







Erie County Natural Hazards Mitigation Plan

Prepared for **Erie County, Ohio**

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EXECUTIVE SUMMARY

The Erie County Emergency Management Agency/Office of Homeland Security spearheaded this effort to complete a comprehensive countywide Mitigation Plan. Their dedication to this mitigation planning effort is seen in the results of having participation from the County as well as the incorporated jurisdictions.

Erie County is subject to natural hazards that threaten life and health and have caused extensive property damage. To better understand these natural hazards and their impacts on people and property and to identify ways to reduce those impacts, the County's Emergency Management Agency (EMA) undertook this countywide Mitigation Plan.

Most mitigation activities need funding. Under the Disaster Mitigation Act of 2000 (DMA2K, 42 USC 5165), a mitigation plan is a requirement for Federal mitigation funds. Therefore, a mitigation plan will both guide the best use of mitigation funding and meet the prerequisite for obtaining such funds from the Department of Homeland Security's Federal Emergency Management Agency (FEMA). This Mitigation Plan meets the criteria as set forth by FEMA in the DMA2K and provides a community with a "comprehensive guide" for future mitigation efforts as they relate to the hazards that affect their community.

This Mitigation Plan was developed under the guidance of a Core Group of individuals from communities and agencies throughout Erie County. The Core Group met four separate times during the planning process to discuss the hazards that affect the county, the problems associated with these hazards, potential mitigation alternatives to minimize the effect of these hazards and goals that they would like to see achieved within the county.

Erie County has experienced many natural disasters in the past one hundred years. The Core Group evaluated these hazards and chose to address the following hazards based on their impact on human health and property damage: severe storms (lightning, hail and high winds), floods, winter storms (snow and ice), lake/stream bank erosion, droughts and earthquakes.

With the hazards identified, a vulnerability assessment was completed for Erie County. This assessment reviews how vulnerable the county is to property damage, threats to public health and safety, and adverse impact on the local economy. It also evaluates the location and likely damage to critical facilities and other structures from different scenarios of strikes by the five hazards. As part of this assessment, a multi-hazard map was produced to illustrate some of the hazard areas and locations of structures and critical facilities with respect to these hazard areas.

The culmination of Erie County's Mitigation Plan was an Action Plan for the communities to use to track progress on the implementation of their mitigation alternatives.

LIST OF ACRONYMS

BFE Base Flood Elevation

BMPs Best Management Practices
BSC Black Swamp Conservancy

CBR Coastal Barrier Resources System

CEA Coastal Erosion Area

CREP Conservation Resource Enhancement Program

CRP Conservation Resource Program
CSP Conservation Security Program
DMA2K Disaster Mitigation Act of 2000
EAS Emergency Alert System

EMA Emergency Management Agency
EOC Emergency Operations Center
EOP Emergency Operations Plan
EPA Environmental Protection Agency

EQIP Environmental Quality Incentives Program
FCC Federal Communications Commission
FEMA Federal Emergency Management Agency

FIRM Flood Insurance Rate Map

FLC Firelands Land Conservancy Watershed

FMA Flood Mitigation Assistance

GIMS Geographical Information Management Systems

gpm gallons per minute

GPS Global Positioning System
HMGP Hazard Mitigation Grant Program
HUD Housing and Urban Development

LEADS Law Enforcement Automated Data System

mi² square miles

Mitigation Plan All Natural Hazards Mitigation Plan

mph miles per hour

NASA National Aeronautic and Space Administration

NAWAS National Warning Systems
NCDC National Climatic Data Center

NEC National Electric Code

NFIP National Floodplain Insurance Program

NOAA National Oceanic and Atmospheric Administration

NRCS National Resource Conservation Service

NWR National Oceanic and Atmospheric Administration Weather Radio

NWS National Weather Service OBC Ohio Building Code

OBOA Ohio Building Officials Administration
ODNR Ohio Department of Natural Resources
ODOT Ohio Department of Transportation
OEMA Ohio Emergency Management Agency

OSP Ohio State Highway Patrol PDM Pre-Disaster Mitigation

PUCO Public Utilities Commission of Ohio

RMC Regional Medical Center

SRWC Sandusky River Watershed Coalition SWCD Soil and Water Conservation District SWMD Solid Waste Management District

U.S. United States

USDA United States Department of Agriculture USDA-NRCS United States Department of Agriculture

Natural Resources Conservation Service

USGS United States Geographical Survey

WMSC Water Management and Sediment Control

WWTP Wastewater Treatment Plant

Introduction

1.0 INTRODUCTION

A mitigation plan addresses natural disasters that could affect a local community, whether it is flooding, tornadoes, high winds, winter storms, landslides or some other natural disaster. A mitigation plan is an administrative document that is issued to establish activities that should reduce or, when possible, eliminate long-term risk to human-life and property. The plan will also provide a community with a "comprehensive guide" for future mitigation efforts as they relate to the hazards that affect their county. By developing a mitigation plan, a community can identify their areas of risk, assess the magnitude of the risk and develop strategies and priorities to identify projects for reducing risk.

The Erie County Commissioners supported developing their All Natural Hazards Mitigation Plan (Mitigation Plan) with funds received from Ohio Emergency Management Agency (OEMA) and the Federal Emergency Management Agency (FEMA). Although this planning effort was specifically designed to address the creation of a Pre-Disaster Mitigation (PDM) compliant plan, there has been an on-going effort in publicizing the County's activities in relation to mitigation and how the public can continue to get involved and support the County's mitigation efforts.

The State of Ohio completed an analysis in 1998 that determined the hazards that affect the state as a whole. Erie County used this analysis for guidance when choosing their hazards. They include but are not limited to:

Flooding

- Erosion (Stream Bank and Landslides)
- Tornadoes
- Earthquakes
- Severe Storms
- Droughts

As part of the Disaster Mitigation Act (DMA2K,42 USC5165), communities that desire to remain eligible for Federal and State mitigation funds must have an approved mitigation plan in place.

According to the DMA2K, incorporated jurisdictions within a county must participate as well as representatives from the unincorporated areas. Townships are not required to participate because the County Commissioners can represent them on mitigation projects. However, if a township would like to take an active part by submitting a hazard mitigation project, then their participation in the planning effort is crucial. Local participation is "key" to the successful implementation of these mitigation plans.

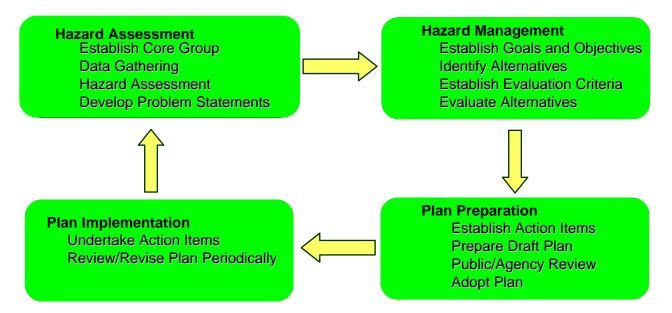
If a community chooses not to participate in the mitigation planning effort, the community becomes ineligible for any future federal or state mitigation money. This mitigation money usually comes in the form of a grant such as the Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance (FMA) or the PDM Grant Program, which is to be used to implement mitigation strategies and activities. Examples of eligible activities that could be supported by mitigation dollars include: relocation, acquisitions, elevation, dry-floodproofing, wetfloodproofing, lightning prediction systems, interoperable siren systems, stream restorations or any other activity potentially funded with mitigation dollars.

The mitigation planning process that Erie County followed was adapted from the State of Ohio's Guidance Book, 2001, and the DMA2K Federal Guidelines. The planning process also involved evaluating several approved FEMA mitigation planning efforts from around the country that the

Core Group approved for their content and set-up, which met the needs of Erie County as well as satisfied the requirement of the reviewers, OEMA and FEMA.

The following flow diagram shows the typical Natural Hazard Mitigation Planning Process that was followed:

NATURAL HAZARD MITIGATION PLANNING PROCESS



In addition to the aforementioned process, the Core Group and the designated leaders of the group made sure that every community that participated in this planning effort was aware of their responsibilities as well as how they could represent their community the best. Some suggestions that were incorporated into the initial invitation to participate in the natural hazard mitigation planning effort included:

- Participate in the Core Group planning meetings representing your community's interests
- Supply any historic information (background) on natural disasters for your community to the Core Group
- Review and comment on the Draft Mitigation Plan
- Review and select mitigation activities developed by the Core Group for your community to implement
- Be an advocate for Final Adoption of the Mitigation Plan by your community

1.1 Planning Approach

In an effort to continue to meet the mission of protecting lives, property, economic viability and quality of life for the people of Erie County, the County Commissioners desired to create the Erie County Mitigation Plan for their community and its residents. Erie County authorized the engineering firm EMH&T, Inc. to help them fulfill this task.

The approach undertaken in the creation of the Mitigation Plan for the county can be described as both comprehensive and collaborative. The comprehensive approach includes following the

interim final rule guidelines enacted under the DMA2K and FEMA suggested guidelines for the creation of a mitigation plan. Any additional items that Erie County and the Core Group chose to address as part of the comprehensive analysis of their community were addressed as well.

The collaborative portion of creating the plan included working with the different agencies within Erie County and coordinating with all participating jurisdictions. The County could not have a comprehensive plan without the coordination of several other agencies. Information was collected from agencies such as the Erie County Emergency Management Agency (EMA), the Regional Planning Commission, Erie Soil and Water Conservation District, the Farm Service Agency, the American Red Cross and any other agencies that were involved in planning efforts for the County.

1.2 Participating Communities

Erie County has nine incorporated areas within its borders. Seven out of the nine have chosen to participate. Bellevue is participating in the Sandusky County Natural Hazard Mitigation Plan. Vermillion is participating in Lorain County's Mitigation Plan. Several letters were sent to incorporated jurisdictions to get involvement from all communities in the mitigation planning effort. Appendix A contains the list of attendees from each community as well as letters sent to communities and the initial concept of how the groups would interact.

The process to create the Mitigation Plan started with the creation of a "Mitigation Core Group" of decision makers and implementers. In order to lead the planning efforts effectively and on a countywide basis, other representatives were added. The Core Group included individuals from the following departments and agencies:

- Erie County Commissioner(s)
- Erie County Emergency Management Agency (EMA)
- Perkins Police Department
- Oxford Township
- Firelands Community Hospital
- Sandusky Fire Department
- Sandusky Police Chief
- Perkins Township Fire Department
- Erie County Health Department
- Milan Township
- Berlin Township
- Florence Township
- Vermilion Township
- Groton Township Fire Department
- Sandusky Planning Department
- Perkins Highway Department
- Bay View
- Firelands Regional Medical Center (RMC)

Community Information

2.0 COMMUNITY INFORMATION

As required by DMA2K, a community profile must be developed for the county and any jurisdictions participating in this effort. Because of the multiple jurisdictions involved in this plan, this section presents a demographical as well as historical description, if available, of each jurisdiction that will be adopting this plan. This brief profile of each jurisdiction gives some insight as to what types of communities exist in the county and provides a better understanding of the effect natural hazards, to be discussed in later sections, may have on this population. In numerous cases, the communities themselves provided the information that follows.

2.1 County Profile

Erie County is located in north central Ohio, along the shore of Lake Erie. According to the U.S. Census Bureau, the County has a total area of 626 mi², with 255 mi² of land and 371 mi² of water. Erie County is bordered on the east by Lorain County, on the south by Huron County, on the west by Sandusky and Ottawa Counties and on the north by Lake Erie. The northern boundary of Erie County consists of 35 miles of shoreline along Lake Erie and Sandusky Bay. Erie County extends 28 miles in an east-west direction and 11 miles in a north-south direction.



The City of Sandusky, which is the County Seat, forms the largest incorporated area, with 27,844 residents according to the 2000 Census. Sandusky is 55 miles east of Toledo, 60 miles west of Cleveland and 106 miles north of Columbus. Other cities in the County, in the order of descending population, include Huron, Vermilion and Bellevue. Villages in the County, in the order of descending population, include Milan, Castalia, Bay View, Berlin Heights and Kelleys Island.

Erie County is highly suitable for agriculture because of its relatively mild temperatures. The County has annual mean temperature of 49°F, an average low of 20°F in February and an average high of 86°F in July. The average annual rainfall of Erie County is 34 inches. Over 50% of the County's land is used for farming various fruits and vegetables, as well as raising cattle and hogs.

Erie County is accessible by land, water or air. U.S. Highway 6 runs east-west along the coast of the County. The Ohio Turnpike (Interstates 80 and 90) also runs east-west through the County and provides access to the cities of Cleveland and Toledo. Six additional Federal and State Highways provide transportation access in the County. Two major railroads pass through Erie County. Shipping access to Lake Erie is available in Huron, Sandusky or Vermilion. There are two airports utilized by Erie County residents. The one, located within the county of Erie, is called Griffing Sandusky Airport. The other main airport, Erie-Ottawa Regional Airport is located close to the city of Port Clinton and is within Ottawa County.

The economy of Erie County is based primarily in the industrial sector. Manufacturing automotive parts, bearings, machine tools, plastics and vinyl products, colorants, paints and food processing equipment are the primary types of industrial business located in the County. Erie County also has a diversified service sector comprised of government, medicine, religion

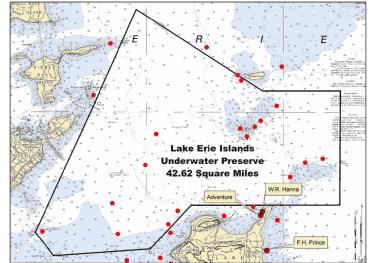
and education. It is home to the Plum Brook Station of the National Aeronautic and Space Administration (NASA). The Plum Brook Station is one of their most vital and active test facilities, operating four test facilities including the Space Power Facility, Spacecraft Propulsion Research Facility, Hypersonic Tunnel Facility and the Cryogenic Propellant Tank Facility. Medicine is centered at Firelands Regional Medical Center. In addition to transportation and manufacturing, Erie County is a major retailing and agricultural center. It ranks third among Ohio's 88 counties at attracting shoppers.

(www.eriecountyohiocofc.com/StudentInfo.htm)

Erie County has six public school districts, a vocational school serving the tri-county area, several parochial and private schools, a school for the developmentally and physically disabled and the Firelands College of Bowling Green State University. Culture is almost as highly valued as education by the County residents. Several unique museums, various art galleries and shows and numerous libraries are located in Erie County. They include Sandusky's historic State Theater, the Huron Playhouse and Harlequins Theater Productions and the Sandusky Cultural Center.

Erie County is also becoming increasingly involved in preservation of historical aspects relating to the County and section of Lake Erie nearest the County. For example, the Ohio Department of Natural Resources (ODNR) is in the process of developing plans for the Lake Erie Islands Underwater Preserve, which will include numerous shipwrecks between Kelleys Island and the Bass Islands. This 42-mile preserve will run from the east side of the Kelleys Island Shoal westerly to near the east side of the Bass Islands and north to near Lake Erie's Ohio-Canadian border. In addition to numerous shipwrecks, the preserve will also include significant underwater

geological features such as glacial grooves. ODNR's goal of creating this preserve is to foster public awareness of the lake's sunken historic treasures and Ohio's rich maritime history. The preserve will be laid out with existing navigational buovs marking all boundaries. The beginning of this preserve has already led to the first archaeological surveys documentation of Ohio shipwrecks, according to a preservation officer with the Ohio Historical Society. In addition to educational and historical significance, the underwater preserve is also an important economical



resource for the surrounding communities, attracting divers from many areas outside of

Lake Erie Underwater Preserve Map

Erie County. Please refer to the map for boundaries of and shipwreck locations in the preserve.

(www.ohiodnr.com/news/apr03/0411underwater.htm)

There are many popular tourist destinations located throughout Erie County. One of these is Cedar Point Amusement Park. Consistently voted the number one amusement park in the

United States, Cedar Point offers more roller coasters (16) and total rides than any other park in the world and draws millions of visitors annually. The close proximity to the Lake Erie Islands also adds to the character of the County and attracts many visitors. Kelleys Island is the largest American Island in Lake Erie and is the only one in the U.S. to be designated as a National Historic District. Other Erie County attractions include Ohio's first "wave action" pool, a speedway for super-modified "Winston Cup" automobile racing, several unique museums, boating, fishing, water skiing, parasailing, two nature preserves, several parks, lake cruises, golf courses and tennis centers.

2.2 County History

Erie County received its name, which means "cat," from the Indian tribe that inhabited the area at the time, as well as in honor of the Great Lake it borders. The County was populated mainly by the Erie tribe until their defeat by the Iroquois Confederacy. Other Native Americans that inhabited the area were the Wyandotte, Ottawa, Chippewa, Delaware, and Seneca tribes. The first white men to settle in the area were French traders. France later surrendered any claim to the land when a treaty was signed with Great Britain in 1763. Great Britain lost control of the land 20 years later after the Revolutionary War. Erie County was founded in 1792 in part of the region known as the "Fire Sufferer Lands", which was later shortened to "The Firelands". "The Firelands" were 500,000 acres within a land area known as the "Western Reserve". This land was the western part of what was then the State of Connecticut, and was given to the Connecticut citizens that were burned out by the British Army during the Revolutionary War. In 1809, the Firelands became Huron County, and in 1838 the Ohio Legislature split the land to create both Huron and Erie Counties; thus, incorporating the current Erie County boundary in 1838. This splitting of counties occurred as a result of Sandusky becoming a natural center of commerce, as well as a statewide trend of reducing the size of larger counties.

A significant moment in both the history of Erie County and the United States was Oliver Hazard Perry's victory over the British fleet in the War of 1812 in the waters of Lake Erie. This event marked the only time in history that a British fleet ever surrendered, and it preserved control of the "Northwest Territory". If Perry had surrendered, that area may now be part of Canada.

The creation of the Mad River & Lake Erie Railroad in 1835 and the Milan Canal in 1839 shaped Erie County as a transportation center. The Erie Canal linked Lake Erie to the Hudson River, providing access to east coast markets for northern Ohio products. Thus, shipping became an important part of the County's history and development in the early years. Along with Erie County being a seaport and transportation center, it is also known as a major manufacturing area with a diverse and successful economy.

Several famous people can be traced to Erie County. The most famous person is Thomas Alva Edison, who was born and spent his youth in Milan on the southern border of the County. His childhood home is preserved as a museum in his honor. Knute Rockney, legendary coach of Notre Dame's Fighting Irish, worked at Cedar Point while he was a student at Notre Dame. He and teammate Gus Dorias used the beach at Cedar Point to perfect the forward pass. A plaque commemorating their accomplishment is located there. Rockne also married a local woman at a Sandusky church. Jay Cooke, another Erie County native from Sandusky, is the creator of "municipal bonds", and was a major financier of the Union in the Civil War.

(www.sandusky.net/heritage/index.htm)

2.3 Jurisdictions

2.3.1 Incorporated Jurisdictions

Bay View

The Village of Bay View is located in the northern part of Maragretta Township and comprises 0.3 mi² of land area. As of the Census of 2000, there are 692 people, 292 households and 195 families residing in the Village. The population density is 2,373 people/mi². There are 351 housing units at an average density of 1,203 units/mi². The Village of Bay View is 8 miles west of Sandusky. Employment is provided through several major industries in Bay View and include manufacturing (29.6%), educational, health, and social services (16.2%) and the arts, entertainment, recreation, accommodation, and food services (11.0%).

The Village of Bay View was incorporated at a relatively late date when comparing the dates of incorporation for other jurisdictions located in Erie County. In the early 1930's, the Midland Bank began selling plats of land for residential development. The first family to become year round residents in the new Bay View area was the Albert Meyers family who were the owners and operators of The Russell Trucking Company at Bay Bridge. The new residents of the area formed the Bay View Property Owners' Association. They were chartered, adopted a constitution, and unofficially governed the area for nearly 20 years. In 1951, citizens of Bay View petitioned the township trustees to allow Bay View their own government. On July 11, 1951, the resolution declaring the incorporation of Bay View as a village was signed. The Village of Bay View presently has no industry.

(1989, *The History of Bay View* by Rosan Allan)

Bellevue

The City of Bellevue is located in Huron, Sandusky, and Erie Counties. It is located in the southwest corner of Erie County in Groton Township and comprises a total land area of 5.2 mi². According to the Census of 2000, there are 8,193 people, 3,332 households and 2,242 families residing in the City. The population density is 1,620 people/mi². There are 3,559 housing units at an average density of 704 units/mi². Bellevue is located 15 miles southwest of Sandusky. Industries providing employment for residents of the City include manufacturing (35.3%) and educational, health and social services (19.5%).

Bellevue was founded in 1815 by a small group of settlers from Genesee County, New York, led by Mark Hopkins. They settled on what is now Main Street and the new community was called Amsden Corners. The first store was opened in 1823 by the same Thomas Amsden for whom the town was originally named, and although other stores followed, the rough log structure remained the general store and gathering place for many years. In 1827, a school was opened in a remodeled log building that had formerly been a blacksmith's shop. Among the early business establishments were blacksmiths, wagon shops and cabinet shops, a flour mill and distillery, followed by a tannery. A post office, known as York Cross Roads Post Office, was established in 1828. The first election was held in April 1821, when just two justices of the peace, three trustees, two overseers of the poor, two fence viewers, three appraisers of personal property, two constables, a treasurer and a clerk were elected.

