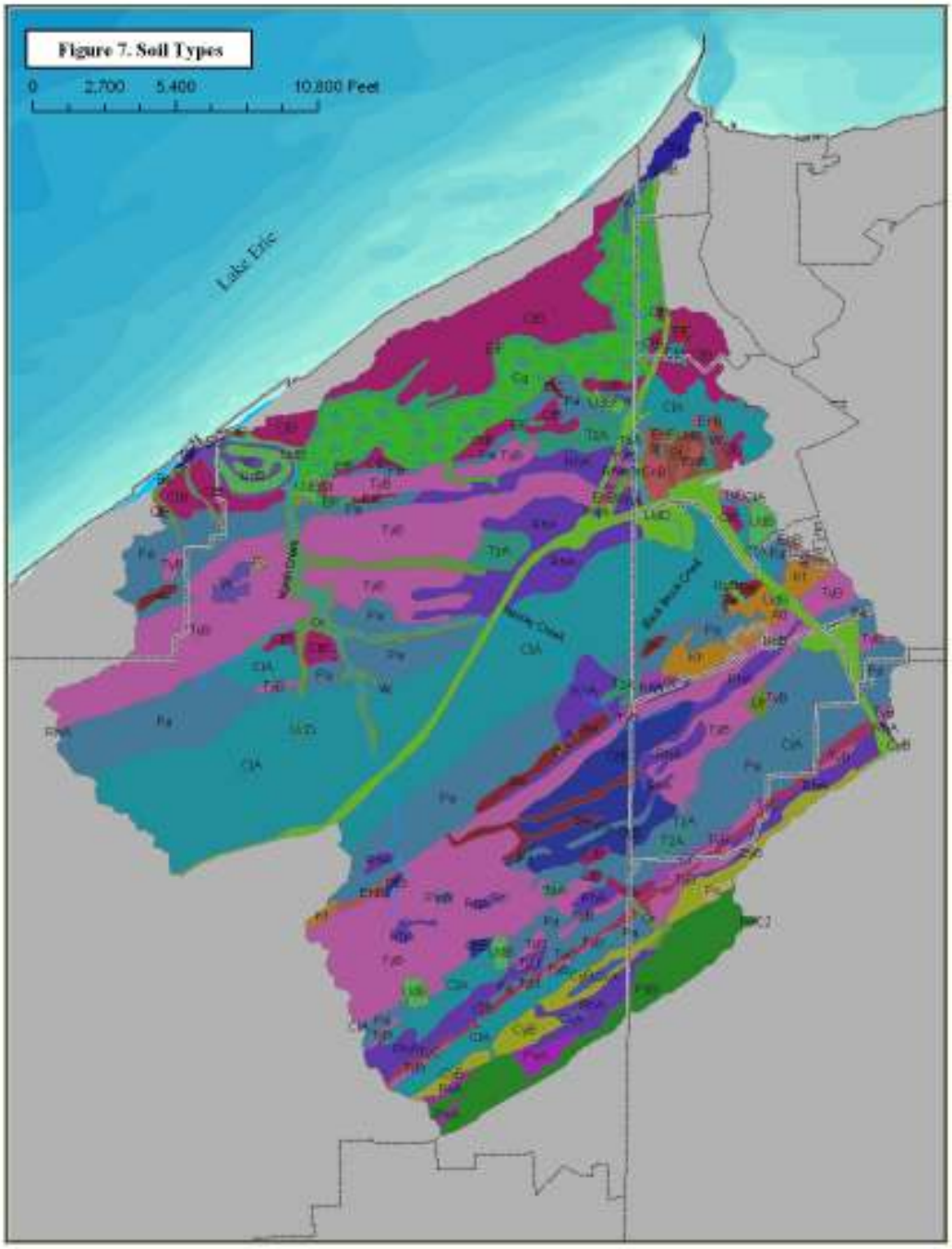
Figure 7. Soil Types
0
2,700
5,400
10,800 Feet
Lake Erie

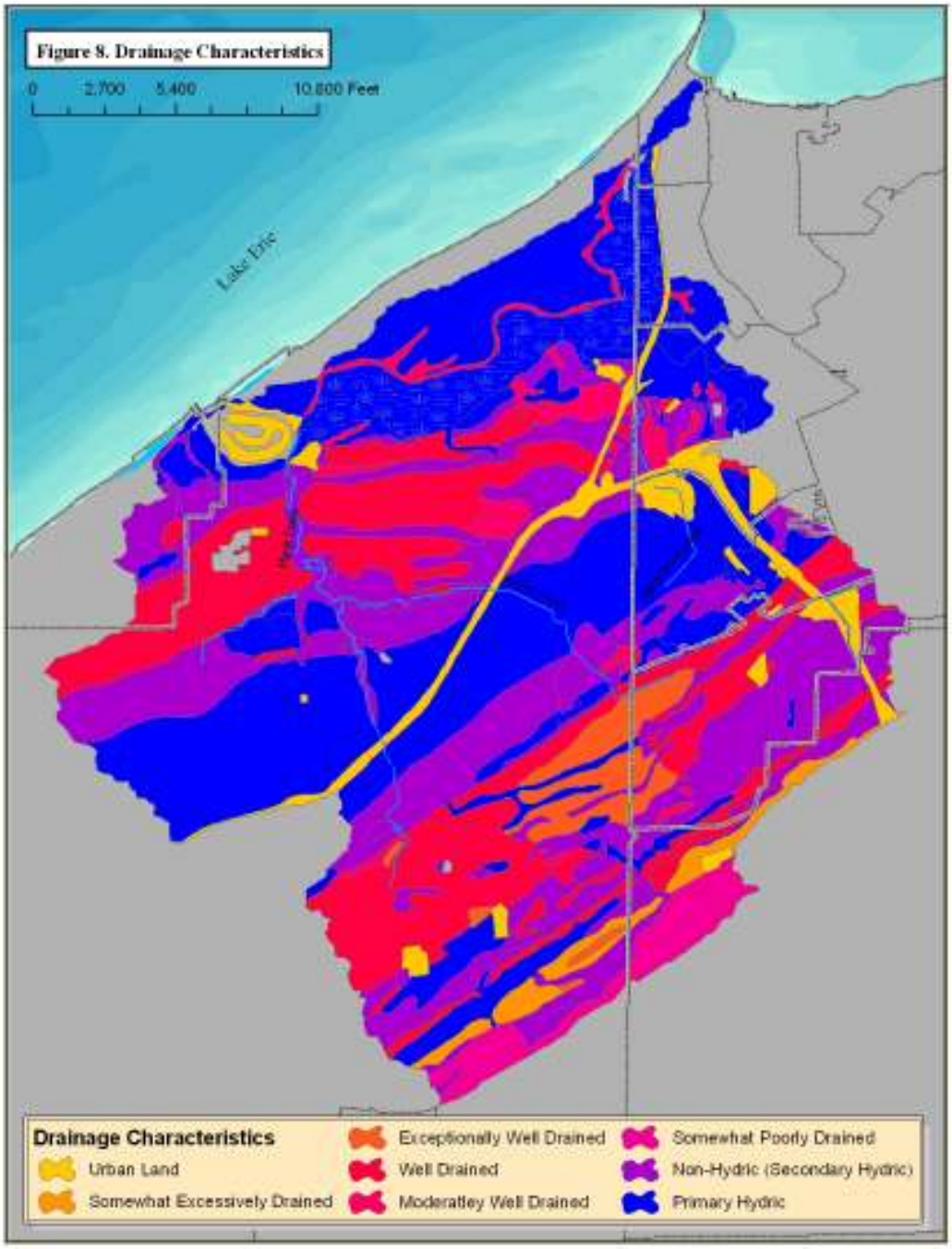
Figure 8. Drainage Characteristics
0
2,700
5,400
10,800 Feet
Lake Erie
Drainage Characteristics
Urban Land
Somewhat Excessively Drained
Exceptionally Well Drained
Well Drained
Moderatley Well Drained
Somewhat Poorly Drained
Non-Hydric (Secondary Hydric)
Primary Hydric

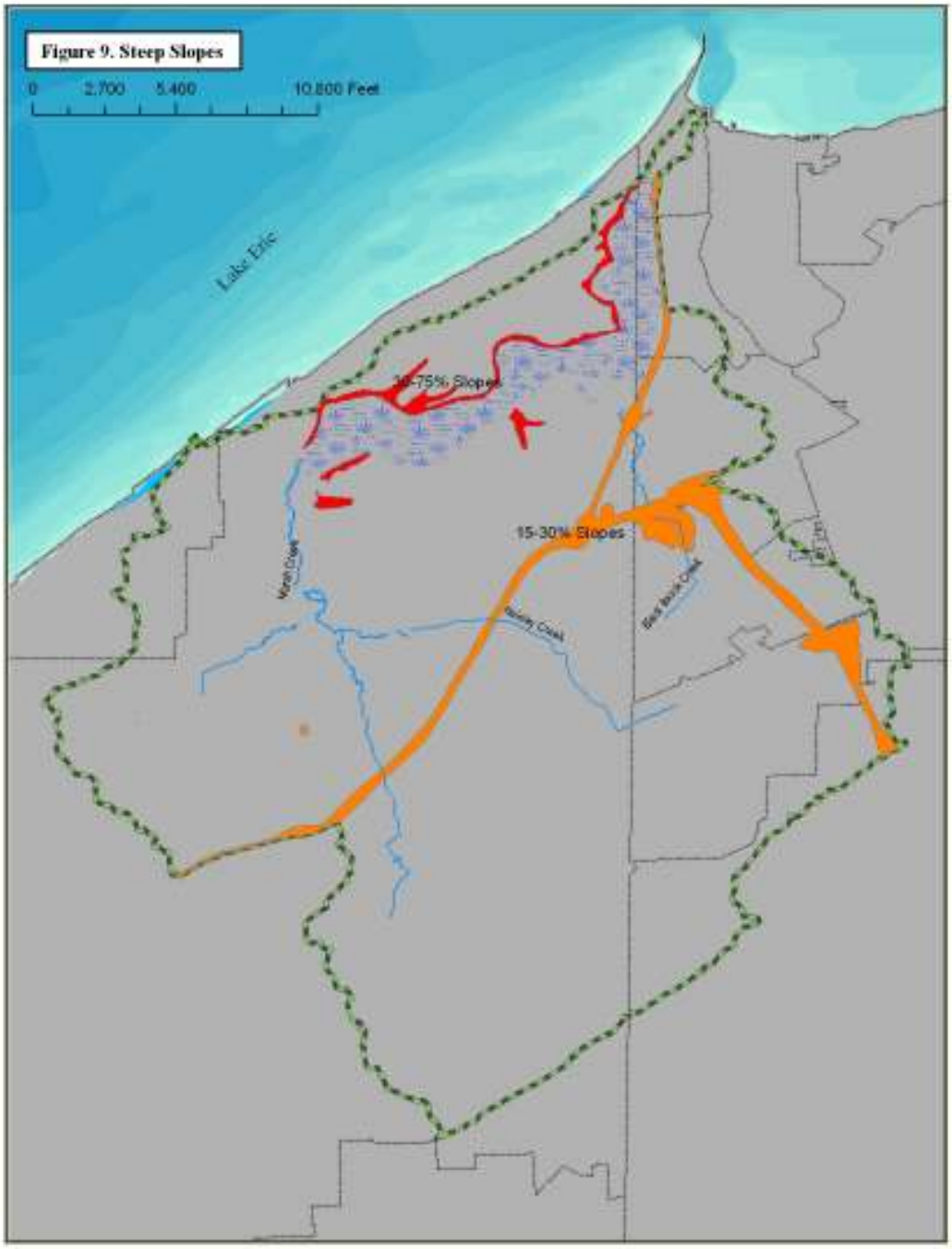
Figure 9. Steep Slopes
0
2,700
5,400
10,800 Feet
Lake Erie
30-75% Slopes
15-30% Slopes
North Creek
Muddy Creek
East Branch Creek

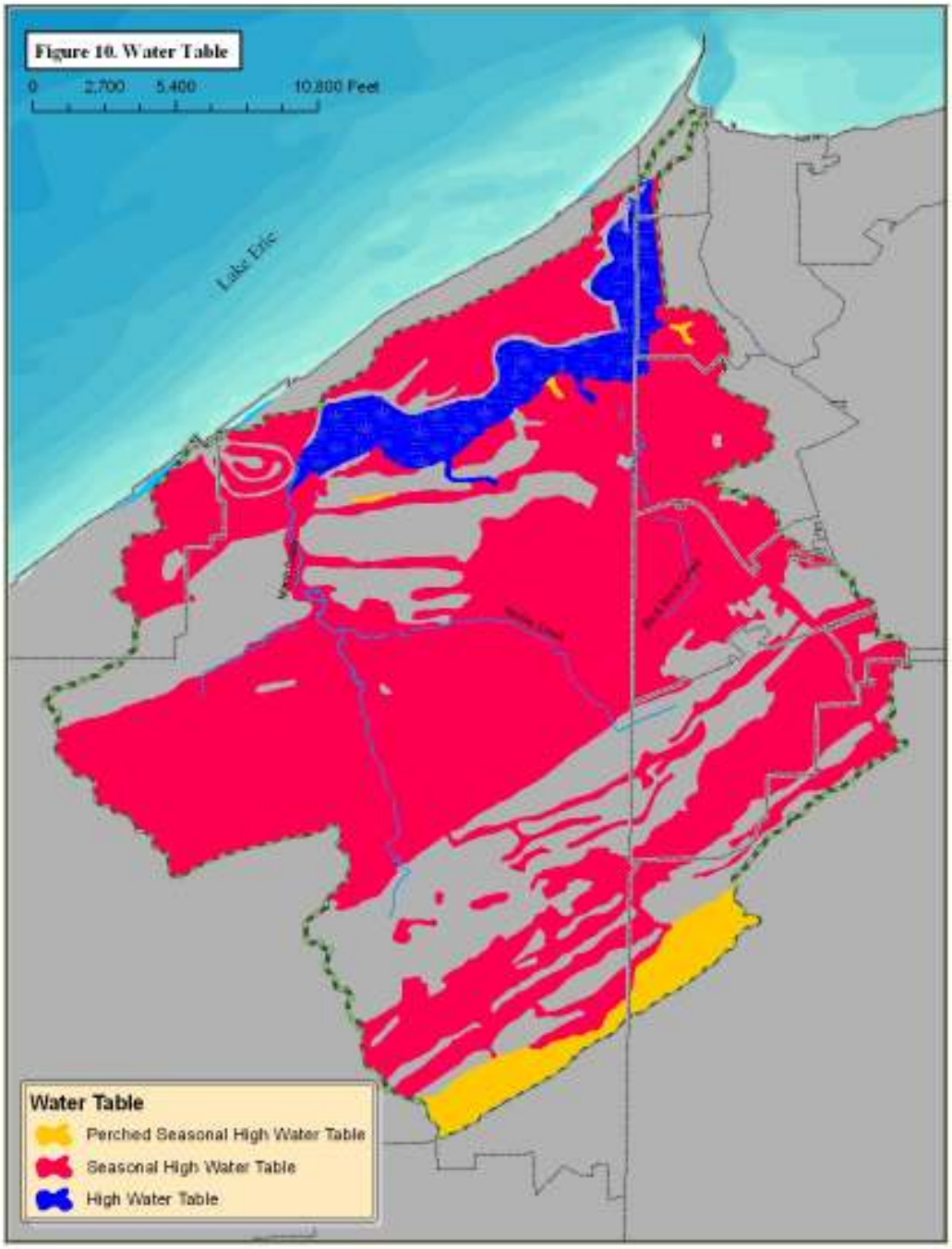
Figure 10. Water Table
0
2,700
5,400
10,800 Feet
Lake Erie
Water Table
Perched Seasonal High Water Table
Seasonal High Water Table
High Water Table

Biological Features

Rare, Threatened, and Endangered Species Currently documented within the Mentor Marsh Watershed by the Cleveland Museum of Natural History:

- American Bittern, Endangered within Ohio
- Least Bittern, Threatened within Ohio
- Sora Rail, Species of Special Concern in Ohio
- Spotted Turtle, Threatened within Ohio
- Winged sedge (Carex alata), Potentially Threatened within Ohio
- Robust smartweed (Polygonum robustius), Threatened within Ohio
- Native reed-grass (Phragmites australis subspecies americanus), Endangered in Ohio
- Star-nosed Mole, Species of Special Concern in Ohio
- Grey Birch, Potentially Threatened within Ohio
- American Chestnut, Potentially Threatened within Ohio
- Spotted Coral-root, Potentially Threatened within Ohio
- Butternut, Potentially Threatened within Ohio
- Floating Pondweed, Potentially Threatened within Ohio
- Leafy Tussock Sedge, Potentially Threatened within Ohio

List of invasive species at Mentor Marsh in order of their threat:

Deleted:

Invasive Plants within wetlands:

- Reed grass (Phragmites australis subspecies austrailis)
- Narrow-leaf cattail (Typha angustifolia)
- Hybrid cattail (Typha latifolia)
- Glossy buckthorn (Rhamnus frangula)
- Common buckthorn (Rhamnus cathartica)
- Reed canary grass (Phalaris arundinacea)
- Purple loosestrife (Lythrum salicaria)
- Black alder (Alnus glutinosa)
- Japanese Knotweed (Polygonum cuspidatum)

Invasive Plants on uplands:

- Garlic mustard (Alliaria petiolata)
- Japanese honeysuckle (Lonicera japonica)
- Glossy buckthorn (Rhamnus frangula)
- Common buckthorn (Rhamnus cathartica)
- Autumn olive (Elaeagnus umbellate)
- Morrows bush honeysuckle (Lonicera morrowi)
- Tatarian honeysuckle (Lonicera tatarica)
- Myrtle (Vinca minor)
- Norway maple (Acer platanoides)
- Canary grass (Phalaris arundinacea)
- Fortunes spindle-tree (Euonymus fortunii)
- Privet (Ligustrum sinense)

11 Digit and 14 Digit HUC Watersheds

Region 04 Great Lakes Region --_The drainage within the United States that ultimately discharges into: (a) the Great Lakes system, including the lake surfaces, bays, and islands; and (b) the St. Lawrence River to the Riviere Richelieu drainage boundary. Includes parts of Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin.

Subregion 0411 -- Southern Lake Erie: The drainage into Lake Erie from the Vermilion River Basin boundary to and including the Ashtabula River Basin. Ohio, Pennsylvania. Area = 3030 sq.mi.

Accounting Unit 041100 -- Southern Lake Erie. Ohio, Pennsylvania. Area = 3030 sq._mi.

Cataloging Unit 04110003 -- Ashtabula-Chagrin. Ohio, Pennsylvania. Area = 630 sq.mi.

04110003-010-Lake Erie tributaries (below Cuyahoga R. to above Grand River [except Chagrin R.]) Area = 76,155-acres

04110003-010-040-Lake Erie drainage east of Chagrin R. and west of Grand R. (includes Mentor Marsh) Subarea= 18,321-acres

Climate and Precipitation

The climate and precipitation of the watershed has been studied extensively and is very well summarized in the Fineran dissertation "Assessing Spatial and Temporal Vegetative Dynamics at Mentor Marsh, 1796 to 2000 A.D." Section 3.4.1.1

> "The corrected annual precipitation data for the years between 1810 and 1838 suggest that this was a period of above average annual rainfall, which corresponds to the rising Lake Erie water levels during this time period."
>
> "The overall trend is rising Lake Erie water levels especially during the 1830's, with many years of above average annual rainfall indicating wetter climatic conditions during this first time interval."
>
> "Lake Erie water levels between 1876 and 1959 were generally much below average with an especially low period during the drought years of the 1930's followed by several high water years in the 1940's and 1950's."
>
> "Annual precipitation for Lake Erie, as provided by Powers et al (1960) for the years 1810 to 1959, also shows a decrease for many years during the second time interval."
>
> "Beginning in 1890's until the late 1940's annual precipitation is much less than it was for most of the first time interval, 1796 to 1876. Beginning in 1887, the 5-year running average for annual precipitation stays below average until 1949."
>
> "Annual precipitation for Lake Erie is … very low in the late 1800's and then generally around average in the early 1900's. This is followed by a period of below-average annual precipitation in the 1930's indicating the

drought years that occurred during that decade. The 1930's drought is followed by a general increase in annual precipitation beginning in the 1940's and lasting for much of the 1950's."

"Annual precipitation for the upper Great Lakes basin was also generally below average beginning around 1892 and lasting until the 1940's."

"The overall trend for the second time interval, 1876 to 1959, is lower Lake Erie water levels and many years of drought during the late 1800's and during the 1930's but with several years of above average precipitation as well. …. These conditions indicate a drier climate during the second time interval,…"

"Lake Erie precipitation also shows an increase in annual precipitation during the third time interval, 1959 to 1976."

"Annual precipitation for the upper Great Lakes basin was above-average beginning around 1968 and continued above average through the end of second time interval in 1976."

"From the historical records for Lake Erie water levels and annual precipitation we see that there was a change to a wetter climate during the third time interval, 1959 to 1976,…"

"Annual rainfall between 1976 and 2000 was also above average with only a few years below long-term average."

"So, the overall trend for the time period 1976 to 2000 is above average lake levels and above average annual rainfall." (Fineran, 2003)

Streams, Subwatersheds, and Floodplains

The Mentor Marsh Watershed drains 22.6 square miles, or 14463-acres. The watershed is divided into 3 sub-watersheds. The smallest is the Black Brook Creek watershed, which drains 2128.11-acres. Black Brook Creek drains from northwest Concord Township into Painesville Township and then into Painesville City before entering the City of Mentor near it's confluence with the Mentor Marsh. The confluence is on the eastern end of the marsh near State Route 44 and Deer Ridge Road. No 100-year floodplain has been officially mapped in this subwatershed. The largest subwatershed is Marsh Creek, which drains 8859.26-acres. Marsh Creek also starts in northwest Concord Township and then drains into the City of Mentor and confluences with the marsh near Mentor Lagoons. An extensive 100-year floodplain exists along Marsh Creek, extending as far south as Jackson Street. Floodplains mapped by FEMA are also located along a large unnamed tributary to Marsh Creek that flows along Hilltop Drive and extends into the headwaters along the active CSX railroad north of Jackson Street.

Marsh Creek has two large tributaries, Heisley Creek and Martin Ohm Creek. The Heisley Creek Watershed is 1766.9-acres and starts in northwest Concord Township. It then flows into Painesville Township before entering the City of Mentor where it enters Marsh Creek near Harvest Home Drive and Walden Court. Heisley Creek also contains extensive FEMA floodplains from it's confluence with Marsh Creek to the Painesville Township line. The floodplain becomes very wide south of the CSX railroad. Most likely due to inadequate culvert capacity backing up floodwaters along drainage ditches parallel to the railroad.

The Martin Ohm Creek Watershed is 1459.25-acres and aside from a small portion of the watershed located in southeast Mentor-on-the-Lake; the entire watershed is located in the City of Mentor. Martin Ohm Creek is the only surface water tributary to the marsh in the western limits of the watershed, no FEMA floodplains were identified along the creek.

The last of the subwatersheds is the Mentor Marsh Watershed, which drains 3473.70-acres (excluding the Marsh Creek and Black Brook Creek tributaries). This watershed is typified by overland flow and stormwater inputs from culverts and highly modified surface water channels. The watershed drains eastern Mentor-on-the-Lake, the northern portion of the City of Mentor (included Mentor Headlands), and portions of Grand River, Painesville City, and Painesville Township. The landscape changes which started to occur in the late 1800's and continue today have resulted in a highly modified system of surface water drainage. Most of the functions of headwater stream systems in the watershed have been lost.

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"The chemical, physical, and biological quality of larger streams and lakes have a close connection to the overall health of headwater streams and their watersheds. Primary headwater streams provide important economic and ecological functions through the retention of sediment, water, and organic matter; nutrient reduction; and by providing corridors for wildlife dispersal" (Ohio EPA, 2000a; Meyer and Wallace, 2001; Peterson et al., 2001).

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Naturally functioning primary headwaters prevent flooding, erosion and protect the source of our drinking water. These functions are seen in the headwater's themselves and the larger streams that they flow into. Class III Primary Headwater Habitats are, as evidenced by the presence of the biological species in them, functioning at their highest capacity. These are the streams that provide the most efficient functions of sediment and stormwater retention. A comparison of USGS topographic maps and USGS soil survey maps with current GIS hydrology layers show no wholesale system of culverts in the watershed. The exceptions are small sections of culverts for road crossings and a section of Blackbrook Creek near it's confluence with the marsh.
The streams and surface water network are depicted in Figure 11. The subwatersheds are mapped in Figure 12. Figure 13 shows the extent of the 100-year floodplains.

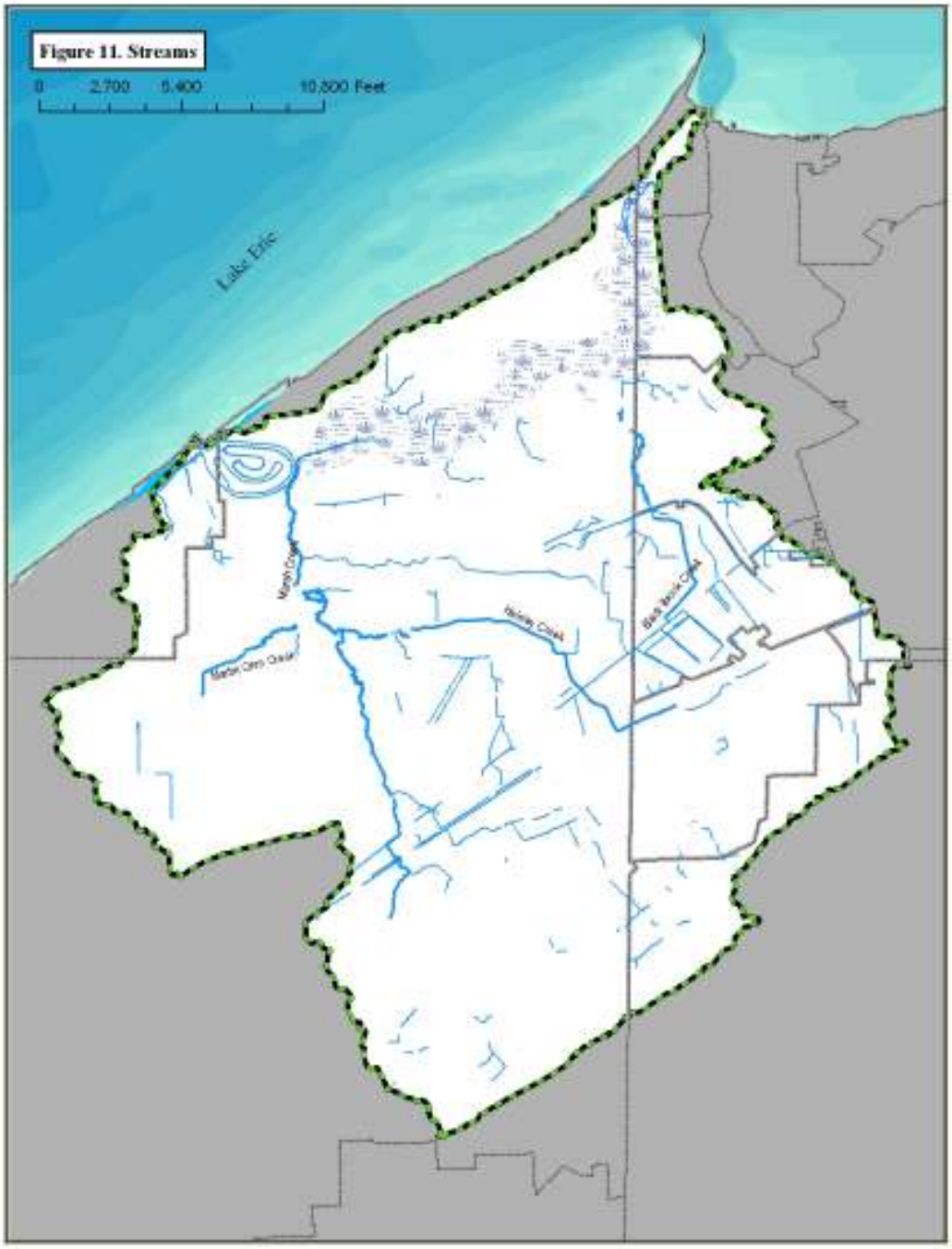
Figure 11. Streams
0
2,700
5,400
10,800 Feet
Lake Erie
Marsh Creek
Marble Cem Creek
Muddy Creek
Black Brook Creek

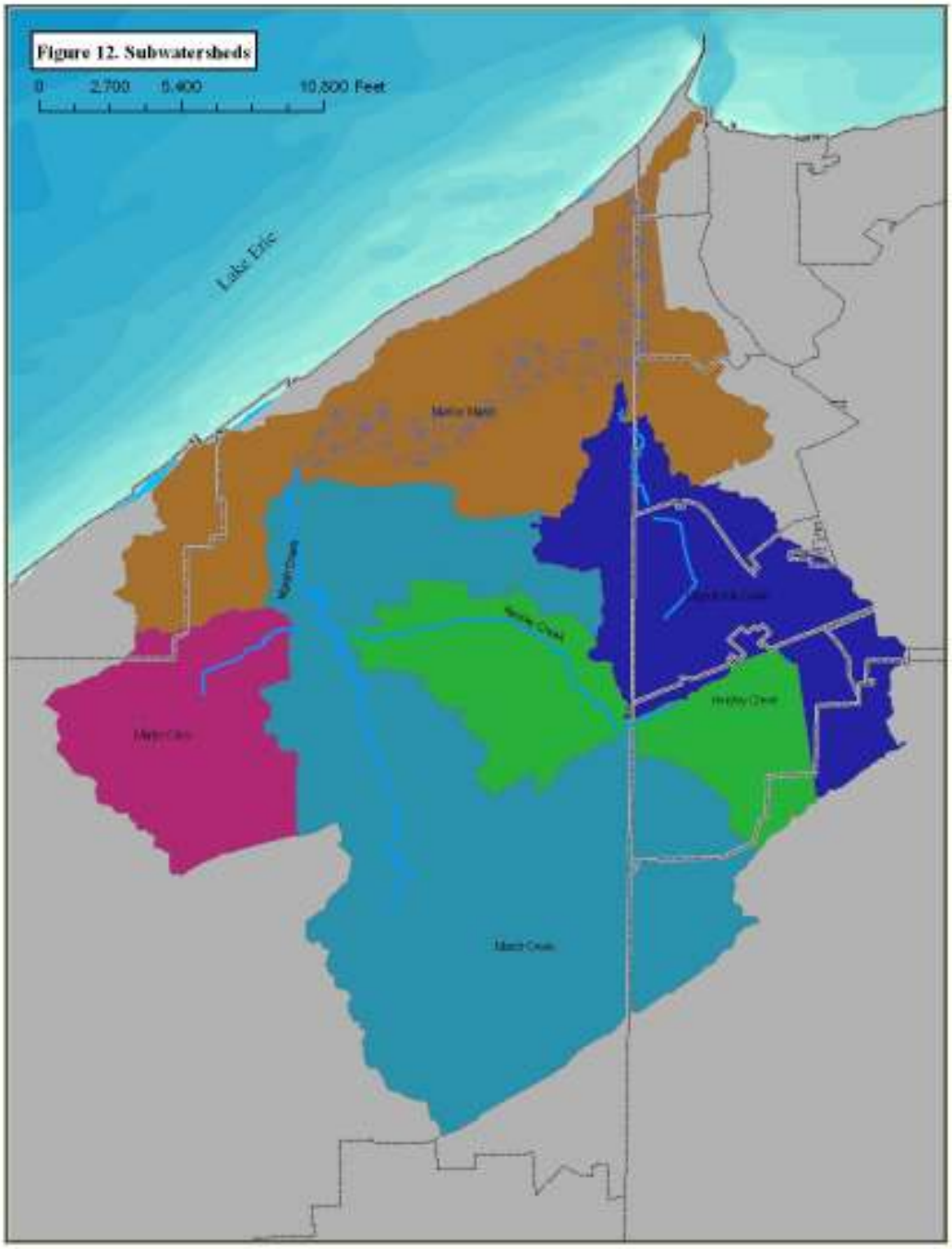
Figure 12. Subwatersheds
0 2,700 5,400 10,800 Feet
Lake Erie

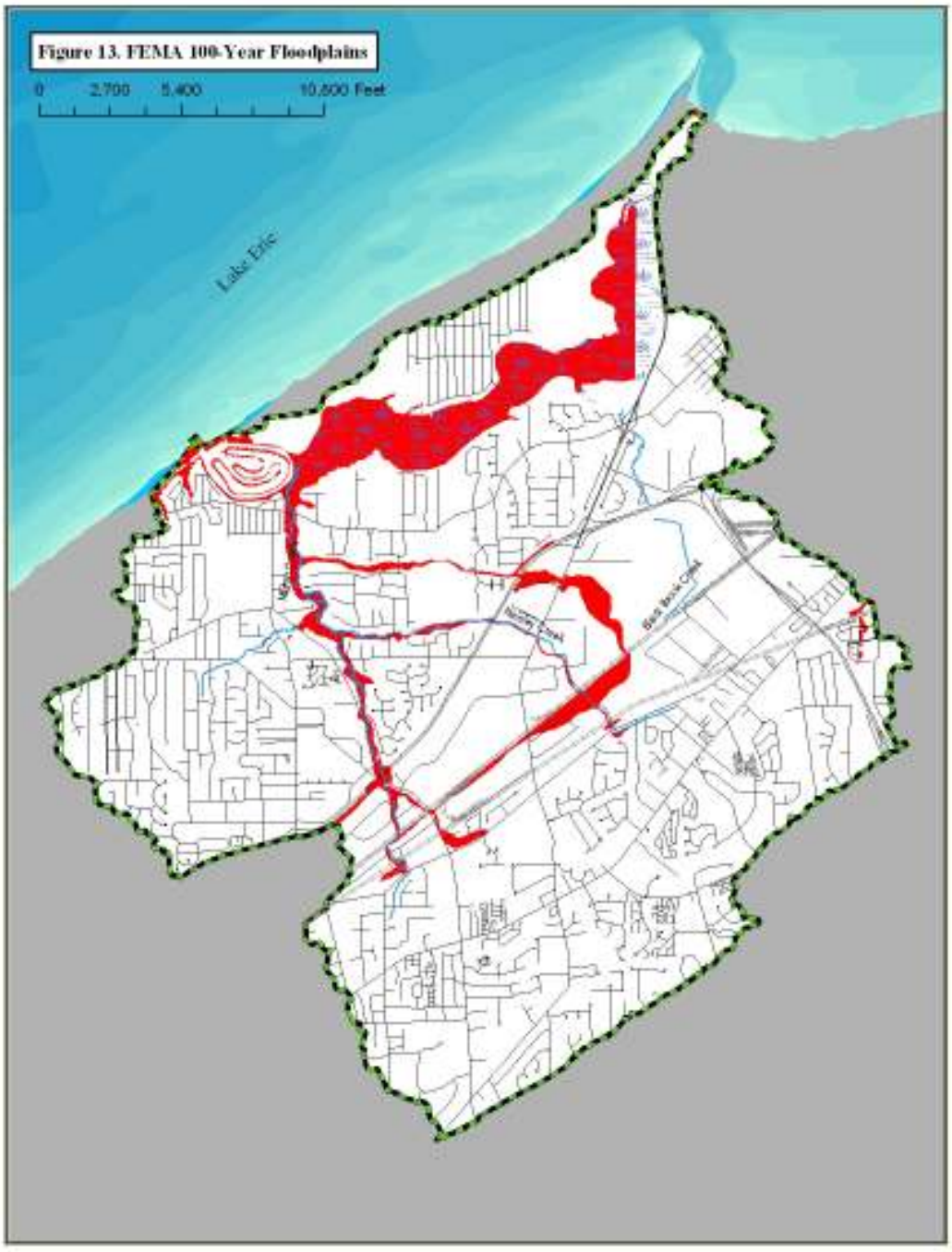
Figure 13. FEMA 100-Year Floodplains
0
2,700
5,400
10,800 Feet
Lake Erie

Headwater Habitat Evaluations

The Lake County Soil and Water Conservation District conducted 21 primary headwater stream habitat evaluations within the Mentor Marsh watershed. Primary headwater habitats are described by the Ohio EPA as streams with a defined bed and bank, drainage areas less than one square mile and pool depths less than 40 centimeters. These primary headwater streams account for 69% of the total flow length of streams in the State of Ohio.
These evaluations were conducted according to guidelines set forth in the Field Evaluation Manual for Ohio's Primary Headwater Habitats. The methodology in this manual allows the user to define a primary headwater stream as a Class III, Class II, or Class I stream.