In the mid 1830s, James H. Bell, a civil engineer of the Mad River & Lake Erie Railroad, helped design a new station and called it "Bellevue" suggestive of his name. By 1836, the post office name was changed to Bellevue. By 1853, the City became known as Bellevue.

The City was further enhanced by the Toledo-Norwalk Railroad that was the connecting link from New York to Chicago in 1852. The Nickel Plate and the Wheeling & Lake Erie railroads were constructed through Bellevue in 1882 and 1883, which added several thousand people to its population by the turn of the century. The Pennsylvania Railroad was constructed through the area in 1891. All are now part of the Norfolk & Southern railroad system.

The largest railroad museum in Ohio is located in Bellevue. The Mad River and NKP Railroad Society Museum was founded in 1976 as a community Bicentennial project to honor Bellevue's history as a railroad center. The museum contains a growing collection of historical and educational railroad memorabilia and artifacts.



Mad River & NKP Railroad Society Museum

(www.ohiohistorycentral.org/ohc/history/ocoa/gro/smrc.shtml)

Since this City is located in multiple counties, the City may decide which county's plan in which to participate. The City of Bellevue has chosen to participate in Sandusky County's Countywide All Natural Hazard Mitigation Plan. Please refer to Sandusky County's Mitigation Plan for further information concerning Bellevue's mitigation planning efforts.

Berlin Heights

The Village of Berlin Heights is located in the south central portion of Berlin Township and comprises a total land area of 1.6 mi². As of the Census of 2000, there are 685 people, 257 households and 200 families residing in the Village. The population density is 438 people/mi². There are 266 housing units at an average density of 170 units/mi². Berlin Heights is located 18 miles southeast of Sandusky. Employment is provided to the residents of Berlin Heights through several leading industries, including manufacturing (22.0%), educational, health, and social services (21.3%), arts, entertainment, recreation, accommodation, and food services (13.4%) and retail trade (10.8%).

The town of Berlin Heights was officially organized in November 1897. Prior to 1897 the Village was known as the town of Eldridge. In 1832, the name was changed to Berlin Heights by the Huron County Commissioners. Noah Hill, a Huron County Commissioner, wanted to link the two names of Berlin Heights and the nearby town of Milan with the Berlin-Milan Accords prior to the War of 1812.

The first religious organization was the Methodist denomination and was established prior to 1812. The brick church that was erected in 1870 still stands today. The second denomination established was Baptist. Later, the congregation was divided on the issue of slavery and, by a vote of 17 to one; they declared no slave holder shall receive the hand of fellowship. The Congregational Church was organized in 1823. It is still a thriving denomination in Berlin Heights.

Berlin Heights became widely known at one time due to a small "free-love" community established there. There were three attempts to organize this community: Point Hope Community was the first, Industrial Fraternity was the second, and the Berlin Community or Christian Republic was the last attempt at this organization. None of these communities existed for more than a year.

(2005, *Berlin Heights* by The Berlin Heights Historical Society)

Castalia

The Village of Castalia is located in central Maragretta Township and comprised of 1.0 mi² of total land area. As of the Census of 2000, there are 935 people, 359 households, and 266 families residing in the Village. The population density is 896 people/mi². There are 380 housing units at an average density of 364 units/mi². Castalia is located 7.5 miles southwest of Sandusky. Employment is provided in the Village of Castalia from several major industries, including manufacturing (25.6%), educational, health, and social services (21.4%) and arts, entertainment, recreation, accommodation, and food services (11.5%). The Village was platted in 1836. The name Castalia is derived from the name of a Grecian fountain.

A natural spring known as"The Blue Hole" is located in Castalia and was a famous tourist destination until about 15 years ago when it was closed to the public. This spring, one of numerous springs that feed Cold Creek, is fed by subterranean waters flowing upward from deep limestone orifices in the earth. It gushes forth 7,519 gallons of water per minute, which is enough to supply the needs of a city with a population of 75,000. It spawns Cold Creek, which then runs swiftly northward descending 57 feet into Sandusky Bay. It was one of Ohio's favorite tourist attractions.

(www.lkwdpl.org/buckeye/buck07.htm)

Huron

The City of Huron is located in the north central portion of the County in Huron Township bordering Lake Erie. The city has a total land area of 7.7 mi². According to the 2000 Census, there are 7,958 people, 3,315 households and 2,260 families residing in the City. The population density is 1,629 people/mi². There are 3,832 housing units at an average density of 784 units/mi². Huron is located 10 miles southeast of Sandusky. Industries providing employment for residents of Huron include manufacturing (23.6%), educational, health and social services (23.3%) and retail trade (10.2%).

The precise date of the first occupation of the City of Huron by white settlers is uncertain, although it was the first town settled in the "Firelands." The first permanent settler was a fur trader named John Baptiste Flemmond. In 1805, he built a two room log cabin.

The City was organized in 1809. The first public school was taught by Calvin Coe in the winter of 1810 to 1811. The first public highway in Huron Township was located on the east side of the river and surveyed by Jabez Wright in 1810. The date of the first post office in the City of Huron was in 1817, with Asa Sandford as postmaster. William Winthrop, former owner of Huron Township, built a saw mill on Saw Mill Creek in 1819.

Soon after the end of the War with England, the Huron harbor began to attract attention as a favorable business location. The United States made appropriation for improvement of the harbor in 1827, thus, rapidly increasing immigration until 1834, when a serious impediment to business occurred by the appearance of Asiatic cholera. This cholera outbreak suspended various industries until autumn, when the disease began to disappear. The City of Huron then became known as a leading community in the construction of steamships.

(www.cityofhuron.org/history.htm)

Kelleys Island

Kelleys Island, which is the largest freshwater American island, is located in Lake Erie and has a land area comprising 4.6 mi². As of the Census of 2000, there are 367 people, 183 households and 112 families residing in the Village. The population density is 81 people/mi². There are 709 housing units at an average density of 156 units/mi². Kelleys Island is located 11 miles northwest of Sandusky. Industries providing employment for residents of Kelleys Island include retail trade (15.6%), arts, entertainment, recreation, accommodation and food services (12.2%), manufacturing (10.9%), educational, health and social services (10.9%) and transportation, warehousing and utilities (10.2%).

At least two Indian villages once existed on Kelleys Island, most likely belonging to the Erie

nation, which was annihilated by the Iroquois in 1665. Petroglyphs existing on the south side of the Island were carved over a number of years by the Erie Indians. These petroglyphs found at Inscription Rock are over 500 years old and describe important events in the Erie nation history.

Kelleys Island has one school, known as Kelleys Island High School, educating approximately 28 students in grades Pre-Kindergarten through twelfth grade. Kelleys Island is the largest American Island in Lake Erie, and is the only island in the United States to be designated as a National Historic District.



Downtown Kelleys Island

(www.kelleysisland.com)

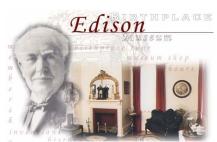
Milan

Milan is located in southern Milan Township. It has a land area of 1.2 mi². Milan is 13 miles south of Sandusky. According to the Census of 2000, there are 1,445 people, 540 households and 406 families residing in the Village. The population density is 1,229.9 people/mi². There are 574 housing units at an average density of 488.6 units/mi². Major industries providing employment in Milan include manufacturing (28%), educational, health, and social services (19.9%) and retail trade (15.7%).

The school system in the Village of Milan is comprised of four public schools, five private and parochial schools, four preschool and nursery schools and one vocational school. Ehove Career Center is located in Milan and provides training to college students for employment. Ehove Career Center Vocational, Edison High School and Milan Elementary School are other schools located in Milan. The Milan-Berlin Township Public Library is the only library located in Milan.

Milan was founded in 1816 and was originally known as Merry's Mill. The Village was named after Ebenezer Merry who settled in this area and built a flour and sawmill. The Village was incorporated in 1837. In 1839, the man-made canal linking Milan to the Huron River launched a trade boom. At one time, Milan's wheat export volume ranked second only to Odessa, Russia, with approximately \$2 million worth of commodities exported in 1847.

Thomas Alva Edison was one of Milan's most famous residents and was born February 11, 1847. The home in which he was raised is now open for tours and is known as The Edison Birthplace Museum. This museum displays many of his early inventions, documents, and family mementos. He was granted over 1,000 patents over the course of his career, including the phonograph and the incandescent light bulb. However, his name is most connected to the incandescent light.



The Edison Birthplace Museum

(www.milanohio.com/Information)

Sandusky

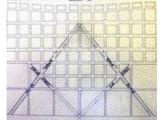
The City of Sandusky is located in the northwest portion of the County bordering Lake Erie. The City is comprised of 10.0 mi² of land area. As of the Census of 2000, there are 27,844 people, 11,851 households and 7,039 families residing in the City. The population density is 2,770.6 people/mi². There are 13,323 housing units at an average density of 1,325.7 units/mi². Major industries providing employment in Sandusky include manufacturing (25%), educational, health, and social services (17%), arts, entertainment, recreation, accommodation and food services (13%) and retail trade (13%).

The City of Sandusky is the County Seat of Erie County and was incorporated in 1824. The City of Sandusky was platted in the shape of the Masonic emblem. The City's name is believed to

originate from the Indian phrase "Lac-san-dou-ske", meaning "lake of cold water". It is located 55 miles east of Toledo, 60 miles west of Cleveland, and 106 miles north of Columbus.

In the years preceding the Civil War, Sandusky became an important terminal in the Underground Railroad. Sympathetic abolitionists sheltered runaway slaves on their dangerous and weary flights to freedom. Many of Sandusky's older homes have secret passages and rooms that were used to hide the slaves from their southern masters and slave catchers.

Although no battles were fought in Sandusky during the Civil War, the area was nonetheless affected by this great tragedy in American history. Johnson's Island, located in Sandusky Bay, was the site of a



The Kilbourne Plat, showing Masonic symbol street patterns in downtown Sandusky

prison for Confederate soldiers. The compound usually had about 3,000 prisoners at any one time, but had a capacity for 5,000. A cemetery was established on the east end of the island for those who died while imprisoned. Some of the bodies were removed to their southern homes at the end of the war, but 206 remained on the island. A monument was erected to the soldiers' memory in 1910, and the cemetery is now federal property.

Sandusky has the largest collection of limestone buildings on Ohio. They are erected in every different Victorian style popular during the 19th century. Blackboard chalk and corrugated cardboard were invented in Sandusky in 1835. It is also the home to one of Ohio's premier amusement parks, Cedar Point Amusement Park, voted "The Best Amusement Park in the World" for four years in a row by *Amusement Today*.

(www.sandusky.net/heritage/index.htm)

Vermilion

The City of Vermilion is located in both Lorain County and Erie County. It is located on the western border of Lorain County and the eastern border of Erie County. The City has a total land area of 10.8 square miles. According to the Census of 2000, the population of the City is 10,927. There are 4,254 households and 3,113 families residing in the city. The population density is 1,012.6 people/mi². There are 4,713 housing units at an average density of 436.7 units/mi². Major industries providing employment in Vermilion include manufacturing (24%), educational, health, and social services (19%) and retail trade (14%).

Between 1808 and 1811, the first settlers arrived in what is now known as Vermilion. The first settler to arrive was William Hoddy from Connecticut. He built a cabin by the mouth of the river and then returned east for his family. However, he did not return to the area.

In January of 1837, Vermilion was incorporated and granted a charter by the Ohio Legislature. At this time of incorporation, Vermilion's architecture was reminiscent of a typical New England hamlet with its clapboard buildings, giant maples and village square. The City of Vermillion was named for the red clay found there. The little harbor community had just 43 land owners. In 1912, two families arrived and settled in various places. The Austins from New York settled on the west bank of the Vermilion River. The Sherods from Connecticut and Pennsylvania settled on land now known as Sherod Park.

(www.vermilion.net/history/settlers.htm)

Since this City is located in multiple counties, the City may decide which county's plan in which to participate. The City of Vermilion has chosen to participate in Lorain County's Countywide All Natural Hazard Mitigation Plan. Please refer to Lorain County's Mitigation Plan for further information concerning Vermilion's mitigation planning efforts.

2.3.2 Other Jurisdictions

Cedar Point

The same Cedar Point with record breaking roller coasters is also the second oldest amusement park in North America with a history dating back to 1870. The park was originally named for the groves of cedar trees that once outlined the peninsula. It first started as a bathing beach with small attractions and gradually turned into the Cedar Point, as it is known today. Its tradition of being an old-fashion park, and having the latest amusement rides makes the park unique from most parks.



Cedar Point

Over three million people, from around the globe, visit Cedar Point a year finding themselves surrounded by its collection of sixteen roller coasters and many other rides. This once tree covered peninsula is now one of the largest and most successful amusement parks in the world. Sandusky is one of the premiere vacation destinations in the United States, due in great part to Cedar Point Amusement Park. This major amusement center has consistently been voted the number one amusement park in the United States, and features more roller coasters and total rides than any other park in the world. Cedar Point has been a valuable economic resource to the residents of the City of Sandusky as well as Erie County for generations. The average number of visitors per day during the peak season is between 30 to 40 thousand persons a day.

Cedar Point, owned and operated by Cedar Fair, L.P., has their own police department as well as their own fire department and emergency management services facilities. These departments are self-sufficient entities that are official branches of the City of Sandusky's fleet. During the park's off-season, all the responsibilities are directed back to the City of Sandusky's internal operations.

Cedar Point implements their own protocol for dealing with on-coming natural disaster threats such as severe weather. The Department of Safety utilizes different levels of public service announcements to alert patrons of threatening conditions. The alert is used to inform patrons of developing weather patterns that may affect their time at Cedar Point. Cedar Point has no official shelters for severe weather. Cedar Point encourages patrons to seek cover where they can. Most of the bathroom facilities are cinder-block and wind resistant. However, these facilities are not designated as official shelters.

(www.cedarpoint.com)

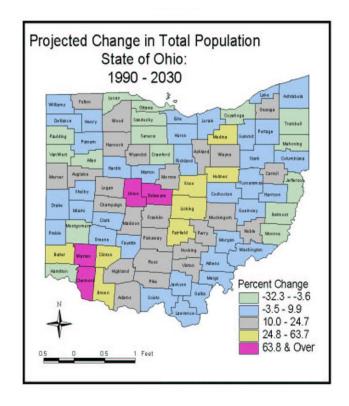
2.4 Census Information

2.4.1 State Population

The State of Ohio's population in 2000 was 11,353,140 and it is projected to climb to 12,317,613 by 2030, an increase of 8.5%. However, it appears that the rate at which Ohio's population is growing is diminishing.

Several factors may be contributing to this decline. The birth to death ratio is much smaller than in faster growing states, with Ohio expected to have 4.4 million births and 3.6 million deaths. Net migration is a factor as well. Ohio may gain approximately 247,000 people through in-migration but may lose about 758,000 people through out-migration.

The projected percentage of population change by county in Ohio from 1990 to 2030 is reflected on the map in this section. Counties



surrounding a major metropolitan area - Cincinnati, Columbus, and Cleveland - generally will

experience higher growth rates. Counties in the north central and eastern region of the state are projected to experience a decline.

2.4.2 County Population Projection

The population of Erie County has steadily increased from the Census of 1840 until the Census of 1980. The largest change in population occurred from 1950 to 1960 when the population increased by 29.4%. The population continued to increase until 1990. The population slightly declined in the 1990 Census, but increased again with the Census of 2000. The population in 1990 was 76,779, compared to a population of 79,551 in 2000. According to the Ohio State University Extension Data Center, the total population is expected to steadily increase to 83,061 by 2030. From 2001 to 2002, more people moved out of Erie County than moved into the County. In 2001, the personal income per capita reached \$29,921, while the State of Ohio averaged \$28,699. In 2001, the County also had a net increase in the number of businesses started. Please refer to Table 2-1 for more demographic information.

Table 2-1 POPULATION TABLE

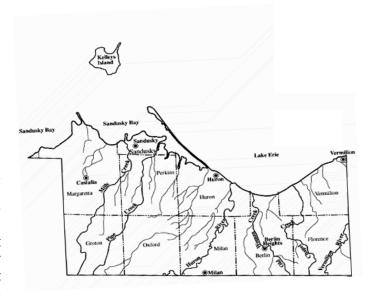
Year	Total Population	Year	Total Population
1800	NA	1910	38,327
1810	NA	1920	39,789
1820	NA	1930	42,133
1830	NA	1940	43,201
1840	12,599	1950	52,565
1850	18,568	1960	68,000
1860	24,474	1970	75,909
1870	28,188	1980	79,655
1880	32,640	1990	76,779
1890	35,462	2000	79,551
1900	37,650		

An Erie County demographic profile is also available on the Ohio Department of Development's website and provides more specific information for Erie County and its political jurisdictions. (http://www.odod.state.oh.us/osr/profies/pdf/.)

2.5 County Land Use and Future Land Use

2.5.1 Topography

Erie County lies in the Central Lowland Province. Lying in an area of lake plain and till plain physiography, the County has a relatively uniform, level topography. Berlin Township is the highest point in Erie County and is 320 feet above the approximate mean level of Lake Erie. Most of the County has a slope of six percent or less. The steeper areas are mainly a result of deep stream dissection. Beach ridges



and bedrock ridges account for a small percentage of the steeper areas.

Erie County drains northward into Lake Erie. There are 17 distinct watersheds in the County. Primary watersheds include Mills Creek and Pipe Creek to the west, the Huron River in the central part of the County, Old Woman Creek in the east-central part of the County and the Vermilion River on the eastern edge of the County. Small creeks drain the other watersheds.

2.5.2 Soil Survey of Erie County, Ohio

Soil surveys contain information that affects the land use planning of a county. The February 2002 Interim Report *Soil Survey of Erie County, Ohio* contains predictions of soil behavior for selected land uses, as well as emphasizes soil limitations, improvements needed to overcome the limitations and the impact of selected land uses on the environment. Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to us as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

Erie County has 38 soil types, grouped into 11 associations, which vary in drainage quality from very poorly drained to well drained. The 11 associations include: Toledo-Fulton, Del Rey-Milford, Weyers-Endoaquents-Sandusky, Bennington-Haskins-Cardington, Pewamo-Bennington, Mahoning-Ellsworth-Orrville, Allis-Bennington, Hornell-Fries-Colwood (bedrock substratum), Milton-Millsdale-Castalia, Kibbie-Colwood-Elnora, and Jimtown-Oshtemo-Millgrove Associations. According to the Ohio State University Extension Water Resources, 27% of these soils are very poorly drained and 38% somewhat poorly drained.

The natural resources of Erie County include water, sand and gravel and some layers of bedrock. The groundwater in Erie County varies considerably in quality and quantity. Water is obtained from glacial material or bedrock, depending on the location of the well site. Surface runoff, infiltration rates and geologic material affect the water supply. Typically good sources of water can be found in glacial deposits with lenses and stratified layers of sand and gravel and yield from 20 to 250 gallons per minute (gpm). However, most wells in glacial deposits have low yields on less than 10 gpm. Bedrock wells also vary considerably in suitability according to the

area and type of geologic material. For instance, up to 500 gpm can be obtained from the wells drilled in the cavernous limestone bedrock found in the western portion of the County. A large quantity of ground water obtained from similar formations in the western portion of Erie County has potential for contamination resulting from underground disposal of wastewater, or may have high concentrations of hydrogen sulfide. Aside from glacial or bedrock wells, water may also be obtained from Lake Erie, dug wells, cisterns, and ponds, as long as surface water and groundwater pollution are controlled to ensure a quality water supply.

The U.S. Department of Agriculture defines prime farmland as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. Prime farmland includes cultivated land, pastureland, forest land or other land that is not urban or built-up land or water areas. It has a, adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from zero to six percent.

Approximately 129,000 acres of Erie County, or nearly 71% of the total acreage, meets the soil requirements for prime farmland; and are located primarily in the western part of the County. Most agricultural land is used for cash grain crops, particularly hay, corn, wheat and soybeans. Specialty crops, such as sugar beets, cabbage, tomatoes, and melons, are also grown. Dairy and livestock are also important sources of revenue. In 1997, approximately 89,871 acres were used as farmland. This acreage consisted of 380 farms, averaging 237 acres per farm. In 2001, corn generated the largest amount of crop cash receipts while cattle produced the largest amount of livestock cash receipts.

A small percentage of land is devoted to woodlands, usually on steep slopes along major streams and in undrained areas. According to the United States Department of Agriculture Natural Resources Conservation Service (USDA-NRCS), as of 1996, only about 21,800 acres remain forested, mainly in river bottoms and in small, scattered woodlots in the uplands. Most woodlands have been harvested repeatedly, and many have been pastured. Although farm products provide a larger income for the County residents, in properly managed and harvested woodlands, most Erie County soils may potentially provide income per acre that is similar to other agricultural products through the sale of timber products. Woodlands are also beneficial because they provide wildlife habitat, serve as windbreaks from erosion, produce nuts, lumber and fuel wood, and have aesthetic value. Pastures are common in areas where soils present severe limitations affecting row crops. The common pasture and hay plants include alfalfa, red clover, alsike clover, bluegrass, orchardgrass, tall fescue, timothy and bromegrass.