(From the Field Evaluation Manual for Ohio's Primary Headwater Habitat Streams):

The Three Types of Primary Headwater Streams in Ohio:

(1) **Class III-PHWH Stream (cool-cold water adapted native fauna)**
(2) **Class II-PHWH Stream (warm water adapted native fauna)**
(3) **Class I- PHWH Stream (ephemeral stream, normally dry channel)**

Class III streams are perennial streams that exhibit the highest quality of headwater stream habitat. These streams are defined by having a very high score on the Headwater Habitat Evaluation Index (HHEI >70) and the Headwater Macroinvertebrate Field Evaluation Index (HMFEI >19) and will typically have species of obligate salamanders with larval stages greater than 12 months and three or more species of cool water benthic macroinvertebrates. Class II streams are usually intermittent streams; however they could have perennial flow in some instances. Intermittent streams are typically flowing for large portions of the year, but may become dry during the summer months. Class II streams will score between 30 and 70 on the HHEI and between 7 and 19 on the HMFEI. Class I streams are ephemeral streams and generally will have poor habitat conditions and little to no biological activity.
They will score very low on both the HHEI (<30) and the HMFEI (<7), and do not provide good habitat for salamanders or macroinvertebrates. These streams are typically dry and only flow during wet weather events.

(From the Field Evaluation Manual for Ohio's Primary Headwater Habitat Streams):

Perennial flow (continuous, permanent)	= either Class III or Class II PHWH stream
Interstitial flow (interrupted)	= either Class III or Class II
Intermittent flow (temporary, summer-dry)	= Class II
Ephemeral flow	= Class I

IF Final HMFEI Score is >19 ,	Then CLASS III PHWH STREAM
IF Final HMFEI Score is 7 to 19 ,	Then CLASS II PHWH STREAM
IF Final HMFEI Score is < 7,	Then CLASS I PHWH STREAM

All locations were assessed for quality of headwater habitat, presence or absence of biological indicator species, dissolved oxygen, temperature, salinity, conductivity, and pH.

The information collected on primary headwater streams has been used to:

- Administer Erosion and Sediment Control Regulations
- Evaluate and review U.S. Army Corps of Engineers and OEPA permit applications
- Raise public awareness on natural resources
- Monitor pollution abatement projects
- Assist in NPDES Phase II implementation
- Obtain grant funding

Methods

The first step in conducting this study was obtaining recent aerial photography of the area as well as digital stream and topography data. Stream assessment locations were chosen on all 1st order streams and larger that were shown on the USDA Soil Survey for Lake County. Using recent aerial photography, an assessment location is chosen that is as far downstream as practical and is also representative of the majority of the stream habitat. District staff conducted seven days of field work and assessed a total of 34 headwater streams. Each headwater stream assessment starts with the delineation of a 200ft sample reach. Once the sample reach has been determined; a salamander and macroinvertebrate sample is collected, two digital photographs are taken, in-situ chemistry is recorded (temperature, pH, dissolved oxygen, salinity, and conductivity). These measurements are taken first as they require non-turbid water for accurate recordings. Once this data is acquired, a drawing of the stream reach is completed, a pebble count is conducted, and the pool depths and bankfull widths are measured. Additional information such as the floodplain quality, riparian width, and gradient are also noted. A detailed explanation of the methodology is provided in the Field Evaluation Manual for Ohio's Primary Headwater Streams.

Any voucher specimens that were collected are taken to a lab where salamanders and macroinvertebrates are preserved for permanent storage. Samples are identified to the lowest taxanomic level possible by District staff. The presence of biological indicator species from these vouchers is also used to determine the quality of the headwater stream according to HHEI methodology.

Results

A total of 21 assessments were complete. Figure 14 shows the distribution and classification of the HHEI assessments. Of the 21 sites that were assessed, none were determined to be a Class III Primary Headwater Habitat Stream. There were 9 primary headwater habitats that were designated Class II habitats. Two sites exhibited both sufficient HHEI score and biology to warrant the designation. The remaining 7 sites did not have the requisite biology. The Class II designation was awarded from the HHEI score. The types of species present and the lack of diversity in the samples would indicate severe water quality impacts in these streams. Most of the Class II channels have been modified and would be candidates for restoration projects. The larger percentage of Class II habitats, when compared to state trends, is likely due to the inclusion of impacted Class III habitats.

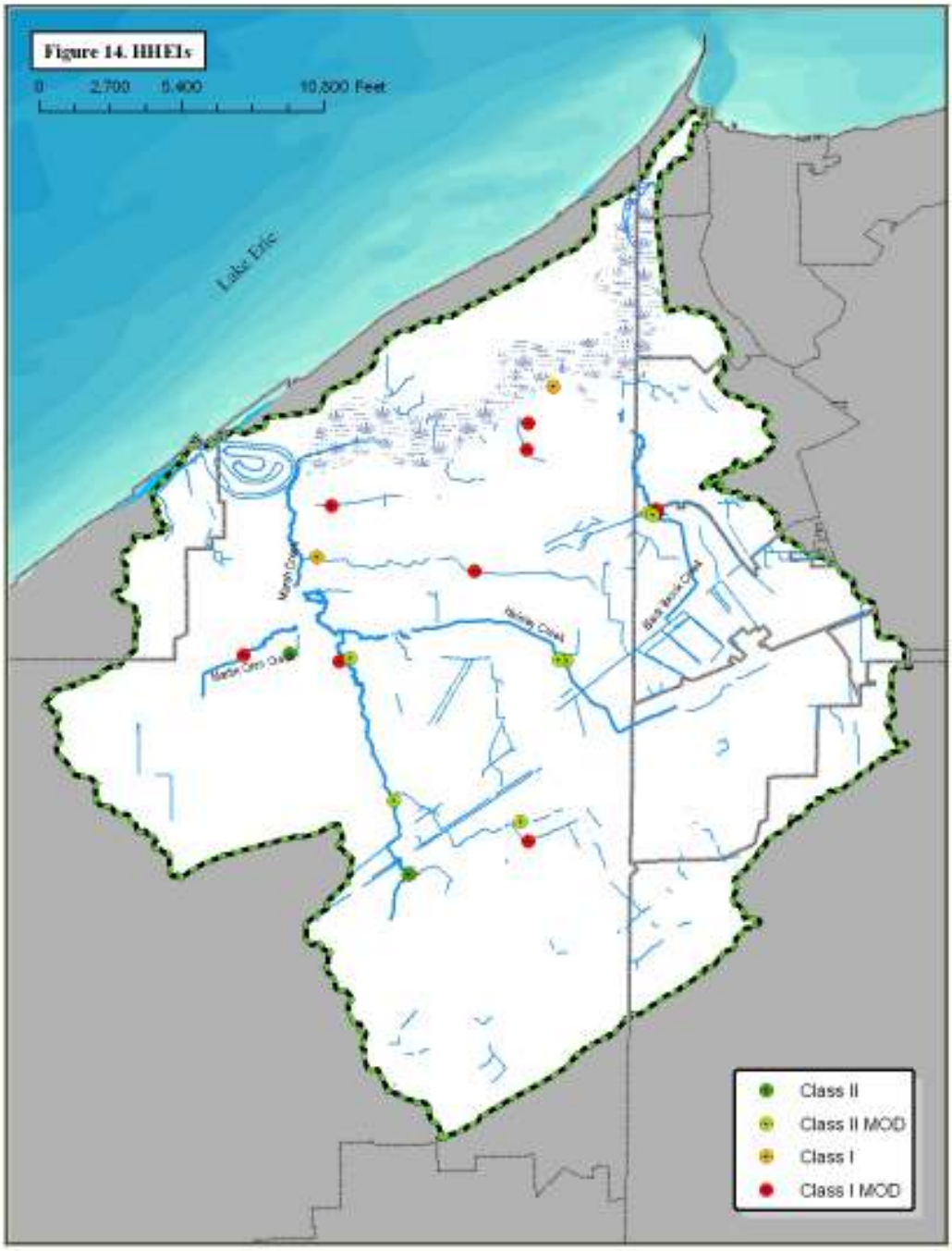
Figure 14. HHEIs
0
2,700
5,400
10,800 Feet
Lake Erie
Class II
Class II MOD
Class I
Class I MOD

The remaining 12 sites that were determined to be primary headwater habitats were designated as Class I streams. These sites were ephemeral channels that exhibited limited biology and were designated based on HHEI scores only. All but 3 of the channels have been modified and would be candidates for restoration projects. Data collected from the sites indicate that they are severely impacted by both channel modifications and water quality impacts. While these streams are not providing any aquatic habitat they are very important for sediment retention, nutrient reduction, and stormwater control. Impairment of these streams ability to provide these functions could result in downstream degradations.

2006 Integrated Water Quality Report

The entire HUC-11 in which the watershed is located is listed in the 2006 (DRAFT) Integrated Report Section 303(d) Reporting Category as water that is impaired or threatened and a TMDL is needed. (Figure 15) Appendix D.1.1 of that report lists the Status of the Watershed as having Impairment of Water Quality Standards, both Aquatic Life Use and Recreation Use. (Figure 16) The next field monitoring is scheduled to occur in 2014 and the TMDL is projected to occur in 2016. Appendix E.2 of the 2006 Integrated Report lists the Aquatic Life use as WWH (Warm Water Habitat) and LRW (Limited Resource Water) from sampling year 2000. The watershed has 0% of the primary tributaries in full attainment, 5% in partial attainment, and 95% in non-attainment. (Figure 17) The high magnitude causes include Organic Enrichment/Dissolved Oxygen and Flow Alteration. The high magnitude sources are Combined Sewer Overflows and Urban Runoff/Storm Sewers (NPS). Sanitary sewers and storm sewers are not interconnected in the watershed. The watershed assessment unit contains both Doan Brook and Euclid Creek, which have a long history of CSO's. Figure 18 shows the 303(d) list of impaired waters of Ohio.

The 303(d) report does not provide an accurate description of water quality conditions in the Mentor Marsh watershed. The inaccuracies are due to the extremely small watershed size, and therefore inclusion into a larger HUC with streams such as Doan Brook and Euclid Creek. Further compounding the problem is the lack of a standard for developing TMDLs for wetlands. Without this methodology, TMDLs, load reductions and effluent volumes can not be provided in the watershed action plan.

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Ohio Sport Fish Consumption Advisory

The Mentor Marsh Watershed was not listed in the 2006 Ohio Sport Fish Consumption Advisory. However, any listing for Lake Erie would be appropriate due to it's close proximity and hydrologic connection to the Mentor Marsh Watershed. Channel Catfish 16" and over from all waters of Lake Erie are listed as "Do Not Eat! Fish high in PCBs and other contaminants!"

Wetlands

Without exception the most significant wetland in the watershed is Mentor Marsh, the central resource for which this document was prepared. The marsh has been extensively studied, starting in the 1800's with the Burroughs Nature Club, and continued by the Cleveland Museum of Natural History, the University of Akron, the Ohio State University, Lake SWCD, OEPA, ODNR, and a host of others. The floral communities within the wetland have changed numerous times in response to human and natural disturbances, such as flooding, salt pollution, and fires. (Fineran, 2003). Prior to the salt intrusion, the marsh was largely a swamp forest with interior cattail-nightshade areas and was as alder or buttonbush wetlands. According to Whipple the swamp forest was encroaching on the other areas until the water became to saline for the swamp forest to grow or it was flooded due to an increase in beaver habitat. (Whipple, 1999) The marsh is now largely dominated by Phragmites and only small areas of swamp forest remain.

Numerous other smaller, yet no less insignificant, wetlands are present in the watershed. Figure 19 shows the amount of wetlands identified in the 1987 Ohio Wetlands Inventory. The amount of wetlands shown south of State Route 2 to Jackson Street is quite significant. Neither the Ohio GAP analysis (2004 data) nor the OEPA Land Cover analysis (2005 data) identifies wetlands to that extent. (Figure 20 and Figure 21). Further discussion on wetlands is present in Section 6. Mentor Marsh Watershed Impairments and Problems Summary.

Lakes and Reservoirs

Numerous small lakes and ponds are located in the watershed. The majority of the ponds are "dug" ponds or "groundwater" ponds. These ponds are very small, less than 1-acre, and used for landscaping, stormwater treatment, and/or fishing. The only sizeable lake is the 33-acre Veteran's Park Lake. No reservoirs are located in the watershed. Figure 22 shows the locations of surface water (including open water wetlands) in the Mentor Marsh Watershed.

Figure 15. 2006 Integrated Water Quality Report Appendix D

Appendix D.1.1. Status of Watershed Assessment Units

Assessment Unit	Size (sq mi)	Impairment of Water Quality Standards: Aquatic Life Use	Impairment of Water Quality Standards: Recreation Use	Human Health (Fish Consump.)	AU Category	Priority Points	Next Field Monitoring	Projected TMDL
04110001 030	East Branch Black River (headwaters to downstream Coon Creek)							
	95.8	Yes	Yes	Yes	5	9	2021	2007
04110001 040	East Branch Black River (downstream Coon Creek to mouth)							
	125.8	Yes	Yes	Yes	5	8	2021	2007
04110001 050	Black River; Lake Erie tributaries East of Black River to West of Porter Creek)							
	100.8	Yes	Yes	Yes	5	7	2021	2007
04110001 060	West Branch Rocky River							
	190.2	Yes	No	Yes	5	4	2021	2006
04110001 070	Rocky River; East Branch Rocky R.; Lake Erie tributaries (West of Porter Cr. to West of Cuyahoga R.)							
	138.8	Yes	No	Yes	5	6	2021	2006
04110002 010	Cuyahoga River (headwaters to downstream Black Brook)							
	148.9	Yes	Unknown	Yes	5	1	2020	2022
04110002 020	Cuyahoga River (downstream Black Brook to downstream Breakneck Creek)							
	139.9	Yes	No	Yes	5	1	2020	2022
04110002 030	Cuyahoga River (downstream Breakneck Creek to downstream Little Cuyahoga River)							
	112.2	Yes	No	Yes	5	2	2020	2022
04110002 040	Cuyahoga River (downstream Little Cuyahoga River to downstream Brandywine Creek)							
	163.9	Yes	Yes	Yes	5	2	2020	2022
04110002 050	Cuyahoga River (downstream Brandywine Cr. to downstream Tinkers Cr.); excluding Cuyahoga R.							
	138.1	Yes	No	Yes	5	2	2020	2022
04110002 060	Cuyahoga River (downstream Tinkers Creek to mouth); excluding Cuyahoga R. mainstem							
	115.6	Yes	Yes	Unknown	4A		2020	
04110003 010	Lake Erie tributaries (East of Cuyahoga River to West of Grand River); excluding Chagrin River							
	119.0	Yes	Yes	Unknown	5	6	2014	2015
04110003 020	Chagrin River (headwaters to downstream Aurora Branch)							
	119.5	Yes	No	Unknown	5	3	2019	2007
04110003 030	Chagrin River (downstream Aurora Branch to mouth)							
	145.1	Yes	Yes	Unknown	5	6	2019	2007

Figure 16. 2006 Integrated Water Quality Report Appendix E

Ohio EPA 2006 Integrated Report Appendix E.2
Watershed Assessment Unit (WAU) Results

HUC11: 04110003 010

WAU Description: Lake Erie tributaries (East of Cuyahoga River to West of Grand River); excluding Chagrin River

WAU Size (mi^2): 119.0

Integrated Report Assessment Category: 5

Priority Points: 6

Figure 17. 2006 Integrated Water Quality Report Aquatic Life Use Status

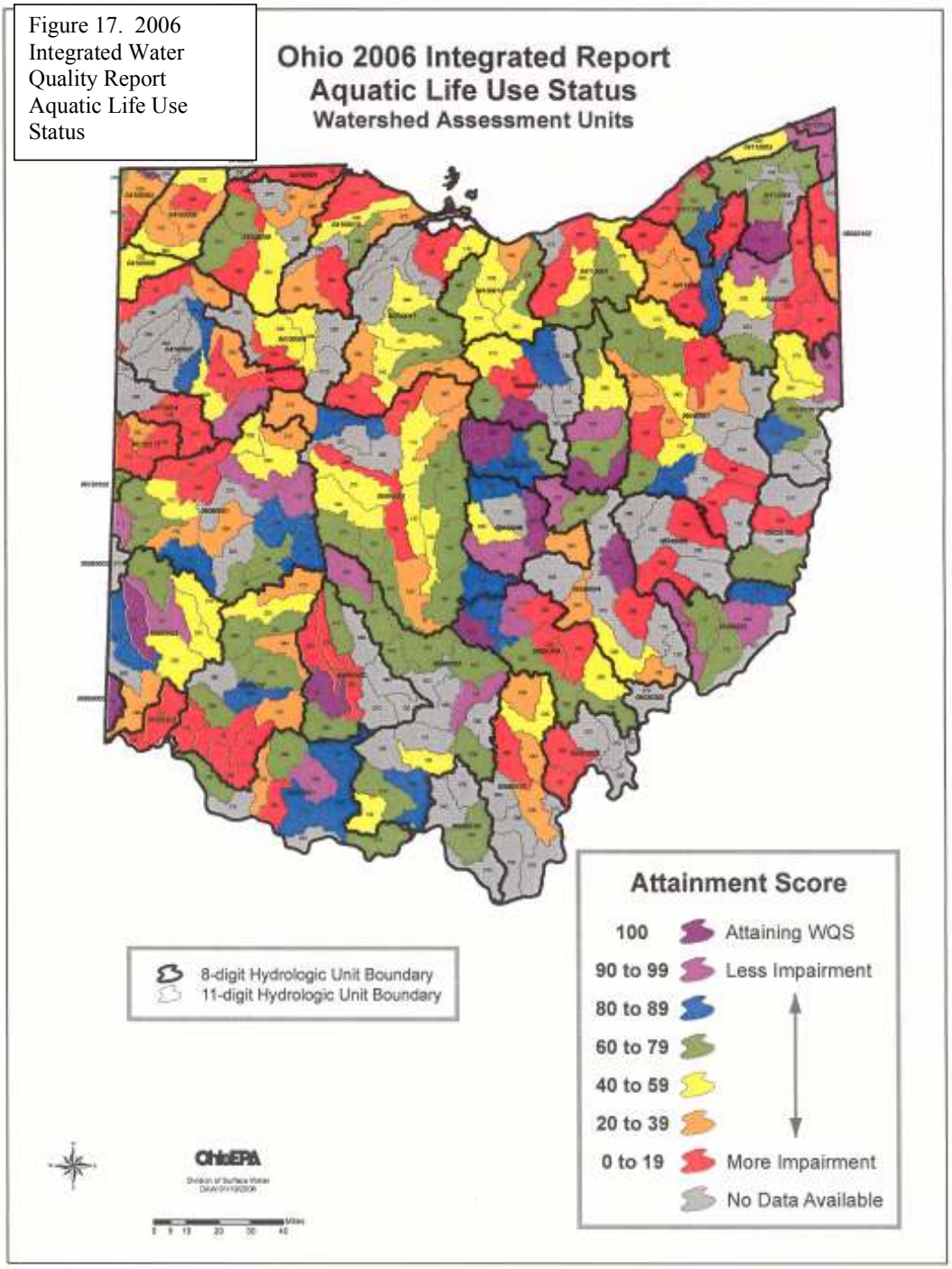
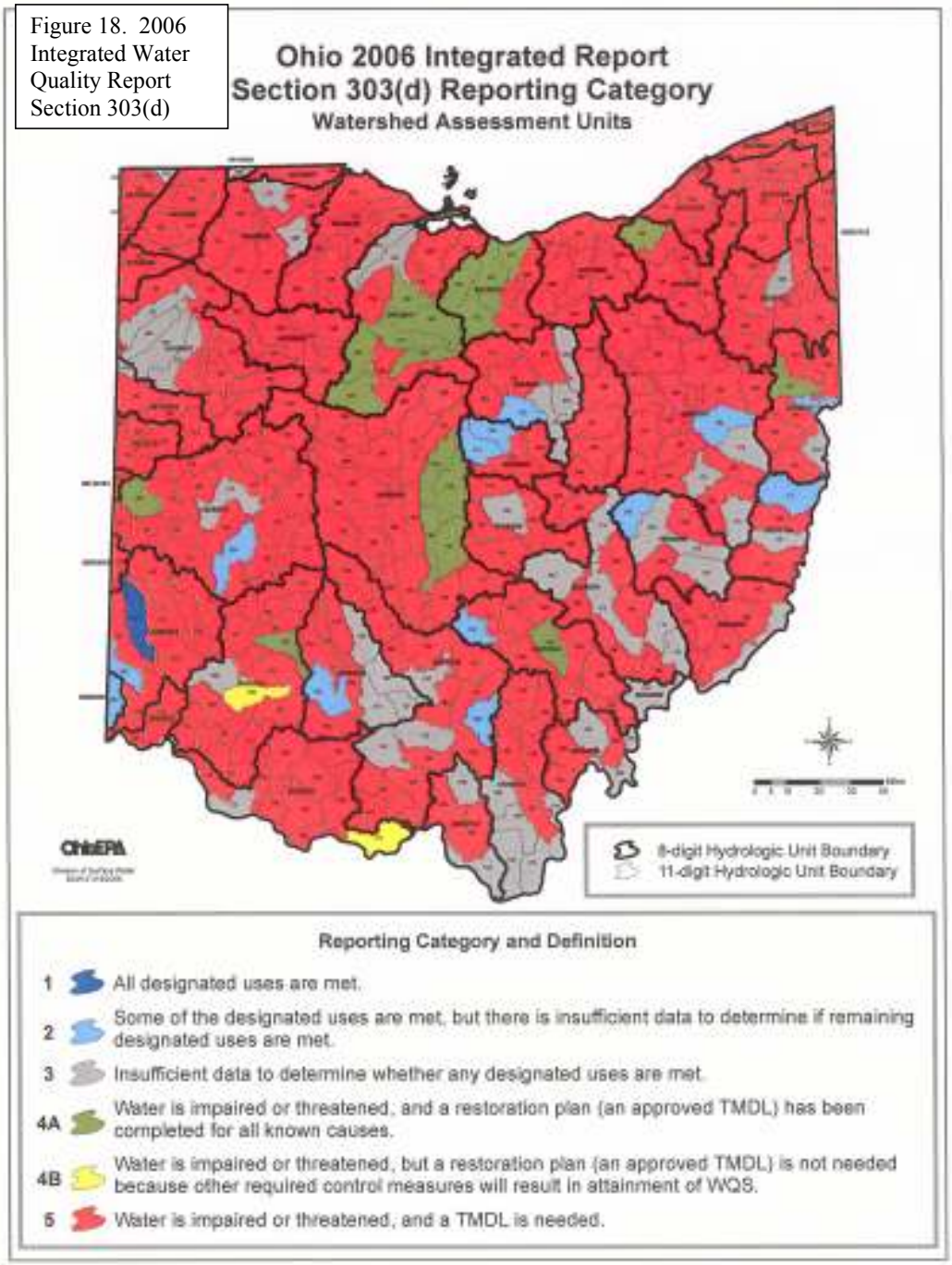


Figure 18. 2006 Integrated Water Quality Report Section 303(d)



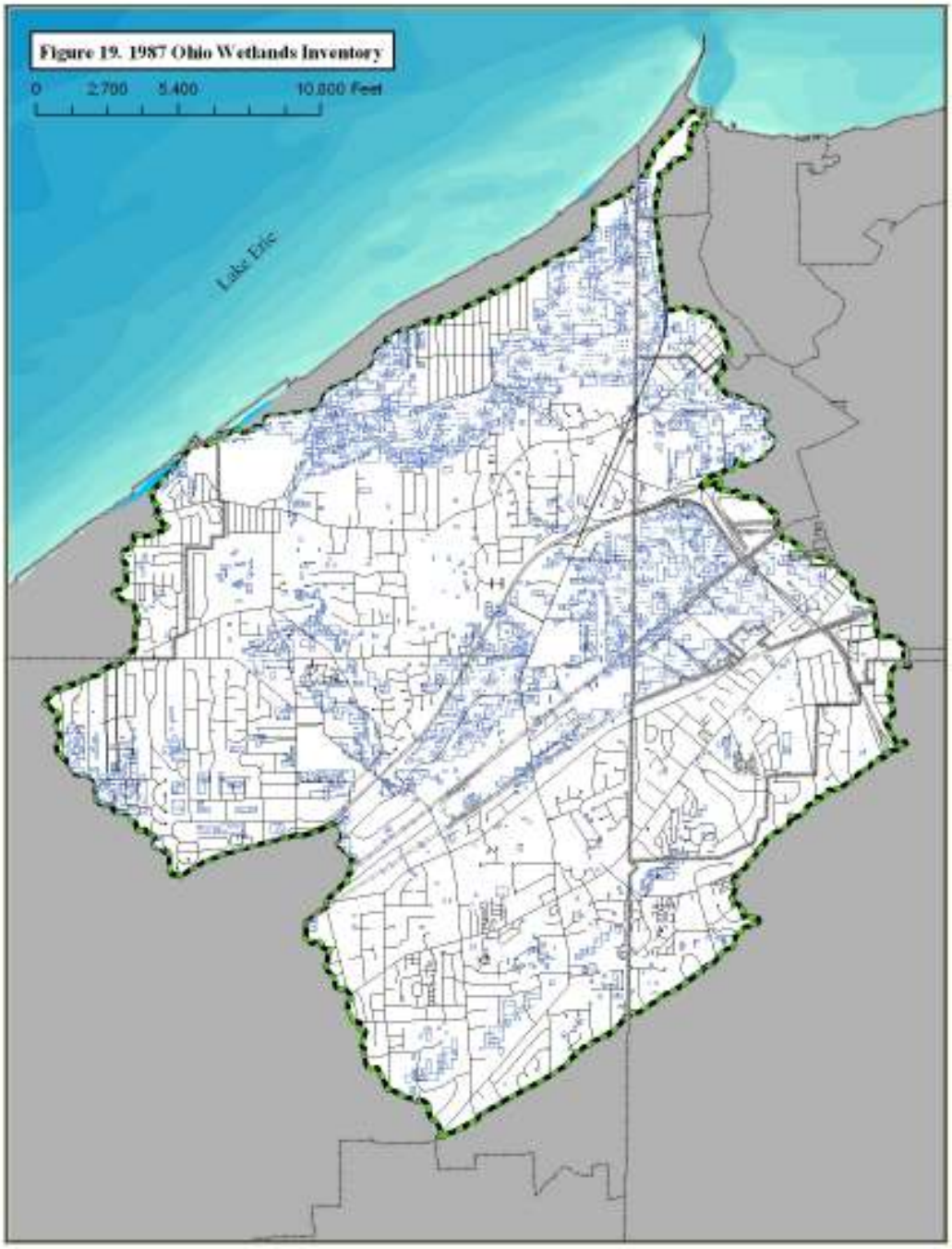


Figure 19. 1987 Ohio Wetlands Inventory
0
2,700
5,400
10,800 Feet
Lake Erie

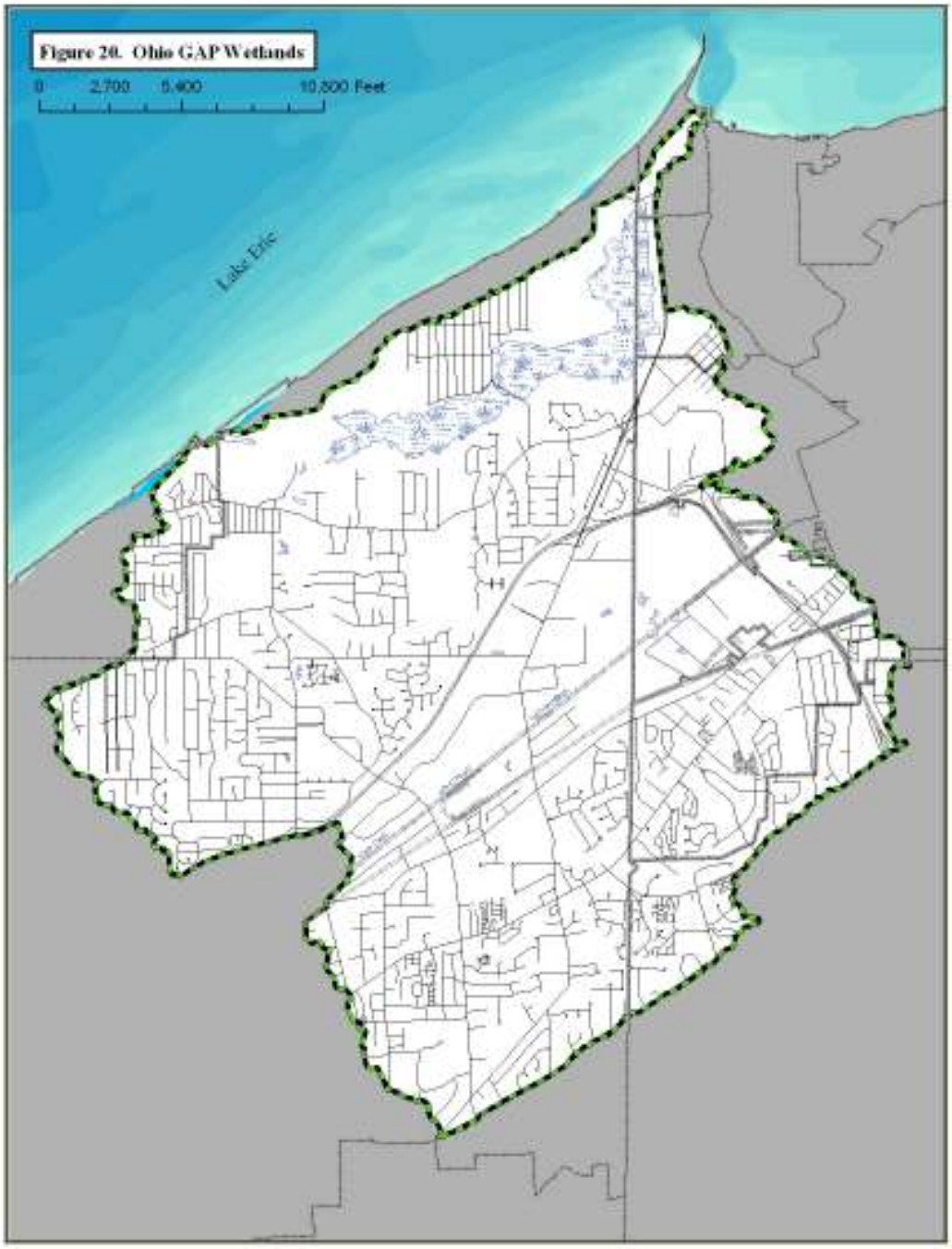


Figure 20. Ohio GAP Wetlands
0 2,700 5,400 10,800 Feet
Lake Erie

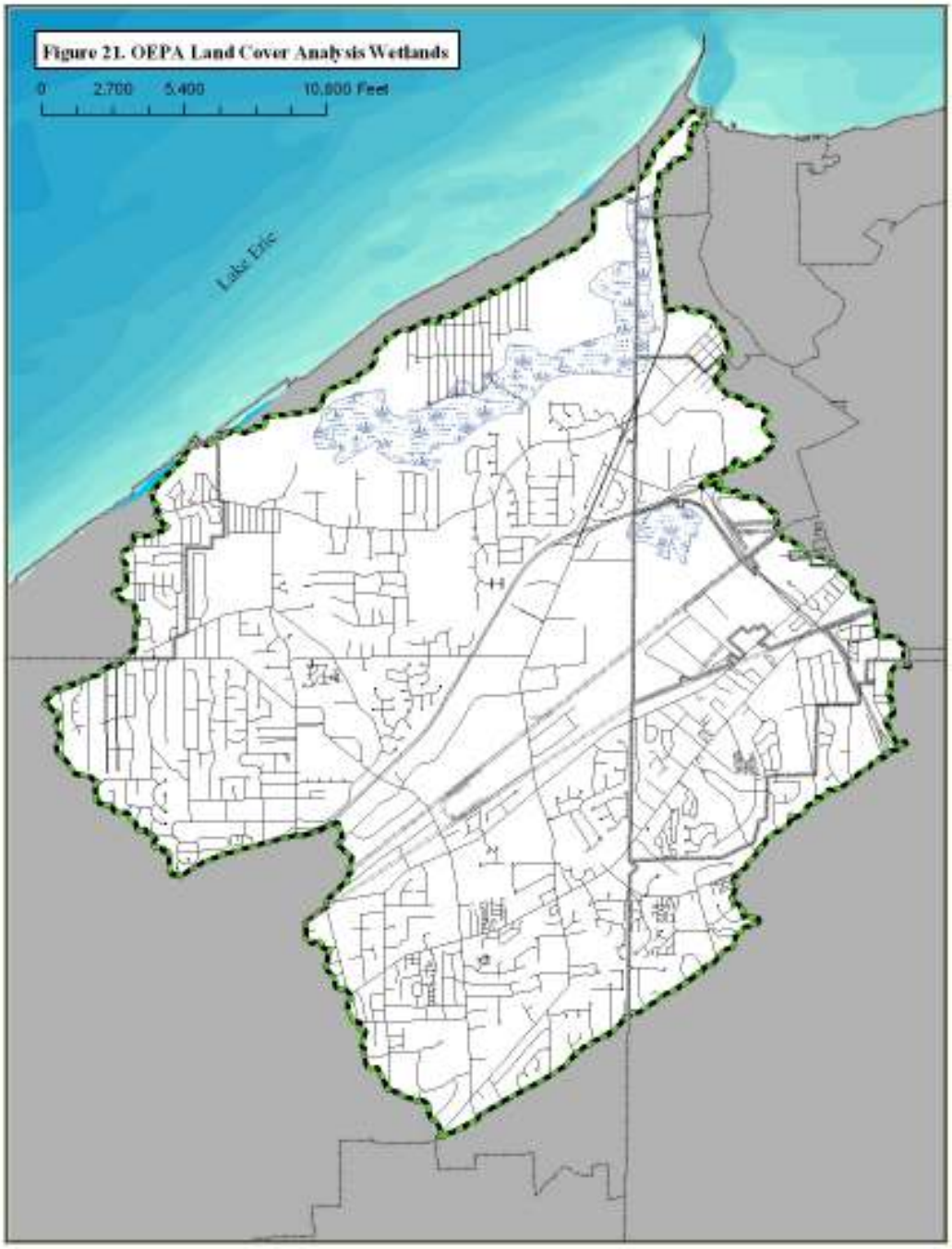


Figure 21. OEPA Land Cover Analysis Wetlands
0
2,700
5,400
10,800 Feet
Lake Erie

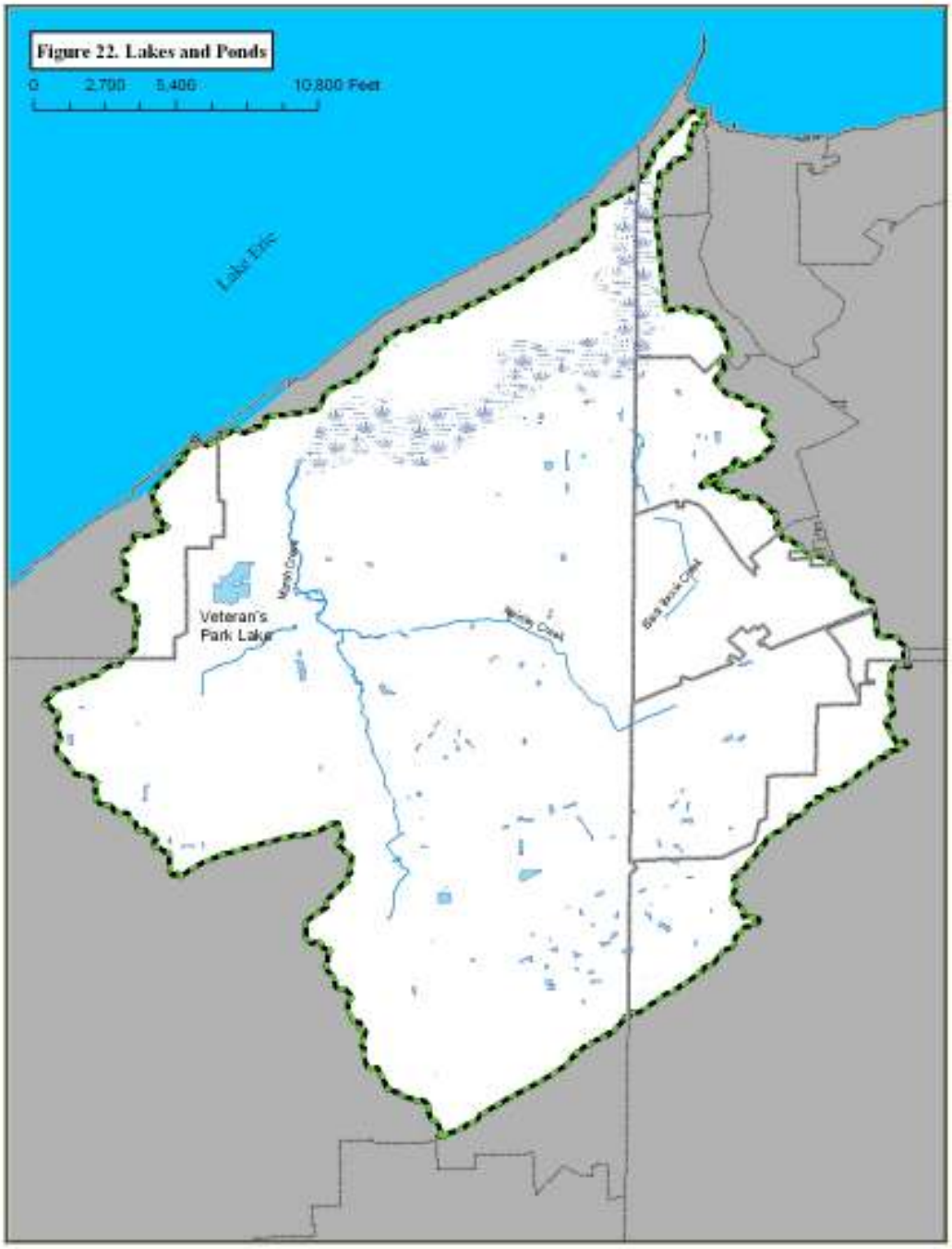


Figure 22. Lakes and Ponds
0
2,700
5,400
10,800 Feet
Lake Erie
Veteran's
Park Lake

Groundwater Resources and Groundwater Pollution Potential

The entire watershed is serviced by public water systems. Lake Erie is the source of all public drinking water in Lake County, and only small isolated areas may still rely on groundwater for domestic use. The aquifers in the watershed produce very limited quantities of water and are often susceptible to pollution due to the wells being completed at very shallow depths. Aller and Ballou (Groundwater Pollution Potential of Lake County, 1991) describe the aquifer north of the escarpment (which would include all of the Mentor Marsh Watershed):

> "North of the escarpment the most pervasive aquifer is the thick layer of glacial till between lacustrine deposits and the bedrock. This unit typically yields only meager ground water supplies to large diameter dug wells or wells drilled to the interface between the till and the bedrock. Other less widespread aquifers in this region include the beach ridge sand deposits, and alluvial sand and gravel units underlying portions of the floodplains of major streams."

There are 5 main "Hydrologic Settings" identified in the watershed by the Groundwater Pollution Potential of Lake County report. Each setting is divided into smaller units with appropriate values assigned that represent vulnerability to pollution.

(7Ae) Glacial Till Over Shale

This hydrogeologic setting consists of varying thicknesses of glacial till overlying fractured, flat-lying shales. The till is principally unsorted deposits with interbedded lenses of loess and sand and gravel. Ground water is derived from either localized sources in the overlying till or from deeper, more permeable formations. The shale is relatively impermeable and does not serve as a source of ground water. Although precipitation is abundant, recharge is minimal from the till to deeper formations and occurs only by leakage of water through the fractures.

Map unit 7Ae9 was the only identified unit in this Hydrogeologic Setting.

(7Eb) River Alluvium Without Overbank Deposits

This hydrogeologic setting is characterized by low topography and deposits of alluvium along parts of stream valleys. Water is obtained from sand and gravel layers deposited within the valley. Significant fine-grained floodplain deposits are present in the stream valley. This results in significantly higher recharge where precipitation is adequate and sandy soils occur at the surface. Water levels are moderate to shallow in depth. Hydraulic contact with the surface stream is usually excellent, with alternating recharge/discharge relationships varying with stream stage. These deposits also serve as a good source of recharge to the underlying fractured bedrock.

Map unit 7Eb1 was the only identified unit in this Hydrogeologic Setting.

(7F) Glacial Lake Deposits

This hydrogeologic setting is characterized by flat topography and varying thicknesses of fine-grained sediments that overlie sequences of fractured sedimentary rocks. The deposits are composed of fine-grained silts and clays interlayered with fine sand that settled out in glacial lakes and exhibit alternating

layers relating to seasonal fluctuations. As a consequence of the thin, alternating layers there is a substantial difference between the vertical and horizontal permeability with the horizontal commonly two or more orders of magnitude greater than the vertical. Due to their fine-grained nature, these deposits typically weather to organic-rich sandy loams with a range in permeabilities reflecting variations in sand content. Underlying glacial deposits or bedrock serve as the major source of ground water in the region. Although precipitation is abundant, recharge is controlled by the permeability of the surface clays; however, in all instances recharge is moderately high because of the impact of the low topography. Water levels are variable, depending on the thickness of the lake sediments and the underlying materials.

Map units 7F1, 7F2, 7F3, and 7F5 were identified in this Hydrogeologic Setting.

(7H) Beaches, Beach Ridges and Sand Dunes
This hydrogeologic setting is characterized by low relief, sandy surface soil that is predominantly silica sand, extremely high infiltration rates and low sorptive capacity in the thin vadose zone. The water table is very shallow beneath the beaches bordering the Great Lakes. These beaches are commonly ground-water discharge areas. The water table is slightly deeper beneath the rolling dune topography and the vestigial inland beach ridges. All of these areas serve as recharge sources for the underlying sedimentary bedrock aquifers, and they often serve as local sources of water supply.

Map units 7H1, 7H3, and 7F4 were identified in this Hydrogeologic Setting.

(7I) Swamp/Marsh
This hydrogeologic setting is characterized by low topographic relief, high water levels and high organic silt and clay deposits. These wetlands occur along the courses of floodplains and in upland areas as a result of vertically restricted drainage. Common features of upland wetlands include those characteristics attributable to glacial activity such as filled-in glacial lakes, potholes and cranberry bogs. Recharge is moderate in most of the region due to restriction by clayey soils and limited by precipitation. The swamp deposits very rarely serve as significant aquifers but frequently recharge the underlying sand and gravel or bedrock aquifers.

Map unit 7I1 was the only identified unit in this Hydrogeologic Setting.

Figure 23 shows the DRASTIC ratings for the Mentor Marsh Watershed.

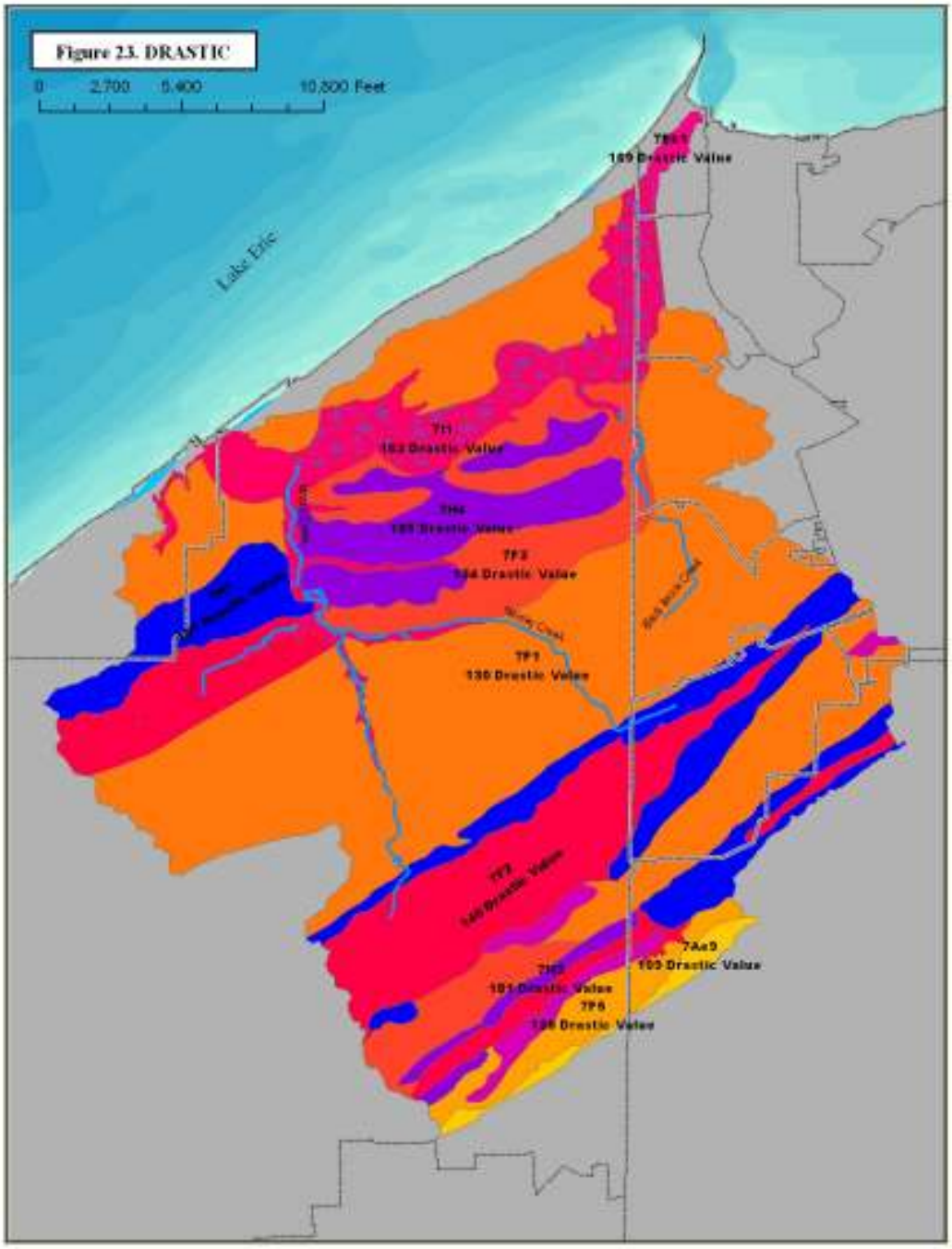


Figure 23. DRASTIC
0
2,700
5,400
10,800 Feet
Lake Erie
7Ae3
103 Drastic Value
7P1
130 Drastic Value
7P3
134 Drastic Value
7P6
136 Drastic Value

Land Use

Existing Land Use and Predicted Trends

Existing land use in the watershed is similar to most urbanized land along the lake front. An analysis of the Ohio GAP project land cover indicates approximately 50% of the watershed has been developed into either "High Density Development" or "Low Density Development". In addition to the developed land use, the associated "Urban / Park Lawn" and "Urban Forest" account for almost 30% of the land use in the watershed. Photo-interpretation with high-resolution (6" pixel) aerial images and ground-truthing indicates some error in the "Row Crop" class. A more appropriate classification of this land cover would be "Urban / Park Lawn", essentially large areas of turf grass. A reclassification of "Row Crop" to "Urban / Park Lawn" would then yield a total of 43% of the watershed in an undeveloped but modified land use. The following table summarizes the land cover/land use in the watershed from the Ohio GAP analysis.

Table. 25 Land Use / Land Cover

Open water	410.09-acres	2.84%
Row Crop	1808.62-acres	12.51%
HD Development	5379.63-acres	37.20%
LD Development	1933.69-acres	13.37%
Urban/Park Lawn	127.38-acres	0.88%
Urban Forested	4148.17-acres	28.69%
Great Lakes Dune	6.50-acres	0.04%
Wet Meadow	574.34-acres	3.97%
Oak Forest	2.17-acres	0.02%
Floodplain	59.57-acres	0.41%
Shrub Swamp	10.92-acres	0.08%

Figure 24 shows the Ohio GAP Analysis of land use in Lake County. A more generalized view of the land use, merging like land uses is shown in Figure 25. Current land use in the watershed, as well as future conditions are discussed in detail in Section 6, Mentor Marsh Watershed Impairments and Problems Summary.

Impervious Cover

In order to calculate the amount of impervious cover in the watershed, data from adjacent watersheds, census tract data, and photo-interpretation were all used. Portions of the impervious cover have already been mapped and calculated in Mentor-On-The-Lake, Grand River, Concord Township, and Painesville Township. These communities participate in the Lake County Stormwater Management District (LCSMD), who has mapped all non-residential impervious cover with the use of high resolution orthophotography. The amount of residential impervious cover was calculated by multiplying the number of houses located in these communities by an Equivalent Residential Unit (3050 square feet). Research by the LCSMD indicates that an average of 3050 square feet of impervious cover is present per household across the county. By combining these two figures the amount of impervious cover is closely approximated. Painesville Township and Grand River were calculated together. The value for the number of houses was not available per community, only the sum of the both communities together. No data was available for the City of Mentor or the City of Painesville from the LCSMD. However, the Chagrin River Watershed Partners conducted an impervious cover study of the Chagrin River

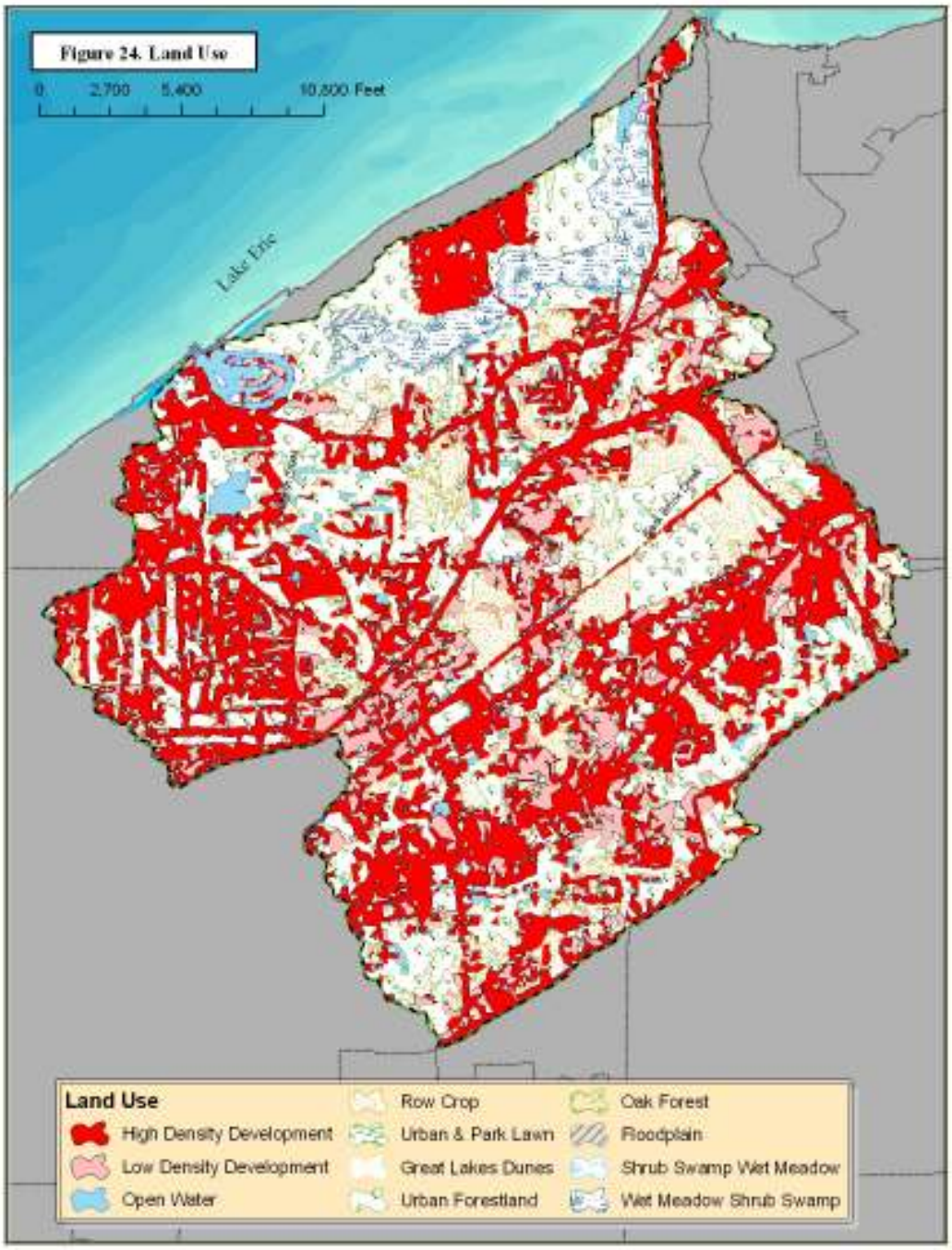


Figure 24. Land Use
0 2,700 5,400 10,800 Feet
Lake Erie
Land Use
High Density Development
Low Density Development
Open Water
Row Crop
Urban & Park Lawn
Great Lakes Dunes
Urban Forestland
Oak Forest
Floodplain
Shrub Swamp Wet Meadow
Wet Meadow Shrub Swamp

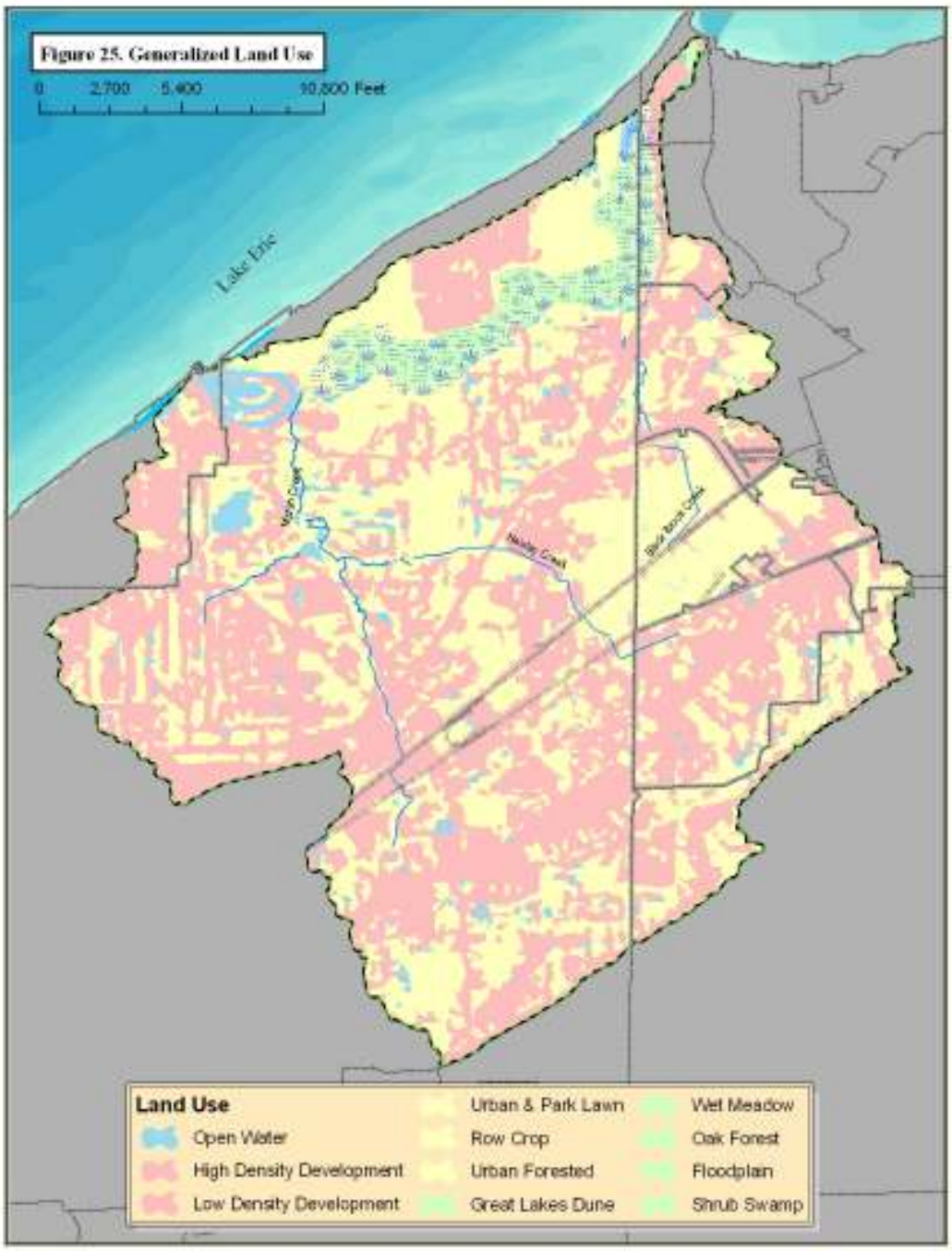


Figure 25. Generalized Land Use
0 2,700 5,400 10,800 Feet
Lake Erie
Land Use
Open Water
High Density Development
Low Density Development
Urban & Park Lawn
Row Crop
Urban Forested
Great Lakes Dune
Wet Meadow
Oak Forest
Floodplain
Shrub Swamp

Watershed. The watershed includes portions of Mentor, which was calculated as having 18.8% impervious cover. (CRWP, 2004) The amount of development in the City of Mentor, in these two watersheds, is largely similar. (Figure 26) Applying the same % of impervious cover in the City of Mentor portion of the watershed is justifiable.
The amount of impervious cover for the City of Painesville was calculated using photo-interpretation with high resolution orthophotography.
The amount of impervious cover is shown in Figure 27. This map does not contain large paved areas or similar impervious covered surfaces in the City of Mentor. Figure 27 does contain all impervious surfaces; including building footprints, railroads, roads, and parking areas in the remainder of the watershed.

Table 26. Impervious Cover

Community	Area In Watershed (Acres)	Impervious Area in Community (Acres)	% of each Community
City of Mentor	10318.78	1939.93	18.8%
City of Painesville	915.78	71.5	7.8%
Concord Twp	759.57	331.93	43.7%
Painesville Twp and Grand River	2065.30	415.25	20.1%
Mentor on the Lake	393.26	179.80	45.7%
Totals/Average	14452.69-acres	2938.41-acres	20.3%

208 Water Quality Management Plans

A 208 Water Quality Management Plan has been completed for all areas of the watershed. The Clean Water 2000 document completed by the Northeast Ohio Areawide Coordinating Agency (NOACA) completed this plan in November, 2000 to comply with the Clean Water Act. All areas, with the exception of a portion of the City of Painesville are considered to be "Areas Currently Sewered". The land west of State Route 44 to the City of Painesville and Mentor boundary, and south of State Route 2 to Jackson Street is considered to be "Limited Sewering likely within 20 years". Clean Water 2000 focuses on issues of planned sewer expansions, better management of home sewage treatment systems (HSTS), more vigorous attention to the control of non-point source pollution, and protection of the region's critical water resources. Figure 28 shows the location of the waste water treatment plant in the watershed.

Figure 26. Development Comparison

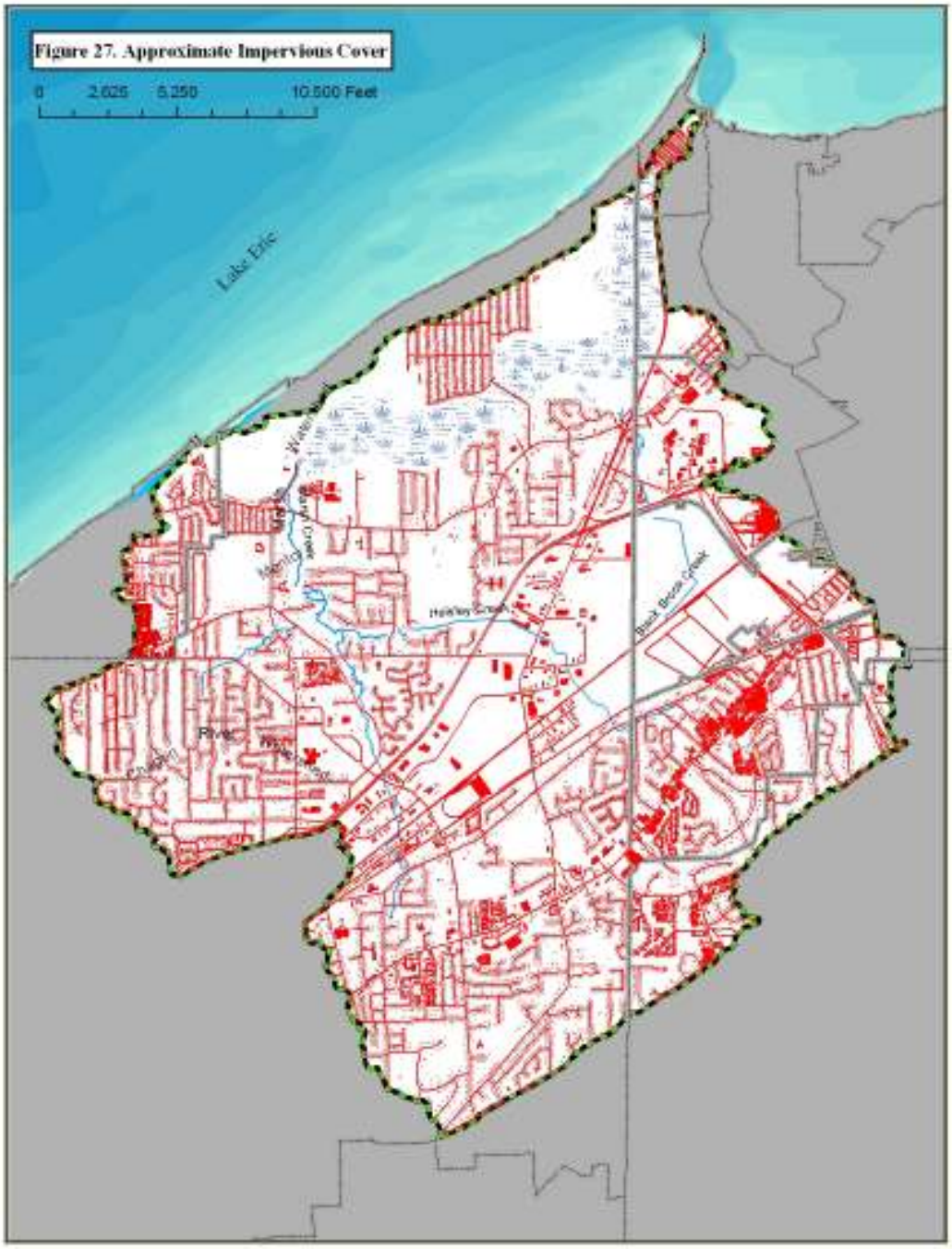


Figure 27. Approximate Impervious Cover
0
2,625
5,250
10,500 Feet
Lake Erie

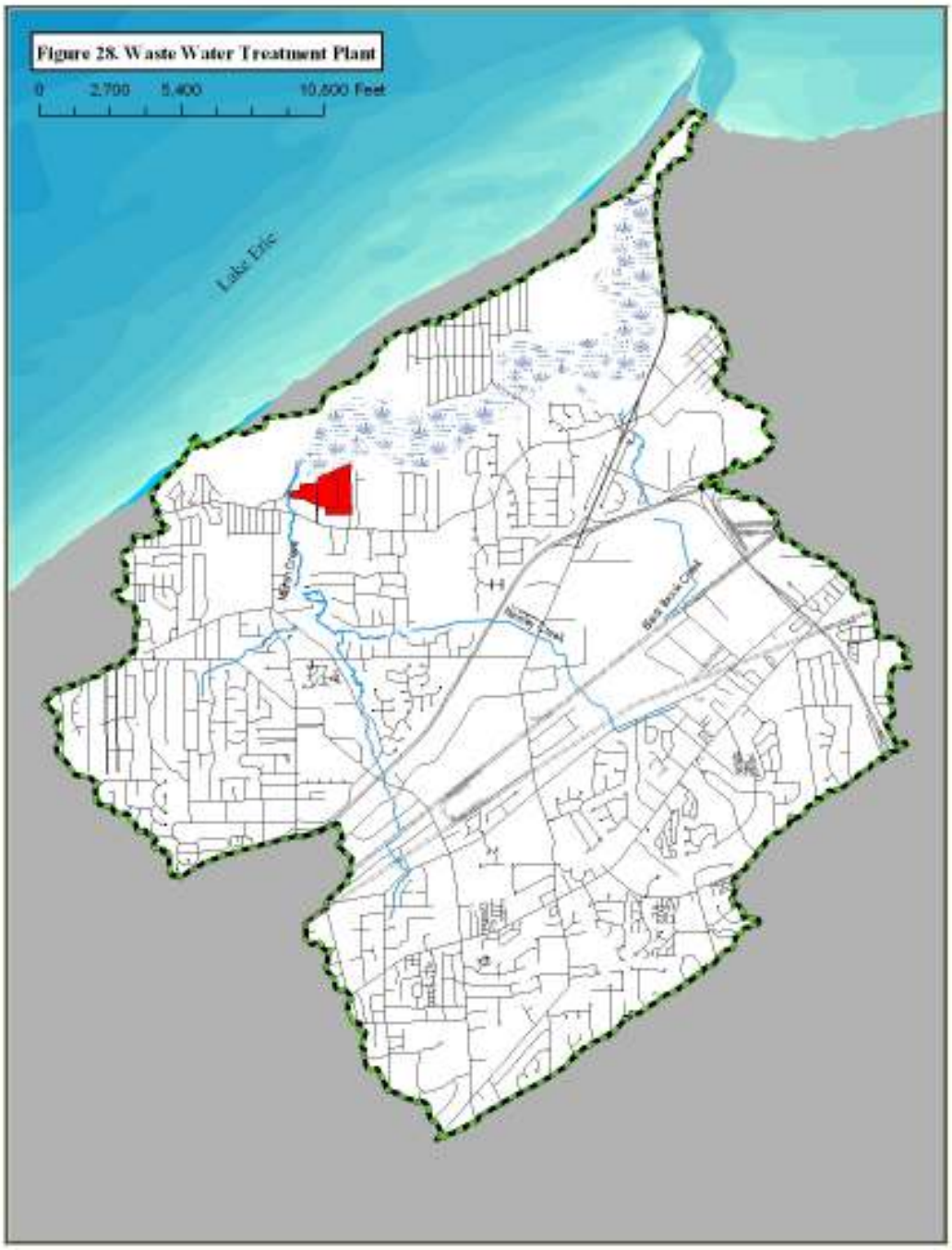


Figure 28. Waste Water Treatment Plant
0
2,700
5,400
10,800 Feet
Lake Erie

Park Districts and Protected Property

Lake Metroparks

Lake Metroparks Veteran's Park is a 100-acre park located in Mentor and Mentor-on-the-Lake. Portions of the land that makes up the park are owned by the Mentor Board of Education, the City of Mentor, and the City of Mentor-on-the-Lake. The park district maintains lease-management agreements with each of these entities. Veterans Park, which lies in the Marsh Creek drainage, features a 21-acre lake used extensively by wildlife and anglers. Amenities include a picnic shelter, restrooms, trails, a playground and fishing piers. 2005 saw 173,900 visitations to the park (Vince Urbanski, pers. comm.)