With good management practices, most soils are highly productive for crops and pasture. The major soil management concerns are seasonal wetness (including ponded areas), erosion, soil structure damage (compaction, crusting, clod formation), droughtiness, and soil fertility. Seasonal wetness and ponding are major concerns on approximately 117, 026 acres of land in Erie County. The very poorly drained Colwood, Condit, Holy, Mermill, Milford, Millgrove, Miner, and Pewamo soils are naturally so wet that crop production is typically not possible unless surface or subsurface drainage is installed. The somewhat poorly drained Bennington, Elliot, Haskins, Jimtown, Mahoning and Orrville soils are naturally so wet that crops are damaged during most years and planting and harvesting is delayed unless artificial drainage is installed. Existing County and private drainage systems should be maintained as adequate outlets for

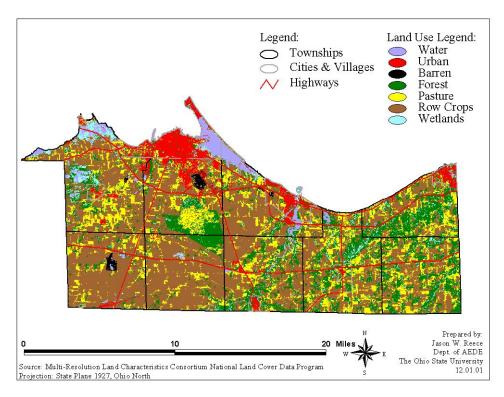
present and future land uses. Urban construction activities can damage and disrupt these existing systems. As a result, renewed wetness and ponding of these previously drained cropland areas now impact homeowners' use of this land. In order to maintain or improve these drainage systems, cooperation is necessary between the urban and agricultural communities.

Approximately 23,494 acres of Erie County land are affected by water erosion. Erosion becomes a hazard when the slope of the soil is greater than two percent, and increases as the slope increases. Erosion is a concern because it reduces the natural soil fertility and productivity as the original topsoil is removed and the more acid subsoil is incorporated into the surface layer through tillage. If the amount of annual soil loss exceeds the rate at which new soil is formed, long-term productivity and natural fertility are affected. Erosion is also a problem because it increases the cost of crop production, results in poor soil structure in the surface layer, increases the need for tillage to incorporate organic matter into the surface layer and reduces the available water capacity of the surface layer. Sediment removal is the most costly item in ditch maintenance. Controlling erosion protects the soil resource base, maintains longterm productivity, reduces drainage maintenance costs and improves water quality. Wind erosion is primarily a concern on the sandier soils. Sod strips and windbreaks can reduce the effects of wind velocity. Windbreaks protect livestock, buildings, and yards from wind and snow. Erosion can be controlled through crop rotations, cover crops, crop residue management, waterand sediment-control basins, grassed waterways and conservation tillage, as well as plowing in the spring rather than in the fall.

2.5.3 Current Land Use

Agriculture is the primary land use in Erie County. According to the 2002 *Soil Survey of Erie County*, in 1982, farms comprised 100,000 acres of the County, or 55% of Erie County's land. Erie County had 535 farms, with an average size of 185 acres. Approximately 5,600 acres were used for pasture and 16,900 acres were urban or built-up land. However, this amount declined to 50%, or 90,000 acres of farmland, in 1992. These 90,000 acres consisted of 406 farms, with an average size of 219 acres. Approximately 94,900 acres were used for cropland, 6,700 acres were used for pasture, and 27,400 acres were urban or built-up land. Thus, although there was less farmland and a smaller number of farms, the average farm size increased. The difference in number of acres of farmland is most likely due to the conversion of farmland to urban or non-farm uses.

In addition to land acres, the County is bordered by Lake Erie across the northern boundary of the County. The County also contains approximately 800 acres of lakes within its borders. According to an Environmental Protection Agency (EPA) estimate, Erie County also contains approximately 340 linear miles of streams and rivers. In addition, 55.9 miles of County-maintained open ditches, 17.3 of tile ditches and approximately 200 miles of privately-maintained ditches are used for land drainage. Approximately 8,600 acres of Erie County are considered wetlands (www.eriecountyohiocofc.com).



The following map illustrates Erie County's land use from the 1990's.

2.5.4 Future Land Use

The community of Erie County has expressed several ideas and concerns about future land use in their 1995 Erie County Comprehensive Development Plan. Erie County is faced with development pressures due to expanding residential areas in and near villages. Below are some guidelines Erie County has established:

- Promote community development through redevelopment, economic development, and constructing infrastructure to meet the demands for development
- Provide all residents in the County adequate, affordable housing
- Preserve the County heritage and those structures significant to its salvation for future generations
- Maintain harmony between the man-made and natural environment by sustaining the County's dedication to protecting the environment through its support of legislation and programs intended to preserve open spaces and natural habitat
- Provide high quality recreation facilities to meet the increasing demands of all residents who reside within the planning area
- Ensure growth in employment will not be obtained through excessive costs to the environment or jeopardize the liveability of the community
- Become efficient and accessible through improvements to street systems, developing along roadways, and through transportation planning
- Encourage growth in areas physically suited and already serviced by infrastructure

 Expand water and sewer lines, and examine capacity issues and wastewater plant upgrade.

The County also has subdivision regulations, which comply with the 1995 Erie County Comprehensive Development Plan to assist in future land use concerns. However, the 1995 Comprehensive Plan covers unincorporated areas only. The central focus of the plan is to encourage development in and around the villages and planned subdivisions where public services are available. Otherwise, agriculture is the preferred use of the land. Increased service costs result from a combination of scattered rural development, poor soil conditions and larger lots. Taxes are not offsetting these increased costs; thus, making it difficult for farmers to compete with speculative developers for land. Unfortunately, no statistics regarding current land use with regard to housing development were available.

2.6 County Utilities and Media

2.6.1 Water and Wastewater

With a population consisting of more than 79,000 residents, Erie County is one-third rural and two-thirds urban, with 86% of the population relying on surface water for their water supply. According to the Ohio State University Extension Water Resources, approximately 34 inches of precipitation falls on Erie County annually. The County experiences an average precipitation of 2.8 inches per month, with February typically being the driest month (1.6 inches), and June the wettest (3.9 inches).

Erie County's primary groundwater source is found in the cavernous limestone and dolomite deposits on the west end of the County. The majority of the County has groundwater resources providing well yields of less than 10 gpm, while a buried valley of permeable sand and gravel east of Milan and a buried valley of clay and fine sands from Milan to east of Huron provide small areas in the middle of the County with yields of up to 200 gpm. Well yields vary considerably depending on the age and depth of the well, well construction, the diameter of the casing, pump capacity and age, and more importantly, geologic formation properties. Approximately 5% of the population obtains water from private wells. Based on an estimated usage of 75 gallons per person per day, 290,670 gallons per day (gpd) are used from private wells. The remaining 95% of households use public water supplies with surface water as the major source. The County's largest public water system is the City of Sandusky, which uses surface water from Lake Erie for its supply. The Erie County Department of Health provides bacteriological water sampling for local citizens and results generally indicate that the water meets current bacteriological standards.

Water quality and availability are important public concerns for Erie County. Water problems can be both costly and inconvenient. The present availability of water is good for Erie County because water is a precious resource which must be conserved and protected. Thus, the water quality of Erie County is monitored. Water quality testing of Erie County has shown that all or parts of the following streams are affected by non-point source pollution: Caswell Ditch, the east branch of the Huron River to Lake Erie, Pipe Creek, Mills Creek and Snyders Ditch. These streams are affected by crop and livestock production, on-site wastewater treatment systems, channelization and/or urban runoff. Pipe Creek, Mills Creek, and Snyders Ditch are also affected by point source pollution. The streams in the County having good water quality and attaining chemical and biological water quality standards include the east fork of the Vermilion

River to Lake Erie, Sherod Creek, Darby Creek, Sugar Creek, Chappel Creek and Cranberry Creek.

Erie County has five wastewater treatment plants (WWTPs). These include the Sandusky WWTP, the Milan WWTP, the Sawmill Creek WWTP, the Huron Basin WWTP and the City of Vermilion WWTP. The Erie County Solid Waste Management District (SWMD) services Erie County.

The following water plants are of service to Erie County. The Erie County Huron East, Perkins, South, Vermilion and West Districts are located in Sandusky and are purchased surface water sources. Kelleys Island public water supply is provided through a surface water source. The plant located in the Village of Milan obtains its water from a groundwater source. The Vermilion public water supply plant obtains their water from a surface water source. The rural/unincorporated areas of Erie County may choose to have their water provided by the Northwest District of Northern Ohio Rural Water that is located in Norwalk (Huron County).

http://ohioline.osu.edu/aex-fact/0480 22.html

2.6.2 Other Utilities

The electric service in Erie County is provided by Ohio Edison. See Map B-1, Service Areas of Ohio Electric Companies, in Appendix B.

Columbia Gas of Ohio provides gas utility service to Erie County. Columbia is an investor owned public utility that sell natural gas and provides gas transportation services to customers in Ohio. See Map B-2, PUCO Regulated Natural Gas Companies, in Appendix B.

Telephone companies that service Erie County include Verizon North, SCB Ohio and Century. See Map B-3, Telephone Service Areas in Ohio, in Appendix B.

2.6.3 News Media

Television stations in Erie County are provided through the Buckeye Cablesystem. Newspapers in Erie County include The *Sandusky Register, The Morning Journal, Vermilion Photo Journal,* and *North Coast Business Journal*. Other papers also available in the area include: the *Cleveland Plain Dealer, Toledo Blade, Detroit Free Press, New York Times, Wall Street Journal,* and *USA Today.* County radio stations include Eagle 99, WCPZ-FM 102.7, WLEC-AM 1450, WMJK-FM 100.9, WGGN-FM 97.7, WKFM-FM 96.1.

Countywide All Natural Hazards Mitigation Planning Process

3.0 COUNTYWIDE ALL NATURAL HAZARDS MITIGATION PLANNING PROCESS

3.1 Mission Statement

At the beginning of the planning process, a mission statement was drafted to establish a clear goal for the Core Group. The Core Group reviewed and approved the following as its Mission Statement:

"The mission of the Core Group for Erie County, Ohio is to develop a working document that fulfills the mandates of the Federal Disaster Mitigation Act of 2000, and satisfies the requirements of FEMA and the Ohio EMA, as well as meets the needs of all of Erie County.

Further, by researching and planning for future natural hazards and implementing appropriate mitigation techniques, all of Erie County can save lives and protect property, reduce the cost of disasters and provide for a rapid and efficient recovery by coordinating response efforts, and increasing the educational awareness of natural hazard events and their effects on the people, property, and resources of all of Erie County."

3.2 Notification Process

The incorporated jurisdictions of the county, as well as other agencies that work within the county, were notified of the mitigation planning process. The Erie County EMA Office created a master list of jurisdictions they felt necessary to participate in this planning effort. The comprehensive list was reviewed to ensure that all the appropriate agencies as well as jurisdictions would be invited to participate in this effort. A Core Group representing a wide array of political subdivisions, as well as agency and private businesses, was notified of the mitigation planning process.

Prior to commencing this planning process, in addition to contacting the Core Group, Erie County notified adjacent counties as well as the general public regarding this mitigation planning process. The Erie County EMA sent letters to adjacent counties with contact information for learning more about the planning effort. Erie County also issued a press release dated November 10, 2004 inviting concerned citizens in all jurisdictions of the County. The Erie County EMA Director was the contact source and his contact information was provided. See Appendix A for copies of these correspondences.

3.3 Groups

The Core Group is the original planning unit for this project. All Core Group members are involved for the entire planning process. They are the decision makers and implementers. The purpose of the Core Group is to provide information to the various entities of Erie County that have a stake, either directly or indirectly, in the Mitigation Plan. They provide feedback, input, and review as the process of the Mitigation Plan development is completed, leading to a better quality and more inclusive scope of the Mitigation Plan that everyone can acknowledge and adopt, truly implementing a countywide plan.

Obtaining support from the whole community required a comprehensive approach to preparing the Mitigation Plan. Identifying those persons, community leaders and government agencies with the knowledge and authority to help the community organize a plan was key to the planning effort. Establishing a group of leaders was necessary to give this task validity. The Core Group included individuals from multiple agencies, County departments and incorporated jurisdictions as previously listed in Section 1.2. Please see Appendix A for a complete list of participants.

3.4 Core Group Meetings

There were four Core Group meetings, and one community meeting for public comment on the Draft Mitigation Plan.

3.4.1 Determination of Hazards - Meeting 1-Kick-Off Meeting

The kick-off meeting presented the Core Group with the process to be followed in the creation of the Mitigation Plan. Overall goals of the plan for Erie County were discussed and the Core Group decided upon which hazards to focus. By the end of the first meeting, Core Group members had exchanged contact information, organized and scheduled several interviews to be conducted, established a priority list of hazards and discussed the general process and timeline of the project.

The list of prioritized hazards was established looking at the National Climatic Data Center (NCDC) tables that illustrated which hazards in Erie County had produced the largest amount of damage based on human or monetary losses. The Core Group also used the collective knowledge they had coupled with the vast amount of local experience and history to determine which hazards to address in their Mitigation Plan. The hazards were prioritized as follows:

- 1. Severe Storms (Summer)
- 2. Flooding (Flash Floods, 100-year Floodplains)
- 3. Severe Storms (Winter)
- 4. Lake/Stream Bank Erosion
- 5. Tornadoes
- 6. Droughts (Extreme Temperatures)
- 7. Earthquakes

Please see Appendix C for Meeting 1 minutes.

3.4.2 Determination of Problem Statements and Overall Goals – Meeting 2

The second meeting focused on the discussion of the problems within the county as it related to the hazards that were identified at the first meeting. Prior to the second meeting, each Core Group member received several documents to facilitate the discussion during the meeting. During this meeting, the Core Group developed problem statements for each community hazard that was identified at the first meeting. Please see Appendix C for the Meeting 2 minutes.

In order to determine the issues associated with the hazards in Erie County and to establish the problem statements associated with the hazards, the group first decided on an overall "state of the hazard" and how it has affected the community in the past. The Core Group reviewed the draft problem statements in the time period between the second and third meeting, to be revised or approved as noted at the third Core Group meeting.

In addition to developing the problem statements, the Core Group determined overall mitigation goals with respect to each hazard. Goals were defined as general guidelines that explain mitigation activities that a community wants to implement in the future. The goals were then used to prioritize mitigation activities for each community. These goals are included in the Problem Statements document attached in Appendix D.

3.4.3 Determination of Alternatives and Evaluation Criteria – Meeting 3

At the commencement of the third meeting, the problem statements and goals developed at the second meeting were approved as drafted or revised by the Core Group. The third meeting focused the Core Group's discussion on developing possible mitigation alternatives and solutions to problems with respect to each hazard. The draft problem statements were used as a reference guide in discussing these possible solutions. The Core Group received several guidance documents at this meeting to facilitate discussion. Alternatives were discussed among the Core Group members and noted for the Mitigation Plan when all were in agreement. These alternatives were then transposed into a rating matrix to be discussed in the following section of this report. Please see Appendix C for Meeting 3 minutes.

3.4.4 Wrap-Up Meeting

The final meeting with the Core Group focused on the discussion of the final mapping products, as well as the mitigation alternatives and completed matrices. The multi-hazard maps were reviewed for any errors or omissions. The results of the matrices were then reviewed by the Core Group for approval. Each individual community then chose which alternative or alternatives they wanted to support and implement within their community.

The remaining steps in the mitigation planning process were reviewed, which included setting a date for a public meeting.

3.4.5 Public Meeting

Public input was necessary to gauge the opinion of the community and build support for the Mitigation Plan. A public meeting was held on March 9, 2005 to review the planning process with the general public. This meeting gave the public an opportunity to comment on the plan. This meeting was also used to address comments and questions concerning the Draft Mitigation Plan.

3.5 Matrix Development

Once the mitigation alternatives were created for each hazard, the Core Group established evaluation criteria to rank each of the alternatives. The criteria included: cost effective; technically feasible; environmentally sound; meets Federal, State, and Local regulations; socially acceptable; and activity has a low cost to high benefit.

The evaluation criteria and the alternatives developed at the third meeting were then copied into a matrix that organized all the alternatives with respect to the County's hazards as prioritized by the Core Group. Utilizing a matrix allowed the community to systematically review all alternatives and to identify which mitigation method(s) were appropriate based on the specified criteria. The combined results of all the Core Group members were tabulated to determine the County's average overall mitigation activities. Each activity was given an averaged rating

number based on all the Core Group scores, which would help Erie County focus their mitigation strategies on the highest rating activities.

3.6 Public Review and Involvement

The formal public notification process as defined in the Federal Code took place prior to approval and/or adoption of the plan. The public was notified that the process to produce the countywide Mitigation Plan was underway and that they will have an opportunity to review the draft plan for a period determined by the Core Group. The Draft Mitigation Plan was submitted concurrently to the OEMA and FEMA for review and approval.

3.7 Finalization

Upon incorporation of all comments into the Draft Mitigation Plan, the Final Mitigation Plan will be prepared and submitted to Erie County in hard copy and digital form. Each incorporated jurisdiction, as well as any township choosing to adopt this Mitigation Plan as a separate entity from the County, will also receive a digital copy of the plan.

Each community that participates in this planning effort will be responsible for administering the various aspects of the Mitigation Plan including how the plan will be implemented within their particular community.

Implementation of the Mitigation Plan is crucial. The Core Group must strategize effectively to put the Mitigation Plan into action. Erie County must follow up to translate the goals and objectives, developed during the planning process, into action steps. It is recommended that a monitoring program be included in the Mitigation Plan.

Hazard Profile

4.0 HAZARD PROFILE

Erie County has experienced many natural disasters in the past one hundred years. These disasters have ranged from tornadoes and blizzards, to flooding and droughts. The purpose of this document is to identify the number and frequency of disasters in Erie County to better prepare and deal with them when they do occur. The following sections describe the process of determining upon which hazards to focus, general background information on each hazard as well as hazard events that have occurred in Erie County.

4.1 Initial Hazard Assessment

In order to properly evaluate the natural hazards to which Erie County may be susceptible, a three-step process was utilized. This three-step process was completed in order to "narrow-down" the hazards for which Erie County should prepare, and potentially mitigate, in the future. The three steps are described in the following paragraphs.

Step 1 - FEMA's database was researched to determine which hazards FEMA had documented as possible natural hazards, including future threats, for the State of Ohio. Several hazards that are listed on FEMA's website include flooding, severe storms, tornadoes and winter storms.

Step 2 - The NCDC was contacted and historic hazard information was reviewed all the way down to the county level. The NCDC website presented each type of hazard and the historic information associated with it for each county, offering several hazard search parameters. These parameters included: droughts, dust storm, flooding, fog, hail, hurricanes, lightning, tornadoes, wild/forest fires, ocean/lake surf, precipitation, snow and ice, temperature extremes and thunderstorms and high winds.

Because NCDC information did not address earthquakes and erosion, other sources were contacted for this data. The information pertaining to earthquake susceptibility was attained from United States Geographical Survey (USGS) data and the Ohio Earthquake Program Manager at OEMA. The information pertaining to stream bank erosion susceptibility was obtained from the Natural Resources Conservation Service (NRCS) District Conservationist.

Step 3 - The *Ohio Hazard Analysis and Risk Assessment*, which is a document created in 1998 by OEMA for local and state emergency preparedness officials was reviewed. The *Ohio Hazard Analysis and Risk Assessment* documented both natural and non-natural (technological) hazard event information.

4.2 Risk Assessment Ranking

The research compiled during the initial hazard assessment was provided to the Core Group for their review and assessment. The Core Group evaluated all the hazards being considered and ranked them based on the number of historic events and cumulative damage that has occurred. The following list shows the Core Group's ranking of hazards with number one being the hazard of the most concern:

- 1. Severe Storms (Summer)
- 2. Flooding (Flash Floods, 100-year Floodplain)
- 3. Severe Storms (Winter)
- 4. Lake/Stream Bank Erosion

- Tornadoes
- 6. Droughts (Extreme Temperatures)
- 7. Earthquakes

4.3 Severe Storms – High Winds, Lightning, Hail

Hazards that fit into the severe storm category include high winds, lightning and hail. One of the biggest problems associated with severe weather is the lack of public education and awareness. Severe storms can do damage, but are often the precursor for much more severe weather to follow. One example is the direct association of tornadoes with thunderstorms.

A severe thunderstorm watch is issued by the National Weather Service (NWS) when the weather conditions are such that damaging winds of 58 mph or more, or hail 3/4 of an inch in diameter or greater, are likely to develop. Citizens should locate a safe place in the home and tell family members to watch the sky and listen to the radio or television for more information. A severe thunderstorm warning is issued when a severe thunderstorm has been sighted or indicated by weather radar. At this point, danger is imminent and citizens should move to a safe place, turn on a battery-operated radio or television, and wait for the "all clear" by the authorities.