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ODNR-DNAP

The Division of Natural Areas and Preserves, in addition to separate easements and management agreements, operates two State Nature Preserves in the watershed. The Headlands Dunes State Nature Preserve is a 24-acre property located in the northeastern most portion of the watershed. This property exhibits a lake shore dune ecosystem that contains numerous threatened or potentially threatened species. The Mentor Marsh State Nature Preserve is a 646-acre property located in the central portion of the watershed near Corduroy Road. This property contains large amounts of the marsh and upland buffer areas. Similar to Headlands Dunes SNP, the Mentor Marsh SNP also contains numerous threatened, potentially threatened, or endangered species.

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ODNR-Parks and Recreation

Portions of Headlands Beach State Park are located in the watershed. The park is located in the City of Mentor on Headlands Road. The park offers a mile-long beach along Lake Erie, fishing, picknicking, hunting, a picnic shelter, sledding, and cross-country skiing. The park is approximately 120-acres and is adjacent to the Headlands Dunes State Nature preserve.

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Cleveland Museum of Natural History

The Cleveland Museum of Natural History has been very aggressive in acquiring lands throughout northeast Ohio that exhibit outstanding or rare habitats. They currently own 691-acres in the watershed and manage over 50-acres owned by the State of Ohio.

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Mentor Community Parks

Mentor Community Parks are properties managed by the City of Mentor for recreation; specifically picnic areas, playgrounds, fishing ponds, hiking, fitness and bike trails, swimming pools, skate parks, spray parks, tennis and basketball courts, and athletic fields. Parks located within the watershed include Morton Community Park, Tiefenbach Memorial Park, Mentor Lagoons Nature Preserve & Marina, Wildwood Park, Krueger Park, Civic Center Park, and Dog Park. The City of Mentor has recently acquired additional natural areas along Jordan Road.

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Figure 29 shows the extent and ownership of these parks and protected properties in the watershed.

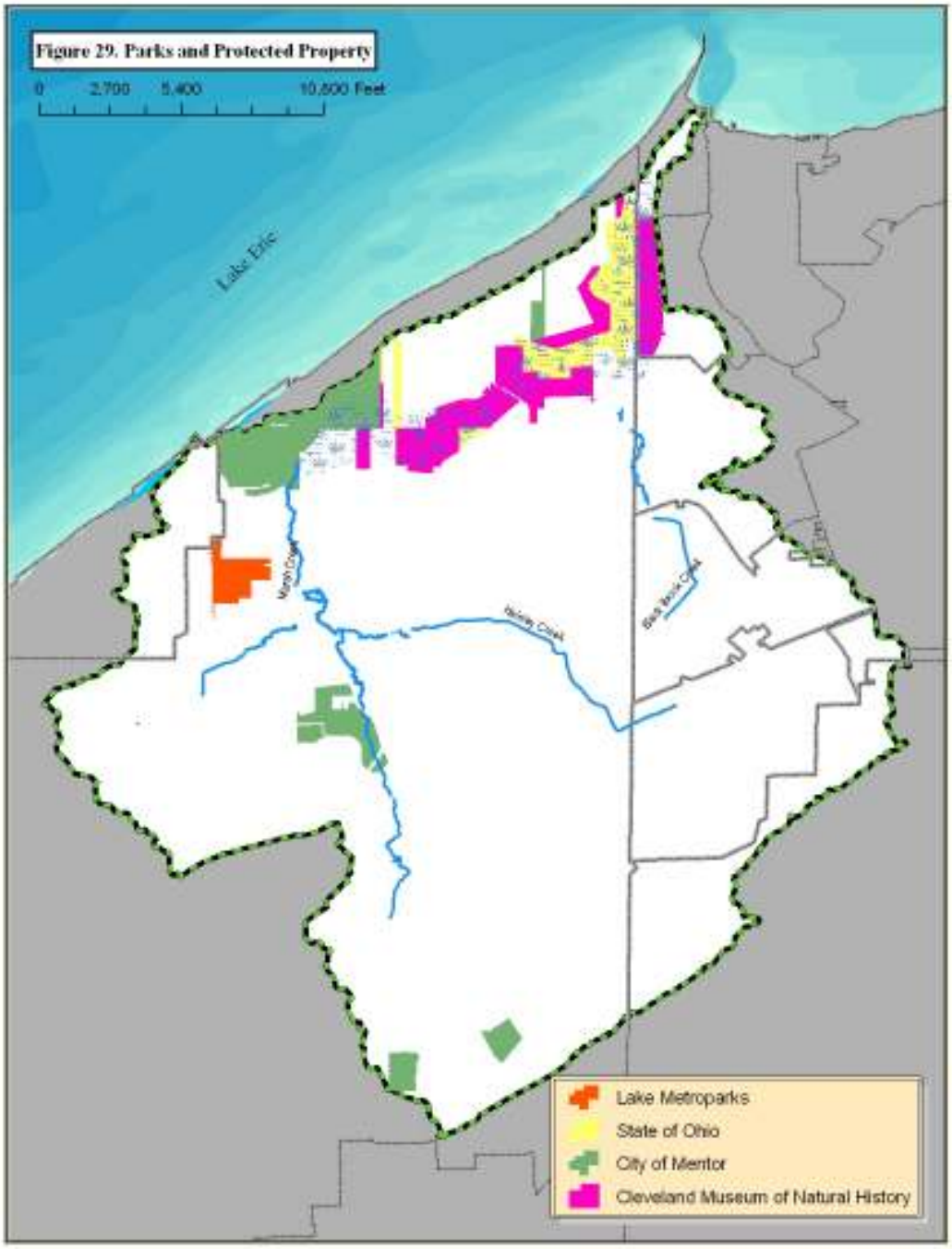
Figure 29. Parks and Protected Property
0
2,700
5,400
10,800 Feet
Lake Erie
Lake Metroparks
State of Ohio
City of Mentor
Cleveland Museum of Natural History

Cultural Resources

The following information on cultural resources was prepared by the Lake County Historical Society.

National Register of Historic Places

Information about local sites on the National Register of Historic Places may be found at the following web site: http://dbs.ohiohistory.org/hp/index.cfm

The Norma Grantham site is a prehistoric Native American village site. At least two additional prehistoric Native American village sites have been partially explored in the Headlands area of the Mentor Marsh watershed by the Cleveland Museum of Natural History.

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The Mentor Marsh was declared a National Natural landmark in 1966 by the US Department of the Interior and there is a marker to this effect at the Zimmerman Trail head near Headlands Road.

Information below has been reproduced from the National Register of Historic Places web site.

Mentor

REFNUM: 66000613
RESNAME: James A. Garfield National Historic Site
ADDRESS: 8095 Mentor Ave.
RETYPECD: B
NUMCBLDG: 4
NUMCSITE: 0
NUMCSTRC: 1
NUMCOBJ: 0
NUMNBLDG: 1

NUMNSITE: 0
NUMNSTRC: 0
NUMNOBJ: 0
CERTCD: LI
CERTDATE: 19661015
MULTNAME:
OTHRNAME: Garfield,James A.,Home;Lawnfield;Dickey Farm;James A. Garfie
SIGNAME: Garfield,James Abram
AREA OF SIGNIFICANCE: POLITICS/GOVERNMENT
Cultural Affiliation:
Architect:Unknown
Criterion: PERSON
Criteria:
Material: NONE LISTED FOUN NONE LISTED ROOF NONE LISTED
OTHR WEATHERBOARD OTHR
Historic Use: DOMESTICCOMMERCE/TRADE
Historic Secondary Use: SINGLE DWELLINGPROFESSIONALSECONDARY STRUCTURE
Current Use: RECREATION AND CULTURE
Current Secondary Use: MUSEUM
Architectural Style : NO STYLE LISTED
Resource Type: BUILDING
City: Mentor
County: Lake

REFNUM: 72001027
RESNAME: Corning-White House
ADDRESS: 8353 Mentor Ave.
RETYPECD: B
NUMCBLDG: 1
NUMCSITE: 0
NUMCSTRC: 0
NUMCOBJ: 0
NUMNBLDG: 0
NUMNSITE: 0

NUMNSTRC: 0
NUMNOBJ: 0
CERTCD: LI
CERTDATE: 19721107
MULTNAME:
OTHRNAME:
SIGNAME:
AREA OF SIGNIFICANCE: ARCHITECTURE
Cultural Affiliation:
Architect: Goldsmith, Jonathan
Criterion: ARCHITECTURE/ENGINEERING
Criteria:
Material: NONE LISTED FOUN NONE LISTED ROOF NONE LISTED OTHR WEATHERBOARD OTHR
Historic Use: DOMESTIC
Historic Secondary Use: SINGLE DWELLING
Current Use: VACANT/NOT IN USE
Current Secondary Use:
Architectural Style : FEDERAL
Resource Type: BUILDING
City: Mentor
County: Lake

Comment: Added space

REFNUM: 74001542
RESNAME: Sawyer-Wayside House
ADDRESS: 9470 Mentor Ave.
RETYPECD: B
NUMCBLDG: 1
NUMCSITE: 0
NUMCSTRC: 0
NUMCOBJ: 0
NUMNBLDG: 0
NUMNSITE: 0
NUMNSTRC: 0

NUMNOBJ: 0
CERTCD: LI
CERTDATE: 19741029
MULTNAME:
OTHRNAME:
SIGNAME:
AREA OF SIGNIFICANCE: ARCHITECTURE
Cultural Affiliation:
Architect: Unknown
Criterion: ARCHITECTURE/ENGINEERING
Criteria:
Material: STONE FOUN NONE LISTED ROOF WOOD OTHR STONE OTHR
Historic Use: DOMESTIC
Historic Secondary Use: SINGLE DWELLING
Current Use: COMMERCE/TRADE
Current Secondary Use: BUSINESS
Architectural Style: NO STYLE LISTED
Resource Type: BUILDING
City: Mentor
County: Lake

REFNUM: 75001452
RESNAME: Gray-Coulton House
ADDRESS: 8607-8617 Mentor Ave.
RETYPECD: B
NUMCBLDG: 4
NUMCSITE: 0
NUMCSTRC: 0
NUMCOBJ: 0
NUMNBLDG: 0
NUMNSITE: 0
NUMNSTRC: 0
NUMNOBJ: 0
CERTCD: LI

CERTDATE: 19751203
MULTNAME:
OTHRNAME:
SIGNAME:
AREA OF SIGNIFICANCE:ARCHITECTURE
Cultural Affiliation:
Architect: Gray,Martin
Criterion: ARCHITECTURE/ENGINEERING
Criteria:
Material: STONE FOUN OTHER ROOF NONE LISTED OTHR NONE LISTED OTHR
Historic Use: DOMESTICCOMMERCE/TRADE
Historic Secondary Use: SINGLE DWELLINGSPECIALTY STORE
Current Use: DOMESTICCOMMERCE/TRADE
Current Secondary Use: SINGLE DWELLINGBUSINESS
Architectural Style: ITALIANATE
Resource Type: BUILDING
City: Mentor
County: Lake

REFNUM: 75001453
RESNAME: Mason, James, House
ADDRESS: 8125 Mentor Ave.
RETYPECD: B
NUMCBLDG: 1
NUMCSITE: 0
NUMCSTRC: 0
NUMCOBJ: 0
NUMNBLDG: 0
NUMNSITE: 0
NUMNSTRC: 0
NUMNOBJ: 0
CERTCD: LI
CERTDATE: 19750918
MULTNAME:

OTHRNAME:
SIGNAME:
AREA OF SIGNIFICANCE: ARCHITECTURE
Cultural Affiliation:
Architect: Goldsmith, Jonathan
Comment: Added space
Criterion: ARCHITECTURE/ENGINEERING
Criteria:
Material: NONE LISTED FOUN NONE LISTED ROOF NONE LISTED OTHR WEATHERBOARD OTHR
Historic Use: DOMESTIC
Historic Secondary Use: SINGLE DWELLING
Current Use: RELIGION
Current Secondary Use:
Architectural Style : NO STYLE LISTED
Resource Type: BUILDING
City: Mentor
County: Lake

NO PHOTO AVAILABLE
REFNUM: 78002092
RESNAME: Lake Shore and Michigan Southern RR Depot and Freight House
ADDRESS: 8445 Station St.
RETYPECD: B
NUMCBLDG :2
NUMCSITE: 0
NUMCSTRC: 0
NUMCOBJ: 0
NUMNBLDG: 0
NUMNSITE: 0
NUMNSTRC: 0
NUMNOBJ: 0
CERTCD: LI
CERTDATE: 19780131
MULTNAME:
OTHRNAME: Mentor Railroad Station
SIGNAME:
AREA OF SIGNIFICANCE: ARCHITECTURE
Cultural Affiliation:
Architect: Unknown
Criterion: ARCHITECTURE/ENGINEERING
Criteria:
Material: LIMESTONE FOUN SLATE ROOF WOOD OTHR STONE OTHR STONE OTHR BRICK OTHR
Historic Use: TRANSPORTATION
Historic Secondary Use: RAIL-RELATED
Current Use: COMMERCE/TRADE
Current Secondary Use:
Architectural Style : NO STYLE LISTED
Resource Type: BUILDING
City: Mentor
County: Lake

NO PHOTO AVILABLE
REFNUM: 79001872
RESNAME: Garfield Library
ADDRESS: 7300 Center St.
RETYPECD: B
NUMCBLDG: 1
NUMCSITE: 0
NUMCSTRC: 0
NUMCOBJ: 0
NUMNBLDG: 0
NUMNSITE: 0
NUMNSTRC: 0
NUMNOBJ:
CERTCD: LI
CERTDATE: 19790223
MULTNAME:
OTHRNAME:
SIGNAME:
AREA OF SIGNIFICANCE: ARCHITECTURE
Cultural Affiliation:
Architect: Garfield, Abram
Comment: Added space
Criterion: ARCHITECTURE/ENGINEERING
Criteria:
Material: NONE LISTED FOUN NONE LISTED ROOF NONE LISTED OTHR BRICK OTHR
Historic Use: EDUCATION
Historic Secondary Use: LIBRARY
Current Use: COMMERCE/TRADE
Current Secondary Use: BUSINESS
Architectural Style: CLASSICAL REVIVAL
Resource Type: BUILDING
City: Mentor
County: Lake

NO PHOTO AVAILABLE
REFNUM: 94000240
RESNAME: Yager, John and Carrie, House
ADDRESS: 7612 S. Center St.
RETYPECD: B
NUMCBLDG: 2
NUMCSITE: 0
NUMCSTRC: 3
NUMCOBJ: 0
NUMNBLDG: 0
NUMNSITE: 0
NUMNSTRC: 0
NUMNOBJ: 0
CERTCD: LI
CERTDATE: 19940317
MULTNAME:
OTHRNAME: Wickert,Ruth,House;LAK-98-3

SIGNAME:
AREA OF SIGNIFICANCE: ARCHITECTURE
Cultural Affiliation:
Architect: Yager, John
Criterion: ARCHITECTURE/ENGINEERING
Criteria:
Material: STONE FOUN ASPHALT ROOF INAPPLICABLE OTHR STONE OTHR STUCCO OTHR
Historic Use: DOMESTIC
Historic Secondary Use: SINGLE DWELLINGSECONDARY STRUCTURE
Current Use: DOMESTIC
Current Secondary Use: SINGLE DWELLINGSECONDARY STRUCTURE
Architectural Style : BUNGALOW/CRAFTSMAN
Resource Type: BUILDING
City: Mentor
County: Lake

NO PHOTO AVAILABLE
REFNUM: 96000867
RESNAME: Young, Benjamin and Mary, House
ADDRESS: 7597 S. Center St.
RETYPECD: B
NUMCBLDG: 1
NUMCSITE: 0
NUMCSTRC: 0
NUMCOBJ: 0
NUMNBLDG: 0
NUMNSITE: 0
NUMNSTRC: 0
NUMNOBJ: 0
CERTCD: LI
CERTDATE: 19960808
MULTNAME:
OTHRNAME: Rhoda Corning Holmes House;LAK-95-3
SIGNAME:
AREA OF SIGNIFICANCE: ARCHITECTURE
Cultural Affiliation:
Architect: Unknown
Criterion: ARCHITECTURE/ENGINEERING
Criteria: MOVED PROPERTY
Material: CONCRETE FOUN ASPHALT ROOF NONE LISTED OTHR WOOD OTHR
Historic Use: DOMESTIC
Historic Secondary Use: SINGLE DWELLING
Current Use: DOMESTIC
Current Secondary Use: SINGLE DWELLING
Architectural Style: FEDERAL
Resource Type: BUILDING
City: Mentor
County: Lake

Fairport Harbor

REFNUM: 71000642
RESNAME: Fairport Marine Museum
ADDRESS: 129 2nd St.
RETYPECD: U
NUMCBLDG: 1
NUMCSITE: 0
NUMCSTRC: 1
NUMCOBJ 0
NUMNBLDG: 0
NUMNSITE: 0
NUMNSTRC: 0
NUMNOBJ: 0
CERTCD: LI
CERTDATE: 19711105
MULTNAME:
OTHRNAME: Fairport Harbor Coast Guard Light Station Reservation
SIGNAME:
AREA OF SIGNIFICANCE: COMMERCEENGINEERING
Cultural Affiliation:
Architect:
Criterion: EVENTARCHITECTURE/ENGINEERING
Criteria:
Material: NONE LISTED FOUN NONE LISTED ROOF NONE LISTED OTHR BRICK OTHR SANDSTONE OTHR
Historic Use: TRANSPORTATION
Historic Secondary Use: WATER-RELATED
Current Use: RECREATION AND CULTURE
Current Secondary Use: MUSEUM
Architectural Style: NO STYLE LISTED
Resource Type: STRUCTURE
City: Fairport Harbor
County: Lake

NO PHOTO AVAILABLE
REFNUM: 84003757
RESNAME: Grantham, Norma, Site (33-La-139)
ADDRESS: Address Restricted
RETYPECD: S
NUMCBLDG: 0
NUMCSITE: 1
NUMCSTRC: 0
NUMCOBJ: 0
NUMNBLDG: 0
NUMNSITE: 0
NUMNSTRC: 0
NUMNOBJ: 0
CERTCD: LI
CERTDATE: 19840531
MULTNAME:
OTHRNAME:33-La-139
SIGNAME:
AREA OF SIGNIFICANCE:PREHISTORIC
Cultural Affiliation: Whittlesey Late Woodland
Architect:
Criterion: INFORMATION POTENTIAL
Criteria:
Material: INAPPLICABLE FOUN INAPPLICABLE ROOF INAPPLICABLE OTHR INAPPLICABLE OTHR
Historic Use: DOMESTICFUNERARY
Historic Secondary Use: VILLAGE SITEGRAVES/BURIALS
Current Use: COMMERCE/TRADE
Current Secondary Use:
Architectural Style :
Resource Type: SITE
City: Fairport Harbor
County: Lake

NO PHOTO AVAILABLE
REFNUM: 92000242
RESNAME: Fairport Harbor West Breakwater Light
ADDRESS: W breakwater pierhead, harbor entrance
RETYPECD: U
NUMCBLDG: 0
NUMCSITE: 0
NUMCSTRC: 1
NUMCOBJ: 0
NUMNBLDG: 0
NUMNSITE: 0
NUMNSTRC: 0
NUMNOBJ: 0
CERTCD: LI
CERTDATE: 19920410
MULTNAME: Light Stations of Ohio Multiple Property Submission

Deleted: LIght

OTHRNAME:
SIGNAME:
AREA OF SIGNIFICANCE: ARCHITECTURETRANSPORTATION
Cultural Affiliation:
Architect: Unknown
Criterion: EVENTARCHITECTURE/ENGINEERING
Criteria:
Material: CONCRETE FOUN STEEL ROOF NONE LISTED OTHR STEEL OTHR
Historic Use: TRANSPORTATION
Historic Secondary Use: WATER-RELATED
Current Use: TRANSPORTATION
Current Secondary Use: WATER-RELATED
Architectural Style: OTHER
Resource Type: STRUCTURE
City: Fairport Harbor
County: Lake

Comment: Added space

Ohio Historic Inventory

Additional information on local Lake County History may be obtained from the Lake County Historical Society at their web site; http://www.lakehistory.org/.

There are seven historic markers with in and adjacent to the Mentor Marsh Watershed. Information concerning the markers is copied below from the remarkableohio.org website listed below by searching by zip codes, 44060, 44077 and 44045.
http://www.remarkableohio.org/index.cfm?action=search_markers.basic_search

OHIO HISTORICAL MARKERS

La Salle Expedition, 1669 : Marker #20-43

In search of a westward-flowing river, French explorer and trader René-Robert Cavelier, Sieur de La Salle (1643-1687) mounted an inland expedition from the south shore of Lake Erie at the mouth of the Grand River in the fall of 1669. Thought to be the first European to see the Ohio River, La Salle journeyed up the Grand River and portaged to a tributary of the Ohio; from there he descended as far as the falls at Louisville, Kentucky. La Salle's explorations both expanded the fur trade and helped to consolidate French claims to the Mississippi River valley. French dominance in Ohio ended following British victory in the French and Indian War (1754-1763).

County

Lake

Address

301 Huntington Beach Drive
Fairport Harbor, OH 44077
Directions

Fairport Harbor Lakefront Park, 301 Huntington Beach Dr.

Latitude / Longitude

41.758149 ° / -81.2774 °

Category(s)

Community Planning/Development (CPD)

Keyword(s)

"Discovery & exploration"

Sponsor(s)

Ohio Bicentennial Commission, The Marietta Chapter NSDAR, Lake County Historical Society, and The Ohio Historical Society

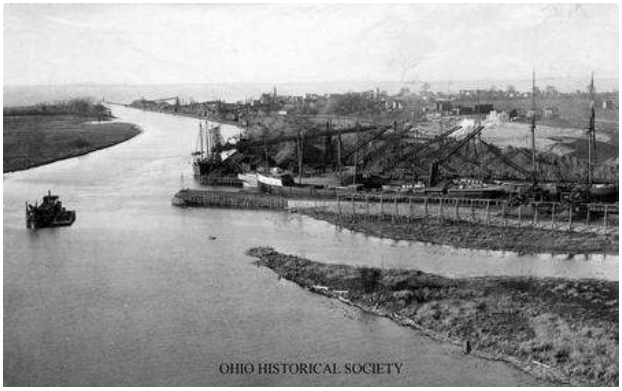
Year

2003

Condition

New

Fairport Harbor Lighthouse : Marker #5-43



Lighthouse and keeper's dwelling, erected in 1871 to replace the 1825 structures designed by Jonathan Goldsmith. From the time it guided early settlers into the Western Reserve until it was decommissioned in 1925, this station served Great Lakes shipping for its most important 100 years. The present, well-proportioned tower, constructed of Berea sandstone, is an outstanding engineering achievement.

County

Lake

Address

129 2nd Street
Fairport Harbor, OH 44077

Directions

Fairport Marine Museum, 129 Second Street

Latitude / Longitude

41.756846 ° / -81.278 °

Category(s)

Architecture (ACH), Natural History/Geologic Site (NAT), Transportation (TRA)

Keyword(s)

"Lighthouses", "Rivers"

Sponsor(s)

The Fairport Harbor Historical Society and The Ohio Historical Society

Year

1971

Condition

Unknown

James A. Garfield : Marker #2-43

His oratorical powers made him a master recruiter. His willingness to learn earned him important field commands. His talents for organization won him praise, distinction and the rank of major general at the Battle of Chickamauga. His gallant and meritorious military successes launched him into national politics and the presidency.

County

Lake

Address

8095 Mentor Avenue
Mentor, OH 44060

Directions

Lawfield Historic Site, 8095 Mentor Avenue, Mentor

Latitude / Longitude

41.663774 ° / -81.35052 °

Category(s)

Military (MIL), Politics/Government (POL)

Keyword(s)

"Civil War", "Presidents"

Sponsor(s)

The Ohio Historical Society and the Ohio Civil War Cenntenial Commission

Year

1965

Condition

Unknown

Mentor Avenue Historic District : Marker #10-43

Among the fifty-four buildings that comprise the Mentor Avenue District are examples of Federal, Greek Revival, Early Romanesque Revival, Italianate, Second Empire, Queen Anne, and twentieth century eclectic styles. Renowned master builder Jonathan Goldsmith (1783-1847), whose Federal and Greek Revival designs define the so-called "Western Reserve" style, built at least two of these houses; the Denton-Powers House (ca. 1820) is representative. The Mentor Avenue District was added to the National Register of Historic Places in 1979. The Painesville City Hall, the Sessions House (157 Mentor

Avenue) and the Smead House (187 Mentor Avenue) are also listed individually on the National Register.

County

Lake

Address

143 Mentor Avenue
Mentor, OH 44060

Directions

30435 Lakeshore Boulevard

Latitude / Longitude

41.650046 ° / -81.38193 °

Category(s)

Historic District (HST)

Keyword(s)

"Cities", "Neighborhoods"

Sponsor(s)

Ohio Bicentennial Commission, The Longaberger Company, Lake Metroparks, City of Willowick, The Lake County Historical Society, and The Ohio Historical Society

Year

2000

Condition

Unknown

Mentor Lagoons : Marker #17-43

For over 200 years, the Mentor Lagoons have had a major impact on northeastern Ohio and its people. Located on the site of a large estuary where the Grand River once flowed into Lake Erie, the area evolved into a large marsh. It was here in 1797 that Charles Parker, a member of Moses Cleaveland's survey party, platted lands for the Connecticut Land Company and established the "Marsh Settlement," the first in what later became Lake County. Throughout the twentieth century, attempts were made to commercially develop this natural treasure, the most recent occurring in 1996. The proposed destruction of the Mentor Lagoons' pristine lakefront, upland forest and riverine marsh prompted Mentor voters to

call for its preservation. For the first time in Ohio's history, voters affirmed eminent domain action to protect open space. This led to the city's acquisition of the 450-acre tract, now known as the Mentor Lagoons Nature Preserve & Marina.

County

Lake

Address

8365 Harbor Drive
Mentor, OH 44060

Directions

8365 Harbor Drive

Latitude / Longitude

41.722196 ° / -81.34041 °

Category(s)

Natural History/Geologic Site (NAT)

Keyword(s)

"Estuaries"

Sponsor(s)

Ohio Bicentennial Commission, The Longaberger Company, City of Mentor, and The Ohio Historical Society

Year

2002

Condition

New

Rose Capital of The Nation : Marker #19-43

From the 1920s through the 1970s, Mentor was recognized as the Rose Capital of the Nation. Lake effect climate, a variety of soils, and abundant water made Mentor ideal for growing roses. Over a dozen growers produced about five million plants a year from their fields in Mentor. The Civic Center Complex was once a massive field of roses, and streets such as Tea Rose, Wyant, and Rosebud were named in honor of the blossoms that grew so abundantly here. Notable growers include Gerard K. Klyn,

the largest rose grower in the Midwest; Joseph Kallay, who in 1932 received U.S. patent No. 10 for "Blaze;" Melvin E. Wyant, accredited rose grower, judge, and lecturer; Joseph J. Kern, nationally recognized expert on old fashioned roses; and Paul R. Bosley, who specialized in hybrid tea roses. By the 1970s, increased land values and development led to depletion of much of Mentor's nursery lands.

County

Lake

Address

8537 Mentor Avenue
Mentor, OH 44060

Directions

Commemorative Rose Garden, 8537 Mentor Ave.

Latitude / Longitude

41.668433 ° / -81.33484 °

Category(s)

Agriculture (AGR)

Keyword(s)

"Horticulture"

Sponsor(s)

Ohio Bicentennial Commission, The Longaberger Company, City of Mentor, and The Ohio Historical Society

Year

2003

Condition

New

Thomas W. Harvey (1821-1892) : Marker #11-43

This Italianate-style house is the former home of noted educational leader Thomas W. Harvey. Here he wrote A Practical Grammar of the English Language, as well as a series of language texts and readers. First published in 1868, Harvey's Grammar was a fixture in primary schools across the Midwest for more than fifty years. As State Commissioner of Common Schools, Harvey advocated legislation that greatly increased state support of local school districts. He also served as superintendent of Painesville

schools, founded the Northeastern Ohio Teachers' Association, and served as a trustee of Lake Erie Seminary (now Lake Erie College). Painesville's high school, located one block southeast, is named for him.

County

Lake

Address

143 Mentor Avenue
Mentor, OH 44060

Directions

143 Mentor Avenue

Latitude / Longitude

41.650046 ° / -81.38193 °

Category(s)

Architecture (ACH), Education (EDU)

Keyword(s)

"Houses", "Public Schools"

Sponsor(s)

Ohio Bicentennial Commission, The Longaberger Company, The Painesville City Improvement Corporation, and The Ohio Historical Society

Year

2000

Condition

Unknown

Ohio Archaeological Inventory

At least three prehistoric Indian villages/sites in or near the Mentor Marsh watershed have been explored in recent years. Prehistoric Indian artifacts may be viewed at the local Indian Museum in Willoughby and at the Cleveland Museum of Natural History.

The Ohio Historical society has an excellent document detailing the relationship between wetlands and archeological sites. This document can be viewed at:
http://www.ohiohistory.org/resource/histpres/toolbox/wetarch.html

Mentor Marsh Watershed Impairments and Problems Summary

> "This area contains a number of unique ecosystems. Mentor Marsh State Nature Preserve, previously identified as a National Natural Landmark, is currently undergoing hydrologic changes and degradation from water quality impairment and the introduction of exotic species. The area also boasts the last remaining large undeveloped beach on Ohio's Lake Erie shoreline that supports a diverse ecological community and that serves a valuable natural protective function in an area subject to erosion." (Davey Resources, 2001)

The Mentor Marsh watershed is located within the Ohio Lake Basin and therefore must apply management measures specific to the Ohio Coastal Nonpoint Pollution Control Program that satisfy Appendix 8 of "A Guide to Developing Local Watershed Action Plans in Ohio". The following problem statements and restoration goals that satisfy Appendix 8 Management Measures of the Ohio Coastal Nonpoint Pollution Control Program will be numbered accordingly. Many of these measures are not applicable to this watershed action plan.

Non-Applicable Appendix 8 Management Measures of the Ohio Coastal Nonpoint Pollution Control Program

Agriculture (3.3.7) Irrigation Water Management – Exempt with Farm Bureau participation. Only incidental amounts of land use devoted to silviculture in watershed.

Urban (5.3.1) New Development – Exempt with NPDES Phase II participation.
Urban (5.5.1) Existing Development - Exempt with NPDES Phase II participation.
Urban (6.6.2) Operating On-site Disposal Systems – Exempt <1 HSTS per 20 acres
Urban (5.8.5) Road, Highway, and Bridge Operation and Maintenance - Exempt with NPDES Phase II participation.
Urban (5.8.6) Road, Highway, and Bridge Runoff Systems - Exempt with NPDES Phase II participation.

Problem Statement

The problems, or issues, affecting the Mentor Marsh Watershed are best described in the Issues Characterization document that was created for the MARC by Davey Resources in 2001:

Comment: Added an "r"

> "Over the past several months, Task Forces have worked to describe the problems in the Marsh Area SAMP region. The ODNR Division of Real Estate and Land Management, and Dee Hammel with the Ohio Department of Natural Resources' Division of Natural Areas and Preserves facilitated a process through which the MARC identified and ranked a list of 27 strategic issues to be addressed in the SAMP. These issues were then divided among task forces, which were formed to describe and characterize the issues. These issue characterizations provide the information necessary to begin the strategy development process. Five main issues are characterized by their respective task forces in this document:
>
> - Water Quality
> - Land Use and Economic Development
> - Wetlands and Biodiversity

- Recreation and Public Access
- Shoreline Management and Nearshore Issues

These five issues were identified as the most critical issues of concern in the region. It is important to stress that this document is dynamic and subject to comments and changes.

Before implementation plans could be addressed, specific items were identified in each of the five main issues. The MARC identified sub-issues within each main issue and assigned a priority status of high, medium, or low. The high and medium priorities were decided to be time sensitive and/or were not currently being addressed by an existing program. Low priority issues were typically covered by existing programs or were otherwise chosen as lower priorities by the stakeholders.

The following is a thorough description of each issue from the "Issue Characterizations Marsh Area SAMP". (Davey Resources, 2001)

Water Quality

Water quality is a concern throughout the Marsh Area SAMP region. A thorough review of the causes of degraded water quality includes both point and non-point pollution sources. Water quality issues are inherently challenging due to the cumulative nature of water quality impacts from watershed activities and the often latent nature of the problems. Planning focus must be toward the impacts of erosion and sedimentation and the loss of habitat upon water quality in order to implement strategies through which long-term protection of the resources can be ensured.

Comment: Added a hyphen

Point Source Pollution

Waste Water Treatment Systems – Low Priority / Urban (5.6.1) and (5.6.2)

These types of sources are controlled primarily through state-run regulatory programs administered by the EPA under the Clean Water Act. Although point sources are regulated, point source pollution from industrial stormwater discharge, industrial sanitary discharge, wastewater treatment plant discharge, and sanitary sewer inflow infiltration may be adversely affecting water quality in the Marsh Area SAMP region.

The wastewater treatment plant located in the watershed is the Greater Mentor Wastewater Treatment Plant. This facility treats 20 million-gallons per day of activated sludge and discharges into Lake Erie immediately east of the mouth of Mentor Harbor. Recently upgraded in July of 2000, the plant has been operating in 100% compliance with their National Pollution Elimination Discharge System (NPDES) permit.

Prior to the plant upgrade and the elimination of Uniroyal Chemical Company, an inhibiting industrial wastewater source, the facility experienced difficulty in achieving consistent discharge compliance. Uniroyal and the Lake County Department of Utilities engaged in a public dispute over the inhibition of the facility's operation during the 1990's. The controversy ended in August 1999 when Uniroyal closed its doors and

moved its operations to Mexico. Within two weeks of the industry's closure, the plant recovered and began meeting discharge standards.

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Oil and Brine Storage Lagoons and Wells – Low Priority / Urban (5.3.2)

Some concentration of salts and minerals is necessary for the survival, growth, and reproduction of all living organisms. Northeast Ohio and all of the coastal areas along Lake Erie are freshwater ecosystems with typically minimal concentrations of salts and dissolved minerals. Plants and animals throughout Ohio have adapted to life in these freshwater, low mineral environments. Under these conditions, organisms have developed methods to acquire and utilize salts and minerals. Plants use the concentration of salts and dissolved minerals within their tissues to assist in the uptake of water.

Accidental spills from oil and brine wells can introduce large concentrations of salts and minerals into the environment, which in turn can eliminate most, or all, of the native vegetation within a given area. Such sudden and dramatic increases in the concentrations of salts and dissolved minerals can have damaging and dramatic effects. Most of our native flora and fauna cannot tolerate high levels of salts in their environments. A few species of plants are able to adapt to high levels of salts and dissolved minerals. Common reed (Phragmites australis) is well adapted to saline environments. This provides an opportunity for monocultures of salt- tolerant species like common reed. Once established, this species can prevent the return of a healthy and diverse ecosystem.

Wetlands are particularly sensitive to the introduction of salts and minerals. Because most wetland environments are depositional, water does not flush through these systems and salts tend to remain for decades. This further hinders the return of a diverse native ecosystem of plants and animals. This contributes to the present poor water quality at Mentor Marsh.

Brine, a salty byproduct of drilling gas and oil wells, is generally disposed of through injection into wells and pockets about a half-mile underground, below drinking water level. Before the brine is injected it is often stored in a holding pond or lagoon. Improperly designed or illegally constructed oil and brine storage lagoons threaten to degrade water quality at ecologically sensitive areas in the watershed. These lagoons can often be attractive nuisances to waterfowl and other wildlife when not properly managed.

Most, but not all, of the wells have been abandoned and sealed. Historically, high concentrations of dissolved solids and chlorides have entered Mentor Marsh via Black Brook, mainly from Diamond Shamrock's salt brine wells and a waste salt disposal site owned by Jerome Osborne. In 1991, an abandoned brine pit covered with thick oil resulted in the deaths of 59 Canada geese and a Mallard duck. By 1996, the number had increased to over 100 deaths of birds and waterfowl, including a Blue Heron. The deaths were directly attributed to the oil and brine in the storage lagoon. This lagoon also had an oil spill in 1995 that migrated to a nearby creek. On June 18 and 26, 1996, spills totaling

approximately 50,000 gallons of oil and brine were reported. The spills made their way to a tributary of the Mentor Marsh. The lagoon was observed to have 1,000,000 gallons of an oily water mixture in the 12,000,000-gallon impoundment.

At the site of the impoundment are also above ground storage tanks. The lagoon and above-ground tanks were reported by the U.S. EPA to present a substantial threat of discharge of oil into or upon the navigable water of the United States. U.S.EPA, U.S. Coast Guard, Ohio EPA, Lake County Health District, Painesville Township Fire Dept., Ohio Department of Natural Resources and others have been involved in the remediation activities and closure activities at this site. When the clean up was complete, 70,000 gallons of crude oil from leaky tanks, 2,000,000 gallons of contaminated water and 30,000 gallons of sludge from the lagoon were removed at a cost of $1.5 million to the U.S.EPA.

A related concern is the potential of an underground release once the brine is injected to the wells. The leak could migrate through cracks and fissures deep in the earth looking for an outlet. Due to its proximity to numerous underground gas and oil wells now containing brine, the Mentor Marsh would receive any releases from these facilities.

Figure 30 shows the location of the oil and gas wells in the watershed. Figure 31 shows the location of the salt landfill along the mouth of Blackbrook Creek

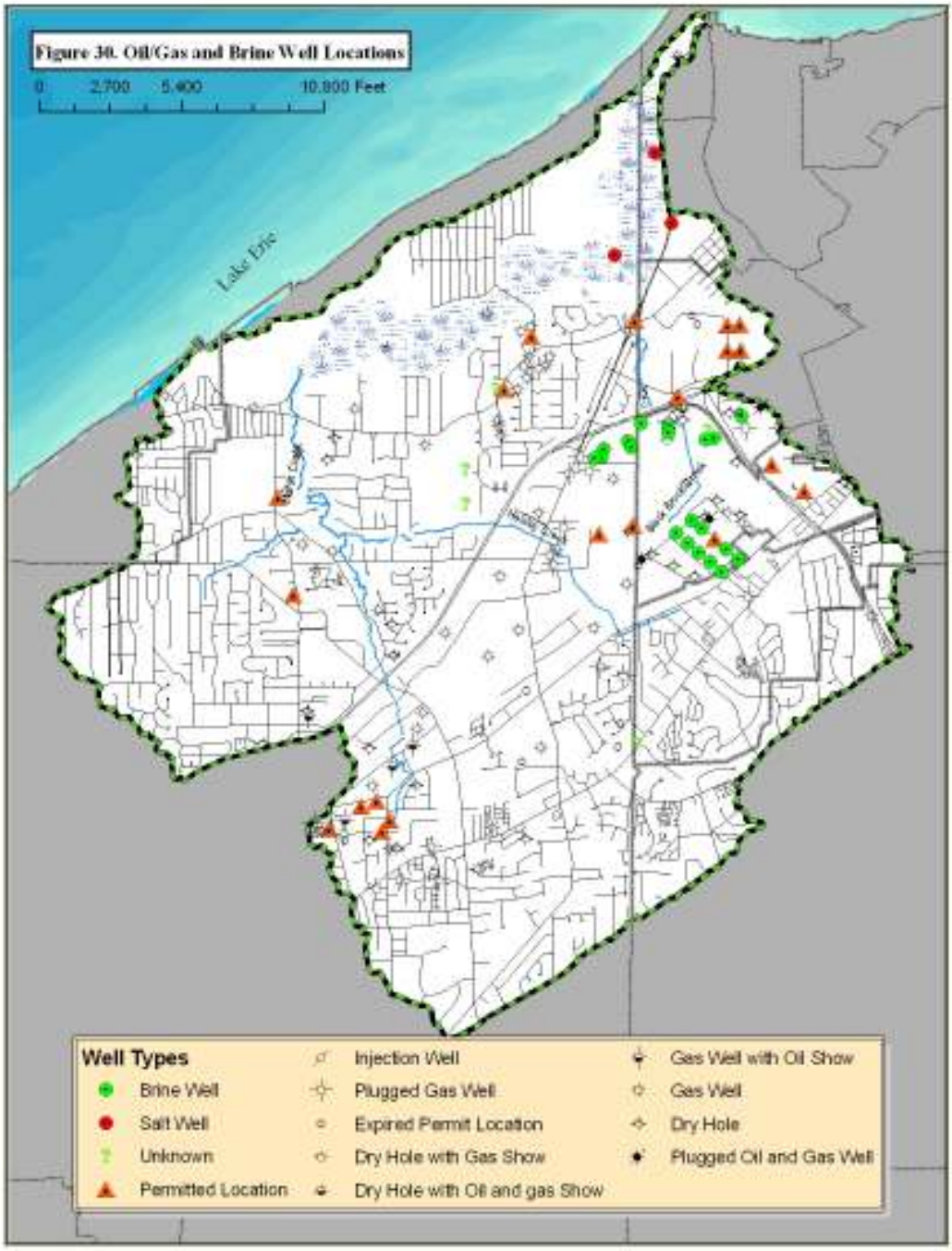
Figure 30. Oil/Gas and Brine Well Locations
0 2,700 5,400 10,800 Feet
Lake Erie
Well Types
Brine Well
Salt Well
Unknown
Permitted Location
Injection Well
Plugged Gas Well
Expired Permit Location
Dry Hole with Gas Show
Dry Hole with Oil and gas Show
Gas Well with Oil Show
Gas Well
Dry Hole
Plugged Oil and Gas Well


Figure 31. Salt Fill Location
0
2,700
5,400
10,800 Feet
Lake Erie

Salt Contamination – High Priority / Urban (5.3.2)

Between 1954 and 1966, the once freshwater Mentor Marsh was severely impaired by runoff from salt wells and salt mine tailings. Between 1954 and 1959, salt brine from salt wells on Blackbrook Creek flowed into the marsh and caused die-back of swamp forest between the mouth of Blackbrook and Corduroy Road. In 1966, thousands of tons of low- grade salt ore were dumped over a five-acre area near Routes 44 and 283. In the 20 years after the first salt entered the marsh, sodium ions spread throughout the marsh, significantly changing the ecology of the preserve. The system changed from a freshwater swamp forest to a marsh dominated by salt-tolerant species such as the common reed, *Phragmites australis*.

Mitigation efforts were undertaken in the early 1980s, but it wasn't until nearly 20 years later that we would understand the effectiveness of those efforts. In 1999, an Akron University graduate thesis was completed that assessed the present water conditions of the marsh. The study indicated that chloride levels from salt contaminated runoff from the Osborne Salt Fill have decreased significantly.

The general decrease in chloride concentrations from the baseline study in 1988 to those found by Whipple's study shows that the remediation efforts were somewhat successful. Even with significant improvement in surface water conditions, however, the marsh remains drastically altered from its natural state.

A salt pollution study of Mentor Marsh has been conducted by the Ohio State University with financial support from the Lake Erie Protection Fund (LEPF) and the Ohio Coastal Management Program (OCMP) from September 2004 to 2006. The results discussed below are based on the analysis of preliminary data, which are unpublished. The data show a continued pattern of salt pollution of Mentor Marsh. Total chloride results have been consistently above the tolerance limit for a freshwater swamp forest but well below the tolerance limit for the invasive species *Phragmites australis* (Cav.) Steudel.
The spatial patterning of total chloride levels indicate two primary sources of salt pollution to Mentor Marsh: the salt fill placed over Blackbrook immediately upstream from the Mentor Marsh/Blackbrook confluence; and the abandoned brine fields located to the south of State Route 2 within the Mentor Marsh watershed.
The results indicate the salt fill continues to release large amounts of salt pollution to the Marsh basin. Water samples collected immediately downstream from the salt fill consistently show total chloride levels greater than the upper limit for freshwater ecosystems of 500 mg/l. In April 2005, a water sample collected from this location had total chloride of 2,000 mg/l. The EPA limit is 300 mg/l. Of the 36 water samples collected from this location during the 18-month study period, 29 have exceeded the EPA limit. The average total chloride for this location for the study to date is 721 mg/l.
The salt pollution downstream from the abandoned brine fields might be owing to the recent disturbance of salt-laden soils in this area. In September 2004, a water sample collected downstream from the abandoned brine fields had total chloride of 1,600 mg/l. Of the 47 water samples collected at this location during the 18-month study period, 37 have exceeded the EPA limit of 300 mg/l. The average total chloride for this location for the study to date is 591 mg/l.

Results from additional sampling points located within the marsh basin and at both of its outlets indicate that the salt pollution gets distributed throughout Mentor Marsh. Results show all sample locations within the Marsh basin have exceeded 300 mg/l on multiple occasions except for the remnant swamp forest area located in the southwest portion of the preserve. This area has never exceeded 300 mg/l and has an average total chloride for the study period of 172 mg/l, which is the lowest for any location sampled. This area's location away from the main flow of contaminated water provides a refuge for the remaining swamp forest species (Fineran, Unpublished Data).

Additional investigations were performed by the Ohio EPA in June, 2007 on seeps and surface water on the cap of the landfill. The analytical results of these investigations resulted in the issuance of a "Notice of Violation" to the landowners on November 17, 2006. "Salt contaminated groundwater and surface erosion are allowing the release of pollutants into adjacent surface waters at values far in excess of the State Water Quality Criteria for Total Dissolved Solids and pH as established in Rule 3756-1-07 of the Ohio Administrative Code. The releases have caused a documented violation of the Water Quality Criteria in Black Brook, and then impact the Mentor Marsh, a State Nature preserve." (EPA, 2007)

Hazardous Waste Contamination – Low Priority / Urban (5.3.2)

The Diamond Shamrock site began operations in 1912. Over its 65-year history in Painesville Township, the company produced soda ash, caustic soda, coke sodium bicarbonate, cement, chlorine, chlorinated hydrocarbons, sodium dichromate, chromic acid, chlorowax, and other products. A large amount of hazardous and solid wastes were disposed in large "soup ponds" on site. The wastes include acid, calcium chloride, limestone impurities, chrome wastes, solvents, asbestos, and other wastes.

The plant closed in 1977, and one of the waste lakes was capped in 1982. Ohio EPA and US EPA investigations led to placement on the National Priorities List (Superfund). The Superfund designation has since been withdrawn in favor of a cooperative working relationship among local, state, and federal authorities and the potentially responsible parties. Remediation activities are ongoing at the site.

The Uniroyal facility, which is currently closed, manufactured Paraquil, an intermediate chemical for the tire industry. A radioactive waste site is on the company property, with the potential to leak into the Grand River upstream of the drainage ditch connecting Mentor Marsh and the Grand River.

Uniroyal Chemical began operations at the present 130-acre site in 1965. The site produced various types of nitrile rubber products and ceased operations in June 1999. The company signed an administrative order with the Ohio EPA in May 1999 that requires the company to investigate and clean up any chemical contamination. Further information can be found on the internet at www.lrb.usace.army.mil/fusrap/paine.

Finally, several companies continue active chemical production operations on Fairport-Nursery Road. While these facilities are not located within the watershed, leakage at any of these sites threatens the health of the watershed.

Further investigation of these operations is required to better assess the potential threat to the marsh area.

Storm Water Management – Low Priority / Urban (5.3.2), (5.3.3), (5.8.1), (5.8.2), (7.4.1), 7.4.2), 7.5.3) and 7.6.1)

Under intensive pressure from development, the marsh area has been losing beneficial wetlands and riparian areas at a rapid pace. Residential and commercial development removes considerable areas of vegetation from the landscape and increase paved, or impervious areas. Impervious surfaces impede absorption of rainfall through the soils, which acts to recharge the groundwater. Interrupting this natural recharge process, impervious surface area reduces aquifer capacity and limits the natural flow to rivers and streams during dry periods.

Increasing impervious areas impacts the potential quantity and quality of stormwater runoff. Pollutants and toxic substances such as oils and road salts are carried from these impervious surfaces by stormwater and are deposited in surface water bodies and groundwater. These stormwater discharges into coastal waters and tributary streams increase as impervious areas increase throughout the watershed. The Land Use/ Economic Development Issue Characterization addresses the effects of imperviousness in further detail.

Erosion and Sediment Control – Low Priority / Urban (5.3.2), (5.3.3), (5.8.1), and (5.8.2)

Traditionally regarded as an agricultural issue, erosion and sedimentation have been drawing a great deal more attention in urban areas. It has become evident that the agricultural-related issues have been masking growing erosion and sedimentation problems surrounding urban land uses and construction site runoff. The problems of erosion and sedimentation ("E&S") are caused by alterations to vegetation and soil surfaces within the watershed. Vegetated areas adjacent to water resources, called riparian buffers, are important landscape features that help to maintain and/or improve water quality by preventing erosion and controlling the transport of sediment into adjacent wetlands and water bodies. Buffer zones are particularly valuable for removing pollutants and excess nutrients from surface water runoff and in some cases from the underlying groundwater. Wetlands also provide the same benefits as riparian buffers, as they serve as collectors and natural recyclers for the eroded sediment. Sediments are particles suspended in a body of water that eventually settle out and accumulate on the bottom of the body of water. Sediment pollution causes problems in water quality by reducing light penetration, covering aquatic organisms, bringing insoluble toxic pollutants into the water, and filling waterways. Suspended sediments adversely affect water quality by carrying toxic chemicals, both organic and inorganic, into the water. The sediment particles provide surface area to which some insoluble, toxic compounds adhere. Additionally, pathogens, or disease-causing agents, can be carried in stormwater runoff and may be partially responsible for some of the bacteria contamination in nearshore areas. Further investigation is needed to better understand the degree to which bacteria along beaches and other toxic elements carried by runoff present public health and safety concerns.

Due to the potential for impacts such as property damage and public safety concerns, regulatory agencies and communities are taking urban E&S seriously.

In an effort to abate the runoff pollution, the Lake County Board of Commissioners adopted the Lake County Erosion and Sedimentation Control Rules that require reasonable standards of management and conservation practices. This legislation affects the Mentor Marsh only in the township areas. The City of Mentor, which constitutes 70% of the SAMP region, has its own less stringent E&S rules, (City of Mentor Subdivision Regulations, Section 152.057).

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Home Sewage Treatment Systems (HSTS) – Low Priority / Urban (5.6.2)

The density of HSTS in the watershed is <1 per 20 acres and is therefore exemptHousehold sewage disposal systems are usually present in the unsewered areas of a community. A variety of factors can affect how a home sewage disposal system will function. Those factors include, but are not limited to, soil types, water tables, depth to bedrock, slope and the amount of water used in the home.

Previous and current studies are indicating that systems throughout Ohio have a statistically significant failure rate. In 1997, the Lake County General Health District initiated a two-phase study to determine the effectiveness of the sewage systems being utilized in at-risk soil types. Systems installed from 1988 through 1996 had an overall failure rate of 17%. The failure rate of home septic systems surveyed in 1997 was 35%. Systems installed where homes are 30 to 40 years old have an estimated failure rate of over 50%.

Used to determine the failure rate of home septic systems, this study was primarily for statistical purposes and not for an enforcement program. Traditionally, the Health District issues orders to repair malfunctioning systems based on a complaint basis. There are no routine inspection programs once a system has been approved and installed.

When a household sewage disposal system fails, one of the results can be off-site discharge, which is a nonpoint source of water pollution. This type of nonpoint pollution may affect the water quality in a couple of different ways. One of these ways is by fecal contamination. Fecal matter contains coliforms, a group of bacteria produced and hosted by feces, soil, water, vegetation and other matter. If present in water, a dangerous water quality problem arises.

Another effect of off-site septic discharge is lack of clarity due to suspended solids when the suspended solids begin to settle in the water. After settling, a sludge layer can form and cause oxygen demand problems. Septic waste in the watershed can create high biological oxygen demand, which robs the water of dissolved oxygen. When dissolved oxygen levels are low, anaerobic (without oxygen) microorganisms produce compounds that have very unpleasant odors, further deteriorating water quality.

The Lake County Health District is currently pursuing new alternatives to traditional household sewage disposal methods. The alternatives include drip irrigation technology and variations of mound systems.

Impoundments and Dams / Hydromodification (7.4.1)

This section was not specifically identified during the development of the SAMP. However, it is a required Management Measure of the Ohio Coastal Nonpoint

Pollution Control Program. No impoundments or dams, with the express purpose of creating a reservoir have been located within the watershed. Several man-made features as well as beaver dams in the marsh have acted as hydrologic controls in the watershed. These features are well documented in the Fineran dissertation "Assessing Spatial and Temporal Vegetative Dynamics at Mentor Marsh, 1796 to 2000 A.D.":

Beaver dams

Beaver dams are cited as a reoccurring problem in the Shipman Pond area. The dams obstruct flow at the mouth of Shipman Pond and raise water levels in the eastern basin. Damming of the mouth of Shipman Pond increases retention time (flood duration) within the marsh basin thereby increasing flood stress. The newspaper article (Headlands Beach Archives: Unknown, August 1, 1974) also mentions the damage done to the trees within the marsh because of the increased flood stress. Currently, beaver continue to build dams across the mouth of Shipman Pond elevating water levels in the eastern basin. State Park rangers periodically clear the dams but beavers quickly rebuild them sometimes in a single night. Water levels in the marsh have been observed to fall nearly 3 feet immediately following the removal of the beaver dams.

Greater Mentor Wastewater Treatment Plant

In 1964, the Greater Mentor Wastewater Treatment Plant (WWTP) was built on the southwest bank of Mentor Marsh. Concurrent with its construction, an embankment was built within the marsh basin to support a large 42-inch corrugated metal outfall pipe with a 36-inch polyethylene liner, which carries treated effluent to Lake Erie. The embankment begins on the southwest bank of the marsh and ends just south of the drainage ditch which flows from east to west within the marsh basin. The embankment carries the WWTP's discharge (effluent) pipe above ground to the embankment's end and then the pipe runs underground to its outfall, which is below water level within Lake Erie and is located to the northeast of the mouth of Mentor Harbor. Therefore, the WWTP does not discharge its treated effluent into the marsh basin. The embankment and discharge pipe are still used today and many trees have grown along the embankment. Although the embankment obstructs flow in this portion of the marsh, several breaches in the embankment allow flow to cross at points along its length. Sometime between the treatment facility's construction in 1964 and 1973, a sanitary sewer line was installed which carries the raw sewage from Mentor Headlands to the wastewater treatment plant. The sewer pipe crosses the marsh from a point on the north bank of the marsh, just west of Wakerobin Trail, to the south bank of the marsh, east of Becker Pond. The sewer pipe is half buried in the marsh with approximately one quarter to one half of the top of the pipe sticking up above the marsh surface. The sewer pipe is made of corrugated metal and is 36 inches in diameter. It appears to be a minor obstruction to surface flow within the marsh basin.

Roads and trails

Corduroy Road was originally built in 1854. As discussed in Chapter 2, a bridge appears to have been built over a stream flowing within the marsh at the time of Corduroy Road's construction. This bridge may have been in existence as late as 1925. There is mention of Corduroy Road being paved in 1927. Perhaps at this time the bridge was replaced with the three culverts that channel flow beneath the

roadway today. Corduroy Road acts as a hydrologic obstruction to flow across the marsh basin. The magnitude of its affect on flood duration to the east of the roadway is uncertain. Wakerobin Trail is a boardwalk that extends across the west central basin from the north side of the marsh terminating before it joins with the south bank near the Blackbrook Golf Course. The boardwalk also acts as a hydrologic obstruction to flow within the marsh basin. Several channels have formed beneath the boardwalk with high velocity of flow observed during times of high water. Again, the magnitude of its effect on the flood duration east of the boardwalk is also uncertain.

Land Use and Economic Development

The Marsh Area SAMP region is largely developed, dominated by residential land use. Current land use practices threaten the long-term viability of exceptional natural resources within the region. Existing development patterns compromise ecosystems, and projected future growth and development threaten to further fragment and divide remaining resources. A diversity of landowners and a complicated mix of stakeholder interests and attitudes contribute to land use problems.

The Land Use/ Economic Development Task Force is working to address these and related issues in order to facilitate the development of local land use plans and development controls as a means of safeguarding coastal natural resources and resource usage while preserving and promoting economic development in the SAMP region.

Projected Growth – Low Priority / Urban (5.3.3)

Areas under considerable future development pressure include sensitive areas that are critical to the health of the region's natural resources. Currently, undeveloped, sensitive property near the marsh is not anticipated to be developed in the near future. However, undeveloped areas near the Blackbrook and Marsh creeks may be developed in the next 5-10 years.

The Marsh Creek watershed currently has the most residential, commercial, and industrial development. The major areas of development in the City of Mentor, within the watershed, are the Diamond Center at SR2 and Heisley Road, the Tyler Blvd. extension from Hopkins Road to Heisley Road, and various areas along Mentor Ave. (U.S.20.) The Diamond Center and Mentor Avenue areas are predominantly commercial and office and will continue to develop in this manner for the next five to fifteen years. The Tyler Blvd. area and the Heisley Road area will continue to develop with industrial and office, with limited commercial use interspersed throughout the area on a conditional use permit basis. These commercial uses are complementary to or accessory to the industrial use permitted. This development is likely to occur over the next ten to fifteen years. The vacant parcels along Mentor Avenue will also continue to develop over the next five to ten years.

Concord and Painesville Townships, in the Marsh Creek watershed, have been almost completely developed. The existing uses and zoning are residential and commercial, which are approaching built-out capacity. Residential development has slowed to about one to two houses every three to four years. Commercial development is more active but

will be built out within five to ten years. Redevelopment activity is already occurring in the area.

The Blackbrook Creek watershed is the smaller of the two watersheds in the SAMP region that drains into the marsh. Most of the development in this watershed will occur within Painesville City and Painesville Township. Painesville City recently annexed 480-acres from Painesville Township. Single-family housing has been proposed for the area south of CSX Railroad and industrial development to the north. Development of this area is dependent on obtaining access and will likely occur over a twenty- year period or more.

Several factors affect this development trend. These factors are access, wetlands, possible existence of hazardous waste on site, soil conditions, brine wells, and drainage. The balance of the watershed, zoned for light industrial with some areas of residential and two small areas of commercial, will develop slowly for the next five years and depend on Mentor reaching its saturation point. Industrial uses are anticipated to grow more quickly than residential and commercial land uses. Development of this area will probably take 10 to 25 years.

Uncoordinated Land Use Planning – High Priority / Urban (5.3.3)

Continued consumption of the SAMP region's open space and natural resources for the purpose of residential development is the net result of the cumulative consequences of independent local land use decisions throughout the region.

Though the intent of land use planning is to empower local governments to meet the needs of their communities, the result has been fragmentation among the local jurisdictions and little coordination given to regional needs or consequences. Communities do not have a unified vision regarding the desired state for ownership, natural resource management, quality, or levels of use for the marsh and coastal areas.

A total of eight jurisdictions are included in the SAMP area: Mentor, Mentor-on-the-Lake, Painesville, Painesville Township, Concord Township, Grand River Village, Fairport Harbor, and Lake County.

Past difficulties in devising resource management policies for the Mentor Marsh and shoreline as areas of particular concern have resulted, in part, from the breadth of perspectives represented by the diversity of landowners.

Given the diversity of owner interests and available planning tools, local policies must be devised to take into account unique ownership perspectives and natural resource management issues of the individuals and the whole management area. "Common Groundwork: A Practical Guide to Protecting Rural and Urban Land" (Institute for Environmental Education, 1993) is a handbook for making land-use decisions that will provide a wealth of options for the MARC during the Strategy Development Phase of the planning process. This handbook contains a host of privately and publicly initiated tools, such as zoning ordinances, subdivision regulations, and land trusts to consider for use in the SAMP.

Development Pressures – Low Priority / Urban (5.3.3)

Development, particularly residential, is booming in the Marsh Area SAMP region. The development rate for the SAMP region is approximately 205 to 225-acres per year, with

an average of 42 lots per subdivision. Generally, this rapid residential growth stimulates positive economic change for the region's communities in the short term. This growth can improve the quality of life for community residents in the short run through an increased tax base and the provision of services that follow; however, in the long term it expands the demand for services beyond the increase in tax base.

In addition to the economic burden of providing services to support residential growth, one of the many negative environmental impacts is wildlife habitat loss due to construction and development. Loss of habitat can destroy the ecotourism component in the marsh area. The economic benefits of visitors to the SAMP region's beaches, natural areas and preserves are highly significant to the region's economy.

Another negative impact development can have on a community's economy is the property damage created by flooding and erosion. When development occurs the amount of impervious surfaces increases. Impervious surfaces are paved surfaces, such as roads, driveways, and parking lots. These impervious surfaces prevent rainwater from percolating into the ground, thus decreasing the area's natural flood and erosion control capacities. Development occurring on floodplains and stream bank slopes disturbs anchoring vegetation and, consequently, causes the sediment to erode. Floodplains, wetlands, and riparian areas, or lands adjacent to streams or rivers, absorb rainfall and snowmelt. Building on or near these critical areas prevents their ability to minimize the force of runoff, thereby increasing the erosion of stream banks and slopes.

Another related consequence to increasing impervious surfaces is flooding. The increased flow rate and quantity of rainwater or stormwater due to the lack of vegetation on eroded stream banks can present expensive and dangerous flooding problems to landowners along the water. Homes and roads, bridges, and other infrastructure are threatened from increased flooding and erosion.

Wetlands and Biodiversity

Wetlands are of particular importance in the Marsh Area SAMP region. In addition to the biological and environmental quality values wetlands provide, there are numerous associated socio-economic values, such as flood control functions, erosion protection, pollutant filtration, and aesthetics. Wetlands promote biodiversity, defined as an ecosystem's inclusion of a variety and quantity of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur.

The Mentor Marsh State Nature Preserve, City-owned Mentor Lagoons Nature Preserve and Marina, Headlands Dunes State Nature Preserve, and Headlands Dunes State Park have been designated for varying degrees of use while abiding by the principles of natural area preservation. In spite of local, state, and national esteem, these biological gems are threatened. Residential, commercial, and industrial development encroaching on the edge of environmentally sensitive sites continually threatens environmental quality and the long-term viability of the ecosystems. This development, its accompanying hydromodification, and the salt contamination from past years have changed natural landscapes, altered drainage patterns, fragmented inland wetland habitat, stressed littoral ecosystems, and reduced biodiversity throughout associated unique biotic communities.

It is vital that the public understand the current and potential residential and industrial impacts to the environmental quality of natural regional assets, as well as the role of the Marsh Area SAMP's environmental planning initiatives for protecting the rich natural resources of the region.

Biodiversity Loss – High Priority / Urban (5.3.3)

Almost immediately following the brine leakage from salt wells into Black Brook Creek, which flows into Mentor Marsh, the maple-ash-elm swamp forest began to die. Whipple's thesis determined the long-term historical impact of the salt contamination on marsh vegetation by comparing aerial photographs taken over the years between 1937 and 1991. The maps reveal how the salt contamination changed a rich swamp forest community to one dominated by common reed, which occupied 75% of the marsh by 1991. With the die-off of the swamp forest and loss of other native plant communities, a niche was created for common reed and cattail to flourish.

In an ongoing monitoring program, the Cleveland Museum of Natural History has found a remnant of the original swamp forest that is regenerating and shading out some of the common reed. Some examples of efforts to preserve biodiversity include Headlands Dunes State Nature Preserve and vernal pool creation adjacent to Mentor Marsh.

Home to the sea rocket, beach pea, seaside spurge beach grass, and purple sand grass, the 24-acre Headlands Dunes State Nature Preserve is legally preserved as a lakeshore beach dune community through its designation as a Coastal Barrier Resource Area. The preserve is proposed for critical habitat designation for the endangered piping plover, a shore-nesting bird native to the Great Lakes. Piping plovers use wide, flat, open, sandy beaches with very little grass or other vegetation. Nesting territories often include small creeks or wetlands. Many of the coastal beaches traditionally used by piping plovers for nesting have been lost to commercial, residential, and recreational developments.

The Cleveland Museum of Natural History with the approval of the U.S. Army Corps of Engineers, ODNR, Division of Natural Areas and Preserves and the Mentor Marsh Board of Management has recently created 2-acres of vernal pool wetlands in forested uplands to provide habitat for salamanders, frogs, turtles and wood ducks. This vernal pool and hummock habitat was originally lost when the area was settled and the land cleared and leveled for agriculture. Vernal pools are smaller, typically isolated wetlands ecosystems that periodically dry out during late summer. The regular drying of these wetlands prevents the permanent establishment of fish. Vernal pools are often home to sensitive species of invertebrates (i.e. fairy shrimp) or amphibians (i.e.mole salamanders) that cannot tolerate fish predation. Biodiversity is further threatened due to increased development pressures in the watershed. Despite the measurable environmental, social, and economic benefits of wetlands, more than 50% of the wetlands in the continental United States and over 90% of Ohio's wetlands have been destroyed as a result of conversion to agriculture, mining, forestry, and urban uses during the past 200 years. Development threatens the entire marsh area, including Mentor Marsh State Nature Preserve, Headlands Dunes State Nature Preserve, Mentor Lagoons Nature Preserve and Marina, and Headlands Dunes State Park.