Severe storms are also associated with other hazards such as tornadoes and severe flooding. Since tornadoes and flash flooding are spawned by thunderstorms, people should review what action to take under a tornado warning or a flash flood warning when a "severe thunderstorm warning" is issued. When thunderstorms are forecasted to bring heavy rains (which can cause flash flooding), strong winds, hail, lightning and tornadoes, people should get inside a sturdy building and stay tuned to a battery-operated radio for weather information. People should also be aware that lightning and high winds are also major threats during thunderstorms. Data obtained from FEMA shows that the frequency of recorded severe storm events are increasing year after year as shown in Table 4-1.

Table 4-1
Ohio Disaster History

Year	Disaster Type	# of Storm Events
1989	Severe Storms & Flooding	831
1990	Severe Storms, Tornadoes & Flooding	870
1992	Severe Storms, Tornadoes & Flooding	951
1995	Severe Storms & Flooding	1,065
1996	Severe Storms & Flooding	1,097
1996	Flooding & Severe Storms	1,122
1997	Severe Storms & Flooding	1,164
1998	Severe Storms	1,227
2000	Severe Storms & Tornadoes	1,343
2001	Severe Storms & Flooding	1,390
2002	Severe Storms & Tornadoes	1,444
2003	Severe Storms & Flooding	1,478
2004	Severe Storms & Flooding	1,556

4.3.1 High Winds

Straight-line winds are often responsible for most of the wind damage associated with a thunderstorm. These winds are often confused with tornadoes because of similar damage and wind speeds. However, the strong and gusty winds associated with straight-line winds blow roughly in a straight line unlike the rotating winds of a tornado.

Property damage and loss of life from windstorms are increasing due to a variety of factors. According to the Ohio Manufactured Housing Association, the use of manufactured housing is on an upward trend, and this type of structure provides less resistance to wind than conventional construction. Uniform building codes for wind resistant construction are not adopted by all states, and population trends show rapid growth in the highly exposed areas.

A total of 152 thunderstorm and high wind events were recorded in Erie County between 1950 and 2004, according to the NCDC. The monetary damage totaled \$37 million in property damage and \$42.5 million in crop damage. Five deaths and 26 injuries resulted from these events.

4.3.2 Lightning

Lightning kills between 75 to 100 people a year. It is the second largest killer of natural hazard events, exceeded only by floods. Lightning strikes can happen anywhere and affect anyone. Only 10% of lightning strikes result in death, leaving the rest with various degrees of disability, most being central nervous system issues.

A total of 9 lightning events otherwise known as documented lightning occurrences were recorded in Erie County between 1950 and 2004, according to the NCDC. The monetary damage totaled \$507,000. Two injuries resulted from these lightning events.

4.3.3 Hail

Hail is a type of precipitation composed of balls or irregular lumps of ice. It occurs when supercooled water droplets (remaining in a liquid state despite being below the freezing point, 0 °C/32 °F) in a storm cloud collide with some solid object, such as a dust particle or an already-forming hailstone.

Hail often forms in strong thunderstorms, often along a cold front, where the layer of air on top is much colder than that on the bottom. The smaller hailstones can bounce up and down between the warm and cold layers due to updrafts and gravity. The longer the stones bounce around, the larger they grow. These strong, severe, or even supercell thunderstorms can also produce hail in the summer months, even without a cold front.

Hailstones, while most commonly only a few millimeters in diameter, can sometimes grow to several inches or occasionally even bigger. Such large hailstones can do serious damage, notably to automobiles, skylights, and glass-roofed structures. Pea or golf ball-size hailstones are not uncommon in severe storms. Rarely, massive hailstones have been known to cause concussions or to kill people by causing head trauma.

According to the NCDC, 42 hail events were recorded from 1950 to 2004. The monetary damage totaled \$47,000.

4.4 Floods (including Flash Floods)

Floods are a naturally recurring event for a river or stream, and are caused by weather phenomena and events that deliver more precipitation to a drainage basin that can be readily absorbed or stored within the basin. Flooding is a localized hazard that is a result of heavy or continuous rainfall exceeding the absorptive capacity of soil and the flow capacity of rivers and streams. Floods can be generally considered in two categories: flash floods, the product of heavy localized precipitation in a short time period over a given location; and riverine floods, caused by precipitation over a longer time period and over a given river basin.

Flash floods occur within a few minutes or hours of heavy amounts of rainfall, from a dam or levee failure, or from a sudden release of water held by an ice jam. Flash floods can destroy buildings and bridges, uproot trees, and scour out new drainage channels. Heavy rains that produce flash floods can also trigger mudslides. Most flash flooding is caused by slow-moving thunderstorms, repeated thunderstorms in a local area, or by heavy rains from hurricanes and tropical storms. Although flash flooding occurs often along mountain streams, it is also common in urban areas where much of the ground is covered by impervious surfaces. Roads and buildings generate greater amounts of runoff than typical forested land. Fixed drainage channels in urban areas may be unable to contain the runoff that is generated by relatively small, but intense, rainfall events.

Riverine flooding refers to periodic flooding of lands adjacent to non-tidal rivers and streams. It is a natural and inevitable occurrence. When stream flow exceeds the capacity of the normal watercourse, some of the above-normal stream flow spills over onto adjacent lands within the floodplain. Riverine flooding is a function of precipitation levels and water runoff volumes within the watershed of the stream or river. The recurrence interval of a flood is defined as the average time interval, in years, expected to take place between the occurrence of a flood of a particular magnitude and an equal or larger flood. Flood magnitude increases with increasing recurrence interval.

Flooding is an important issue for the residents and local business owners of Erie County. Whether it was riverine flooding or flash flooding events that occurred in the past, lives have been disrupted and damage has been extensive. A total of 55 flooding events were recorded in Erie County between 1950 and 2004, according to the NCDC. The monetary damage totaled \$5.4 million in property damage and \$115,000 in crop damage. No deaths or injuries were recorded for these events.

4.4.1 Special zone flood (100-year Floodplain)

Flood Insurance Rate Maps (FIRM) show areas delineated to be special flood hazards. The Base Flood Elevation (BFE) refers to the elevation associated with a special flood zone, or a flood with a 1% chance of occurring in any given year. Areas within a special flood zone area, also known as the 100-year floodplain, have an elevation lower than the BFE and are categorized into zones. Zone "A" is the flood insurance rate zone that corresponds to a special flood zone area that is determined in the Federal Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no BFEs or depths are shown within this zone. Zone "AE" is the flood insurance rate zone that corresponds to a special flood zone area that is determined in the Federal Flood Insurance Study by detailed methods. In most instances, BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Erie County has special zone floodplains identified within the county. The best way to combat a disaster happening within these special zone flood hazard areas is through public awareness. All of Erie County is in compliance with state floodplain management standards and participates in the National Flood Insurance Program (NFIP). The County has been involved since January 16, 1981 (including the Township of Margaretta). The following list gives the incorporated jurisdictions that participate in the NFIP and the date in which they entered the program.

Village of Bay View
 September 15, 1977

Village of Castalia
 May 25, 1978

[No Special Flood Hazard Area (NSFZA) -

All Zone C]

• City of Huron April 3, 1978

Village of Milan
 September 1, 1978

City of Sandusky
 July 5, 1977

• City of Vermilion December 31, 1970

The following list gives the incorporated areas which have had special flood hazard areas identified but do not participate in the program and the date in which the hazard area was identified.

Village of Berlin Heights April 5, 1974
Village of Kelleys Island August 17, 1981

4.4.2 Repetitive Loss

Recurrence interval, or frequency of occurrence, is defined as the average number of years between storms of a given intensity. Recurrence intervals commonly used in technical studies and design are 2, 10, 25, 50 and 100 years. Recurrence interval addresses how often a flood of a specific depth will be expected to occur. Structures located within areas of a higher recurrence interval should be considered at higher risk and should be prioritized higher as it relates to mitigation.

In most counties there are areas that periodically suffer damages from floods. They are known as "repetitive loss" properties. Repetitive loss properties are defined as properties with structures that have had two or more insurance claims within a ten-year period. According to FEMA, there are 84 properties that have suffered from repeated flooding occurrences in Erie County.

4.5 Winter Storms

A winter storm encompasses several types of storm systems that develop during the late fall to early spring. It deposits any of the following types of precipitation: snow, freezing rain, or ice. Blizzards and ice storms are subcategories of winter storms. A winter storm watch indicates that severe winter weather may affect an area. A winter storm warning indicates that severe winter weather conditions are definitely on the way.

4.5.1 Blizzards

A blizzard warning signifies that large amounts of falling or blowing snow, and sustained winds of at least 35 mph, are expected for several hours. In order to be classified as a blizzard, as opposed to merely a winter storm, the weather must meet several conditions. The storm must decrease visibility to a quarter of a mile for three consecutive hours, include snow or ice as precipitation, and have wind speeds of at least 35 mph. A blizzard is also characterized by low temperatures.

4.5.2 Ice Storms

An ice storm is defined as a weather event containing liquid rain that falls upon cold objects creating 1/4 inch thick or more accumulation of ice buildup. This ice accumulation creates serious damage such as downed trees and power lines, leaving people without power and communication. It also makes for extremely treacherous road conditions.

Occasionally, snow will fall after an ice storm has occurred. With the ice covered, it is nearly impossible to determine which travel areas to avoid. When traveling by car, this snow covered ice causes accidents and when walking it causes people to fall, possibly sustaining injuries.

Erie County is located within the "snow belt" region of Northeast Ohio. Although lake-effect snow squalls can occur anywhere in Ohio, there are two main areas in northeastern Ohio that are stricken with lake-effect snow squalls each winter. The primary snow belt gets anywhere from 60 to 110-plus inches of snow per year. It consists of the eastern half of Cuyahoga County, and all of Geauga, Lake and Ashtabula counties. Some of the major municipalites in this area are Euclid, Bedford, Solon, Lyndhurst, Ashtabula, Jefferson, Conneaut, Andover, Chardon, Burton, Chesterland, Chagrin Falls, Madison, Painesville, Mentor, Willoughby and Kirtland. The secondary snow belt usually gets 40 to 80 inches of



snow per winter and consists of the western half of Cuyahoga Ohio's Snow Belt

County, Lorain and Medina counties, plus the portions of Summit, Portage and Trumbull counties north of Interstate 80. It includes the cities of Cleveland, Bay Village, Westlake, Lorain, Strongsville, Oberlin, North Ridgeville, North Olmsted, Brook Park, Medina, Broadview Heights, Brecksville, Brunswick, Twinsburg, Hudson, Aurora, Garrettsville, and North Bloomfield.

Lake-effect snow is unique to only a few areas of the world, including the Great Lakes. Areas downwind of large bodies of water often receive more snow than the surrounding region because of the interaction of cold air and warm lakes. For example, cold air from the Arctic flows quickly out of Canada during winter and across the Great Lakes. Water in the lakes has stored up high amounts of heat energy from the previous summer. This heat is released through evaporation. The cold air blows over the warm waters of the Great Lakes and picks up the evaporated moisture. As the air rises up over the higher elevations of land downwind of the lakes, it cools further and cannot hold the moisture it has picked up from the lakes. That moisture condenses, forming clouds and snow over what is known as the "snow belt" areas of Ohio and Western Pennsylvania.

In Erie County, there were 18 recorded snow and ice storm events from 1950 to 2004, according to the NCDC. Seventy-one injuries were caused by these events, as well as \$20.3 million in property damage and \$500,000 in crop damage.

4.6 Erosion

Erosion is defined as the removal and transport of earth materials by natural agents. Some of these agents include glaciers, wind, water, earthquakes, volcanoes, tornadoes, hurricanes, mud flows, and avalanches.

4.6.1 Stream bank Erosion

Stream bank erosion is the direct removal of banks and beds by flowing water. Typically, it occurs during periods of high stream flow. It is sometimes confused with gully erosion because it has similarities with seasonal or ephemeral streams.

Erosion of stream or riverbanks through lateral (side) erosion and collapse often causes high sediment loads in creeks and rivers. The problem is often initiated by heavy rainfalls in catchments with poor vegetation cover, causing excess run off. The resultant high volume and velocity runoff concentrates in the lower drainage lines or streams within catchments. When the stress applied by these stream flows exceeds the resistance of



Example of deposited stream sediment following erosion event

the local soil material, stream bank erosion occurs. As the sediment load increases, fast-flowing streams grind and excavate their banks lower in the landscape. Later, the stream becomes overloaded or velocity is reduced, and deposition of sediment takes place further downstream or finally in dams and reservoirs. Stream bank erosion is exacerbated by the lack of riparian zone vegetation and by direct stock access to streams.

In addition to loss of productive land due to bank erosion, dramatic changes in the course of a river or creek often restrict access on properties. Subsequent deposition of soil causes problems on productive land downstream and sedimentation in reservoirs. Other problems include reduction in water quality due to high sediment loads, loss of native aquatic habitats, damage to public utilities (roads, bridges and dams) and maintenance costs associated with trying to prevent or control erosion sites.

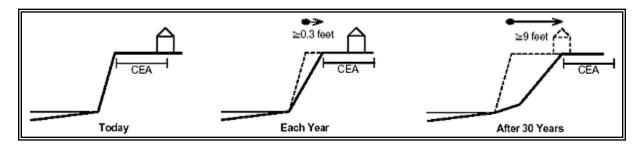
Soil that has eroded and washed into the water is the chief cause of pollution in the waters of Ohio, according to the ODNR. This soil is carried along with the water. When the water's velocity decreases, the soil settles out of the water. This sediment reduces the capacity of creeks, rivers, ponds, and streams, which leads to loss of habitat for insects and fish in that waterway.

4.6.2 Lake Erosion

Lake erosion, also known as coastal erosion, is the gradual wearing and carrying away of land or beach materials by wave action, water, wind, general weather conditions and tidal currents. It is a process which affects the landmass of an area as a consequence of the sea or lake acting upon it. It is usually caused by a relative rise in sea level and the fact that the amount of sediment removed by wave energy exceeds that supplied to the beach by longshore currents.

In 1994, according to a study conducted by the H. John Heinz III Center for Science, Economics and the Environment, it is estimated that coastal erosion will destroy 87,000 buildings within 500 feet of the U.S. shoreline over the next 60 years, including the Great Lakes. Factors contributing to this erosion include rising sea levels, large storms, flooding, and powerful ocean waves. Other study findings indicate that those who live along the coast face as large a risk of damage from erosion as they do from flooding. Roughly 1,500 homes and the land on which they were built will be lost to erosion each year, with losses averaging \$530 million per year.

In Ohio, a Coastal Erosion Area (CEA) is a designated land area along Lake Erie's shore that is anticipated to be lost due to Lake Erie related erosion if preventative measures are not taken. More specifically, a CEA begins at the top of a bluff, bank or beach ridge and includes all land predicted to erode within a 30-year period if that distance totals nine or more feet. In June 1998, the ODNR finalized its official designation of CEAs, including those portions of property along Ohio's 262-mile Lake Erie coast which appear most threatened by erosion. They totaled 2,234 parcels, which represents about 37% of Ohio's Lake Erie coastline. The following diagram illustrates the effects of coastal erosion over a 30-year period of time and is taken from ODNR's Office of Coastal Management. Table 4-2 lists Ohio counties that lie along Lake Erie that describes the erosion distances and rates over long-term and short-term periods of time.



Effects of Coastal Erosion

Table 4-2
Ohio Lake Erie Erosion Statistics by County

County	Long-term Distance in feet	Long-term Rate in feet per year (1877-1973)	Short-term Distance in feet	Short-term Rate in feet per year (1973-1990)
Ashtabula	82	0.9	28	1.6
Lake	160	1.7	32	1.9
Cuyahoga	60	0.6	8	0.4
Lorain	80	0.8	12	0.7
Erie (lake)	103	1.6	42	2.5
Ottawa (lake)	208	2.0	27	1.6
Lucas	520	5.4	46	2.7
Erie (bay)	241	2.8	32	1.9
Ottawa (Bay)	61	2.0	21	1.2

The northern boundary of Erie County consists of 35 miles of shoreline along Lake Erie and Sandusky Bay. The City of Vermilion, Bay View, Sandusky and Huron are all located within this shoreline. A shore structure inventory was conducted in the late 1990s that included Erie County; however, this information is not currently available. The Division of Geological Survey plans to have the information regarding the mainland part of the County available in early 2005. The data regarding Sandusky Bay and Kelleys Island will not be included in that product, but may be available for limited distribution from the office of the Division of Geological Survey.

4.7 Tornadoes

Tornadoes are produced from the energy released during a thunderstorm, but account for only a tiny fraction of the overall energy generated. What makes them particularly dangerous is that the energy is concentrated in a small area, perhaps only 100 yards across. Not all tornadoes are the same and science does not yet completely understand how a portion of a thunderstorm's energy becomes focused into something as small as a tornado.

Tornadoes occur mostly in the central plains of North America, east of the Rocky Mountains and west of the Appalachian Mountains. They occur primarily during the spring and summer – the

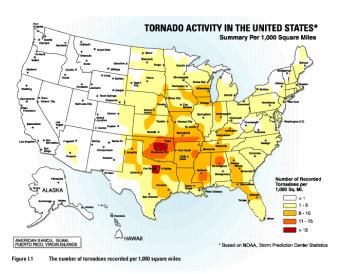
Annual Average Number of Tornadoes, 1950-1995



tornado season comes early in the south and later in the north according to the seasonal changes in relation to latitude – usually during the late afternoon and early evening. They have been known to occur in every state in the United States and every continent on the earth, any day of the year, and at any hour.

The damaging strong winds generated from tornadoes can reach 300 mph in the most violent tornadoes, causing automobiles to become airborne, ripping ordinary homes to shreds, and turning broken glass and other debris into lethal missiles. The biggest threat to living creatures, including humans, during tornadoes is flying debris and being tossed about in the wind. Contrary to previous belief, it is not true that the pressure in a tornado contributes to damage by making buildings "explode."

According to the NWS, the development of Doppler radar has made it possible, under certain circumstances, to detect tornado winds with radar. However, spotters remain an important part of the system to detect



Based on NOAA Storm Prediction Center Statistics

tornadoes, because not all tornadoes occur in situations where the radar can "see" them. Citizen volunteers comprise what is called the SKYWARN (www.skywarn.org) network of storm spotters, who work with their local communities to watch out for approaching tornadoes to ensure that appropriate action is taken during tornado events. Spotter information is relayed to the NWS, who operates the Doppler radars and issues warnings, usually relayed to the public by radio and TV, for communities ahead of the storms. The NWS utilizes all the information they can obtain from weather maps, modern weather radars, storm spotters, monitoring power line breaks, as well as additional sources for issuing tornado warnings.

Although the process by which tornadoes form is not completely understood, scientific research has revealed that tornadoes usually form under certain types of atmospheric conditions. Those conditions can be predicted, but it is not yet possible to predict in advance exactly when and where they will develop, how strong they will be, or precisely what path they will follow. According to the NWS, there are some "surprises" every year, when tornadoes form in situations that do not look like the right conditions in advance, but these are becoming less frequent. Once a tornado is formed and has been detected, warnings can be issued based on the path of the storm producing the tornado, but even these cannot be perfectly precise regarding who will, or will not, be struck.

Table 4-3 shows that although the State of Ohio may not have the most tornadoes, those that do hit Ohio are significant in damage and have other indication factors of a large scale tornado.

Table 4-3
State Tornado Ranking

Rank	Total Number of Tornadoes	Deaths per 10,000 sq. miles	Number of Killer Tornadoes	Total Tornado Path Length per 10,000 sq. miles	Killer Tornadoes as a % of all Tornadoes	Annual Tornadoes per 10,000 sq. miles
1	Texas	Massachusetts	Texas	Mississippi	Tennessee	Florida
2	Oklahoma	Mississippi	Oklahoma	Alabama	Kentucky	Oklahoma
3	Florida	Indiana	Arkansas	Oklahoma	Arkansas	Indiana
4	Kansas	Alabama	Alabama	Iowa	Ohio	Iowa
5	Nebraska	Ohio	Mississippi	Illinois	Alabama	Kansas
6	Iowa	Michigan	Illinois	Louisiana	Mississippi	Delaware
7	Missouri	Arkansas	Missouri	Kansas	North Carolina	Louisiana
8	Illinois	Illinois	Indiana	Indiana	Michigan	Mississippi
9	S Dakota	Oklahoma	Louisiana	Nebraska	New York	Nebraska
10	Louisiana	Kentucky	Tennessee	Wisconsin	Massachusetts	Texas

Although the number of tornadoes in Ohio does not rank high compared to other states in the United States, the State does average around 14 tornadoes a year. Ohio's peak tornado season runs from April through July, with most tornadoes occurring between 2 p.m. and 10 p.m. Even though June has been the month with the most tornado occurrences, many of the State's major tornado outbreaks have taken place in April and May. However, history has shown that tornadoes can occur during any month of the year and at any time of the day or night.