Areas targeted for development are often sites overlooking, abutting, or in close proximity to these areas. Mentor, Mentor-on-the-Lake, the villages of Fairport Harbor and Grand River, and Painesville Township are located on the shores of Lake Erie in the center of Lake County, Ohio. The region is generally urban with homes, industry, and commercial development immediately adjacent to significant wetlands in the SAMP area.

Development pressures in these areas are intense. Between 1995 and 1999, over 1,700 family units have been built within the nearby communities of Mentor, Painesville, Painesville Township and Mentor-on-the-Lake. In the recent past, new homes were constructed directly abutting the Mentor Marsh without any buffer requirements. Development occurring too close to the wetlands has the potential to directly reduce the

amount and quality of wetlands required by flora and fauna that depend on this habitat. For instance, homeowners deposit grass clippings and other yard wastes into the preserve, and urban runoff from chemicals applied to new lawns may go directly into the preserve.

Additionally, large developments within the City of Painesville in the Blackbrook Watershed will impair the marsh area with increased stormwater runoff from new roads and other impervious surfaces. Increased pollutant loads from new development are likely, if proper controls are not applied.

Hydromodification – High Priority / Hydromodification (7.4.1), (7.4.2), (7.5.3), and (7.6.1)

Hydromodification has yet to be well studied in the watershed, and consequently, the effects of changes to the hydrology over time are not totally understood. Currently students of The Ohio State University are conducting hydrology research in the marsh. This information should help land managers and planners make more informed decisions on future marsh area development. However, continued long-term hydromodification, in conjunction with rapid growth and development, can lead to the isolation of critical habitats and species from larger ecosystem functions. Ultimately, these activities further contribute to continued losses in marsh area biodiversity.

Compounding these impacts, mitigation for these losses has historically been implemented outside the marsh watershed, further impairing the ecological function of the remaining freshwater wetlands. Specifically, alteration of wetland hydrology or sediment budgets, increased surface runoff through ditching, and wetland conversion to developable lots are some of the examples where small alterations in the natural landscape can result in a cumulative impairment of the wetland's ecological functions.

In addition to direct losses in habitat caused by residential and industrial development, hydromodification resulting from development increases stormwater runoff. Stormwater controls increasingly replace natural riparian areas. As the amount of impervious surface increases with development, stormwater runs into adjacent water bodies, degrading adjacent wetlands and other natural habitats by increasing sediment, nutrient and contaminant loads. Hydromodification reduces the beneficial protection that wetlands provide (flood and erosion control and groundwater recharge). These problems are most apparent near areas of dense residential and industrial development. Federal Phase II Stormwater Management regulations must be considered in upcoming SAMP strategy development.

Natural Disturbances – High Priority / Urban (5.3.2)

Other disturbances include natural and man induced actions. The activities of beavers and other animals may naturally alter the marsh area and retard the restoration of the native swamp forest in the marsh area.

In 1973, beavers moved into the marsh, raising water levels and flooding the northeastern part of the preserve. Today, the presence of beavers, although ecologically important, continues to threaten the regrowth of a swamp forest and may require management.

Fire is both a natural and a human-caused disturbance. Natural fires may keep small areas open. On May 9, 1982, approximately 100-150-acres of marsh burned in the eastern part of the preserve. Another fire took approximately 350-acres on May 11, 1992 in what was known as the "Mother's Day Fire," and approximately 60-90-acres of the preserve

burned between August 1 and 13, 1998. Another 350 acres burned between Corduroy Road west to Mentor Lagoons on April 28, 2003.

Public Understanding and Attitudes – High Priority / Urban (5.3.2)

The general public often does not recognize the value and functions of natural resources. The flood protection of wetlands is not appreciated until the wetlands are lost and residential flooding occurs in areas not previously flooded. Even then, residents often do not have a clear understanding of the connection of flooding to wetland losses.

The erosion protection afforded by natural beaches is not understood until the beach is lost to development and homes are threatened by Lake Erie storms. A lack of understanding of the natural systems that support our economy and quality of life can lead to inadvertent actions that reduce or eliminate the functions and values of the marsh area's resources.

Creating public awareness of the value and functions provided by natural resources can help instill a sense of stewardship for the marsh area. Both landowners and key decision makers have a responsibility to protect, conserve and develop the marsh area in a sustainable manner. Individual actions can and do play a large role in the preservation and conservation of our natural ecosystems.

Outreach and education efforts are needed to increase awareness of and an appreciation for the natural resources of the marsh area. Such efforts can instill the environmental ethic that will lead to actions needed to restore biodiversity and reduce harmful impacts on the ecosystem.

Recreation and Public Access

For purposes of the Marsh Area SAMP, "recreation" refers to the breadth of experiences visitors enjoy at recreational facilities and via public access areas along the coast of Lake Erie, specifically within the Marsh Area SAMP region. Recreational opportunities and the assurance of public access to sites throughout the marsh area and along the Lake Erie coast provide for social, personal, economic, and environmental benefits. With rapid development of areas around recreational facilities within the SAMP region, many critical public access points could be in jeopardy.

A coordinated regional strategic recreational plan is needed to assess, connect and expand the current recreational and public access uses in the region. This brief discussion summarizes the current recreational conditions and public accessibility and serves as a basis for focusing planning efforts.

Lack of a Strategic Recreation Plan – High Priority / Urban (5.3.2)

Outdoor recreation is a significant economic activity in the Marsh Area SAMP region. A cooperative, coordinated approach to recreation resource management is needed to maintain the diversity and extent of exceptional active and passive recreational opportunities within the region. Currently, the area does not have a strategic plan to guide efforts to preserve and protect recreational and public access resources.

Although programs are effective within each entity's recreation department, potential exists to expand sustainable, low-impact recreational uses within the project area. A

strategic regional recreation plan would help to focus efforts designed to maximize recreational resources within the marsh area SAMP region. These efforts could include:

- promoting a deeper understanding among public officials of the tools available for recreational land preservation and acquisition;
- updating the inventory of publicly and privately owned recreational properties and the identification of undeveloped land suitable for future recreation use;
- integrating recreational and public access points into local and regional planning initiatives;
- recommendations for accommodating heavy demand for public lakefront access for a variety of activities;
- guidance to communities on targeted planning initiatives for long-term promotion of recreation and public access resources.

The marsh area encompasses a unique natural area of over 32,200-acres in a fast growing metropolitan area. With over 215,000 residents and the smallest county in terms of area, Lake County is ranked 12th in Ohio's 88 counties for population and continues to grow dramatically. This growth results in increased demands for public access, recreational opportunities, and a disappearance of open space. Since 1977, approximately 24% of open space has been lost in the area.

According to the last Statewide Outdoor Recreation Plan in 1993, Lake County ranked 37 of 88 counties on a per capita basis of land and water-related outdoor recreation acreage. Lake County has a much lower ratio of outdoor recreation to resident than the state. Approximately 67-acres of outdoor recreation per 1000 residents exist in Lake County, while there are 131-acres of outdoor recreation per 1000 residents in Ohio. Approximately 30% of the SAMP region is devoted to open space.

Demand for public access to Lake Erie is significant. Only 40 of the state's 262 miles of shoreline are publicly owned, a figure that includes ports, military installations and water treatment plants. ODNR's Coastal Management Program reports sixteen miles are local, county or state parks. Twenty-four publicly owned beaches account for approximately eight miles in shoreline length. The SAMP region includes approximately 2.5 miles of public beach, or 37% of the available Lake Erie public beaches.

When surveyed, Ohioans ranked public nature areas, public fishing areas, public boating and access areas as their greatest outdoor recreation needs. These needs have produced increased number of recreational visits at local, county, and state facilities within the SAMP region. According to the Ohio State Parks 1999 Annual Report, Mentor Headlands State Park, with its coastal beach, provided shoreline enjoyment to 783,324 persons during the summer of 1999. The Mentor Marsh State Nature Preserve saw over 600,000 visitors in 1999 and 3,800 participants in outdoor education activities sponsored by the Mentor Marsh House. Fairport Harbor Lakefront Park, operated by Lake Metro Parks, saw approximately 232,000 visitors in 1999. The total number of 1999 visitors to the SAMP region's parks is estimated to be over 1.5 million persons.

Boating is an extremely popular pastime in Ohio, with over 407,688 registered boats. Of the approximately 9,225 boats registered in Lake County, survey results indicate that over 80% of the users boat on Lake Erie. Ohio Sea Grant conducted a Lake Erie Quality Index Survey, which noted the lack of available dockage and launching facilities along the eastern part of the Lake Erie shoreline from Cleveland to Conneaut as areas of highest

concern. The demand for dockage in the watershed is evidenced by the increase in dockers at the Mentor Lagoons Marina from 305 in 1997 to 424 in 2000.

The Fairport Port Authority operates a public boat launch ramp at the mouth of the Grand River. This ramp is only one of eight major boat ramps from Rocky River to the Pennsylvania border. Ramp usage is in the middle range for shoreline ramp usage averaging 12 trailers per weekday and 42 trailers on weekends. The ODNR Division of Wildlife reports that seasonal peak usage can be some of the highest in the state. It is estimated that anglers spend 220,000 hours fishing within a 16-mile wide area adjacent to the SAMP region.

Recreation, public access, and open space within the Marsh Area SAMP region provide significant economic benefits. A National League of Cities Survey of 483 communities found that city leaders rank tourism as one of the top three sectors of their local economy. "Various types of attractions are seen as having particular value for enriching a city's quality of life, attracting visitors, or enhancing economic vitality. Performing arts centers and nature reserves were seen as the top assets for quality of life, along with entertainment and restaurant districts,"

According to the Trust for Public Land (TPL), "Across the nation, parks, scenic lands, wildlife habitat and recreational open space help support a $502 billion tourism industry. Travel and tourism is the nation's third largest retail sales industry, and tourism is one of the country's largest employers supporting some 7 million jobs," The truth is that tourist activity contributes to the health of local economies is certainly true in the SAMP region.

The Mentor Marsh State Nature Preserve and the Mentor Lagoons Preserve annually attract hikers, birders, and nature lovers who purchase goods and services from the local economy. In 1999, the Lake County Visitors Bureau received 12,000 phone inquiries and over 15,000 web site hits regarding tourist activities.

TPL asserts the following in "The Economic Benefits of Parks and Open Space- How Land Conservation Helps Communities Grow Smart and Protect the Bottom Line":

- Protecting open space helps communities grow smart, avoiding higher service costs;
- Open space is a key resource that attracts new residents and business;
- Recreation on public land is a $40 billion economic activity; and
- Natural Areas and parks attract residents, tourists, and business while boosting the value of nearby properties.

Results of a 2000 survey of Ohio residents, conducted by the Ohio Department of Natural Resources, states that an average of $70 is spent per visitor to state parks. In 2000, over a million persons visited Headlands State Park, Mentor Marsh State Nature Preserve, Lake Metro Parks' Fairport Harbor Beach, and the Mentor Lagoons Nature Preserve and Marina. Based on the spending per state park visitor of $70, visitors to the SAMP region contributed approximately $70 million to the local economy.

Both public and private marinas and public and private boat launch ramps are operated within the SAMP region. In 1998, Ohio Sea Grant reports that the economic impact attributable to the marine trades in Ohio is $233 million and employs 5,121 full time equivalent jobs. On average a boat in Lake County will make 19.4 trips to Lake Erie annually and spend $203 per trip on fuel, food, and services. It is estimated that there are

approximately 1,500 boats that launch or are docked within the SAMP region. Based upon these estimates, boaters within the region purchase approximately $6 million of goods and services annually. This enormous benefit can be protected and strengthened through coordinated planning.

Numerous state and local comprehensive planning documents have identified the need to preserve and protect critical natural areas and to provide increased public access:

Lake Erie Protection & Restoration Plan-Priority Recommendations:

- Minimize the conversion of green space and the loss of critical habitat areas, forest, and open spaces;
- Enhance public access to Lake Erie for all Ohioans;
- Protect critical fish spawning areas in Lake Erie and its watershed.

ODNR Coastal Management Strategic Plan:

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- More nature preserves, parks open spaces and recreational areas in the coastal region;
- More recreational opportunities;
- Easier access to the shore;
- New hands-on-educational opportunities to learn about the unique nature of Lake Erie's coast-for both school children and adults;
- Preservation of remaining wetlands;
- Economic development that enhances Lake Erie's shore;
- More opportunities for citizens to participate in the preservation of Lake Erie's natural resources.

Mentor Lakefront Preserve—Urban Land Institute Recommendations:

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- The highest priority will be the preservation of the spectacular ecosystem of the site;
- Learning, recreating, and celebrating at all levels and for all ages shall be accommodated;
- The development of high quality, efficient, and profitable marina will provide a secure boating environment;
- Access should be available to the lakefront and lagoons for all the people of Mentor.

Lake Erie Lakewide Management Plan (LaMP)

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The Lake Erie Lakewide Management Plan (LaMP) concludes the "Availability of natural undisturbed land is the single most important condition affecting the restoration of Lake Erie." A cooperative coordinated approach to recreation resource management is needed to maintain the diversity and extent of exceptional active and passive recreational opportunities within and surrounding the Marsh Area SAMP region.

Negative Impacts of Public Access – Low Priority / Urban (5.3.3)

The negative impacts of public access include increased potential for litter, pollution, impacts to habitat associated with new trails, boat access structures and/or simply the increased numbers of visitors. Maintenance and monitoring are needed to keep the natural areas in the Marsh Area SAMP region clean and attractive. As efforts are made to create and enhance recreational opportunities within the SAMP region, it will be of utmost importance to protect the area's natural resources and facilities from degradation.

From a natural resource perspective, trails and parking facilities need to be placed and designed in a manner that avoids sensitive areas. From a management perspective, increased recreation can lead to conflicts between users. Hikers, horseback riders, rollerbladers, skateboarders, cross-country skiers and cyclists are all looking for specific trail types and experiences. In addition, uses such as ATVs and mountain biking have largely been excluded from natural areas because of adverse impacts on the environment. These conflicts will need to be addressed through multiple trail systems, signage, user education and other innovative arrangements.

There are also issues of vandalism, littering and over-use that accompany increased recreation use. To a certain extent, these issues are unavoidable. However, certain practices can be instituted to minimize their impact on the attractiveness and health of the SAMP region's natural areas. Timely maintenance and inspection of trails and facilities will help to reduce vandalism and littering. Meanwhile, on-going evaluation of user impacts on the natural resources will guard against over use.

Public Outreach – Low Priority

Unfortunately, communities within the Marsh Area SAMP region have not always benefited from public outreach efforts designed to promote a basic understanding of environmental concepts, including the proper ethical behavior associated with natural environments in recreational areas. Research conducted by the Ohio Statewide Comprehensive Outdoor Recreation Plan suggests that many forms of depreciative behavior (littering, vandalism, polluting, etc.) take place because people don't understand the impacts of their actions on others and the natural environment.

Significant opportunity for the promotion of learning-based recreation via public outreach exists for both visitors and local communities within the region. Environmental education allows the public to better appreciate park and recreational resources while promoting better stewardship of public lands. An environmentally aware public is less likely to misuse public lands and more apt to respect and act more responsibly toward public lands. Environmental education regarding the benefits of preserving and protecting the environmental assets of the Marsh Area SAMP region help to instill a land ethic with strong natural resource based motives. In so doing, enabling individuals and communities to understand and recognize the effects that they have on natural surroundings as well as to encourage the development of personal values that will minimize environmental degradation.

Shoreline Management and Nearshore Issues

Approximately 90% of the sand that makes up Lake Erie's beaches comes from erosion of the lake's bluffs, which are comprised of 15% to 20% sand. The rate of erosion or recession is primarily dependent on the strength of the shore materials and the exposure of the shore to wave action. Other contributing factors include long-term changes in water levels, changes in land use patterns, and alterations to surface and subsurface drainage. Reduction of the sediment supply through the installation of shoreline protection and the trapping of sand updrift of large jetty structures has affected shoreline processes.

Planning initiatives must take into consideration the role of this dynamic shoreline and the influence of its natural processes upon nearshore issues such as coastal erosion and bluff recession rates. Sediment transport, landowner practices, increased surface water runoff, reductions in vegetative cover, and the trapping of sand updrift of large jetty structures impact the shoreline process and nearshore issues. By understanding the major issues affecting the stability of the region's shoreline, the MARC will be better capable of designing policies as part of the Marsh Area SAMP that will most effectively protect and preserve natural resources and coastal economic growth.

Lake County has approximately 30 miles of shoreline fronting Lake Erie. The shoreline is bordered, for the most part, by 30 to 40 foot till bluffs that are capped in places by glaciolacustrine clay, silt and/or sand. A discontinuous ribbon of sand fronts the shoreline. Where beaches are present, they are typically less than 25 feet wide. The principal exceptions are wider beaches located to the west of major jetty structures, such as Fairport Harbor, Mentor Harbor, and First Energy's Eastlake Power Plant.

Shorelines along the Great Lakes are subject to the natural processes of flooding (including high water levels, wind setup and wave runup), erosion and dynamic beaches. These are natural shoreline processes that only become "hazards" when a development is located too close to the shoreline. Hazards can be defined as natural events that present a danger to life or result in significant property damage.

The long-term, large-scale evolution of the Marsh Area SAMP shoreline is dependent upon the controlling substrate. "Controlling substrate" is defined as the dominant underlying material that makes up the main body of the lakebed in the nearshore and the offshore. Along shorelines where the controlling substrate consists of bedrock (e.g., erodible or erosion resistant) or cohesive material (e.g., cobble/boulder till, fine-grained cohesive), there may also exist unconsolidated, cohesionless sediment (e.g., sand, gravel, shingle, cobbles). The cohesionless sediment may even extend onshore, appearing as a beach deposit. However, the volume of these surficial materials is insufficient or too transient to protect the underlying material from the wave action. Dynamic beach shorelines are composed of such deep sand and gravel deposits that any underlying bedrock or cohesive material is never exposed. Therefore, the dynamic beach material itself can be considered the controlling substrate.

Longshore transport is the movement of beach sediment, parallel to the shoreline, by waves and currents. Because of the southwest-northeast trending shoreline, the prevailing westerly winds, and a fetch as great as 100 miles to the west and up to 60 miles from the north, the net sediment transport is from southwest to northeast.

Shoreline bluffs, subject to wave action at the slope toe, commonly experience cycles of erosion and slope instability leading to crest recession. Erosion may start when lake levels rise and cover previous beach areas along the bluff toe. This allows wave action to undercut and locally over-steepen the slope toe. Similar to gully and river erosion, this toe undercutting triggers the loss of vegetation cover near the slope toe, which progressively spreads up the slope face. This sets in motion a whole series of subaerial processes (e.g., gravity, groundwater) in an effort to restore an equilibrium slope through bluff or bank failure. These subaerial forces usually tend to include slumps, slides, falls, or flows.

Along shorelines where the downcutting process is limited—due to the presence of a rock outcrop, a thick deposit of sand on the nearshore profile, or a rapid decline in water levels—erosion of the shore bluff or low plain will be dominated by subaerial processes. In these situations, the bluff will ultimately establish a stable slope position while the low plain will return to a continuous, gently sloping plain. There may be infrequent episodes of bluff undercutting during periods of extremely high water levels.

Insufficient Sand Supply – Medium Priority

There is insufficient sand supply to provide natural beaches, which reduces the available supply of sand needed for protection of the bluffs. In order for beaches to be established to protect the bluffs from erosion, there must be an adequate supply of sand in the littoral drift system. The majority of the sand comes from the erosion of the shoreline bluffs and the scour of the nearshore bottom materials.

Although erosion is a naturally occurring and continuous process, the short-term impacts of excessive wave action and heightened water levels, particularly during storm events, tend to cause the more readily visible, short-term destruction and shore losses. Evidence of these losses is typically visible in the undermining and collapse of shore bluffs or through the rapid changes in beach profiles.

The primary erosional process affecting the cohesive and erodible bedrock profiles along the open shorelines of the Great Lakes is direct wave action on the subaqueous nearshore profile, resulting in the erosion, or downcutting, of the lakebed material. This ongoing downcutting allows waves to reach the slope toe with more power. Nearshore downcutting is described in greater detail earlier on in this report. In addition, wave uprush and abrasive effects of entrained coarse sediments, which accompany the wave action, cause an additional erosional impact on the subaqueous nearshore profile and toe of a bluff or bluff face. It is this combination of wave action and accompanying abrasive forces that essentially act to dislodge the shore material, which is then quite often quickly removed by alongshore and offshore currents. The sand released by these processes is normally transported west-to-east along the shoreline. An adequate supply of sand will build beaches sufficiently to reduce the erosive force of the waves to a minimum.

The 1250-foot long intake jetties located at the Eastlake Power Plant just west of the Chagrin River interrupt the west-to-east longshore transport of sand. Since the mid-1980s, sand dredged from the intake channels has been returned to the nearshore zone east of the Chagrin River. As a result, much of the sand transported along the shore between the Chagrin River and Mentor Lagoons is supplied by three possible mechanisms: 1) when the sand dredged from the Chagrin River is discharged in the nearshore zone east of the river; 2) when flood events flush sand from the Chagrin River; or 3) when waves erode the bluff between the Chagrin River and Mentor Lagoons.

Because of the high erosion rates caused partly from disruption of sand transport by the power plant jetties, many landowners have chosen to try to armor their lakefront property with various forms of shore protection. Protecting the shore from erosion aggravates the problem of sand supply, because erosion of the bluff no longer supplies sand to the littoral system. This, in turn, greatly increases erosion in unarmored areas.

Activities Landward of the Bluff Edge – Medium Priority

A major factor in erosion of the bluffs is activity that occurs on the landward side of the bluff. Coastal Erosion Areas (CEA) occur along 6.9 miles of the reach and affect 331

parcels. Of the approximately 233 lakefront homes in the Marsh Area SAMP region, about 30% sit within 50 feet of the bluff edge, and about 39% are in the 30-year CEA. The development occurring landward of the bluff in the CEA has a negative influence on the long-term health of the SAMP region shoreline.

While the shoreline is a highly desirable site for homes and industry, it is also a highly sensitive environment. A great deal of care needs to be taken in developing this area to prevent aggravating the existing erosion problems. A lack of understanding of shoreline dynamics often leads landowners to develop their property in ways that are detrimental to the land/lake interface. Undeniably, a lake view is desirable, but clearing of the vegetation that obscures the view can drastically increase the erodibility of the bluff.

Building too close to the bluff can also aggravate the mass wasting process by changing stormwater absorption characteristics and adding weight to what is normally an already unstable slope. In addition, development that is too close to the bluff is frequently subject to damage by the erosion. This usually results in attempts by the owners to protect their property. Unfortunately, these protection measures often further aggravate the existing problems.

Some consequences of human activity occurring in the CEA are surface runoff and removal of vegetation. Surface runoff can have a major effect on rill and gully erosion of the bluff face. Excess water from storm drains may also contribute to further damage of the bluff. Removal of vegetation along the bluff face and edge also tends to weaken the bluff by removing reinforcing root structures and the plants that reduce soil moisture through evapotranspiration.

Watershed Restoration and Protection Goals

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In the absence of a watershed coordinator typically associated with watershed action plans, the MARC Chair will be responsible for overssing the progress of the goals and activities outlined below. Progress on the programatic items will be delivered at regularly scheduled MARC meeting and posted on the MARC website. Progress for educational and public forum items will be be delivered at regularly scheduled MARC meetings, posted on the MARC website and press releases as appropriate. The MARC will be responsible for maintaining all records and documentation associated with implementation of the plan.

Water Quality Implementation Plan 1: Salt Contamination / Urban (5.3.2)

Problem Statement

A salt pollution study of Mentor Marsh has been conducted by the Ohio State University with financial support from the Lake Erie Protection Fund (LEPF) and the Ohio Coastal Management Program (OCMP) from September 2004 to 2006. The data show a continued pattern of salt pollution of Mentor marsh. Total chloride results have been consistenly above the tolerance limit for a freshwater swamp forest but well below the tolerance level for the invasive species *Phragmites australis*.

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Activity 1

Assist the Ohio EPA complete a Phase II Environmental Sight Assessment of the salt fill as well as providing technical support when necessary in enforcing the Chapter 6111 of the Ohio Revised Code violations of water quality standards on the property.

Activity 2

Assist the USACE to develop a Preliminary Restoration Plan — fully funded by the USACE Section 206 program — to address salt contamination in the Mentor Marsh. Continue working with the USACE program for Section 206 of the Water Resources Development Act of 1996 if approval from USACE is granted. The USACE Section 206 process is outlined below:

1. The **Preliminary Restoration Plan** (PRP) is 100 percent federally funded. A PRP has been requested and the remaining steps discussed below depend upon the findings of the PRP.

2. Either a **Planning and Design Analysis** is required for proposed projects with a federal cost greater than $1,000,000 or a **Feasibility Study** is required for proposed projects with federal costs below $1,000,000.

3. A **Detailed Project Report** is the approval document for Step 2 above.

4. **Plans and Specifications** must be developed.

5. **Construction** begins after the plans are approved. A **Project Cooperation Agreement** must be signed before construction begins.

6. The non-federal sponsor is responsible for 100 percent of **Operation and Maintenance** costs.

After a presentation by local MARC representatives explaining the salt pollution problem and the USACE authority to conduct a PRP, the City of Mentor requested that the USACE develop a PRP for the salt pollution issue under Section 206 of the Water Resources Development Act (WRDA) of 1996. A contract to conduct a PRP was to be initiated by the USACE in the spring of 2004. MARC members supplied data and information on Mentor Marsh (including the Fineran dissertation) to the USACE. The Section 206 of the WRDA is currently unfunded. No projects are currently being undertaken until funding is restored.

To continue participation in the Section 206 program, if granted by USACE, the following steps will need to be undertaken by the City of Mentor:

Step 1: Seek willing cooperators for restoration actions. Members of the MARC will seek cooperation from local, state, and federal government agencies. Members of the MARC will work with local authorities to seek USACE assistance in developing a PRP for aquatic ecosystem restoration of Mentor Marsh.

Step 2: Seek funding for restoration, remediation, and/or mitigation actions from federal and non-federal sources. Members of the MARC can assist the City of Mentor to identify potential sources of funding for planning and restoration actions. The Preliminary Restoration Plan under Section 206 of WRDA 1996 is 100 percent federally funded. Action beyond the PRP will depend upon the findings of the PRP, but restoration projects over $1,000,000 require a 35 percent nonfederal cost share. Ohio EPA's assistance will be necessary to develop salt remediation actions.

Step 3: Determine extent of salt contamination and future impact. The USACE PRP requested by the City of Mentor will provide information and direction needed to move forward in remediating the salt issue. The Fineran dissertation clearly documents the impacts and consequences of the salt pollution in Mentor Marsh and outlines a course of management action. Please refer to Appendix A for an outline of the Fineran dissertation.

Step 4: Obtain permission to conduct mitigation, remediation, and/or restoration actions on affected upland properties and marshlands within the Mentor Marsh watershed. Members of the MARC will seek opportunities to conduct studies and restoration actions on private property, government-owned land, and state nature preserves land.

Activity 3

Identify all new and/or unmapped wells and brine facilities. Document the type, location, and status (e.g., active, inactive, and/or capped). Ensure and document that all existing and/or abandoned wells and facilities are properly identified, sealed, and mitigated. The ODNR, Division of Mineral Resources Management has information on the oil and gas wells organized by county. These data are available on the World Wide Web at: www.dnr.state.oh.us/mineral/oil/map/index.html.

Local city, township, and county governments should be ultimately responsible for knowing locations of wells during the planning and development review processes at these local levels. This information is critical to prevent development that could be detrimental to public health and safety. Development in these areas should proceed cautiously and structures should not be placed directly on top of any oil or gas well. Policy changes at the local level may be necessary to enforce these recommendations.

Activity 4

Establish a Mentor Marsh monitoring program for chlorides and other pollutants and adjust the activities identified in this implementation plan as required by the monitoring results. Monitoring the results of mitigation, restoration, and remediation actions is vital to measure

the degree of success over the long term. As this is the first SAMP developed by Ohio, this effort will be a model for others throughout Ohio. Without accurate monitoring of the program, long-term funding will not be available. The Mentor Marsh Board has acquired a conductivity meter and will do some monitoring. A monitoring plan will need to be developed. Soil testing should be conducted within the marsh where swamp forest restoration is to be encouraged.

Primary Coordinating Agency

Activity1:

The Lake County Soil and Water Conservation District is the primary coordinating agency responsible for overseeing this activity's implementation.

Activity 2:

The City of Mentor initiated the Section 206 program request to develop a *Preliminary Restoration Plan* and is the primary coordinating agency responsible for overseeing this activity's implementation.

Activity 3:

The MARC is the primary coordinating agency responsible for overseeing this activity's implementation.

Activity 4:

Mentor Marsh Board and Ohio Sea Grant are the primary coordinating agencies responsible for overseeing this activity's implementation.

Participating Agencies, Organizations, and Entities

The Cities of Mentor and Painesville, Lake County Soil and Water Conservation District (SWCD), Lake County Stormwater Management Department, and Mentor Marsh Board of Management all have local interest in preventing the additional salt pollution of Mentor Marsh.

The property owners of the mine tailings landfill and other parties potentially responsible for the salt contamination of the Mentor Marsh have an interest in this issue. The Ohio Department of Natural Resources (ODNR), Office of Coastal Management (OCM), Division of Natural Areas and Preserves (DNAP), and Ohio Environmental Protection Agency (EPA) have interests in the issue.

The USACE, Buffalo District, will provide significant support through the Section 206 program. Significant additional support will come from a variety of federal, state, and local resources. Significant formal and informal networking will be needed to accomplish the activities identified in the implementation plan.

Costs

A PRP to address salt contamination in Mentor Marsh will be conducted by the USACE at the request of a local government, agency, or organization. The cost to develop this Plan will be federally funded and is approximately $12,000. The PRP will provide estimated costs for remediation of the salt pollution in the Mentor Marsh.

Additional funding of the proposed activities is anticipated to come from federal, state, and local agencies as well as private property owners and developers.

Timeline

The anticipated timeline for this implementation plan is one to eight years.

Ohio EPA staff has indicated that the enforcement of the Chapter 6111 violations has been given to the Ohio Attorney General's Office. No timeline has been supplied by the AG's office.

Initial request for the Preliminary Restoration Plan (PRP) for Mentor Marsh was accomplished in August 2003. The request was made by the City of Mentor. When funding levels are established for the Section 206 Program, the city will resume negotiations. The PRP for Mentor Marsh should be completed within six months to a year of the initial request to the USACE. Additional activities resulting from the USACE Section 206 program will be scheduled accordingly following acceptance into the program.

Appropriate emergency mitigation, remediation, and/or restoration actions may be initiated as funding becomes available and need not wait for the completion of the final feasibility study.

Existing Programs

The Mentor Marsh Board of Management advises the Cleveland Museum of Natural History (CMNH) on the management of Mentor Marsh. The Marsh Board has an educational mission to teach about the natural history of the marsh. The CMNH works with the Ohio Department of Natural Resources (ODNR) Division of Natural Areas and Preserves (DNAP) to cooperatively manage and protect Mentor Marsh State Nature Preserve. Much of the day to day management of the Mentor Marsh has been turned over to the Cleveland Museum of Natural History by the ODNR.

As much as possible the action items in this plan should be networked with existing and ongoing ecosystem and water quality protection efforts. Existing programs and authorities must be involved in the review and decision-making process including the MARC and other federal, state, and local authorities that have appropriate legal jurisdiction, responsibility, and authority for protecting, preserving, and monitoring the Mentor Marsh ecosystem.

Public Outreach Component

Throughout the USACE Section 206 program, information will be distributed to the public through public meetings.

Objective

Restore the aquatic ecosystem of Mentor Marsh by eliminating salt contamination from existing sources of contamination including the salt mine tailings mound, brine storage lagoons, wells and pipes, and other known or unknown point or non-point sources. The methodology to conduct a TMDL study on wetlands has not been created by the OEPA. In the absence of a TMDL study the MARC contacted Mick Miccachon, from the Ohio EPA to determine suitable restoration levels of Sodium and Chloride ions in Mentor Marsh. Analytical data collected from twenty wetlands across Ohio were used to calculate an average value for each to be used as a target for restoration. The MARC will consider the salt contamination restored when Sodium levels drop below 57 mg/L and Chloride below 51 mg/L or the successful regeneration of native plant species.

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Wetlands and Biodiversity Implementation Plan 1: Wetlands Mitigation / Urban (5.3.2)

Problem Statement

The Mentor Marsh State Nature Preserve, City-owned Mentor Lagoons Nature Preserve and Marina, Headlands Dunes State Nature Preserve, and Headlands Dunes State Park have been designated for varying degrees of use while abiding by the principles of natural area preservation. In spite of local, state, and national esteem, these biological gems are threatened. Residential, commercial, and industrial development encroaching on the edge of environmentally sensitive sites continually threatens environmental quality and the long-term viability of the ecosystems. This development, its accompanying hydromodification, and the salt contamination from past years have changed natural landscapes, altered drainage patterns, fragmented inland wetland habitat, stressed littoral ecosystems, and reduced biodiversity throughout associated unique biotic communities.

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Activity 1

Track developments and permit requests to impact wetlands and streams in the Mentor Marsh watershed. Lake County SWCD will maintain an ongoing record tracking the number of-acres of wetlands lost, created, restored, and/or protected due to development within the Mentor Marsh watershed in the past ten years. These records will be maintained as new development occurs.

Activity 2

Identify willing cooperators and funding for mitigation opportunities that include protection, restoration, and creation actions. The MARC will seek cooperation from local, state, and federal government agencies. The MARC will work with local authorities to seek USACE assistance in developing mitigation opportunities within the Mentor Marsh watershed. The Mentor Marsh Board will help identify potential mitigation projects. Permission to conduct mitigation, remediation, and restoration actions on affected upland properties and marshlands within the Mentor Marsh watershed will be sought. These actions may be performed on private property, government-owned land, and state nature preserves land. Mitigation opportunities should be explored with regulatory agencies.