Tornadoes are considered the most violent atmospheric phenomenon on the face of the earth with their strength being measured by the Fujita Scale as described in Table 4-4. This scale is the mechanism used to determine the potential type of tornado that may have affected a particular community. It is based on velocity of wind and the type of damage the tornado caused. Many F0 and F1 tornadoes have touched down in Ohio, but Ohio has also been struck by some of the most destructive (F5) tornadoes ever, including the April 3, 1974 tornado which devastated Xenia, killing over 30 people and destroying 2,000 buildings.

Table 4-4
Fujita Scale for Tornadoes

Scale	Wind Speed	Typical Damage		
F-0 Weak	40-72 miles per hour (mph)	Light Damage: Some chimneys damaged, twigs and branches broken off trees, shallow-rooted trees pushed over, signboards damages, some windows broken.		
F-1 Weak	73-112 mph	Moderate Damage: Surface of roofs peeled off, mobile homes pushed off foundations or overturned, outbuildings demolished, moving autos pushed off the roads, trees snapped or broken; beginning of hurricane speed winds.		
F-2 Strong	113-157 mph	Considerable Damage: Roofs torn off frame houses, mobile homes demolished, frame houses with weak foundations lifted and moved, large trees snapped or uprooted, light-object missiles generated.		
F-3 Strong	158-206 mph	Severe Damage: Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forecast uprooted, heavy cars lifted off the ground and thrown, weak pavement blown off the roads.		
F-4 Violent	207-260 mph	Devastating Damage: Well-constructed houses leveled, structures with weak foundations blown off the distance, cars thrown and disintegrated, trees in forest uprooted and carried some distance away.		
F-5 Violent	261-318 mph	Incredible Damage: Strong frame houses lifted off foundations and carried considerable distance to disintegrate, automobile-sized missiles fly through the air in excess of 300 feet, trees debarked, incredible phenomena will occur.		

Erie County has experienced 13 tornadoes from 1950 to 2004, according to the NCDC. These tornadoes caused \$3.5 million worth of property damage and \$10,000 worth of crop damage. Two deaths and 26 injuries were recorded.

4.8 Drought

A drought is a period of abnormally dry weather that persists long enough to produce a serious hydrologic imbalance (i.e., crop damage, water supply shortage, etc.) The severity of the drought depends upon the degree of moisture deficiency, the duration and the size of the affected area.

The worst drought in 50 years affected 35 states during the long, hot summer of 1988, when some areas had been suffering from lack of rainfall since 1984. Rainfall totals in 1988 throughout the mid-west, Northern Plains and the Rockies were 50% to 85% below normal. Crops and livestock died, and some areas became desert. Forest fires began over the Northwest that left 4,100,000 acres destroyed by autumn.

4.8.1 Droughts-Precursor to Other Disasters

Rural counties are susceptible to wild land fires especially during drought conditions. When most people think of wild fires, the first thing that comes to mind is the devastating and disastrous western fires that are quite prevalent during the summer months.

With more people than ever living, working, traveling and recreating in the urban/urban interface, the odds of wild land fires are increasing. Causes of wild land fires include the careless burning of debris, household trash and cigarettes, lightning, equipment and vehicles, railroad accidents, electrical fires, and arson.

Fire fighters talk of the fire triangle in terms of the heat of combustion, fuel and oxygen all being necessary for fire to occur. Wild land fire fighters are concerned with the wild land fire triangle of fuel (grass, brush, forests, crops, etc.), terrain (open flat lands, steep slopes and everything conducive to wild land fire spread) and weather (hot, dry, windy conditions are typical wild land fire weather).

During an average year in Ohio, an estimated 15,000 wildfires and natural fuel fires occur. Typically, a reported 1,000 wild land fires burn an average between 4,000 to 6,000 acres in Ohio each year.

Although Erie County is susceptible to fires, no recorded information was readily available concerning wild land fires.

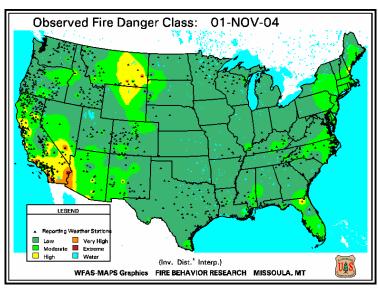
4.8.3 Urban/Rural Fire Interface

The wildland-urban interface can be defined as the zone where structures and other human developments meet or intermingle with undeveloped lands.

Topography plays a major role in how fast a wildfire spreads. Steep slopes are the greatest topographical influence on fire behavior. As the steepness of a slope increases, fires spread more quickly. A fire will spread twice as fast on a 30% slope than it will on level ground. This fast speed is due to the fact that a fire starting at the bottom of a slope has a longer upslope run with more available fuel in its path.

Unlike most hazards, the threat of a drought tends to be dismissed because of the relatively long time a drought takes to have damaging effects.

According to the NCDC, there are three drought events that occurred from 1950 to 2004. The first event was recorded in 1995, the second in 1996, and the third lasted from June to September of 1999. The current US Forest Service forecasts a low fire danger potential for Erie County.



4.9 Earthquakes

4.9.1 Earthquakes in Ohio

The problem with earthquakes are major earthquakes are a low probability, high consequence event. It is because of the potential high consequences that geologists, emergency planners and other government officials have taken a greater interest in understanding the potential for earthquakes in some of the areas of the eastern United States and educating the population as to the risk in their areas. Although there have been great strides in increased earthquake awareness in the eastern United States, the low probability of such events makes it difficult to convince most people that they should be prepared.

It is surprising to many Ohioans that the State has experienced more than 120 earthquakes since 1776, and that 14 of these events have caused minor to moderate damage. The largest historic earthquake in Ohio was centered in Shelby County in 1937. This event, estimated to have had a magnitude of 5.5 on the Richter scale, caused considerable damage in Anna and several other western Ohio communities, where at least 40 earthquakes have been felt since 1875. Northeastern Ohio, east of Cleveland, is the second most active area of the state. At least 20 earthquakes have been recorded in the area since 1836, including a 5.0 magnitude event in 1986 that caused moderate damage. A broad area of southern Ohio has experienced more than 30 earthquakes.

Although the New Madrid Line is in close proximity to the State of Ohio, there has not been an earthquake of any significance since 1875 caused by this fault line. An earthquake on June 18, 1975 caused damage in western Ohio, and affected a total area estimated at over 40,000 square miles. Walls were cracked and chimneys thrown down in Sidney and Urbana. The shock was felt sharply at Jeffersonville, Indiana. The affected area included parts of Illinois, Indiana, Kentucky and Missouri.

4.9.2 Monitoring of Earthquakes

The ODNR Division of Geological Survey has established a 23 station cooperative network of seismograph stations throughout the State in order to continuously record earthquake activity. The network, which went on line in January 1999, ended a fiveyear gap during which there was only one operating station in Ohio. The State was dependent Kentucky seismographs in and Michigan to record Ohio earthquakes.

The 23 stations of the new seismograph network, which is called OhioSeis, are distributed across the State, but are concentrated in the most seismically active areas or in areas that provide optimal conditions

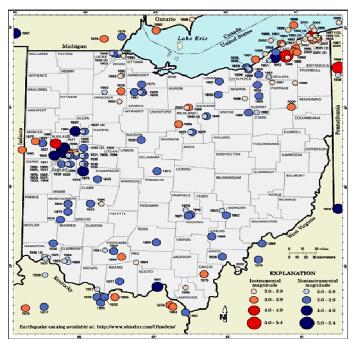


for detecting and locating very small earthquakes that are below the threshold of human notice. These small micro earthquakes are important because they occur more frequently and help to identify the location of faults that may periodically produce larger, potentially damaging earthquakes.

The OhioSeis seismograph stations are located at colleges, universities and other institutions, employing new technology that not only makes them very accurate, but also relatively inexpensive and easy to operate and maintain. In contrast to the old technology, in which a pen made a squiggly line on a paper drum, the new system is entirely digital and uses a desktop computer to continuously record and display data. Two other innovations have made the system unique. An inexpensive Global Positioning System (GPS) receiver is used to keep very precise time on the continuously recorded seismogram, and each station's computer is connected to the Internet for rapid data transfer.

Each OhioSeis station is a cooperative effort. Seismometers, the instrument that detects Earth motions, and other seismic components were purchased by the Division of Geological Survey with funds provided by FEMA through the OEMA, as part of the National Earthquake Hazards Reduction Program. The computers and Internet connection were purchased and provided by the cooperating institutions.

The Division of Geological Survey is coordinating the seismic network and has established the Ohio Earthquake Information Center at the Horace R. Collins Laboratory at Alum Creek State Park, north of Columbus. This facility functions as a repository and laboratory for rock core and cuttings, has but а specially constructed room for earthquake recording. The seismograph system allows for very rapid location of the epicenter calculation of the magnitude of any earthquake in the State. The earthquake records, or seismograms, from at least three seismograph stations are needed to earthquake determine locations (epicenters). These records can downloaded from the internet at any station on the network, and location and magnitude can be determined. Small earthquakes were in many cases not even detected by distant, out-of-date seismograph stations.



Epicenters of past earthquakes in Ohio.

The OhioSeis network provides a whole new dimension of understanding about the pulse of the Earth beneath Ohio. Although the new seismograph network will not predict earthquakes or provide an alert prior to an event, it will provide insight into earthquake risk in the State so that intelligent decisions about building and facility design and construction, insurance coverage and other planning decisions can be made by individuals, business and industry, and governmental agencies.

Erie County has not had a recorded epicenter within its boundaries. According to OEMA's Earthquake Program Manager, the risk in Erie County's zone is low. The natural geology in the area lends itself to very stable conditions if an earthquake were to occur.

4.10 Significant Events

Significant events pertaining to Erie County were chosen by evaluating the NCDC tables that listed hazards in Erie County that have produced the largest amount of damage based on human or monetary measures. The Core Group also used the collective knowledge they had coupled with the vast amount of local experience and history to determine which events they considered significant. Refer to Appendix E for descriptions of significant events affecting this county for each type of hazard.

Vulnerability Assessment

5.0 VULNERABILITY ASSESSMENT

Erie County is susceptible to many different kinds of natural hazards as reviewed in the previous section of this plan. If a hazard event struck vacant land, there would not be much cause for concern. However, since Erie County has close to 80,000 residents and thousands of homes, businesses and critical facilities, the potential for damage and injury could be high, especially in higher populous areas such as Sandusky and Huron.

This chapter reviews how vulnerable Erie County is to property damage and threats to public health and safety. This chapter also reviews how hazards may have an adverse impact on the economy. The potential for property damage is measured in dollars based on historical events of the past and damage incurred from those events.

A four-step process was followed to estimate the cost to Erie County of the hazards reviewed in the Hazard Profile section (Section 4.0) of this report. This process was documented on a per hazard basis. The steps that were used are as follows:

- Step 1: Inventory critical facilities and structures susceptible to property damage.
- Step 2: Determine potential dollars lost based on various levels of damage on different categories of structures.
- Step 3: Evaluate the impact on infrastructure and general population.
- Step 4: Evaluate property damage, loss of life and economic losses.

5.1 Critical Facilities

Members of the Core Group from each of the communities were asked to compile a list of critical facilities pertaining to their community. All the critical facilities within Erie County (schools, hospitals, water treatment plants, airports, police and fire stations, nursing homes, entertainment facilities, and any other facility deemed a critical facility for their county) are charted on the map entitled 'Erie County Multi-Hazard Map' in Appendix F. See Table 5-1 for a summary of critical facilities by facility type. Please refer to Appendix G for a complete list of these critical facilities.

Table 5-1
Critical Facilities in Planning Area

Property	Count
Medical Facilities/Nursing Homes	9
Emergency Services	23
Schools	38
Community Facilities/Churches	26
Municipal/Government Facilities	31
Industry	1
Energy	1
Total Critical Facilities	129

The Multi-Hazard Map will also be made available in digital form so that the table associated with the critical facilities shape file will be accessible. This accessibility will allow the attributed information for the critical facilities to be viewed by simply clicking on the critical facility on the map and viewing the information for that facility. This will also allow for easy facilitation of updates to the critical facilities list when the Mitigation Plan is updated.

5.2 Potential Dollars Lost

The second step of the vulnerability assessment was to calculate the impact of the given hazards in terms of property damage and loss of property use. Averages and typical situations were used for various categories of facilities. This approach did not predict which facilities will be hit by which hazard, but it instead provided a general estimate of the level of damage that would be expected based upon available data.

First, the value of the property being damaged was determined based on average value of a facility within that category. Typical values of the structures were determined using data received from the County's Auditor's Office.

Contents value was calculated as a percentage of the structure's value. Table 5-2 shows the relative value of the typical contents to the typical structure type. These ratios were taken from FEMA guidance documents.

Table 5-2
Contents Value as a Percentage of Structure Value

Occupancy Class	Value (%)
Residential	50%
Commercial	100%
Industrial	150%
Medical Facilities	150%
Emergency Services	150%
General Government	100%
Schools/Libraries	100%
Colleges/Universities	150%
Religion/Non-profit	100%
Shelters	100%

Second, three levels of physical damage were evaluated for each category of structure. These levels have a percentage of damage associated with each. The dollars lost for each level, however, may be underestimated since there may be downtime associated with closing a business for an extended period of time.

 Minor damage: Many structures exposed to a storm or other hazard will suffer only minor to moderate damage. For example, a hurricane may just damage the roof and windows of some structures. For this calculation, 5% of the structure's value was used. Because the structure stays substantially intact, no contents losses were considered.

- Moderate damage: This category represents more serious damage, such as a collapsed wall or floodwater over the first floor of a building. Moderate damage is calculated as 40% of the structure's value plus 40% of the content's value.
- Major damage: This category is used when a building is demolished or heavily damaged. An example of the former is a house leveled by a tornado. An example of the latter is floodwater more than 1.5 feet over the lowest floor (i.e., over the electrical outlets). The average dollar figure for this category is 75% of the structure's value and 75% of the contents' value.

Table 5-3 shows the calculated dollar losses for each level of damage per facility type. The type of facility as listed was limited to that information available from the County Auditor's Office.

Table 5-3
Physical Potential Dollar Losses

Property	Avg. Value	Minor Damage	Moderate Damage	Major
				Damage
Residential	\$91,290	\$4,565	\$36,516	\$68,468
Commercial	\$245,985	\$12,299	\$98,394	\$184,489

5.3 Vulnerability Data Collection

Prior to beginning an assessment of a community's vulnerability to hazards, local sources of information were researched including comprehensive plans, land use plans, land development regulations and flood regulations, to determine if the county previously addressed its vulnerability to any particular hazard. In most cases, local plans and regulations did not yet exist or were very minimal in addressing natural hazard situations and building parameters. Further, a vulnerability assesment of future buildings, infrastructure and critical facilities also could not be completed due to data limitations.

Therefore, other state and national sources were researched for detailed information. One of these resources was the NCDC. The NCDC is the world's largest active archive of weather data. The NCDC produces numerous climate publications and responds to data requests from all over the world. The NCDC supports a three-tier national climate services support program that includes partners such as the NCDC, Regional Climate Centers, and State Climatologists. The NCDC has long served as a national resource for climate information. The NCDC's data is used to address issues that span the breadth of this nation's interests. As climate knows no boundaries, the NCDC works closely with scientists and researchers world-wide to develop both national and global data sets that have been used by both government and the private sector to maximize the resources provided by our climate and minimize the risks of climate variability and weather extremes. The NCDC has a statutory mission to describe the climate of the United States and acts as the nation's scorekeeper regarding the trends and anomalies of weather and climate. The NCDC's climate data have been used in a variety of applications including agriculture, air quality, construction, education, energy, engineering, forestry, health, insurance, landscape design, livestock management, manufacturing, recreation and tourism, retailing, transportation, and water resources management among other areas. The NCDC's data and products fulfill needs ranging from building codes to power plant and space shuttle design.

Another source of hazard information that was explored was the Ohio Seismic Network as described in previous sections of this report. The Division of Geological Survey of the ODNR coordinates a 23-station cooperative network of seismograph stations throughout the state in

order to continuously record earthquake activity. OEMA's Ohio Earthquake Program Manager was also contacted to discuss the risks associated with each county to determine if the type of geology lends itself to increased damage.

Because the state and national agencies are not always privy to the local knowledge, some information extracted from their libraries may not be comprehensive or complete. Therefore, the Mitigation Focus Group used their experience and knowledge with verification from the local EMA directors to prioritize the hazards determined to affect the county the most and assess them according to local concerns.

5.4 Vulnerability Assessment by Hazard

5.4.1 Severe Storms

Erie County is highly susceptible to severe storms, which encompasses thunderstorms, high winds, lightning and hail. See Appendix H for tables extracted from the NCDC that show the number of reported events since 1950.

5.4.1.1 Infrastructure Impact

Since severe storms are random in nature, the impact on the County's infrastructure is not limited to a certain area as with river flooding. Homes and businesses all throughout the County are susceptible to high winds, lightning and hail. Shingles are blown from rooftops and hail may dent siding or break windows. Lightning strikes may be more damaging to structures that are not grounded with lightning rods. Trees may become uprooted and limbs detached and blown into structures. Winds also cause severe damage to mobile home parks and campgrounds if units are not properly secured to permanent structures.

Utilities and municipal plants may also be damaged during severe storms. Debris, such as tree limbs, blown into utility lines may cause downed power lines. Wastewater plants may also be adversely affected with blown limbs and debris clogging the tanks and filters.

5.4.1.2 Population Impact

Because severe storms are random in nature, the entire County population is susceptible and should be prepared. All citizens should become familiar with locations of shelters in which they can seek safety in the event of severe weather.

5.4.1.3 Property Damage

According to the NCDC, there have been 203 severe storm events in Erie County reported since 1968, with total property losses totaling \$35.3 million. The majority of property losses occurred between 1996 and 2004. The average annual losses reported for the County during these eight years was approximately \$4.4 million.

This information shows that severe storms and high winds are extremely costly to the County and have intensified over the past eight years.

5.4.1.4 Loss of Life

Since 1994, there have been 28 recorded injuries and five deaths due to severe storms, wind, lightning and hail. Due to the relatively high severity of the storms affecting Erie County, the potential for injury and death is relatively high. Since the population of the County is forecasted by the 2000 Census to increase, the potential for injury and/or loss of life will also increase. One of the biggest problems associated with severe storms is the lack of public education and awareness. Citizens are not aware of the warnings and dangers associated with severe weather.

5.4.1.5 Economic Losses

The economic losses a community suffers during a severe storm event can be high. In communities with hazard trees, these trees have the potential to destroy homes and businesses if uprooted. Fallen branches may also cause severe damage. Residents and business owners then turn their efforts from work and running a business to clean up efforts.

With the average house value at \$91,290 and the majority of the houses built around 1960, damage costs from severe storms begin to accumulate quickly due primarily to the age of the house and its susceptibility to damage. Residents often cannot rely on federal assistance for the total damages incurred. Since January 1, 1964, the President of the United States has declared Erie County a disaster area on only two occasions due to damage suffered by severe storms. If a Presidential Disaster Declaration is granted to the County, federal money may not cover the entire amount of damage. Therefore, the County and local governments must find the additional money needed to complete the clean up process.

5.4.2 Flooding

Flooding is a site-specific hazard. Therefore, floodplains are an important planning consideration. A floodplain is any land area susceptible to inundation by floodwaters from any source. Floodplains are measured in terms of the amount of stormwater that it takes to cover a given area of land. These storm events are measured in frequency of occurrence, such as 5-year, 100-year and 500-year, with the standard measurement being the 100-year storm or floodplain. The 100-year floodplain is the land area having a 1 in 100 chance of flooding in any given year, but the statistics can be misleading. In reality, the 100-year storm or flood could occur two, three, or several years in a row (unlikely but possible), because the 100-year flood is a statistical probability and not a predictable recurrence. Statistically, the 100-year flood has a 25% chance of occurring during the typical 30-year lifespan of a home mortgage.

Any development within floodplains can impact the direction, flow and level of the watercourse during periods of high water or flooding. In other words, if fill material is placed or a house constructed in a floodplain, it will alter the boundaries of the floodplain downstream of that area. This alteration happens because structures or fill utilize valuable space that would otherwise act as a natural retaining area for floodwaters to spread and slow. Not only does development in the floodplain increase dangers downstream, developments within the floodplain are at higher risk of damage due to flooding. This damage includes fill material and debris from destroyed structures upstream colliding with structures in the floodplain downstream of an affected area. Many bridges are washed out in floods because river borne debris clog their free-flow area.

5.4.2.1. Infrastructure Impact

There are a total of 2,136 structures in Erie County considered to be at-risk due to flooding. Of this total number, 1,292 of the structures are located in the unincorporated areas and 844 are located in the incorporated areas of the county. (This information was collected from the ODNR's Division of Water Floodplain Geographical Information Management System (GIMS) Project.) All the at-risk structures are located on the maps in Appendix F. These at-risk structures are located within the 100-year floodplain and are therefore susceptible to damage during a flood.

At-risk structures in areas of flash flooding areas, which are not within the 100-year floodplain were not identified by the ODNR's GIMS project and consequently have not been mapped.

5.4.2.2 Population Impact

Based on the NCDC data published for the 1950 through March 2004 time period, Erie County's citizens have had to endure multiple flooding situations, including flash floods and river floods. See Appendix H for tables extracted from the NCDC that show the number of reported events since 1950. Flash floods affect a specific area over a short period of time and a smaller population than river floods. On occasion, a life may be lost because of water rising very quickly in this short time.

Unlike flash flooding, the 100-year river flood has a less likelihood of occurring but will impact a larger population. The streams and rivers within the floodplain will flood their 100-year floodplains on an average of once every 100 years. This flood will affect the populations occupying at-risk structures located in the floodplain area shown on the Multi-hazard Map in Appendix F.

5.4.2.3 Property Damage

Based on information retrieved from the NCDC, river flooding in Erie County has accounted for \$5.4 million in property damage from 1993 through 2004. On average, the County suffered \$491,000 per year in total damage.

Approximately 25% of Erie County is in the 100-year floodplain as shown on the Multi-Hazard Map in Appendix F. There are an estimated 2,136 at-risk structures in the 100-year floodplain. Of this number of at-risk structures, 50% are assumed to be commercial buildings with the rest of the buildings being residential. According to the County Auditor's Office, the average value of a residential housing unit in Erie County is \$91,290. With 1,068 of the at-risk structures being residential, the County's average potential dollars lost due to residential property complete destruction is \$97,497,720, not including contents replacement. The average commercial unit value is \$245,985, which would account for an average loss in property damage of \$262,711,980, not including contents replacement, assuming the structures were completely destroyed.

On the other hand, based on information retrieved from the NCDC, most flood damage in Erie County is caused by flash flooding. From 1993 through 2004, the County suffered \$4.3 million in property damage from flash flooding as compared to \$1.5 million in damage from river flooding. On average, Erie County incurred approximately \$391,000 of property damage per year due to

flash flooding. Since the flash flood areas have not been mapped, it is difficult to assess the number of impacted structures and potential future dollars lost due to this hazard.

5.4.2.4 Loss of Life

Even though the NCDC has no recorded deaths or injuries due to flooding from 1993 through 2004, the potential for death and injury is ever present, especially in flash flood events. During flash floods water rises very quickly and may catch citizens by surprise. Homeowners may not be prepared for the rising waters and the need to seek safety quickly. Motorists often think that they can drive through ponded water and therefore risk getting stuck in the flooded area. By educating the residents of the Erie County, the risk to human life can be reduced.

5.4.2.5 Economic Losses

The economic losses a community suffers during a flood event can be high. Productivity decreases as residents miss work to tend to the damage incurred at their homes. Some inventory within a business itself may be lost if the owner is not prepared and the facility not flood proofed prior to a flood event. Small businesses may suffer so much damage that they are unable to reopen. Contractors and clean up companies may reap the benefits of the damage but not enough to offset the overall losses to the economy.

The County's infrastructure will also suffer damage to be repaired. Some roads and bridges may wash out. Erie County has areas that suffer repeated flooding and are mapped on the Multi-Hazard Map in Appendix F.

Residents often cannot rely on federal assistance for the damages incurred. Since January 1, 1964 Erie County has been declared a federal disaster area on four occasions due to damage suffered by severe storms and associated flooding. If a Presidential Disaster Declaration is granted to the County, federal money may not cover the entire amount of damage. Therefore, the County and local governments must find the additional money needed to complete the clean up process.

5.4.3 Winter Storms

Erie County is located in the northern portion of Ohio in the outer reaches of the "snow belt" making it moderately to highly susceptible to winter storms, which encompass snow, ice and extremely cold temperatures. See Appendix H for tables extracted from the NCDC that show the number of reported events since 1950.

5.4.3.1 Infrastructure Impact

Because the area receives a moderate amount of snowfall, all of the structures erected in the County are susceptible to damage if not designed to the proper snow load-bearing parameters.

5.4.3.2 Population Impact

Because snow and ice storms occur countywide, the entire county population is susceptible and should be prepared. Motorists should be aware of declared snow emergencies and seek safety before becoming stranded. Motorists should also be educated on the presence of black ice on

roadways and bridges. The sensitive populations will be the most susceptible to snow and ice and should prepare for such events prior to the winter months.

5.4.3.3 Property Damage

According to the NCDC, there have been 25 winter storm events, including extreme cold, in Erie County reported since 1993, with total property losses of \$24.7 million. The majority of losses due to snow and ice were recorded during the years 2000 and 2004, accounting for \$17.4 million. One event in 1996 caused by extremely cold temperatures caused \$3.4 million in property damage.

5.4.3.4 Loss of Life

Since the County is located in the "snow belt," snow, ice and extremely cold temperatures will always be a natural hazard that has potential to cause significant property and crop damage. Since 1993, there have been 13 recorded deaths and 72 recorded injuries due to winter storms and extremely cold temperatures. Due to the number of winter events affecting Erie County, the potential for increase, the potential for loss of life and injury of life will also increase. One of the biggest problems associated with winter storms and extreme cold is the lack of public education and awareness. Citizens are not aware of the warnings and dangers associated with severe weather, such as driving on ice and snow and medical conditions relative to frostbite and hypothermia.

5.4.3.5 Economic Losses

The economic losses a community suffers during a winter storm event may be moderate. Residents and business owners turn their efforts from work and running a business to digging themselves out of the snow. If power lines become burdened with snow and snap, prolonged power outages may cause some businesses to close for an extended period of time leading to loss of revenue. In communities with hazard trees, these trees have the potential to damage homes and businesses if branches loaded with snow crack off and fall.

Residents often can not rely on federal assistance for the total damages incurred. Since January 1, 1964, the President of the United States has declared Erie County a federal disaster area on only one occasion due to damage suffered by winter storms. If a Presidential Disaster Declaration is granted to the County, federal money may not cover the entire amount of damage. Therefore, the County and local governments must find the additional money needed to complete the clean up process.

5.4.4 Stream Bank and Lake Erosion

As seen in the hazard profiles and as determined by the Core Group, Erie County has a countywide risk of incurring damage from lake erosion and stream bank erosion. The coastal area of Erie County extends inland on average from 1/8 mile to 1/4 mile on average, but continues to incorporate lake-influenced tributaries, embayments, wetlands and estuarine areas. In urban areas, the coastal boundary is generally less than 1/2 mile from the shore. Stream bank erosion occurs along the Vermilion River, Huron River, Mills Creek and their tributaries and is accelerated during flooding due to higher than normal water velocities within the streams.

If property protection measures are not taken to avoid lake erosion along Lake Erie, the risk of damage to or loss of property, possessions, infrastructure and life are greatly increased.

5.4.4.1 Infrastructure Impact

As floodwaters overflow their banks, they carry sediment and debris from residential lawns, agricultural land and other sources further downstream and eventually into the channels of the creeks and their tributaries. This sediment and debris deposition has an adverse effect on aquatic and riparian habitats in Erie County and its watersheds. The bridges in Erie County act as collection sites for this debris, causing blockages of the floodway that raise flood elevations further downstream and also threaten evacuation routes during extreme flood emergencies.

In addition, erosion left untreated may cause damage to roadways along stream banks and public piers and marinas along Lake Erie. Undermining of pavement may cause roadways to crumble and slip down the bank, creating hazards for motorists. Public piers and marinas that are affected by erosion could be potentially dangerous, especially near recreational areas or public parks.

5.4.4.2 Population Impact

Since the threat of stream bank erosion and lake erosion is typically localized, the County's population living near stream banks and the coast of Lake Erie needs to be aware of erosion hazards. Motorists traveling on roads that closely parallel stream banks also need to be aware of the damage that erosion can cause to pavement.

5.4.4.3 Property Damage

Property erosion results in accumulation of sediment and debris within and along the channel of streams and along the shores of Lake Erie. In streams, this accumulation occurs as sediment and debris settles in the channel simultaneously lowering the elevation of the stream banks and raising the elevation of the streambed. The subsequent result is a reduction in the carrying capacity of the streams, which causes higher water elevations during future floods. Since property damages due to flooding were high, property damages for stream bank erosion are also high due to similar effects on surrounding areas.

Factors that cause shoreline erosion include bluff recession, high lake levels, high winds and human activities. These cause many problems to the coastal communities of Bay View, Sandusky, Huron, Vermilion and Kelleys Island. Manmade shoreline structures that lie within a designated CEA along Lake Erie's coastline are susceptible to property damage over a 30-year period. Because of the large number of residential properties located within a CEA along the shoreline, property damages are expected to be high.

5.4.4.4 Loss of Life

Stream bank and lake erosion are not considered to be life threatening. Some injuries may result from flooding but none have been recorded. Other injuries may be caused by motorists being unaware of damaged pavement and possibly driving off the road. However, damaged roads that may cause traffic accidents are typically closed for repairs to minimize the number of motorists traveling through that area. Therefore, the potential for death or injury is minimal.

5.4.4.5 Economic Losses

Based on the property damage expected from stream bank and lake erosion, the impact on the local economy and local government expenditures is considered to be high. Manmade shoreline structures built along the Lake Erie shoreline trap sand supply, causing beachless shores. Lack of beaches may have an adverse effect upon tourism in Erie County. County roadways may be affected and in need of repair but this repair does not typically have an adverse effect on the economy as motorists will find an alternate route.

5.4.5 Tornadoes

Erie County is highly susceptible to tornadoes, which could strike anywhere in the county. As seen in the hazard profile and as determined by the Core Group, Erie County has a moderate risk of incurring damage from tornadoes. See Appendix H for tables extracted from the NCDC that show the number of reported events since 1950.

5.4.5.1 Infrastructure Impacts

Because tornadoes are random in nature, no one area of the County is more susceptible to infrastructure damage than another. In Erie County, the occurrence of tornadoes is low with only 13 occurring since 1950. However, the damage incurred by these tornadoes has been excessive. Therefore, the effect on the infrastructure is moderate based on the strength of the tornadoes that have occurred and the destruction that has been associated with them. In 1992, a tornado that touched down in the County was classified as an F2 and caused significant damage to residential and commercial buildings.

Please see the Erie County Multi-Hazard Map in Appendix F for tornado paths recorded in the County.

5.4.5.2 Population Impacts

Since tornadoes typically present localized hazards, the overall population impact within the County is expected to be relatively low. However, based on the tornado paths that have been tracked through Erie County, many populations are susceptible to destruction during just one event. Therefore, the overall impact on the County population should be considered moderate to high. The populations located in mobile home parks and campgrounds should take particular care to seek adequate permanent shelter with approaching severe weather.

5.4.5.3 Property Damage

According to the NCDC, there have been 13 tornadoes in Erie County reported since 1950 with magnitudes ranging from F0 to F4. These tornadoes caused total property losses averaging \$3.5 million. However, one tornado occurred in 1992 recording \$2.5 million in damage, which also was the most damage in one event that has been recorded. The average loss for the other twelve recorded events was \$82,100.

With the exception of the 1992 tornado event, the County has not suffered significant property damage due to tornadoes on an annual basis. Since the average dollars lost of the other events was near \$82,000, there is a low impact relative to property damage on an annual basis.

5.4.5.4 Loss of Life

Since 1950, there have been 2 recorded deaths and 26 recorded injuries due to tornadoes. The two deaths and 23 of the injuries were all associated with one particular F4 tornado that struck the County in 1953. Because approximately 15% of all the tornadoes that have struck the County caused death and injury, the potential for death and injury is moderate to low. Since the population of the County is forecasted by the 2000 Census to increase, the potential for injury and/or loss of life will also increase.

One of the biggest problems associated with tornadoes is the lack of public education and awareness, especially since tornadoes do not happen that frequently. Citizens are not aware of the warnings and dangers associated with severe weather and tornadoes and thus may not be prepared.

5.4.5.5 Economic Losses

Due to major destruction associated with some of the tornadic events in Erie County, the overall impact on the economy is moderate. If a tornado were to strike, the majority of the economic losses would be local versus countywide. However, many communities rely on the support of other communities throughout the county for clean up. Many businesses' daily income may be disrupted by the clean up process.

A federally declared disaster area because of tornado damage has never been recorded for Erie County. Therefore, all clean up costs would be funded locally.

5.4.6 Drought

As seen in the hazard profile and as determined by the Core Group, Erie County has a low risk of incurring damage from droughts and extreme heat. Due to the non-site specific nature of this hazard, the best way to deal with preparing for future events is to consider historical occurrences. This information was obtained from the NCDC website, and is shown in Appendix H.

5.4.6.1 Infrastructure Impact

Because droughts and extreme temperatures are a non-site specific hazard, the effects of a drought should be evaluated countywide. There are no documented critical facilities that are considered at-risk as it relates to droughts.

By itself, a drought does not damage developed property. However, over a long period of time, certain soils can expand and contract resulting in some structural damage to buildings. A small percentage of buildings in areas with such soils suffer minor damage during their "useful lives." Therefore, the overall impact on the County's infrastructure will be very low.

5.4.6.2 Population Impact

Since drought and extreme temperature events are non-site specific, the entire County population could be affected by hot, dry or cold, frigid conditions. The overall impact that droughts and extreme temperatures have on the Erie County population is low based on the number of events recorded by the NCDC since 1950. Therefore, the County's residents,

especially the sensitive populations, should still be aware of the dangers of extreme temperatures, such as heat stroke and hypothermia.

5.4.6.3 Property Damage

According to the NCDC, there have been six droughts in Erie County between 1995 and 1999. No events have been recorded outside of those years. The drought of 1999 was the most significant drought event, lasting four months and causing \$200 million in crop.

The extreme cold recorded during the winters of 1993 and 1997 were the most significant events with regard to property damage, with 100% of the recorded property damage at \$5.5 million.

Overall, the County has suffered significant property and crop damage due to extreme temperatures and drought conditions. However, these events do not occur frequently. Therefore, there is a moderate impact relative to property damage.

5.4.6.4 Loss of Life

Since 1950, there have been 31 recorded deaths and 76 injuries due to drought and extreme temperatures. Because the number of drought and extreme temperature events that have affected Erie County is low but the number of deaths and injuries is high, the potential for death and injury is moderate.

Citizens still need to be educated on the dangers of extreme temperatures. Because drought conditions are not prominent, citizens tend to not be aware of the warnings and dangers associated with conditions like heat exhaustion and heat stroke and thus may not be prepared.

5.4.6.5 Economic Losses

Due to the amount of damage recorded for drought and temperature extremes events in Erie County, the overall impact on the economy is moderate. However, when droughts do occur, the economic losses will be countywide, affecting the farming community the most. It is very unlikely that a Presidential Disaster Declaration would occur, therefore the all mitigation costs would be funded locally.

5.4.7 Earthquake

As seen in the hazard profile and as determined by the Core Group, Erie County has a very low risk of incurring damage from earthquakes. The County has never had an epicenter within its boundaries.

5.4.7.1 Infrastructure Impact

Due to the geology in the area, Erie County is not expected to feel earthquakes occurring however, Erie County did feel the Perry, Ohio earthquake of 1986. The thick layer of glacial till in the area can act as a buffer and absorbs seismic shock waves. Therefore, the impact of the County's infrastructure is extremely low.

5.4.7.2 Population Impact

Since the threat of an earthquake is minimal, the overall impact on the County's population will be very low. However, all citizens within the county need to be aware of the threat of potential earthquakes.

5.4.7.3 Property Damage

The level of damage expected from an earthquake in Erie County is very low. It would be no worse than a 3.0 to 3.9 magnitude quake as registered on the Richter scale. A quake of this magnitude would be felt by most people and include some breakage of dishes, windows and plasters.

5.4.7.4 Loss of Life

The level of an expected earthquake is not considered to be life threatening. Some minor injuries may result from falling objects. Because the likelihood of an earthquake occurring is very low, the potential for death or injury is minimal.

5.4.7.5 Economic Losses

Based on the very limited property damage expected from a 3.0 to 3.9 magnitude earthquake, the impact on the local economy and local government expenditures is considered to be minimal.

6.0 GOALS

Goals were needed for this planning effort to guide the review of the possible mitigation measures. The recommended actions of this plan are consistent with what is appropriate for Erie County. Mitigation goals reflected community priorities and should be consistent with other plans for the county.

After the determination of the draft problem statements, the Core Group agreed to goals that they wanted to achieve for each hazard. These goals are listed in the following section.

6.1 County Goals

Severe Storms (Summer)

Overall Goal: To increase awareness of summer storms and reduce property damage by evaluating current means of response and determining where Erie County needs to coordinate better in reacting and planning for summer storms.

Flooding (including 100-year flood zone, non-flood zone, and flash flooding)

Overall Goals: To save lives and property, reduce damage and to increase education (awareness) of flooding and how floods can affect a community.

Winter Storms/Ice Storms

Overall Goal: To increase awareness and reduce property damage of winter/ice storms and to also evaluate needs to prepare for winter/ice storms such as the need for back-up generators for critical facilities within Erie County.

Stream bank and Lake Erosion

Overall Goal: To evaluate true needs as it relates to what mitigation activities can go in place to lessen stream and lake bank erosion.

Tornadoes

Overall Goal: To evaluate the need for shelters and safe rooms for Erie County especially in areas of greatest concern such as campgrounds and large critical facilities such as Cedar Point Amusement Park.

Droughts (Excessive Heat- Excessive Cold)

Overall Goal: To reduce potential damage and to increase awareness of drought occurrences throughout Erie County by increased preparedness.

Earthquakes

Overall Goal: To increase awareness of earthquake events and to establish administrative controls that address earthquakes during construction.

Hazard Mitigation Practices

7.0 HAZARD MITIGATION PRACTICES

As required by the DMA2K, this Mitigation Plan summarizes policies, plans, regulations, programs and projects that Erie County has implemented or is planning to implement in the future that affect growth and how the county can achieve and maintain sustainability and disaster resiliency. These administrative controls and activities are separated into six categories as determined by FEMA which are referred to as hazard mitigation activities. The following sections describe these general categories, as well as plans and activities that the communities are implementing now or plan to implement in the future.

7.1 Property Protection

Protection measures are usually undertaken by property owners on a building-by-building or parcel basis. They help reduce a building's susceptibility to flood damage.

7.1.1 Acquisition

Acquisition of a property and removing any structures eliminates the potential for harm to residents and businesses. After any structures are removed, the land is usually converted to public use, such as a park, or allowed to revert to natural conditions.

7.1.2 Relocation

Relocation is moving a building to higher ground, either within the same property boundary or to a separate property. The building should always be moved to an area not susceptible to flooding.





7.1.3 Retrofitting

Retrofitting a flood-prone structure entails installing flood protective measures on a specific structure or group of structures. Some of the more common examples of retrofitting and flood-profing are elevating a flood-prone building above the flood level, creating barriers around a flood-prone structure, dry floodproofing a structure to make it watertight and wet floodproofing to intentionally allow floodwaters to enter and yet reduce water pressure on the structure.

Retrofitting structures for other hazards is also possible. Structures affected by high winds can possibly be mitigated by securing a roof structure with adequate fasteners or tie downs to mitigate damage that may occur. Other retrofits are to strengthen garage doors, windows and other large openings. For tornadoes, constructing underground shelters or safe rooms can save lives. Burying power lines is a retrofit measure that addresses the winds from tornadoes, thunderstorms and ice that accompany winter storms.

Based on available information, Erie County has not implemented any property protection measures on a countywide basis.

7.2 Preventive Measures

7.2.1 Planning and Zoning

7.2.1.1 Comprehensive Planning

Comprehensive plans and land use plans specify how a community should be developed (and where development should not occur). Through these plans, uses of land can be tailored to match the land's hazards. Comprehensive planning reflects what a community wants to see happen to their land in the future. A comprehensive plan can look 5, 10, or even 20 years into the future to help a community plan and shape how they envision their community. However, planning is only one part of the puzzle and usually has limited authority. Tied with zoning comprehensive planning can be more effective.

In 1995, the Erie County Department of Planning and Development updated the *Comprehensive Plan for Erie County*, which the Erie County Regional Planning Commission and consultants, Parkins, Rogers, and Associates submitted in 1970. Since 1970, many changes in the County have resulted in problems for local residents. The outdated Plan has resulted in increased traffic congestion, sprawling residential growth, the disappearance of primary farmland and the overcommercialization of U.S. 250.

The Plan is designed to coordinate land use with the limitations of the natural environment, the current established land uses and infrastructure. It is the County's blueprint for the future by outlining the strengths and weaknesses of the region. The most pertinent problems include the loss of agricultural land, congested roads and the overall degradation of the urban and rural environments. The Plan will only be effective if the political subdivisions within Erie County work together to ensure that planned development occurs throughout the region. The Plan requires that the cities and villages in the County develop their own detailed plans, which will function in concept with the County plan.

The community of Erie County has expressed several ideas and concerns about future land use in their 1995 Erie County Comprehensive Development Plan. Erie County is faced with development pressures due to expanding residential areas in and near villages. The following guidelines have been established for Erie County in the Comprehensive Development Plan:

- Promote community development through redevelopment, economic development, and constructing infrastructure to meet the demands for development
- Provide all residents in the County adequate, affordable housing
- Preserve the County heritage and those structures significant to its salvation for future generations

- Maintain harmony between the man-made and natural environment by sustaining the County's dedication to protecting the environment through its support of legislation and programs intended to preserve open spaces and natural habitat
- Provide high quality recreation facilities to meet the increasing demands of all residents who reside within the planning area
- Ensure growth in employment will not be obtained through excessive costs to the environment or jeopardize the liveability of the community
- Become efficient and accessible through improvements to street systems, developing along roadways, and through transportation planning
- Encourage growth in areas physically suited and already serviced by infrastructure
- Expand water and sewer lines, and examine capacity issues and wastewater plant upgrade.