Mitigation opportunities should seek to implement the following key recommendations:

- Acquire additional marsh land and buffer areas
- Protect remnant swamp forest
- Establish a permanent monitoring site on Blackbrook, upstream of Mentor Marsh
- Monitor the salt fill dump site
- Study the impact of salt pollution on soils in the Mentor Marsh
- Monitor the ground and surface water hydrology of the Mentor Marsh
- Prevent fires
- Reduce flood stress

Activity 3

Work with developers to keep wetland mitigation projects and money within the Mentor Marsh watershed. By continuous monitoring of permit requests to impact wetlands and streams in the Mentor Marsh watershed, the MARC will be able to identify developers seeking to perform mitigation for their proposed impact(s). Members of the MARC will continue to actively participate in the public comment process initiated by the regulatory authorities—USACE and the Ohio EPA.

The identification of potential mitigation opportunities as discussed in Activity 2 above will provide MARC members with information that can be shared with developers to assist them in coordinating mitigation projects in the Mentor Marsh watershed. The primary hydric soils layer is a source of information that should be used to prioritize potential mitigation sites.

Primary Coordinating Agency

Activity 1:

Lake County Soil and Water Conservation District (SWCD) is the primary coordinating agency responsible for overseeing this activity's implementation.

Activity 2:

Marsh Area Regional Coalition (MARC) is the primary coordinating agency responsible for overseeing these activities' implementation.

Activity 3:

Marsh Area Regional Coalition (MARC) is the primary coordinating agency responsible for overseeing these activities' implementation.

Participating Agencies, Organizations, and Entities

The U.S. Army Corps of Engineers (USACE) and the Ohio Environmental Protection Agency (EPA) have federal and state regulatory authority, respectively, over wetlands. The Cities of Mentor and Painesville, the Cleveland Museum of Natural History (CMNH), and the Mentor Marsh Board all have local interest in keeping wetlands mitigation in the Mentor Marsh Watershed. The Ohio Department of Natural Resources (ODNR) has interests in the issue. Developers who impact wetlands have an interest in the issue.

This Plan should be well coordinated with the activities of USACE, Ohio EPA, Lake County Planning Department, Lake County SWCD, planning departments for municipalities, and other public entities responsible for local level site plan review.

Costs

Costs to mitigate for wetlands can be substantial and may be useful in protecting the water quality of Mentor Marsh if kept in the Mentor Marsh watershed. Costs are not available at this time but might range from $10,000 to $20,000 per acre or more depending on each individual mitigation project. The party responsible for the loss and/or degradation of wetlands pays costs for mitigation.

Timeline

This is an ongoing activity to monitor the wetlands loss and corresponding mitigation actions. As projects are proposed and wetlands are degraded or lost, specific mitigation

projects will be needed. Wetlands mitigation will be an ongoing task for the MARC and other local groups. The Mentor Marsh Board and the ODNR Division of Natural Areas and Preserves (DNAP) have a long-term commitment to the conservation, protection, and preservation of Mentor Marsh.

Existing Programs

The Mentor Marsh Board of Management advises the CMNH on the management of Mentor Marsh. The Marsh Board has an educational mission to teach about the natural history of the marsh. The CMNH works with ODNR DNAP to cooperatively manage and protect Mentor Marsh State Nature Preserve.

As much as possible, the action items in this plan should be networked with existing and ongoing ecosystem and water quality protection efforts.

Public Outreach Component

A brochure will be developed to ensure the local community is aware of these activities and to encourage mitigation within the Mentor Marsh watershed. This brief, user-friendly brochure will identify the current tally of wetlands lost, created, restored, and preserved in the watershed. The brochure will provide a brief description of why mitigation within the Mentor Marsh watershed is more beneficial to the local environment. It will also include maps of potential mitigation projects identified in the watershed and the locations of successful existing mitigation sites that have been used to offset impacts from local developments. These brochures will be made available to the community at public places, through local government offices, and, to reach the development community, though distribution to local homebuilders' associations.

In addition, information will be distributed by posting signs in the watershed informing the public of the current tally of wetlands lost, created, restored, and preserved and by coordinating with local newspapers to print articles on this issue.

Objective

As development occurs throughout the Mentor Marsh watershed, loss of wetlands is inevitable. The objective of this plan is to minimize the cumulative loss of wetlands in the Mentor Marsh watershed.

Wetlands and Biodiversity Implementation Plan 2: Biodiversity Loss / Urban (5.3.2)

Problem Statement

Almost immediately following the brine leakage from salt wells into Black Brook Creek, which flows into Mentor Marsh, the maple-ash-elm swamp forest began to die. With the die-off of the swamp forest and loss of other native plant communities, a niche was created for common reed and cattail to flourish.

Activity 1

Monitor for and address future introduction and spreading of exotic species in Mentor Marsh.

Activity 2

Maintain and continue to update the comprehensive inventory of flora in the Mentor Marsh.

Activity 3

Initiate habitat restoration projects to encourage native plant communities.

Activity 4

Monitor target areas and project areas for success or failure.

Primary activities are focused on habitat restoration projects. The most feasible and realistic habitat restoration measures would involve working with small areas and radiating from these starting points.

Eco-management of target areas with the intent to eradicate invasive plants is an offshoot of habitat restoration. Decisions on eco-management techniques within these proposed areas are dependent on target species and habitat as well as surrounding vegetation. For example, by targeting and discouraging the growth of Phragmites, it is possible that native seed buried in the marsh will be able to germinate. Over time, a regeneration of the native plant population similar to the type of population that was present before the colonization of the invasive Phragmites could become a reality.

It should be noted that specific eco-management activities within this implementation plan might be experimental. Projects are also subject to change as new products and techniques become available. Biological control methods are a possibility of the future as are new and improved herbicides.

Primary Coordinating Agency

Cleveland Museum of Natural History (CMNH) and the Ohio Department of Natural Resources (ODNR) Division of Natural Areas and Preserves (DNAP) are the joint primary coordinating agencies responsible for implementing and monitoring all activities documented in this plan.

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Participating Agencies, Organizations, and Entities

Mentor Marsh Board and volunteers from the local communities and organizations will participate in the activities for this implementation plan.

Costs

Herbicide cost per gallon is approximately $50. Dilution rates are most effective at an herbicide-to-diluent ratio of 3: 10. Additional costs include equipment such as sprayers, surfactants, and labor. As an example of cost, to hire an outside agency to spray a cut acre of land costs $2000. Spraying an uncut acre is $4000.

Timeline

Complete and permanent eradication of invasive plant species is an unrealistic expectation due to a constant influx from a variety of vectors. Control efforts must be continued annually and on a seasonal rotation. The following schedule is targeted at Phragmites, but control of other invasive species can be integrated into this type of seasonal schedule:

Winter—Cut last season's growth to prepare for spring eco-management projects.

Spring—Spray new Phragmites growth with herbicide before other vegetation emerges.

Summer—Continue herbicide applications on invasive plants and monitor project progress.

Fall—Monitor plant populations both quantitatively and qualitatively and assess the impact of eco-management efforts on floral diversity within the Marsh.

Along with a seasonal plan, target areas will be selected on a yearly basis. Beginning with small areas and expanding from them is a feasible means of accomplishing this plan. Locations of current projects are centered on the Shipman Pond and Wake Robin Trail areas. Native Phragmites has been identified near Shipman Pond. Projects centered on encouraging the growth of the native variety are being initiated in this area. Wake Robin Trail is a second target area. Physical limitations to Phragmites growth (habitat that is unable to support Phragmites) allow a starting place to encourage diverse flora to colonize.

Existing Programs

Native swamp white oak and Black gum trees were planted along Wake Robin Trail in the fall of 2003. This habitat restoration project was done with the anticipation of evidence that Phragmites is shade intolerant. By planting these native-wetland-favorable trees, it is hoped that the Phragmites in this general area with not be able to withstand the stress of shade. In an ongoing monitoring program, the Cleveland Museum of Natural History has found a remnant of the original swamp forest that is regenerating and shading out some of the common reed.

An example of efforts to preserve biodiversity includes vernal pool creation adjacent to Mentor Marsh in the wooded area of the State Nature Preserve.

Documenting our area's biological diversity is an ongoing activity for both CMNH and DNAP. Because of the Museum's curatorial staff, research is ongoing and wide in scope. Active areas of research include plants, amphibians, beetles, flies, and a general invertebrate survey.

Dr. Lisa Parks and her students at the University of Akron have explored ostracod species and the age of the Mentor Marsh. The most comprehensive study was published in June 2003 by Stacey Fineran in a Ph.D. dissertation at the Ohio State University.

The following is the museum's management plan for the restoration of Mentor Marsh:
The Swamp Forest, Shrub Swamp and Emergent Marsh Wetlands were severely altered by the major salt kill of 1959. The wetland communities within the Mentor Marsh Basin were further harmed by the placement of tailings from the Morton Salt Mine at the mouth of Blackbrook in 1966. The former marshes dominated by greater bur-reed, shrub swamps dominated by buttonbush, winterberry, high-bush blueberry and northern arrow-wood and the swamp forests dominated by red ash, pumpkin ash, American elm, silver maple, black ash, peach-leaf willow, eastern cottonwood and yellow birch can be restored to the marsh basin. The Museum is now working to restore the native swamp forest, shrub swamp and emergent marsh communities formerly present at Mentor Marsh because the rerouting of Black Brook channel around the salt fill in 1988 has reduced the salt concentrations in the marsh to levels low enough to allow the native vegetation to once again grow within the basin.
The Museum has conducted some trial removals of non-native reed grass along the east side of the Wake Robin boardwalk. The removal of the reed grass triggered a massive growth of native marsh species from the seed bank. Several species of sedges, rushes, bedstraws, native trees, native shrubs and greater bur-reed (*Sparganium eurycarpum*) germinated from the seed bank in 2004 after the reed grass was sprayed in 2003. No greater bur-reed was present within the reed grass dominated marsh prior to spraying. The Museum does not have herbarium records of greater bur-reed adjacent to Wake Robin areas collected 40 years ago. Common arrow-leaf (*Sagittaria latifolia*) and water smartweed (*Polygonum hydropiperoides*), two plants common at Mentor Marsh prior to the salt kill, also returned from the seed bank after the reed grass was sprayed in 2003. The native reed grass returned from the seed bank with the greater bur-reed. Umbrella sedges (*Cyperus strigosus*, *Cyperus odoratus*, *Cyperus erythrorhizos*, *Cyperus engelmanii*) and sedges (*Carex scoparia*, *Carex lurida*, *Carex comosa*) and annual smartweeds (Polygonum pensylvanicum, Polygonum lapathifolium) and stick-tights (Bidens cernua, Bidens tripartite) are the most abundant group that returns from the seed bank wherever non-native reed grass has been removed during recent years. One of the rare plants documented in recent years at Mentor Marsh, winged sedge (Carex alata), returned from the seed bank west of the Wake Robin Board Walk when reed grass was cleared and ponds were constructed for the Corduroy Road Mitigation Project.
Mentor Marsh is the largest peat marsh along the shoreline of Lake Erie in Ohio. Restoration of the native wetland communities present within Mentor Marsh prior to the major kill of 1959 will maintain the invertebrate fauna that is essential to the food-web of Lake Erie. Removal of the reed grass will also allow the mudflat community to return to Mentor Marsh. This community is critically important to provide food to migrating shorebirds. Fully established reed grass communities persist through the natural rise and fall of Lake Erie. The water levels of Mentor Marsh adjacent to Wake Robin Trail rise and fall with Lake Erie levels. If Greater Bur-reed marsh can be restored to the wetlands adjacent to Wake Robin Trail, the bur-reed will die back and return to the seed bank during years with high Lake Erie levels. The annual decline in the level of Lake Erie from June to

August exposes mud flats where Greater Bur-reed has been removed due to a high Lake Erie level.
A small silver maple nursery has been established with seed collected from Mentor Marsh. The trees will be transplanted to Mentor Marsh when they reach three feet in height. Prior to the salt kill of 1959, the majority of the Mentor Marsh Basin was covered with Swamp Forest and Shrub Swamp. Emergent marsh communities were only present within the Shipman Pond region and the western end of the Marsh, the Wake Robin, Becker Pond Mentor Lagoons region. In addition to efforts to restore the native flora, the museum has created seventeen vernal pools for amphibian habitat.

Public Outreach Component

The following potential public outreach components were identified for this implementation plan:

- Enlist the assistance of volunteers for specific planting projects
- Develop tree-planting days and organize activities to attract local citizens
- Help homeowners adjacent to the Mentor Marsh to develop fire blocks

Objective

To develop and implement a special management program within the Mentor Marsh State Nature Preserve that protects and/or restores a diverse botanical community of native species and reduces the existing non-native species throughout the Mentor Marsh. Biodiversity loss will be addressed through habitat restoration projects.

Wetlands and Biodiversity Implementation Plan 3: Hydromodification / Hydromodification (7.4.1), (7.4.2), (7.5.3), and (7.6.1)

Problem Statement

In addition to direct losses in habitat caused by residential and industrial development, hydromodification resulting from development increases stormwater runoff. Stormwater controls increasingly replace natural riparian areas. As the amount of impervious surface increases with development, stormwater runs into adjacent water bodies, degrading adjacent wetlands and other natural habitats by increasing sediment, nutrient and contaminant loads. Hydromodification reduces the beneficial protection that wetlands provide (flood and erosion control and groundwater recharge). These problems are most apparent near areas of dense residential and industrial development.

Activity 1

Install a check valve on the drainage ditch leading from the Grand River to Shipman Pond to prevent pollution from entering the marsh area from the Grand River and to regulate water flow. The MARC will be the lead coordinating agency for this activity. To implement this activity, further investigation is required on the processes necessary to accomplish the task. The MARC will work closely with the ODNR Division of Parks and Recreation. The MARC will assist seeking grant opportunities to fund this activity.

Activity 2

Educate and inform the public, both youths and adults, about the hydrology of Mentor Marsh and its impacts on the living resources of the Mentor Marsh ecosystem. The Mentor Marsh Board,

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CMNH, and ODNR Division of Parks and Recreation and DNAP will develop and implement educational curricula and programs to inform the public of the importance and need to protect, restore, and improve the hydrologic regime of Mentor Marsh. To efficiently address this task, these groups should work together to create curricula and programs that can be used by all groups.

Primary Coordinating Agency

Activity 1:

The MARC will be the primary coordinating agency responsible for overseeing this activity's implementation.

Activity 2:

The Mentor Marsh Board is the primary coordinating agency responsible for overseeing this activity's implementation.

Participating Agencies, Organizations, and Entities

The following Participating Agencies, Organizations, and Entities were identified: Cities of Painesville and Mentor and their respective Engineering Departments, Lake County Soil and Water Conservation District (SWCD), Ohio Department of Natural Resources (ODNR) Division of Parks and Recreation, Lake County Government, Lake County Engineer, Other Local Communities, Ohio Environmental Protection Agency (EPA), Cleveland Museum of Natural History (CMNH), MARC, and Ohio Department of Transportation (ODOT).

Costs

Costs are unknown at this time.

Timeline

The MARC and the Mentor Marsh Board will investigate the costs associated with these activities and the tools necessary to accomplish them over the next 12 months. It is anticipated these activities could be accomplished within 18 to 36 months.

Existing Programs

The Mentor Marsh Board advises the CMNH on the management of Mentor Marsh. The Marsh Board has an educational mission to teach about the natural history of the marsh. The CMNH works with the ODNR DNAP to cooperatively manage and protect Mentor Marsh State Nature Preserve.

As much as possible the action items in this plan should be networked with existing and ongoing ecosystem and water quality protection efforts.

Public Outreach Component

To foster public support for the installation of the check valve on the drainage ditch leading from the Grand River to Shipman Pond, a series of press releases will be prepared for local news media. These press releases will chronicle the process from the initial proposal to the final task of installation of the check valve.

Objective

To encourage the protection of the remaining natural aspects of stream and wetlands hydrology in the Mentor Marsh watershed.

Shoreline Management and Near Shores Issues Implementation Plan 1: Insufficient Sand Supply

Problem Statement

There is insufficient sand supply to provide natural beaches, which reduces the available supply of sand needed for protection of the bluffs. In order for beaches to be established to protect the bluffs from erosion, there must be an adequate supply of sand in the littoral drift system. The majority of the sand comes from the erosion of the shoreline bluffs and the scour of the nearshore bottom materials.

Activity 1

Establish sand bypass and beach nourishment requirements for the Lake Erie shoreline in Lake County. Requirements for sand bypassing, pre-filling, and beach nourishment requirements need to be put into place and strictly enforced. New sand-trapping structures should be discouraged and not permitted unless they are pre-filled with sand or other appropriate materials so that the structures do not rely solely on sand from the littoral system to perform their desired function. Model ordinances and regulations will be developed and provided to shoreline communities to be locally adopted and enforced.

Activity 2

Discourage placing fill material over beach and nearshore sand to prevent the burial of sand resources and permit the sand's natural flow. Encourage enforcement of existing rules and regulations established by USACE, ODNR, and local governments. Through a mail campaign, provide educational materials regarding existing rules and regulations to shoreline property owners and provide fact sheets to local governmental offices.

Primary Coordinating Agency

Activity 1:

The Lake County Planning Commission is the primary coordinating agency responsible for overseeing this activity's implementation.

Activity 2:

The Lake County Planning Commission is the primary coordinating agency responsible for overseeing this activity's implementation.

Participating Agencies, Organizations, and Entities

Additional agencies that will assist with performing these tasks and monitoring this implementation plan include USACE, ODNR, and Lake County Engineer.

Costs

Costs for these activities are not anticipated to exceed the costs associated with the normal review process.

Timeline

Over the next 18 months, model ordinances and regulations will be developed and provided to shoreline communities. Encouragement of local adoption and enforcement will occur throughout the 12 months following the initial provision of model ordinances to these communities.

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Existing Programs

The USACE Buffalo District's Regulatory Program reviews permit applications for activities proposed in waters of the U.S. (i.e., to Lake Erie's ordinary high water elevation), and any work within the coastal area may require approval or authorization from the ODNR Coastal Management Program (CMP). Both of these programs address insufficient sand supply issues along Lake Erie's shoreline.

The Lake County Comprehensive Coastal Plan Committee has incorporated plans for shoreline protection in their recent comprehensive planning documents. The Eastern Lake County Coastal Comprehensive Plan was completed and adopted by the Lake County Planning Commission. It is anticipated other local governments will also adopt this Plan.

Public Outreach Component

Public comments will be sought regarding the development of the bypass and nourishment requirements. As these ordinances and regulations are developed, public meetings will be held. As communities begin adopting these ordinances, press releases will be prepared for the local media.

Objective

Work with the U. S. Army Corps of Engineers (USACE), the Ohio Department of Natural Resources (ODNR), and local governments to develop a sand management plan that addresses the insufficient sand supply to Lake Erie beaches.

Shoreline Management and Near Shore Issues Implementation Plan 2: Activities Landward of the Bluff Edge

Problem Statement

The development occurring landward of the bluff in the CEA has a negative influence on the long-term health of the SAMP region shoreline. While the shoreline is a highly desirable site for homes and industry, it is also a highly sensitive environment. A lack of understanding of shoreline dynamics often leads landowners to develop their property in ways that are detrimental to the land/lake interface.

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Activity 1

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Incorporate the Western Lake County Coastal Comprehensive Plan into other local planning agencies' comprehensive plans. This plan provides: an inventory of existing conditions; a determination by each community of those lands that need to be preserved; and development projects communities desire along the shore and the Chagrin River. Lake County Planning department will educate the communities of the benefits of this plan and assist them with incorporating the plan into their local plans.

Activity 2

Encourage shoreline communities to adopt the setback requirements in conjunction with ODNR OCM. Through public outreach and education, shoreline communities will be encouraged to develop regulations limiting new construction in coastal areas. In some cases, regulations may require relocating structures landward of a coastal erosion area—if possible, during reconstruction of the structure. Lake County Planning department will assist these communities in developing the regulations.

Activity 3

Control materials dumped on the bluffs and shoreline. Dumping of materials on the bluffs and shoreline, legally or illegally, including any filling within Lake Erie, needs to be better controlled. The inspection and enforcement process should be reviewed to ensure that illegal filling is controlled. Education and public outreach should be focused on lakefront property owners and local government officials of the shoreline communities to demonstrate how they can help control these activities using new and existing laws.

Activity 4

Support efforts by the ODNR OCM to increase staffing levels to facilitate proper enforcement of existing regulations. This activity consists of preparing letters to the Governor and State legislators supporting increased funding to the ODNR OCM for increased enforcement activities. Included in this should be a set-aside for educational components. A sample letter will be prepared and forwarded to interested parties by the Lake County Planning Department.

Primary Coordinating Agency

Activity 1:

The Lake County Planning Commission is the primary coordinating agency responsible for overseeing the implementation of these activities.

Activity 2:

The Lake County Planning Commission is the primary coordinating agency responsible for overseeing the implementation of these activities.

Activity 3:

The Lake County Planning Commission is the primary coordinating agency responsible for overseeing the implementation of these activities.

Activity 4:

The Lake County Planning Commission is the primary coordinating agency responsible for overseeing the implementation of these activities.

Participating Agencies, Organizations, and Entities

The following Participating Agencies, Organizations, and Entities, organizations, and entities were identified for each activity:

Activity 1: Local planning agencies.

Activity 2: Cities of Mentor-on-the-Lake, and Mentor; U. S. Army Corp of Engineers (USACE); ODNR; Ohio Environmental Protection Agency (EPA); Lake County Engineer; and the Lake County Utilities Department.

Activity 3: Lake County Planning Commission, Lake County Soil and Water Conservation District (SWCD), Ohio Sea Grant, USACE, and ODNR.

Activity 4: All local governments, SWCD, Ohio Sea Grant, and all participating groups and agencies.

Costs

The total cost to develop the Western Lake County Coastal Comprehensive Plan is $123,134. Fifty percent of the total cost is funded by federal coastal funds and the remaining costs are provided by non-federal funds.

Costs for the other activities are directly related to the time and effort necessary to develop and adopt new regulations.

Cost for item three will be based on the time and materials needed to develop educational materials for distribution to land owners and public officials as well as the efforts necessary to provide policing of the shoreline.

Timeline

It will take up to 12 months to incorporate the Western Lake County Coastal Comprehensive Plan into other local comprehensive plans.

Timing of this element is dependent on the time necessary to develop and adopt regulations in the various communities, provided they are amenable, to regulate activity within the Coastal Erosion Area (CEA). This effort will need to be ongoing because of possible changes in the law and new technology in the future.

Existing Programs

Activity 1: ODNR provides financial aid through the Coastal Management Assistance Grant Program to help local communities and local and regional planning agencies.

Activity 2: ODNR has guidelines and models that can be used to assist local communities.

Activity 3: ODNR, Ohio EPA, and USACE have permitting, leasing, and licensing requirements and are willing to investigate illegal activities along the shoreline when citizens and public officials request it.

Activity 4: At this time, no existing programs are known.

Public Outreach Component

Informational materials will be developed on illegal dumping and shoreline stabilization requirements. Materials will be distributed to the public through a mailing to shoreline property owners, posting at public places, and at local governmental offices. In addition, a press release regarding illegal dumping and shoreline stabilization will be prepared for distribution to local media.

Objective

To reduce the effects of land-based activities on the shoreline.

Land Use and Economic Development Implementation Plan 1: Provide for Coordinated Land Use Planning / Urban (5.3.3), (5.6.1), (5.6.2), (5.8.1), (5.8.2), Hydromodification (7.4.1), (7.4.2), (7.5.3), (7.6.1)

Problem Statement

Continued consumption of the SAMP region's open space and natural resources for the purpose of residential development is the net result of the cumulative consequences of independanct local land use decisions throughout the region. Though the intent of land use planning is to empower local governments to meet the needs of their communities, the result has been fragmentation among the local jurisdictions and little coordination given to regional needs or consequences. Communities do not have a unified vision regarding the desired state for ownership, natural resource management, quality, or levels of use for the marsh and coastal areas.

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Activity 1

Work with all governmental jurisdictions to provide storm water detention and limit impervious surfaces. Work with the engineers of each municipality and the county engineer to obtain and require the use of best management practices for stormwater and development.

Activity 2

Provide model regulations for conservation-style developments. Provide copies of the Countryside Program Conservation Development Regulations and assist each jurisdiction to adapt the regulations for their community.

Activity 3

Encourage adoption of sedimentation and erosion control regulation in the political jurisdictions that do not have them. Some communities in the Mentor Marsh Area SAMP Study area have not adopted these requirements. Every effort needs to be made by the MARC, the County Engineer, Soil and Water Conservation District, and the County Planning Commission to show the advantages of such regulations and encourage their adoption where they have not been adopted.

Activity 4

Provide model regulations for stream, riparian, and wetland setbacks. Provide local governments with copies of model regulations for the preservation of streams, riparian areas, and wetlands and assist them in adapting the regulations to their community. The Chagrin River Watershed Partners model regulations can provide a good local source of such regulations.

Activity 5

Establish a unified vision for the areas adjacent to and in close proximity to the Mentor Marsh. A coordinating association will be organized representing major landowners of the Mentor Marsh and properties adjacent to the Marsh. This association will establish a vision and plan for the use of the Marsh. The focus of this plan is to provide the best access to the Marsh without damaging it further.

Activity 6

Assist local regulatory jurisdictions to develop and enact the necessary regulations to bring the vision for the Mentor Marsh to a reality. The MARC and other agencies need to

help develop new or redesign existing regulations to ensure the protection and proper development both in and around the marsh. Identifying new methods of regulatory control and adapting them to local needs will accomplish this task. The MARC members can provide this valuable service based on their areas of expertise.

Activity 7

Work with municipalities adjacent to the Mentor Marsh to establish a buffer or setback requirement for new construction. Offer incentives to developers and/or establish an outright requirement to set aside land adjacent to the Mentor Marsh to protect it from encroachment and lessen the impacts of development. Existing public entities could be receivers of any conservation easements used to provide buffers or setbacks.

Activity 8

Work with municipalities within the Mentor Marsh Watershed to adopt ODOT's "Handbook for Sediment and Erosion Control". This document contains procedures approved under the Ohio Coastal Non-Point Pollution Control Plan for erosion and sediment control on local road, highway, and bridge projects.

Primary Coordinating Agency

Activity 1:

The Lake County Planning Commission is the primary coordinating agency responsible for overseeing the implementation of these activities.

Activity 2:

The Lake County Planning Commission is the primary coordinating agency responsible for overseeing the implementation of these activities.

Activity 3:

The Lake County Planning Commission is the primary coordinating agency responsible for overseeing the implementation of these activities.

Activity 4:

The Lake County Planning Commission is the primary coordinating agency responsible for overseeing the implementation of these activities.

Activity 5:

The Lake County Planning Commission is the primary coordinating agency responsible for overseeing the implementation of these activities.

Activity 6:

The Lake County Planning Commission is the primary coordinating agency responsible for overseeing the implementation of these activities.

Activity 7:

The Lake County Planning Commission is the primary coordinating agency responsible for overseeing the implementation of these activities.

Activity 8:

The Lake County Planning Commission is the primary coordinating agency responsible for overseeing the implementation of these activities.

Participating Agencies, Organizations, and Entities

Primary Participating Agencies, Organizations, and Entities include the planning, development, and/or zoning departments of the following political jurisdictions: Cities of Mentor, Mentor-on-the-Lake, and Painesville; Villages of Grand River and Fairport Harbor; Painesville and Concord Townships; and Lake County.

Secondary Participating Agencies, Organizations, and Entities that will provide support to the above-listed political jurisdictions include: Ohio Department of Natural Resources (ODNR), Cleveland Museum of Natural History (CMNH), Mentor Marsh Board, and Lake County Utilities Department.

Costs

Cost is established by the time the Participating Agencies, Organizations, and Entities will spend in developing the vision and enacting the regulations necessary to make the vision a reality. Cost will also be associated with the purchase of land or conservation easements if such action is determined to be the most appropriate means of protection for the Mentor Marsh. No specific costs were identified.

Timeline

These activities will be accomplished over the next one to three years.

Existing Programs

Several organizations can help in accomplishing these activities; these include: The Western Reserve Resource Conservation and Development Council's Countryside Program regarding conservation subdivision regulations; The Chagrin River Watershed Partners covering stream, riparian, and wetland setbacks; and the Ohio State University Cooperative Extension Program, the Sea Grant Program, and the Lake County Planning Commission for general research and assistance.

Each political subdivision in the Mentor Mash watershed has adopted comprehensive land-use plans. Every effort should be made to coordinate these activities with the local land-use plans or encourage the local community to amend their plan to incorporate the MARC's vision statement.

Several organizations provide funding for purchase of land necessary to protect the Mentor Marsh area and watershed including: ODNR Office of Coastal Management (OCM) through Coastal Management Assistance Grants; Lake Erie Commission grants; and U. S. EPA Section 319 grants. Several private organizations such as The Foundation, located in Cleveland, also provide funding for land purchases. Additional private funding opportunities should be investigated.

Home Sewage Treatment Systems (HSTS)

No implementation Plan was developed for HSTS plans during the development of the SAMP. However, existing programs in place in the watershed adequately address the issue. The following is a summary of the HSTS plan for the watershed prepared by the LCGHD for all new HSTS :

The Lake County General Health District (LCGHD) manages home sewage treatment systems (HSTS) and Semi Public Sewage Treatment Systems in Lake County. These programs involve activities such as site evaluation, design, plan review, installation inspection, and operation and maintenance of household and semi public systems. As a result of a local survey and the NOACA Seven County Sewage Survey documenting the significant causes of system failure such as slowly permeable soils, seasonal high water tables, hydraulic overload of system design, system age and lack of routine maintenance, LCGHD developed a HSTS Improvement Plan.

The HSTS Improvement Plan included key components as follows:

- Consultation with experts to investigate alternative system designs
- Development of alternative system design criteria (drip distribution & mounds) with Ohio Department of Health approval for use in Lake County
- Disclosure notices required for trench type sewage systems in severe soils indicating potential risk of failure

Table 27. HSTS Summary

Community	**HSTS Summary**
Mentor	Predominantly served with sanitary sewers, except for small areas along Lakeshore Blvd.
Grand River	Predominantly served with sanitary sewers.
Painesville Township	Predominantly served with sanitary sewers.
Mentor on the Lake	Predominantly served with sanitary sewers, one sewage system in watershed.

The LCGHD HSTS plan is currently being updated as a sewage treatment program goal. This will enable LCGHD to establish a Linked Deposit Loan Program through Ohio EPA's Water Pollution Control Loan fund. The linked deposit loan program will be used to financially assist homeowners with the replacement of residential sewage treatment systems that are malfunctioning and for the connection to sanitary sewers. Currently the LCGHD is actively participating in the process of revising Ohio's Sewage Treatment Rules that are being updated in accordance with provisions of House Bill 231 (Ohio's new sewage law) effective as of May 1, 2005. The Revision of the Ohio Sewage Treatment Code will lead to OEPA establishing a General NPDES permit program for discharging HSTS. Another LCGHD program goal is to successfully implement the new ODH HSTS and Small Flow Onsite Sewage Treatment System (SFOSTS) Rules when they become effective.

TABLE 28. Lake County Household Sewage Treatment System Summary in Mentor Marsh Watershed*

COMMUNITY	TOTAL HSTS PER COMMUNITY	TOTAL OFFLOT DISCHARGE	TOTAL SOIL ABSORPTION	TOTAL DRIP DISTRIBUTION	TOTAL MOUNDS
MENTOR ON THE LAKE	1	0	1	0	0
GRAND RIVER	0	0	0	0	0
PAINESVILLE TOWNSHIP	0	0	0	0	0
MENTOR	322	0	322	0	0

Operation, Maintenance & Inspection

Since 1988, The Lake County General Health District requires bi-annual inspections of sewage systems in all newly established subdivisions. Homeowners, through deed restrictions, must contract privately from a list of subdivision "qualified" HSTS inspectors. HSTS inspectors must pass a test at the health district to qualify to inspect these systems. The Homeowners Association is also required to ensure that routine maintenance, such as tank pumping, and minor repairs are completed. A copy of the inspection report is sent to the Homeowner's Association of the subdivision, the homeowner, and the health district. LCGHD tracks and ensures compliance with the requirements. There is also an existing service requirement for drip distribution systems, which are inspected annually through individual contracts with the service providers. Currently LCGHD offers a voluntary Point of Sale (POS) sewage system inspection program. Buyers, sellers, lenders and realtors can request the inspections from the Health District for a fee. If a system is found to be malfunctioning after the inspection is completed by a registered sanitarian they are required to remedy the problem. The homeowner must sign an application form that acknowledges this repair/replacement requirement. Approximately 200-300 POS inspections are done annually.

Education

Training is offered through the Lake County General Health District to installers, designers and soil specialists who work on the process of installing HSTS and Semi Public Sewage Treatment systems. Some training is mandatory to qualify individuals in certain areas, while some training is offered on a voluntary basis. In may areas of the county, sewage system operational surveys have been conducted to determine overall system function as well as water quality impacts and more are planned for the future. In these areas, public meetings are held for citizens and elected public officials in the community to summarize findings and make recommendations on options available for abating nuisance conditions and improving water quality.

Illicit discharge detection and elimination

As part of NPDES Storm Water Phase II Final Rule LCGHD has contracted with various communities and public entities to offer services such as: locating and screening of outfalls, water quality testing, illicit discharge detection & elimination, and storm water education. The first permit term ends, March 2008, and is significant operators of regulated small MS4s will have to fully implement their storm water management programs.

As of December 2004, sixteen (16) illicit discharges have been detected and eight (8) have been eliminated throughout Lake County, with a significant amount located in the Chagrin River watershed. Most illicit discharges have been attributed to malfunctioning septic systems and laundry wastewater discharge into ravines, ditches that eventually make their way to a stream or river.