The County also has subdivision regulations which comply with the 1995 Erie County Comprehensive Development Plan to assist in future land use concerns. However, the 1995 Comprehensive Plan covers unincorporated areas only. The central focus of the plan is to encourage development in and around the villages and planned subdivisions where public services are available.

7.2.1.2 Zoning Ordinance and Building Codes

A zoning ordinance regulates development by dividing the community into zones or districts and establishing the type of development allowed within each district. The floodplain can be designated as one or more separate zoning districts in which development is prohibited or allowed only if it is not susceptible to flood damage. Some districts that are appropriate for floodplains are those designated for public use, conservation or agriculture. Zoning works best in conjunction with a comprehensive plan or "road map" for future development and building codes.

According to the 1995 Erie County Comprehensive Development Plan, zoning and planning functions and procedures for regions, counties, and townships are split between two different government bodies, the Regional Planning Commission and the Zoning Commission. The Zoning Commission prepares for the enactment of local zoning regulations. The power of townships to zone is based on authority granted in Chapter 519 of the Ohio Revised Code and the limitations imposed within this code. The Zoning Commission may regulate the location, height, bulk, number of stories and sites of buildings and other structures, setbacks, sizes of yards, open spaces, density of population, use of buildings and uses of land for trade, industry, residents, and recreation. The Regional Planning Commission's responsibility is to prepare a plan for the development of the community. Duties of the Commission also include reviewing, evaluating, and making recommendations on proposed land use, transportation, zoning plans and other projects of the local government.

Erie County also enforces Coastal Zone Management. ODNR is responsible for implementing and enforcing regulations of impacts on coastal zone management. In the fall of 1988, the Ohio General Assembly enacted enabling legislation, Senate Bill 70, to authorize ODNR to develop and implement a coastal management program for Ohio. This law became effective March 15, 1989.

7.2.1.3 Open Space Preservation

Open space preservation is a technique that can be used to not only preserve floodplains but to preserve lands that may be crucial to controlling runoff that adds to flood problems. Existing undeveloped areas can be preserved as open space through zoning ordinances. Lands that ought to be set aside as open space but are already being put to other uses can be converted to public ownership (acquisition) or to public use (easement). Once the land is owned by the county, municipality, or state, buildings and other development that are subject to flood damage can be removed or prohibited. Open space lands and easements do not always have to be purchased outright. Developers can be required to dedicate land to the public for a park and/or to provide easements for flood flow, drainage, or maintenance.

There are no locally adopted/implemented programs for farmland protection or open space preservation at this time. Under the 1995 Erie County Comprehensive Development Plan, well-placed open space serves a variety of functions, such as recreation, being aesthetic and separating residential areas from the noise and lights of commercial areas.

The Agriculture Task Force is proposing that new residential and industrial development only be located in incorporated areas where public sewer and water systems exist. This task force also recommends the promotion of farmland preservation tools such as Ohio's Agricultural Easement Program (purchase of development rights) and the Ohio Agricultural District Program.

In addition, the Environmental Task Force recommends that there be a countywide initiative that new developments dedicate at least 5% of the total parcel as green space or open space. They would also like to see condemned structures and abandoned properties purchased and these structures removed to establish green space. The County recommends using underutilized, adequately serviced sites to accommodate new growth as infill areas in order to preserve open space.

7.2.1.4 Subdivision Regulations

Subdivision Regulations govern how land will be broken up into individual lots. These regulations set construction and location standards for the infrastructure built by the developer, including roads, sidewalks, utility lines, storm sewers, stormwater retention or detention basins, and drainage ways.

All of the unincorporated areas in Erie County are subject to the Erie County Unincorporated Area Subdivision Regulations in conjunction with the 1995 Erie County Comprehensive Development Plan. Section 711 of the Ohio Revised Code enables the Erie County Commissioners and the Erie Regional Planning Commission to adopt regulations governing plats and subdivisions of land within their jurisdiction. The subdivision regulations consist of articles outlining procedures for subdivision approval, subdivision design standards, requirements for construction of improvements, required statements and signatures to be affixed on the plat, revisions after plat approval and enforcement. Zoning for rural areas and provisions with the County subdivision regulations are two planning tools implemented for ensuring harmony among new non-farm dwellings within the rural development. The County recommends using underutilized, adequately serviced sites to accommodate new growth as infill areas.

7.2.1.5 Building Codes

Building codes provide some of the best methods of addressing all the hazards in this plan. They are the prime measure to protect new property from damage by high winds, tornadoes, earthquakes, hail, and winter storms. When properly designed and constructed according to code, the average building can withstand the impact of most of these forces.

Although Erie County currently does not enforce countywide building codes, a patchwork of codes exists in municipal areas, townships and state code for building, electric and plumbing. Examples of these codes include the Ohio Building Officials Administration (OBOA) Residential Code and the Ohio Building Code (OBC) commercial code. The County also enforces the National Electric Code (NEC).

7.2.1.5 Manufactured Home Parks

The Erie County Health Department licenses and inspects mobile home parks within the County. Previously, the installation was also regulated at the local level of government, with the construction and fabrication standards being set by the United States Department of Housing and Urban Development (HUD). All mobile type homes constructed after 1976 must comply with HUD's National Manufactured Home Construction and Safety Standards. These standards apply uniformly across the country and it is illegal for a local unit of government to require additional construction requirements.

The installation of manufactured homes in Erie County is currently regulated by Senate Bill 102, which became effective on August 6, 2004. This bill created the Ohio Manufactured Homes Commission to regulate the installation of manufactured housing, which includes mobile and manufactured homes, and vests it with the exclusive authority to regulate manufactured housing installers, the installation of manufactured housing and manufactured housing foundations and support systems. The bill set forth that municipal corporations and other political subdivisions are preempted from regulating and licensing installers and regulating and inspecting the installation of manufactured housing and manufactured housing foundations and support systems. The Commission has exclusive power to adopt rules of uniform application throughout the state to govern the installation of manufactured housing, the inspection of manufactured housing, the inspection of manufactured housing foundations and support systems, the training and licensing of manufactured housing installers, and the investigation of complaints concerning manufactured housing installers. No political subdivision of the state or any other department or agency of the state may establish any other standards.

The Commission must establish standards by rule that govern the installation of manufactured housing, with the minimum standards being the model standards the Secretary of the United States Department of HUD adopts. The standards established by the Commission must be consistent with, and not less stringent, than the standards adopted by the Department of HUD. The Commission has the exclusive authority to make rules regarding "blocking" and "tiedowns" of mobile and manufactured homes. The Commission must also approve permanent foundations to which a mobile or manufactured home may be affixed.

7.2.1.6 Floodplain Regulations

Communities that adopt and enforce a floodplain management ordinance, to regulate new development within the floodplains, can significantly reduce the effects of flood damage.

Communities typically adopt minimum standards that are recommended by FEMA. The objective of these regulations is to ensure that development will not aggravate existing flooding conditions and that new buildings will be protected from flood damage. Zoning and open space preservation work to keep damage-prone development out of hazardous or sensitive areas while floodplain development regulations impose construction standards on what is allowed to be built in the floodplain.

On March 5, 1987, Erie County adopted Flood Damage Prevention Regulations pursuant to authorization contained in Section 307 of the Ohio Revised Code. These regulations apply to all areas of special flood hazard within the jurisdiction of Erie County. The purpose of the implementation of these flood regulations is to protect human life and health, minimize public money expenditure for flood control projects, minimize need for rescue and relief efforts associated with flooding, minimize prolonged business interruptions, minimize damage to public facilities and utilities, maintain a stable tax base by providing for the proper development in flood prone areas to minimize future flood blight areas, ensure potential buyers are aware that property lies in a floodplain and ensure that those who occupy flood hazard areas assume responsibility for their actions. The regulations consist of five sections that outline definitions, general provisions, such as which lands need to comply, administration, such as permitting and general and specific standards, such as construction materials and methods and floodways.

All of Erie County is in compliance with state floodplain management standards and participates in the NFIP as previously discussed in Section 4.3.1.

7.2.1.7 Drainage Regulations

In order to protect a county's natural resources a community can implement regulations such as County Water Management and Sediment Control Regulations. The purposes of these regulations are to protect the county's water resources by ensuring that the proper storm water and erosion and sediment control measures are in place. Erosion and sediment control measures are called Best Management Practices (BMPs), and when installed and maintained correctly, they help prevent soil from leaving the site. Storm water control measures ensure that the volume of storm water runoff remains the same as before development occurs.

Some examples of what can go into a County Water Management and Sediment Control Ordinance are as follows:

- Submit a Water Management and Sediment Control (WMSC) Plan for proposed commercial, industrial, or residential development sites on parcels greater than five acres.
- Submit an abbreviated plan for sites on parcels less than five acres and part of a larger plan of development.
- Submit a plan for residential dwellings only if a village, township, or city zoning requires them to do so. They must check with the appropriate community for this information.
- Comply with the regulations whether or not a plan is required. All county residents are responsible for being familiar and complying with the regulations.

A designated agency should inspect sites to ensure that the regulations are being followed correctly. The designated agency should also work diligently to review plans and perform site inspections to ensure that these erosion and sediment control measures are in place.

The Erie County Soil and Water Conservation District as well as the Erie County Engineer currently regulate drainage on development project sites, however there are no countywide drainage regulations in place. One of the resulting goals of the Mitigation Plan process is to establish administrative controls for construction practices to promote better drainage to avoid flooding.

7.3 Natural Resource Protection

7.3.1 Riparian Buffer/Wetland Protection

Riparian area refers to the vegetated area next to a watercourse often thought of as the floodplain and its connected uplands. Riparian buffers can protect water resources from non-point source pollution and provide bank stabilization, flood storage and aquatic wildlife habitat. They can be a natural resource management tool used to limit disturbance within a certain distance of a water course to maintain streamside vegetation. Some communities in the State of Ohio have proceeded to adopt riparian buffer overlays and zoning ordinances to reap the benefits of such protection.

The Erie Soil and Water Conservation District uses the State and Federal programs as they become available for issues associated with wetlands protection. However, there are currently several wetland areas protected by the County. These protected areas include Old Woman Creek Sanctuary, Sheldon's Marsh Preserve, and the large Bay View Wetland in Margaretta Township.

7.3.2 Urban Forestry

Eighty percent of Ohioans live and/or work within urban areas. The quality of life for them and their families is dependent upon the urban environment. Healthy trees enhance this environment by promoting clean air and water, increasing property values, reducing erosion and stormwater runoff, providing wildlife habitat, moderating temperature, lessening energy demands, and offering year-round enjoyment.

Ohio's Urban Forestry Program was created in 1979 within the ODNR to promote trees and other vegetation as tools to enhance the quality of life within cities and villages. The purpose of the Urban Forestry Program is to provide community officials and allied agencies with the organizational and technical ability to effectively manage the trees along streets, within parks, and on public grounds. Through a statewide network of regional urban foresters, the program helps communities manage their urban forest resources to meet their local needs.

Trees are particularly subject to damage by tornadoes, wind, ice and snow storms. Downed trees and branches break utility lines and damage buildings, parked vehicles, and anything else beneath them. An urban forestry program can reduce the damage potential of trees. A properly written and enforced urban forestry plan can reduce liability, alleviate the extent of fallen trees and limbs caused by wind and ice build-up, and provide guidance on repairs and pruning after a storm. Such a plan helps a community qualify to be a Tree City USA.

Ohio has been the Tree City USA national leader for the past 23 years. There are 233 Tree Cities USA in Ohio. Counties are not eligible for the program but can implement the credited activities.

Currently, Erie County and its villages and townships do not have codes for issues concerning urban forestry. The Erie County Soil and Water Conservation District (SWCD) uses the State and Federal programs as they become available for issues associated with reforestation. Several communities have contacted their regional urban forester to address tree maintenance issues.

Sandusky has a Forester and full time staff that implement hazard tree removal and regular tree maintenance, including pruning. The City of Sandusky is also working to plant new trees and was recognized in the past as a Tree City.

Milan has a Tree Commission that has begun identifying their hazard trees. They inventory these trees and remove them as they are inventoried. The group has formed an open dialogue with the State Regional Urban Forester and often relies on the Forester for questions and second opinions on hazard trees.

The Village of Castalia, with coordination from the State Regional Urban Forester, compiled a list of hazard trees in the late 1990's.

7.3.3 Flood Compensation Banking

A flood compensation bank is a detention basin that is used for floodplain encroachment compensation or for flood storage in which the basin's volume may be purchased to mitigate the effects of new development. A development may purchase storage volume from a bank to compensate for floodplain encroachment or to satisfy storm water detention requirements provided the basin is within the appropriate zone of influence.

Three areas of Erie County have been designated part of the Coastal Barrier Resources System (CBRS). The first is North Pond. North Pond is a 30 acre state nature preserve located within Kelleys Island State Park, one mile north on Division Street from Water Street, then east on Ward Road 1/2 mile to the parking lot on the right. A boardwalk leads to an observation tower at the pond.

The second area is the Old Woman Creek State Nature Preserve. This nature preserve comprises 572 acres and also functions as a national estuarine research reserve. It is located in Erie County 3 miles east of Huron on U.S. Route 6. The facilities include a visitor center, trail system and observation decks.

The third area is Sheldon Marsh State Nature Preserve. It is located in Erie County approximately 2 miles west of Huron on U.S. Route 6. From U.S. Route 6, the preserve can be reached from the Rye Beach Road exit from SR 2, approximately 1/2 mile west. There are parking, trail system and observation decks available.



Old Woman Creek State Nature Preserve

Any development information for these areas must be forwarded to the Office of U.S. Fish and Wildlife Service in Reynoldsburg, Ohio as part of Erie County's participation in the Coastal Barrier Improvement Act.

7.3.4 Habitat Restoration

In urbanized watersheds, some stream and/or rivers suffer the effects of increased erosion and water quality problems because of the amount of development that is occurring in a given area. Bioengineering techniques can help prevent further degradation and also provide water quality and habitat benefits.

Biotechnical practices use vegetative or other natural materials to achieve stream management objectives, usually erosion control. One of the chief advantages of biotechnical practices is that they help restore natural stream features, like in-stream habitat and streambank vegetation. The materials used for biotechnical practices are generally less expensive than for more traditional approaches, but installation is more labor intensive and they may require more frequent maintenance.

The ODNR has published a *Stream Management Guide #10*. This Guide is one of a series of Ohio Stream Management Guides covering a variety of watershed and stream management issues and methods of addressing stream related problems. It maps and briefly describes some of the many projects that have been constructed in Ohio using biotechnical practices, including the installation date.

In July 1996, two evergreen revetment projects were completed along Old Woman Creek in Berlin Township in Erie County. These two projects consisted of 400 linear feet of evergreen revetments. The purpose for these projects was to protect agriculture and residential property from stream bank erosion.

The Northwest Ohio Windbreak Program has been a cooperative effort between the Ohio Department of Natural Resources and the Erie County SWCD to plant field windbreaks in northwest Ohio to reduce soil erosion and enhance wildlife habitat. It has been successful because landowners are offered a complete service from designing the windbreak to planting the trees with a quarantee.

7.3.5 Watershed Groups

There are three watershed conservancy groups within Erie County associated with Lake Erie.

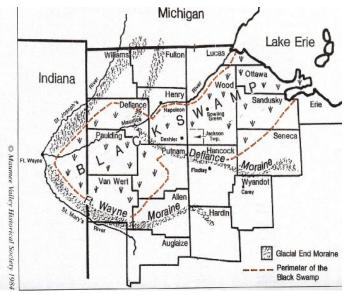
Firelands Land Conservancy Watershed (FLC)

The Firelands Land Conservancy Watershed (FLC) is a local non-profit conservation group that serves the people of the Rocky River, Black River, Vermilion River and the Huron River Watersheds. The FLC, a land trust, is a member-supported organization created to protect natural lands, waters, open spaces and historic resources of Huron, Erie, and Lorain Counties. It was established in 1997 and is funded entirely by grants and individual contributions. It is bound together solely by a common interest in preserving a healthy balance between natural areas, farmland, and development in the Firelands and surrounding areas, as well as the need to protect natural heritage and the integrity of the land. The FLC's mission statement is as follows: "The Firelands Lan Conservancy, a local non-profit organization, serves the people of the North Central Ohio Lake Erie watersheds to conserve, in perpetuity, the natural heritage and rural character of land through partnerships, voluntary conservation options and education." (www.firelandslc.org)

Black Swamp Conservancy (BSC)

The Black Swamp Conservancy (BSC), a land trust, is a regional non-profit organization established to directly support the conservation of land and water resources in Northwest Ohio. It was formed in July 1993 by a group of alarmed citizens by the rapidly accelerating rate of development in rural northwest Ohio who recognized the need to protect and enhance the remaining natural and agricultural areas in this region and to promote responsible stewardship of the land. It is one of over 1.200 land trusts in the United States to conserve land through private action. The conservancy's mission statement is

as follows: The conservancy's mission statement is as follows: "The mission of the



Black Swamp Conservancy District

Black Swamp Conservancy is to encourage conservation and protection of natural and agricultural lands in Northwest Ohio for the benefit of future generations." (www.blackswamp.org)

The BSC has grown into a respected land trust governed by a board of directors. They advise farmers and landowners of the techniques and estate-planning benefits of land conservation and protection. They secure and enforce conservation easements to permanently protect privately owned natural and agricultural lands. Through donation or purchase, they acquire natural and agricultural lands that are left undeveloped. They partner with other organizations and individuals that support their mission. They work with land-use partners, communities, and elected officials who are interested in creative ways to balance growth with today's conservation challenges. Most importantly, the BSC educates the public about the need for, and benefits of, land conservation and protection.

The Lake Erie Islands Chapter of the BSC is a non-profit organization dedicated to the conservation of the land and the waters of Ohio's precious islands in the western Lake Erie Basin. The Lake Erie Islands Chapter believes that the land use choices made today will determine the character of the islands' future. They believe open space is necessary to maintain the islands' unique native plants, wild animals and bird flyways.

The Lake Erie Islands Chapter of the BSC's goals are to preserve natural spaces in the following ways:

- Educate the public about the need for and benefit of land management and preservation
- Collaborate with other regional organizations that support the Chapter's mission
- Secure and enforce easements, which are voluntary legal agreements that preserve natural lands
- Work with local and state officials in the coordination of conservation efforts
- Act as a permanent guardian for the islands' conservation values.

Sandusky River Watershed Coalition (SRWC)

The Sandusky River Watershed Coalition (SRWC) serves the Sandusky River Watershed and residents of Sandusky, Seneca, Wyandot, Crawford, Erie and Ottawa Counties. The group was founded in 1997 by Dr. Dave Baker, former Director of Heidelberg College Water Quality Laboratory, as a way to increase community involvement to protect and improve the river through watershed protection. The SRWC is an association of individuals and organizations concerned with and/or affected by the protection and enhancement of the water resources in the Sandusky Watershed. Many organizations are members of, or



are represented by, the coalition, including Soil and Water Districts, county health departments, city governments, local industries, state and federal agencies, colleges and universities, the Ohio Farm Bureau and environmental organizations. The coalition helps to integrate the activities of these groups and generally helps them to advance their own programs.

The SRWC has written a Resource Inventory and Management Plan, sponsored clean ups, hosted a tour for local officials, hosted a watershed festival and helped to get more monitoring of the watershed. The group is concerned with increasing the recreational and aesthetic use and appreciation of the river, addressing problems related to hydrology, protecting drinking water supplies from spills and increasing the miles of streams with buffers along them. The mission statement of the Coalition is as follows: "To provide information and opportunities for public participation in the stewardship of the Sandusky River Watershed."

(www.riverwatershed.org/watershed)

7.3.6 Environmental Quality Incentives Program (EQIP)

The Environmental Quality Incentives Program (EQIP) was reauthorized in the Farm Security and Rural Investment Act of 2002 (Farm Bill) to provide a voluntary conservation program for farmers and ranchers that promotes agricultural production and environmental quality as compatible national goals. EQIP offers financial and technical help to assist eligible participants install or implement structural and management practices on eligible agricultural land.

On September 21, 2004, an additional \$1,000,000 in funds was allocated to Ohio livestock producers to improve manure and forage management. This additional money will bring the statewide money available to \$13,000,000 and will now provide assistance to more than 1200 EQIP contracts. The U.S. Department of Agriculture (USDA) is in charge of determining the awards and awarded Erie County \$10,692 as shown in Table 7-1.