An illicit discharge self-inspection form has been developed for local service departments to utilize as a means of making a comprehensive inventory of their interior and exterior building premises. With self-inspection, LCGHD can assist their departments in correcting illicit discharges to the storm drainage system. This should be completed by June 2005 and hopefully the form will then be used in other business settings as a tool in locating illicit discharges in business areas. LCGHD has contracted with all delineated communities except Eastlake, Perry Township and Madison Village to conduct illicit discharge services (screening/sampling, detection & elimination) in those communities.

The Health District is in the process of developing a Model Point of Sale Ordinance for Homes with Household Sewage Treatment Systems. This ordinance could be used as a Best Management Practice (BMP) tool, in the municipal storm water system as part of the Phase II storm water management program.

HB 110 Program

LCGHD has had an active Semi Public Sewage Program since the inception of House Bill 110. The Health District has effectively maintained a contract with Ohio EPA to inspect the semi public systems of less than 25,000 gpd at regular frequencies. Program goals for 2005 are to locate any remaining semi public systems currently not in the 110 inspection program and take necessary steps to include them and to initiate an internal inspection of business operations, utilizing dye testing for the onsite systems during the routine inspections of those systems.

Table 29. Lake County Semi-Public Treatment System Summary

COMMUNITY	TOTAL	DISCHARGE	NON -DISCHARGE
GRAND RIVER	0	0	0
PAINESVILLE	0	0	0
MENTOR ON THE LAKE	0	0	0
MENTOR	3	0	3

*Lake County General Health District.

The Ohio Coastal Nonpoint Pollution Control Program management measure for existing HSTS is not applicable to the Mentor Marsh

Watershed because the existing HSTS are in an area where density is less than 1 per 20-acres.

Stormwater Management and NPDES Phase II

In addition to the efforts of the MARC to address stormwater issues, the entire watershed every community within the watershed is participating in the NPDES Phase II program. The Lake County Stormwater Management District (LCSMD) was formed in 2004 to address Phase II issues and fulfills the requirements as outlined below for Mentor-On-The-Lake, Painesville City, Painesville Twp, Concord Twp, and the Village of Grand River. The following is a summary of the NPDES Phase II program in Lake County, prepared by the LCSMD:

The LCSMD and it's Partners agree to provide the following services to the Mentor-On-The-Lake, Village of Grand River, Painesville Township, and Concord Township (herein referred to as "Partners") related to the requirements of their NPDES permit number 3GQ00068*AG:

Minimum Control Measure #1 and #2 – Public Education and Outreach and Public Involvement and Participation

- Develop and distribute newsletter addressing stormwater pollution.
- Make newsletter and other educational publications available on the LCSMD website.
- Develop and implement a mass media program.
- Make educational materials from partner agencies available in public places throughout drainage district.
- Conduct or make available at least three stormwater management workshops annually during permit period for developers, public employees and private groups.
- Prepare community specific stormwater presentations when requested.
- Prepare educational workshop on water quality impacts from illicit discharges for homeowners and small businesses in member LCSMD communities.
- Work with the City to identify target areas for catch basin and stormwater discharge (outfall) labeling program.
- Advertise storm sewer labeling program on LCSMD website and in at least one LCSWCD publication per year.
- Lead storm sewer labeling program.
- Involve local students in stream monitoring program each year.
- Lead annual stream cleanup workdays on major streams.

- Advertise annual stream clean up events on stormwater website and in stormwater newsletter.
- Install stream crossing signs and advertise for public sponsorship.

Minimum Control Measure #3 – Illicit Discharge Detection and Elimination

- Complete a drainage district storm sewer system map.
- Develop a list of all home sewage treatment systems connected to the municipal separated sewage system (MS4) within Partner's boundaries.
- Locate all outfalls on storm sewer system map.
- Develop a regulation to prohibit illicit discharges to the MS4 and authorize access for inspection.
- Visually screen and if required test 20 percent of known outfalls annually. Water quality testing includes sampling for fecal coliform, nutrients, heavy metals, oil and grease and total dissolved solids as needed based on indicators resulting from visual screening.
- Initiate process to remove 25 percent of known illicit discharges during each permitting period utilizing regulatory / enforcement mechanisms based on prioritized problem areas determined by water quality and quantity of flow at outfalls.
- Assist with the elimination of 5 percent of known illicit discharges during each permitting period.
- Consider adopting point of sale inspection ordinance and adopt if appropriate.
- Develop and distribute susceptible businesses stormwater management guide.

Minimum Control Measure #4 – Construction Site Stormwater Runoff Control

- Development of erosion and sediment control regulations.
- Establish procedures to accept and consider public comments concerning construction sites.
- Document public comments and take appropriate action.
- Provide at least two workshops per year to educate developers, builders and installers on how to comply with erosion and sediment control rules.
- Review stormwater management plans for development and redevelopment projects in Lake County and participating Level 2 communities.
- Inspect active construction sites for Lake County and participating Level 2 communities. The frequency of inspections may vary but subdivisions will be visited at least once every two weeks.

Individual lots will be inspected a minimum of once per month during the construction period.

- Pursue injunctions to abate violations.

Minimum Control Measure #5 – Post Construction Stormwater Runoff Control on New Development and Redevelopment

- Develop a riparian and wetland setback regulation.
- Develop model stormwater management rules and regulations.
- Work to have development and redevelopment projects include structural best-management practices (BMPs) in the project plans
- Conduct a post-construction site visit immediately after completion of the project for Lake County and participating Level 2 communities to ensure that stormwater management controls have been properly installed.
- Conduct a six month post-construction site visit to ensure all stormwater management controls are operating effectively.

Minimum Control Measure #6 – Good Housekeeping and Pollution Prevention

- Develop employee training program for the Partners.
- Distribute training program or directly train the Partners for all employees involved in construction and maintenance activities.
- Clean and maintain all regional MS4 facilities (storm sewers, culverts, detention basins, ditches, etc.) on a five year cycle or more frequently when needed within the Partner's jurisdictions.
- Work with the Partners to develop a street sweeping program based on traffic and environmentally sensitive areas.
- Purchase street sweeper.
- Regularly sweep County owned curbed roads at least every other month during good weather.
- Work with the Partners to develop a road salting program that meets NPDES Phase II requirements.

Administration, Regulation and Enforcement

- Provide interagency and intercommunity coordination services.
- Act as liaison for regulatory agencies to ensure fulfillment of all permit requirements.
- Ensure the Partners are informed of regulatory issues.
- Prepare and submit all regulatory compliance reports including information on County and Partner's drainage systems.

Finance

- Prepare and distribute all bills for individual property parcels based on amount of impervious area on each parcel in proportion to the

equivalent residential unit (ERU) set at 3,050 square feet by resolution of the Lake County Board of Commissioners.

- Actively seek grant and low interest loan funding for stormwater projects located within the LCSMD drainage district dealing with public education, public involvement, illicit discharge detection and employee training.
- Prepare cooperative agreements between LCSMD and partner organizations and member communities.
- Conduct all budgeting and accounting for LCSMD.
- Provide the Partners with an annual accounting of LCSMD funds and general work activities in the form of an annual report.

Data Collection and Management

- Maintain base mapping and property records for regional stormwater system.
- Conduct stream sampling and habitat surveys as necessary.

Planning, Design and Construction of Regional Drainage Systems

- Conduct planning program for those regional stormwater systems within the Partner's jurisdiction including hydrologic and hydraulic studies, water quality studies and watershed planning.
- Conduct rain and flow monitoring and evaluation projects on those regional stormwater systems within the Partner's jurisdiction.
- Prepare floodplain map revisions for areas within the Partner's jurisdiction.
- Prepare and fund a capital program for the construction and repair of regional stormwater infrastructure based on priority of needs.

Operations and Maintenance

- Be responsible for all operational and maintenance activities related to the regional stormwater system. System includes streams, culverts, bridges, stream banks and channels, storm sewers, inlets and catch basins, and detention and infiltration facilities.
- The LCSMD and Partner's will meet every tow years to update the regional stormwater system map.

Duties of the Partners

The Partners agrees to provide the following services related to the LCSMD NPDES stormwater permit:

Minimum Control Measure #1 and #2 – Public Education and Outreach and Public Involvement and Participation

- Provide LCSMD with information regarding any additional public education and outreach and public involvement and participation efforts beyond those performed by LCSMD annually.

Minimum Control Measure #3 – Illicit Discharge Detection and Elimination

- Provide LCSMD with storm sewer mapping information.
- Adopt resolution/ordinance to prohibit illicit discharges to the MS4s and authorize access for inspection.
- Initiate process to remove 25 percent of known illicit discharges during each permitting period utilizing regulatory / enforcement mechanisms based on prioritized problem areas determined by water quality and quantity of flow at outfalls.
- Assist with the elimination of 5 percent of known illicit discharges during each permitting period.

Minimum Control Measure #4 – Construction Site Stormwater Runoff Control

- Adopt erosion and sediment control ordinance covering soil disturbing activities greater than one acre.
- Issue verbal and/or written stop work orders for violations of erosion and sediment control rules.
- Complete timely and appropriate legal action to pursue injunctions to abate violations.

Minimum Control Measure #5 – Post Construction Stormwater Runoff Control on New Development and Redevelopment

- Adopt a riparian and wetland setback resolutions / ordinances.
- Assist with the development of stormwater management rules and regulations.
- Adopt stormwater management rules and regulations.
- Ensure new developments include structural best management-practices to reduce the impacts of stormwater.

Minimum Control Measure #6 – Good Housekeeping and Pollution Prevention

- Assist LCSMD by making employees available for the County sponsored employee training program and/or use LCSMD prepared materials to train all the Partner's maintenance and construction employees.
- Develop comprehensive vehicle maintenance program.

- Inspect and maintain vehicles at least twice per year.
- Install oil separators at maintenance facilities.
- Wash equipment in locations that drain to oil separators or other approved treatment system.
- Implement cleaning and maintenance program for local storm sewer systems on a five year cycle, or more frequently where needed. The storm sewer system includes storm sewers, culverts, detention basins, and ditches.
- Regularly sweep locally owned curbed roads at lest once per year during good weather.
- Ensure road salt is stored in covered bins and that runoff is captured and treated.
- Ensure that the road salting program meets NPDES Phase II requirements.

Reporting

- Provide annual documentation in a form deemed acceptable by LCSMD for inclusion in the regulatory report for Partner's work associated with the six minimum controls.

LEVEL 1 (MODIFIED) COMMUNITY – Painesville

The LCSMD and it's partners agree to provide the following services to the City related to the requirements of their NPDES permit number 3GQ00068*AG:

Minimum Control Measure #1 and #2 – Public Education and Outreach and Public Involvement and Participation

- Develop and distribute newsletter addressing stormwater pollution.
- Make newsletter and other educational publications available on the LCSMD website.
- Develop and implement a mass media program.
- Make educational materials from partner agencies available in public places throughout drainage district.
- Conduct or make available at least three stormwater management workshops annually during permit period for developers, public employees and private groups.
- Prepare community specific stormwater presentations when requested.

- Prepare educational workshop on water quality impacts from illicit discharges for homeowners and small businesses in member LCSMD communities.
- Work with the City to identify target areas for catch basin and stormwater discharge (outfall) labeling program.
- Advertise storm sewer labeling program on LCSMD website and in at least one LCSWCD publication per year.
- Involve local students in stream monitoring program each year.
- Lead annual stream cleanup workdays on major streams.
- Advertise annual stream clean up events on stormwater website and in stormwater newsletter.
- Install stream crossing signs and advertise for public sponsorship.

Minimum Control Measure #3 – Illicit Discharge Detection and Elimination

- Complete a drainage district storm sewer system map.
- Develop a list of all home sewage treatment systems connected to the municipal separated sewage system (MS4) within City boundaries.
- Locate all outfalls on storm sewer system map.
- Develop a regulation to prohibit illicit discharges to the MS4 and authorize access for inspection.
- Visually screen and if required test 20 percent of known outfalls annually. Water quality testing includes sampling for fecal coliform, nutrients, heavy metals, oil and grease and total dissolved solids as needed based on indicators resulting from visual screening.
- Initiate process to remove 25 percent of known illicit discharges during each permitting period utilizing regulatory / enforcement mechanisms based on prioritized problem areas determined by water quality and quantity of flow at outfalls.
- Assist with the elimination of 5 percent of known illicit discharges during each permitting period.
- Develop a point of sale inspection ordinance.
- Develop and distribute susceptible businesses stormwater management guide.

Minimum Control Measure #6 – Good Housekeeping and Pollution Prevention

- Develop employee training program for the City.

- Distribute training program and/or directly train City employees involved in stormwater related construction and maintenance activities.

Administration, Regulation and Enforcement

- Provide interagency and intercommunity coordination services.
- Act as liaison for regulatory agencies to ensure fulfillment of all permit requirements and other regulating issues related to surface water quality.
- Ensure the City is informed of regulatory issues.
- Prepare and submit all regulatory compliance reports including information on County and City drainage systems as required by the NPDES permit.

Finance

- Actively seek grant and low interest loan funding for stormwater projects located within the LCSMD drainage district dealing with public education, public involvement, illicit discharge detection and employee training.
- Conduct all budgeting and accounting for LCSMD.
- Provide the City with an annual accounting of LCSMD funds and general work activities in the form of an annual report.

Duties of the City

- The City agrees to provide the following services related to the LCSMD NPDES stormwater permit:

Minimum Control Measure #1 and #2 – Public Education and Outreach and Public Involvement and Participation

- Provide LCSMD with information regarding any additional public education and outreach and public involvement and participation efforts beyond those performed by LCSMD annually.

Minimum Control Measure #3 – Illicit Discharge Detection and Elimination

- Provide LCSMD with storm sewer mapping information
- Adopt resolution/ordinance to prohibit illicit discharges to the MS4s and authorize access for inspection.
- Initiate process to remove 25 percent of known illicit discharges during each permitting period utilizing regulatory / enforcement

mechanisms based on prioritized problem areas determined by water quality and quantity of flow at outfalls.

- Assist with the elimination of 5 percent of known illicit discharges during each permitting period.

Reporting

- Provide annual documentation in a form deemed acceptable by LCSMD for inclusion in the regulatory report for City work associated with the six minimum controls.
- The City agrees to provide such additional services not specifically referred to in this MOU as may be reasonably requested by LCSMD.

The City of Mentor chose to pursue an individual permit (3GQ00034*AG). The City also performs the 6 minimum control measures as required by the Phase II program. The following summary provided by the City of Mentor details their NPDES Phase II program:

Minimum Control Measure #1 and #2 – Public Education and Outreach and Public Involvement and Participation

- Implement the storm water help desk developed in 2003 and maintain it throughout the permit term.
- Develop new flyers that will be sent to residents and businesses.
- Provide information throughout the permit term on watershed topics including:
  Water quality including the impact of suburban activities, illegal discharges, and improper disposal of wastes;
  Disposal of household hazardous wastes;
  Erosion and sediment control for small projects;
  Low polluting lawn fertilizing, care and maintenance;
  Management for back yard streams, swales, and ditches;
  Features on educational activities in community schools;
  Septic operation and maintenance.

Minimum Control Measure #3 – Illicit Discharge Detection and Elimination

- Map storm sewer system with:
  Location of outfalls by 2005;
  Names and location of surface waters to which outfalls discharge by end of 2007;
  Locations of discharging HSTS by end of 2007;
  Type and size of conduits through which HSTS discharge by end of 2007.
- Inventory discharging HSTS connected to municipal storm sewer system. Locate HSTS and develop list by the end of 2007.
- Develop a program to proactively determine if there are dry weather flows in the storm sewer system, the source of these flows,

and possible methods to eliminate their sources. Program to be implemented in 2003 and refined throughout the permit term. Outfalls to be observed at least once during the initial permit period.

- Consider a point of sale ordinance that will require inspections of house connections at time of sale of existing homes. Review ordinance in 2005.
- Develop informational flyers for the boating public regarding marina pump out facilities and correct operating procedures by the end of 2003. Distribute to the marina by the end of 2004.
- Adopt an ordinance prohibiting illicit discharges by the end of 2005.

Construction Site Storm Water Runoff Control MCM #4

- Upgrade erosion and sediment control ordinance. Review model ordinance and upgrade existing erosion and sediment control ordinance if necessary by the end of 2003.
- Provide opportunity for City staff to attend training sessions annually.
- Review site plans of construction sites prior to granting permits. Review of site plans to occur throughout the term of the permit.
- Inspect active sites. Continue inspections throughout the permit term.
- Enforcement Actions: When inspection reveals that work is not proceeding in accordance with approved E&SC plans, the City may issue a stop work order halting construction, or take other enforcement action until problems are corrected. Enforcement actions will take place as necessary throughout the permit term.
- Respond to public complaints regarding construction activities: In addition to regular inspections of active construction sites, the City will advertise through the website a phone number for residents concerned about specific construction activities. Phone number to be established in 2003 and remain active throughout the permit term.

Post Construction Storm Water Management MCM #5

- Provide workshops for Development Community: Workshops for landowners, builders, developers, and community officials on storm water management in 2003 and on going.
- Explore adopting ordinances allowing interested landowners the option of maintaining open space to control storm water runoff. Begin review of BMP in 2004 and determine applicability by the end of 2005.
- Retention and detention pond maintenance: Summarize current policy and communicate to homeowner associations. Develop

methods to ensure proper operation and maintenance in 2004. Implement O&M methods in 2005-2007.

- Riparian and wetland setbacks: Explore adopting ordinances creating setbacks from certain watercourses and wetlands. Begin review of BMP in 2004. Determine applicability of BMP by end of 2005.
- Open Space Preservation: Maintain existing open space. Encourage additional open space as part of development.
- Storm water management ordinance: review storm water management ordinance in 2003 for adoption in 2004. This ordinance includes provisions for both new development and redevelopment activities.

Good Housekeeping and Pollution Prevention MCM #6

- Community Operations: Develop an operation and maintenance program to prevent or reduce storm water pollution from community operations in 2003. Implement program in 2004. Continue program through the permit term.
- City Staff Education: Develop program for City staff education on pollution prevention in 2003. Implement the program in 2004. Continue the program through the permit term. Two supervisors will be sent to a training program per year.
- Catch Basin Cleaning: Develop a program in 2003 to clean 100 catch basins every year including a portion of the storm line draining to the basins. Implement the program in 2004. Continue the program through the permit term.
- Implement a storm drain stenciling program in 2004. Stencil 50 storm drains annually beginning in 2004 and continue throughout the permit term.
- Street Sweeping: Develop a program in 2003 to sweep streets monthly weather permitting or as needed. Continue the program through the permit term.
- Salt Storage and Application: Continue current salt storage and application procedures. Follow International Salt Institute Guidelines. Provide City staff a department policy manual. Store salt under roof and record usage. Review salt application/storage for pollution prevention options throughout the permit term.
- Ditch Maintenance: Clean ditches and cut back slopes to minimize erosion potential. Seed new and cleaned ditches as soon as work is completed. Continue current ditch maintenance program throughout permit term.
- Fleet Maintenance: Drain oil and antifreeze from equipment into drain pans and transfer them an aboveground tank under roof. Recycle used antifreeze and used motor oil and properly dispose of them. Continue existing fleet maintenance operations and review

fleet maintenance operations for pollution prevention options throughout the permit term.

- Hazardous Material Response: Respond to releases to the environment and monitor clean up to minimize impact to watercourses. Continue existing hazardous material response. Review hazardous material response each year throughout permit term.
- Chemical Lawn Care Use: Minimize use of chemicals on public areas to reduce chemical runoff. Review chemical use on public areas. Continue this practice throughout the permit term.
- Disposal of Waste Collected through City Operations: Store paint and other chemicals under roof and dispose of containers properly. The service department has a dumpster for trash. A waste hauling company maintains the container at the City's request. Road kill is properly disposed. Continue current waste disposal activities throughout the permit term. Review waste disposal for pollution prevention.

Erosion and Sediment Control

With the implementation of Phase II of the NPDES Permit of the Clean Water act in March of 2003, all communities in the Mentor Marsh Watershed were require to implement a local erosion and sediment control (ESC) program to address sedimentation issue stemming from all construction activities greater than one acre in size. Since 2003, each Mentor Marsh community has addressed these issues in different ways. The following is a summary of the ESC programs for each community:

The City of Mentor

The City of Mentor adopted an erosion and sediment control ordinance (No. 04-O-05, Chapter 158) on March 25th of 2005 with the assistance and review of the Lake SWCD and the Chagrin River Watershed Partners. The program requires ESC plan review for projects one (1) acre or greater with permitting from all other state and federal agencies as a prerequisite to soil disturbing activities. This program is administered by the Mentor City Engineer with oversight and yearly contractor works shops provided by the Lake SWCD. The Lake SWCD and the City have a signed mutual agreement outlining each party's responsibilities with respect to erosion and sediment control as well as other natural resource issues.

The City of Mentor-on-the-Lake

The City of Mentor-on-the-Lake adopted an erosion and sediment control ordinance (No. 2004-O-20, Chapter 1288) in December of 2004 with the assistance and review of the Lake SWCD and the Chagrin River Watershed Partners. The program requires ESC plan review for projects one (1) acre or greater and all individual homesites. Permitting from all other state and federal agencies is a prerequisite to soil disturbing activities. This program is administered by the Lake SWCD with oversight and yearly contractor works shops provided by the Lake SWCD. The

Lake SWCD and the City have a signed mutual agreement outlining each party's responsibilities with respect to erosion and sediment control as well as other natural resource issues.

The City of Painesville

The City of Painesville has yet to adopt an Erosion and Sediment Control Ordinance that is complaint with the criteria set forth under Phase II of the NPDES permit of the Clean Water Act. The City has in the past had discussions with the Lake SWCD concerning the adoption of the Chagrin River Watershed Model ESC Ordinance but has yet to adopt any current regulations or sign a mutual agreement with the Lake SWCD. The Painesville City Engineer currently handles all erosion and sediment control and natural resource issues for the City.

The Village of Grand River

The Village of Grand River adopted an erosion and sediment control ordinance (No. 2004-136, Chapter 1) on December 29, 2004 with the assistance and review of the Lake SWCD and the Chagrin River Watershed Partners. The program requires ESC plan review for projects one (1) acre or greater and all individual homesites. Permitting from all other state and federal agencies is a prerequisite to soil disturbing activities. This program is administered by the Lake SWCD with oversight and yearly contractor works shops provided by the Lake SWCD. The Lake SWCD and the Village have a signed mutual agreement outlining each party's responsibilities with respect to erosion and sediment control as well as other natural resource issues.

Painesville Township

Painesville Township operates under the Lake County Erosion and Sediment Control Regulations, which were revised October 24th, 2005 by the County Commissioners Office with the assistance and review of the Lake SWCD, The Lake County Prosecutor, and the Chagrin River Watershed Partners. The program requires ESC plan review for projects one (1) acre or greater and all individual homesites. Permitting from all other state and federal agencies is a prerequisite to soil disturbing activities. This program is administered by the Lake SWCD with oversight and yearly contractor works shops provided by the Lake SWCD. The Lake SWCD and the Lake County Commissioners have a signed mutual agreement outlining each party's responsibilities with respect to erosion and sediment control as well as other natural resource issues.

Concord Township

Concord Township operates under the Lake County Erosion and Sediment Control Regulations, which were revised October 24th, 2005 by the County Commissioners Office with the assistance and review of the Lake SWCD, The Lake County Prosecutor, and the Chagrin River Watershed Partners. The program requires ESC plan review for projects one (1) acre or greater and all individual homesites. Permitting from all other state and federal agencies is a prerequisite to soil disturbing activities. This program

is administered by the Lake SWCD with oversight and yearly contractor works shops provided by the Lake SWCD. The Lake SWCD and the Lake County Commissioners have a signed mutual agreement outlining each party's responsibilities with respect to erosion and sediment control as well as other natural resource issues.

Riparian and Wetland Setbacks

With the advent of Phase II of the NPDES Permit of the Clean Water Act in March of 2003 many Mentor Marsh communities have begun to realize the importance of adopting riparian setback language for the purpose of water quality, flood control, and wildlife habitat needs The following is a summary of the riparian setback programs for each community in the Mentor Marsh Watershed:

The City of Mentor-on-the-Lake

The City of Mentor-on-the-Lake adopted a riparian setback ordinance (No. 2004-O-21, Chapter 1286) in December of 2004 with the assistance and review of the Lake SWCD and the Chagrin River Watershed Partners. The program works through current zoning regulations and requires the following minimum setbacks for streams having a defined bed and bank:

- A minimum of 25' setback feet for all streams draining an area less than ½ square mile
- A minimum of 75' setback for all streams draining an area between ½ and 20 miles
- A minimum of 120' setback for all streams draining an area greater than 20 square miles

These setbacks pertain to new and/or proposed structures, parking lots, roads & driveways, walls & fences, and sanitary facilities. The extent is defined by the above parameters and extended to the outer most limits of designated 100-year floodplains and any hydrologically connected riparian wetlands that may occur. These regulations also outline conditional uses within these areas such as crossings, stream bank stabilizations projects, stormwater detention facilities, and landscaping.

The City of Mentor

The City of Mentor does not currently have regulations that speak specifically to riparian setbacks other than the final stabilization language covered in their erosion and sediment control ordinance.

The City of Painesville

The City of Painesville does not currently have regulations that speak specifically to riparian setbacks.

The Village of Grand River

The Village of Grand River does not currently have regulations that speak specifically to riparian setbacks other than the final stabilization language covered in their erosion and sediment control ordinance.

Painesville /Concord Township

The Lake County Commissioners adopted riparian setback regulations for parcels to be subdivided in December of 2004 with the assistance and review of the Lake SWCD. The program works through current Lake County Planning Commission Subdivision Regulations (Section 3.d.1-3) and requires the following minimum setbacks for streams having a defined bed and bank:

- A minimum of 25' setback feet for all streams draining an area less than 2.5 square mile
- A minimum of 40' setback for all streams draining an area between 2.5 and 5 miles
- A minimum of 50' setback for all streams draining an area between 5and 10 miles
- A minimum of 75' setback for all streams draining an area between 10 and 20 miles
- A minimum of 100' setback for all streams draining an area between 20 and 50 miles
- A minimum of 120' setback for all streams draining an area greater than 50 square miles

These setbacks pertain only to proposed subdivisions in the townships and are applied to all new and/or proposed construction activities. The extent is defined by the above parameters and extended to the outer most limits of designated 100-year floodplains. These regulations also prohibit mass clearing within the riparian setback area.

Public Outreach Component

No public outreach components were identified for this implementation plan.

Objective

Synchronize land-use planning efforts to provide a coordinated use of land by all parties within the Mentor Marsh Area SAMP study area to protect the Marsh and enhance its economic value.

Recreation and Public Access Implementation Plan 1: Strategic Recreation Plan / Urban (5.3.2)

Problem Statement

Recreational opportunities and the assurance of public access to sites throughout the marsh area and along the Lake Erie coast provide for social, personal, economic, and environmental benefits. With rapid development of areas around recreational facilities within the SAMP region, many critical public access points could be in jeopardy.

Activity 1

Incorporate the development of a strategic recreation plan into the Western Lake County Comprehensive Coastal Plan through coordination with the Lake County Comprehensive Coastal Plan Committee. The strategic recreation plan component of this Plan should accomplish the following:

- Promote a deeper understanding among public officials of the tools available for recreational land preservation and acquisition
- Integrate recreational and public access points into local and regional planning initiatives
- Update the inventory of publicly and privately owned recreational properties and the identification of undeveloped land suitable for future recreational use
- Provide guidance to communities on targeted planning initiatives for long-term promotion of recreation and public access resources
- Develop recommendations for accommodating heavy demand for public lakefront access for a variety of activities

Primary Coordinating Agency

Activity 1:

The Lake County Comprehensive Coastal Plan Committee, a sub-committee of the Lake County Planning Commission, will be the primary group responsible for the development of the plan.

Participating Agencies, Organizations, and Entities

Participating groups who will help develop the plan include: local residents, local communities, Ohio Department of Natural Resources (ODNR), MARC, Northeast Ohio Area-wide Coordinating Agency (NOACA), Lake County Metroparks, and City of Mentor Parks and Recreation.

Costs

The total cost to develop the Western Lake County Coastal Comprehensive Plan is $123,134. Fifty percent of the total cost is funded by federal coastal funds and the remaining costs are provided by non-federal funds.

Timeline

The Lake County Comprehensive Coastal Plan Committee has incorporated the development of a strategic recreation plan into the Western Lake County Comprehensive Coastal Plan. This process was completed on April, 2006.

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Existing Programs

No existing programs were identified for this implementation plan or activites.

Public Outreach Component

A series of public meetings held throughout the development of the plan will inform the public of the strategic recreation planning process and provide citizens with the opportunity to comment on the plan as it is developed. Once the plan is completed, a small brochure that briefly outlines the plan's goals and includes a map indicating the planned improvements to existing facilities and new proposals for greenways, trails, and parks will be developed to distribute to the public. This brochure will be sent to all individuals who participated in the planning process, will be posted at public places, and made available at local governmental offices.

Objective

To develop a strategic recreation plan for the Mentor Marsh and watershed.

Evaluation and Performance Measures

The MARC was fully aware that any goals detailed in the SAMP would need to be evaluated for success. Performance measures were outlined for each of the implementation plans previously discussed in the SAMP. Evaluating success and the completion of goals will be conducted by representatives of the Primary Coordinating Agencies responsible for each goal. The evaluations shall be done at regularly scheduled meetings of the MARC on an as needed basis and formally on an annual basis during review of the watershed action plan and special areas management plan. A projector should be available for use at each MARC meeting to display appropriate maps of the watershed as needed by attendees of the meetings.

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Water Quality Implementation Plan 1: Salt Contamination / Urban (5.3.2)

The following measures will be used to monitor the success of this implementation plan:

- Completion of the USACE Section 206 Program or successful enforcement of ORC 6111 Water Quality Violations by the OEPA
- Measured reductions of chlorides in the soil and water of Mentor Marsh
- Capping of all salt-producing wells
- Removal of all brines and salt wastes stored upstream of Mentor Marsh
- Restoration and/or renovation of the cap on the mine tailings mound to prevent the introduction of chloride into the Mentor Marsh
- Documentation of the regeneration of native salt-tolerant species to Mentor Marsh
- Additional measures that may be determined

Wetlands and Biodiversity Implementation Plan 1: Wetlands Mitigation / Urban (5.3.2)

The following measures will be used to monitor the success of this implementation plan:

- Record of mitigation measure taken within the Mentor Marsh watershed as compared to the record of wetlands lost in the watershed
- Number of Acres of wetland lost versus the number of acres created, restored, or protected in the Mentor Marsh watershed

Wetlands and Biodiversity Implementation Plan 2: Flora Biodiversity Loss / Urban (5.3.2)

Annual assessment of native flora populations, both quantitative and qualitative, can measure the success or failure of habitat restoration projects. The key question to ask is whether the native species can gain a footing and out-compete the invasive species. If it is found that certain techniques and/or projects are unsuccessful, other plans will be attempted. There is much documentation with regard to the control of *Phragmites*, a hardy plant that can endure a variety of

harsh conditions. There is no use in re-inventing the wheel: persistence is the key to *Phragmites* control.

Wetlands and Biodiversity Implementation Plan 3: Hydromodification / Hydromodification (7.4.1), (7.4.2), (7.5.3), (7.6.1)

Performance measures used to evaluate the success of this implementation plan include the installation of the check valve on the drainage ditch leading from the Grand River to Shipman Pond and the development of an educational program on Mentor Marsh hydrology.

Shoreline Management and Near Shore Issues Implementation Plan 1: Insufficient Sand Supply

- The following measures will be used to monitor the success of this implementation plan:
- Adoption and enforcement of sand bypass and beach nourishment requirements by local communities
- Development of fact sheets to educate shoreline property owners

Shoreline Management and Near Shore Issues Implementation Plan 2: Activities Landward of the Bluff Edge

The following measures will be used to monitor the success of this implementation plan:

- Adoption of the Western Lake County Coastal Comprehensive Plan
- Adoption of regulations for the coastal setback zone
- Development of educational materials and dissemination to local residents and political officials
- Increased inspection and prosecution of violators

Land Use and Economic Development Implementation Plan 1: Provide for Coordinated Land Use Planning / Urban (5.3.3), (5.6.1), (5.6.2), (5.8.1), (5.8.2), Hydromodification (7.4.1), (7.4.2), (7.5.3), (7.6.1)

The following measures will be used to monitor the success of this implementation plan:

- Jurisdictions adopting setback requirements for new development adjacent to the Mentor Marsh
- Jurisdictions adopting best management practices and stormwater NPDES Phase II requirments
- Jurisdictions adopting conservation subdivision regulations
- Jurisdictions adopting stream, riparian, and wetland setback requirements
- Continuation of the MARC and coordination of its activities to further its vision and update and monitor the Mentor Marsh Area SAMP

- Inclusion of the MARC's vision statement in local and county comprehensive plans and zoning and subdivision codes and policies
- Adoption of the "Handbook for Sediment and Erosion Control" for local road, highway, and bridge projects by jurisdictions.

Recreation and Public Access Implementation Plan 1: Strategic Recreation Plan / Urban (5.3.2)

The success of this implementation plan will be measured by the development of the Western Lake County Comprehensive Coastal Plan.

The Western Lake County Comprehensive Coastal Plan was developed in August, 2004.

Plan Update and Revision

A plan to update and revise the watershed plan mimics a previously developed plan by the MARC for the SAMP. The goals, tasks, and strategies of the watershed plan are identical to those of the SAMP, and following the guidelines for this task already outlined by watershed stakeholders is the most appropriate course of action.

> "The MARC has proposed to review and assess the progress of the Mentor Marsh Area SAMP on an internal basis every 12 months. The MARC anticipates developing an annual report to document this internal review. An external review and update of the SAMP will occur in three to five years. It is anticipated a consultant will coordinate and assist with this review and update of the SAMP." (Davey Resources, 2004)

During the January 23rd regular meeting of the MARC, it was decided to review the SAMP and WAP for accomplishments and measurable goals. This process will be undertaken by a special committee to be convened at the next regularly scheduled MARC meeting on February 27, 2008.

References