Table 7-1
Environmental Quality Incentives Program
Additional Funds

Ohio County	Additional Funds	Ohio County	Additional Funds	Ohio County	Additional Funds				
Adams	\$96,065	Gallia	\$49,725	Miami	\$24,412				
Ashland	\$4,630	Geauga	\$2,740	Monroe	\$13,418				
Athens	\$9,000	Guernsey	\$34,560	Morgan	\$5,200				

Belmont	\$3,025	Harrison	\$5,450	Morrow	\$46,084
Carroll	\$21,190	Highland	\$6,240	Muskingum	\$3,700
Clark	\$25,991	Hocking	\$5,700	Perry	\$27,130
Coshocton	\$26,470	Holmes	\$45,685	Preble	\$36,416
Crawford	\$34,324	Huron	\$83,681	Richland	\$18,662
Cuyahoga	\$1,350	Jefferson	\$8,375	Washington	\$13,840
Darke	\$169,176	Knox	\$44,652	Wayne	\$58,940
Delaware	\$36,167	Lorain	\$6,279	Wood	<u>\$22,275</u>
Erie	\$10,692	Meigs	\$4,950	TOTAL	\$1,006,194

7.3.7 Conservation Reserve Enhancement Program (CREP)

Area farmers and landowners are encouraged to enroll in a new conservation buffer plan that will help protect Lake Erie and 5,000 miles of streams by reducing soil erosion and runoff pollution in northwest Ohio.

The new \$201 million Ohio Lake Erie Conservation Reserve Enhancement Program (CREP), to be supervised by the Erie County SWCD, is jointly funded by the ODNR and the USDA. The program will pay eligible farmers and other landowners to plant trees and establish conservation buffers along tributary streams in Erie County and 26 other northwest Ohio counties.

CREP is a voluntary program that uses financial incentives to encourage farmers to enroll in the Conservation Reserve Program (CRP) by committing to protect land for either 15, 20 or 30 years, depending on the enrolled practice. In addition to reducing runoff of soil sediment, nutrients and pesticides, watercourse buffers will also help lower water temperatures, increase dissolved oxygen and provide additional habitat for fish and wildlife.

7.3.8 Conservation Security Program (CSP)

The Conservation Security Program (CSP) is a voluntary program that provides financial and technical assistance to producers who advance the conservation and improvement of soil, water, air, energy, plant and animal life and other conservation purposes on private working lands. Such lands include cropland, grassland and improved pasture, as well as forested land and other non-cropped areas that are an incidental part of the agriculture operation.

Participants are chosen based on a self-assessment of their agricultural operation. The workbook for the self-assessment is on the NRCS's website (www.oh.nrcs.usda.gov) and at the District Office.

The CSP rewards farmers who practice high levels of conservation tillage, keep detailed crop production records, apply conservation buffer systems and use university recommendations for nutrient and pest management and animal waste utilization.

The Huron-Vermilion Watershed was selected as one of the five Ohio CSP Watersheds for 2005. This watershed occupies approximately half of Erie County's topography.

7.4 Emergency Services

Emergency Services protect people before, during, and after a disaster. A good emergency management program addresses all hazards, natural and man-made. It involves the active participation and involvement of all County's departments and municipalities. Emergency services include:

- Threat Recognition
- Warning
- Response
- Evacuation and Sheltering
- Post-Disaster Recovery and Mitigation

Further, an Emergency Operations Plan is imperative for an organized and responsible county. It should always be updated, keeping people abreast of these changes and possible changes in roles or responsibilities. Erie County has instituted an Emergency Operations Plan (EOP) to predetermine emergency management activities and operations for organizations within Erie County that will allow expeditious response and recovery from emergencies.

7.4.1 Threat Recognition

The first step in responding to a hurricane, flood, tornado, or other natural hazard is knowing when weather conditions are such that an event could occur. With a proper and timely threat recognition system, adequate warnings can be disseminated.

The Erie County Sheriff's Dispatch Office is the designated point to receive warnings concerning widespread fires and other emergencies affecting the jurisdiction. The Sandusky Police Department is the designated point to receive severe weather warnings. Each organization with emergency responsibilities is responsible for initiating internal notifications and call downs as needed.

7.4.2 Warning

After there is a potential hazard recognized following steps must be taken to notify the public of its possible onset. Early and specific warnings allow more people the ability to set protection procedures in motion.

The NWS issues notices to the public using two levels of notification:

Watch: conditions are right for flooding, thunderstorms, tornadoes or winter storms. *Warning:* a flood, tornado, etc. has started or has been observed.

A more specific warning may be disseminated by the community in a variety of ways. The following are the more common methods:

- Commercial or public radio or TV stations
- The Weather Channel
- Cable TV emergency news inserts
- Telephone trees/mass telephone notification
- NOAA Weather Radio
- Tone activated receivers in key facilities

- Outdoor warning sirens
- Sirens on public safety vehicles
- Door-to-door contact
- Mobile public address systems
- E-mail notifications

The National Oceanic and Atmospheric Administration Weather Radio (NWR) is a nationwide network of radio stations broadcasting continuous weather conditions 24 hours a day. They work in conjunction with the Federal Communications Commission (FCC) to alert residents of areas when natural and environmental hazards could affect people in a certain area.

Emergency services rely on local print and broadcast media to assist in warning the general public of possible hazards. Telephone and radio communications are also used to notify public official, Emergency Operations Center (EOC) staff, and emergency personnel.

In addition, the Erie County Emergency Management Agency (EMA) has begun to install National Oceanic and Atmospheric Administration (NOAA) weather radios in facilities within the County as part of an indoor warning system. Currently, the radios have been installed in various homes and schools throughout the County. In some school districts, only the central office has a Weather Alert Radio. When a warning is received, the school designated as the central office in turn will notify all other schools in the district. In addition, warning sirens, radio broadcasts and public address systems are used to provide warning to schools, nursing homes, major industries, institutions and places of public assembly.

The Ohio State Highway Patrol (OSP) in Fremont, Ohio is the State of Ohio Warning Point for the National Warning Systems (NAWAS) and operates the Ohio portion of the NAWAS. When it receives a NAWAS warning, the OSP notifies the Erie County Sheriff. All warnings are also broadcast over the Law Enforcement Automated Data System (LEADS) to law enforcement agencies in the warning area.

The Erie County Sheriff's Office also receives warnings regarding severe weather, technological hazards, widespread fires, and other emergencies affecting the County. The Sheriff's Office notifies the EMA Director, local law enforcement agencies and local fire departments.

Cleveland is the Weather Warning Center for Erie County. The NWR stations provide rapid dissemination of severe weather warnings to all Ohio law enforcement agencies with LEADS terminal equipment with continuous, around-the-clock broadcasts of the latest weather information. The Emergency Alert System (EAS) provides operational public warning capabilities to national, state, and local governments. The EAS stations serving Erie County include:

- WTAM (1100 AM), Cleveland, Ohio
- WLEC (1450 AM), Sandusky, Ohio
- WCPZ (102.7 FM), Sandusky, Ohio
- WGGN (92.7 FM), Castalia, Ohio
- WLKR (95.3 FM), Norwalk, Ohio
- WVAC (1510 AM), Norwalk, Ohio

Erie County also uses warning signals to alert residents of other non-natural threatening situations. Warning signals for Erie County are different to warn residents of an enemy attack

versus a peacetime disaster. The Attack Warning is a 3 to 5 minute wavering (warbling n pitch) tone on a siren, or a series of short blasts on horns or other devices and are repeated as often as necessary by government officials to obtain the required response from the County residents. The Alert Warning is a 3 to 5 minute steady signal from sirens, horns or other devices. The warning system is tested annually.

Erie County is one of eight counties comprising the Central and East Lakeshore Operational Area. As part of this area, one county may activate the entire County operational area for widespread emergencies. When only the local area is affected, individual radio stations within the County may be used to broadcast emergency information. The operational area EAS primary operating system is WTAM (1100 AM) in Cleveland, Ohio. The secondary operational area EAS originating station is WGAR in Cleveland, Ohio and is used only when the primary station cannot be reached. Local EAS activations are provided by WLEC, WCPZ, and WGGN.

7.4.3 Response

The protection of life and property is the most important task of emergency responders. Concurrent with threat recognition and issuing warnings, a community should respond with actions that can prevent or reduce damage and injuries.

Typical actions and responding parties include the following:

- Activate the emergency operations center (emergency preparedness)
- Close streets or bridges (sheriff or public works)
- Shut off power to threatened areas (utility company)
- Pass out sand and sandbags (public works)
- Hold children at school/releasing children from school (school superintendent)
- Open evacuation shelters (Red Cross)
- Monitor water levels (engineering)
- Establish security and other protection measures (police/sheriff)

An emergency operations plan ensures that all bases are covered and that the response activities are appropriate for the expected threat. These plans are developed in coordination with the agencies or offices that are given various responsibilities.

Erie County Emergency Operations Plan (EOP)

The purpose of Erie County's EOP is to predetermine emergency management activities and operations for organizations with Erie County that will allow expeditious response and recovery from emergencies. This plan predetermines, to the extent possible, actions to be taken by responsible elements of the government of Erie County and its municipalities, townships, and of cooperating private organizations, to prevent avoidable disasters and reduce the vulnerability of county residents to any disasters that may strike. The document has a *Basic Plan* which defines the purpose, organizes and assigns responsibilities, and discusses plan development and maintenance.

The Basic Plan also provides a County Hazards Analysis, inclusive of all hazards, which details the hazards, risks and vulnerabilities that could lead to declared emergencies in Erie County. This plan also describes the County's response and recovery capabilities. A Concept of Operations is outlined in detail describing the phases of emergency management, the levels of

emergency activation, the County declaration process and the line of succession for decision makers. The *Basic Plan* also lists other plans and standard operating procedures that support the Erie County EOP.

Furthermore, the Erie County EMA is charged with coordinating all activity for all agencies for emergency management within the County. This agency maintains liaisons with similar agencies throughout the state and federal government. The EMA becomes the central point of coordination with the County for response and recovery to disasters.

Erie County citizens are serviced by multiple fire departments. The fire units are made up of both full time and volunteer personnel. Public squads provide emergency medical service.

Communications for emergency services and response is managed on a department by department basis. Each provider is linked to the township 9-1-1 Public Safety Answering System located at the County's Sheriff's office and at the City of Sandusky's Police department. The Sheriff communicates with other County emergency service providers as necessary. Interagency communications between the Sheriff, Sandusky Police department and the Ohio State Highway Patrol is also possible.

However, according to the Emergency Services Task Force committee interagency communications on the local level is currently in its most basic form. Each base operation is able to communicate with their respective officers and equipment and is able to monitor or relay communication among base operations. There is no ability to communicate from officer of one department to another without relays through the base operations. Fire departments are able to communicate between vehicles and departments. However, fire and EMS vehicles cannot communicate with law enforcement without being relayed through base operations.

The Task Force committee recommends that consideration for future communication capabilities move toward interagency communications at the "ground" level. Also, consideration should be made for expanding cellular telephone service to other sections of the County.

7.4.4 Evacuation and Sheltering

7.4.4.1 Evacuation

There are five key components to a successful evacuation:

- 1. Adequate warning
- 2. Adequate routes
- 3. Traffic control
- 4. Knowledgeable travelers
- 5. Care for special populations (i.e. handicapped, prisoners, school children)

There are several areas within Erie County that may require evacuation in the event hazards occur. According to the Ohio Revised Code, Township and municipal police and fire departments and the Erie County's sheriff are responsible for protecting the lives and property of residents in their jurisdictions. In Erie County, the Chief Executive Officer of the affected jurisdiction will coordinate all evacuated orders before they are released to the public. When the Fire Chief, Police Chief, Sheriff, or EMA Director determines that loss of life and/or injury may be prevented by an evacuation, he will initiate the evacuation in coordination with fire departments and law enforcement. The EMA Director will coordinate evacuation information

with the County Commissioners, township trustees and mayors in the affected area as he receives it from the Incident Command Center, which is set up during an emergency situation. The EMA Director and the Red Cross Representative will be contacted in the event residents are evacuated to an adjacent county.

The Council on Aging, Job and Family Services and the Erie County Mental Health Board has provided the fire departments in Erie County with listings of persons who may need special assistance in the event of an evacuation. In addition, the Erie County EMA provides a program to identify any person who may have special needs, including evacuation needs, during an emergency.

7.4.4.2 Shelter

Shelter is required for those who cannot get out of harm's way. Typically, the Red Cross will staff a shelter and ensure that there is adequate food, bedding and washing facilities. Shelter management is a specialized skill. Managers must deal with problems like scared children, families that want to bring their pets and the potential for an overcrowded facility.

In the event of an evacuation in Erie County, fire and law enforcement response organizations, and the Erie County EMA may contact the American Red Cross to coordinate the number of persons to be evacuated to shelters and the requirements for any special needs sheltering. Provisions have been made with the American Red Cross Chapter for establishing, supplying and operating mass care facilities. Institutions in the County that provide long-term care have shelter provisions addressed in plans developed under the guidance of the Ohio Department of Health. Prisoners in the Erie County Correctional Facility will be housed in-place in the event of an emergency.

7.4.5 Post-Disaster Recovery and Mitigation

After a disaster, communities should undertake activities to protect public health and safety and facilitate recovery. Appropriate measures include:

- Patrol evacuated areas to prevent looting
- Provide safe drinking water
- Monitor for diseases
- Vaccinate residents for tetanus
- Clear streets
- Clean up debris and garbage

Throughout the recovery phase, everyone wants to return to their daily routines. The problem is when recovery efforts are being instituted, people may be performing a quick fix that returns them to their daily routines faster. However, it is imperative that during this recovery phase every effort should be made to think about how to prevent repeated damage from happening if another disaster were to strike. Some efforts include:

- Advise residents through public information activities to advise residents about mitigation measures they can incorporate into their reconstruction work
- Evaluate damaged public facilities to identify mitigation measures that can be included during repairs
- Acquire substantially or repeatedly damaged properties from willing sellers,

- · Plan for long term mitigation activities, and
- · Apply for post-disaster mitigation funds.

During emergencies, law enforcement must expand their operations in order to address increased emergency needs. In Erie County, law enforcement is prepared to re-route traffic around damaged areas during emergencies to provide a continuous flow, to the extent possible. The County's law enforcement agencies also provide control of the scene of the emergency, including entrance and egress from the site.

In Erie County, personnel from the Erie County Health Department are ready to coordinate with the EMA and other designated emergency personnel to identify health hazards and determine what special instructions concerning public health need to be released to the public. The Health Department also coordinates with the Ohio Department of Health and the Center for Disease Control, for resource and personnel support in the event of an emergency.

In addition, many other offices and departments within the County are charged with the responsibility of emergency aid and clean up. These organizations and their responsibilities are outlined in the Erie County EOP.

7.5 Flood Control

Flood control projects have traditionally been used by communities to control or manage floodwaters. They are also known as "structural" projects that keep flood waters away from an area as opposed to "non-structural" projects, like retrofitting, that do not rely on structures to control flows.

7.5.1 Flood Control Measures

The most common type of measures that keep flood waters away from an area are reservoirs and dams, diversion channels, levees and floodwalls, and flood compensation banking.

7.5.1.1 Reservoirs and Dams

Reservoirs and dams impound water to reduce the amount that reaches an area at one time. A reservoir holds high flows behind a dam or in a storage basin. Water is released at a controlled rate. Reservoirs and dams are generally perpendicular to a stream or river.

There are no reservoirs located in Erie County that help alleviate flooding.

7.5.1.2 Lowhead dams

A lowhead dam is a dam of low height, usually less than 15 feet, made of timber, stone, concrete and other structural material, or some combination there of, that extends from bank to bank across a stream channel. Lowhead dams are constructed across the river channel to create a pool of water in the stream. They are built for a variety of purposes including, but not limited to diversion, grade control, water supply, gravel barriers, recreation, aesthetics and protection for utility crossings. Concrete, large rocks, wood, steel sheet piling and various combinations of the preceding materials are all common building materials in lowhead dams.

There is one lowhead dam located in Erie County along the main branch of the Huron River in Milan Township. It is located at the Milan State Wildlife Area and is downstream from the Lovers Lane parking area which is west of Milan.

7.5.1.2 Diversion Channels

A diversion is a new channel or overflow weir that sends floodwater to a different location, thereby reducing flooding along a watercourse. During normal flows, the water stays in the old channel. During flood flows, the stream spills over to the diversion channel.

7.5.1.3 Levees and Floodwalls

Levees and floodwalls restrain the flow of the stream or river. During a flood, the stream or river flow is not reduced; only confined. Levees and floodwalls are generally parallel to the flow of the stream.

7.5.2 Drainage Maintenance

Man-made ditches and storm sewers help drain areas where the surface drainage system is inadequate, or where underground drainageways may be safer or more practical. Particularly appropriate for depressions and low spots that will not drain naturally, drainage and storm sewer improvements are designed to carry the runoff from smaller, more frequent storms. There are three types of drainage improvements that are usually pursued to reduce stormwater flooding: putting drainageways in underground pipes, channelization, and removing obstructions caused by stream crossings, such as culverts and bridges with small openings. Because drainage ditches and storm sewers convey water faster to other locations, improvements are only recommended for small local problems where the receiving stream or river has sufficient capacity to handle the additional volume and flow of water. To reduce the cumulative downstream flood impacts of numerous small drainage projects, additional detention or run-off reduction practices should be provided in conjunction with the drainage system improvements.

Erie County's drainage improvements and maintenance activities are implemented through the County Engineer's office. The Engineer's Office maintains drainage systems within nine townships, along with 125 County bridges and approximately 655 culverts. These activities include replacing deficient structures (i.e. pipes, culverts, bridges) over waterways within the County. The County Engineer only maintains structures that are located within a County or Township road right of way.

The Engineer's Ditch department maintains approximately 50 miles of ditches that have been petitioned for cleaning, which then become a County maintained ditch. The Ditch department performs annual maintenance on these ditches. Annual maintenance activities include brush control, washout repair, debris and log jam removal, sandbar removal and slope stabilization. Most County maintained ditches are in sufficient condition for drainage purposes. The Engineer's Ditch department also maintains approximately 30 miles of drainage pipe.

7.6 Public Information

A successful hazard mitigation plan program involves both the public and private sectors. Public information activities advise property owners, renters and businesses about hazards and ways to protect people and property from these hazards. These activities can motivate people to take

the steps necessary to protect themselves and others. Information can initiate voluntary mitigation activities at little or no cost to the government. Property owners mitigated their flooding problems long before there was government funding programs.

7.6.1 Outreach Projects

Outreach projects are the first step in the process of orienting property owners to the hazards they face and the concept of property protection. They are designed to encourage people to seek out more information in order to take steps to protect themselves and their properties. Research has proven that outreach projects work. However, awareness of the hazard is not enough; people need to be told what they can do about the hazard, so projects should include information on safety, health and property protection measures. Research has also shown that a properly run local information program is more effective than national advertising or publicity campaigns. Therefore, outreach projects should be locally designed and tailored to meet local conditions.

There are several types of outreach projects implemented in Erie County. These activities serve to make people aware of the preparedness needed for a natural hazard on a personal level. The Erie County EMA uses the County fair as a means to distribute educational materials since such a large population attends the fair. They distribute brochures that address the warning system and the different tones used for different hazard events. Brochures describing safe shelter and types of emergency supplies to have in the home are also made available at the fair.

Another way the County advises the public on the dangers of severe weather is through the local media. Warnings and emergency preparedness issues are broadcast over local radio stations and television channels. The County is also moving toward establishing a website that would also contain public information concerning the natural hazards prevalent within Erie County.

7.6.2 Real Estate Disclosure

Many times after a natural disaster, people say they would have taken steps to protect themselves if only they had known they had to purchase a property that is exposed to a natural hazard. By reaching out to residents in a community to become informed as to what hazards are a potential in the community, the community has armed them with information that they did not have previously. This knowledge allows them to make an informed decision on purchasing insurance to cover their potential losses.

7.6.2.1 Federal law

Federally regulated lending institutions must advise applicants for a mortgage or other loan that is to be secured by an insurable building whether the property is in a floodplain as shown on the Flood Insurance Rate Map. If so, flood insurance is required for buildings located within the floodplain if the mortgage or loan is federally insured. However, because this requirement has to be met only 10 days before closing, often the applicant is already committed to purchasing the property when he or she first learns of the flood hazard.

7.6.2.2 State law

The state of Ohio's Department of Commerce has a Residential Property Disclosure Form pursuant to section 5302.30 of the Revised Code and rule 1301:1-4-10 of the Administrative Code. It is to be completed by the owners who want to sell their property. Under a good faith stipulation, they are to note any areas of the house that may be dangerous which include being in a floodplain/Lake Erie Coastal Erosion Area, whether there are drainage/erosion problems, and if there are zoning/code violations.

Erie County's and surrounding areas' multiple listing service does not include a listing of whether a property is in a flood zone or wetland. Disclosure practices are left up to the individual broker or agent.

7.6.3 Libraries and Websites

The Erie County Public Library maintains a copy of the County's EOP. This plan is available to anyone interested in reviewing it.

The County maintains a website of general County information such as departments and auditor's information (http://www.eriecountyohiocofc.com). The Erie County EMA also has a website, currently used as a tool for making relevant hazard mitigation information available to the public. This website contains information on preventative measures and emergency planning procedures that individuals can review for guidance (http://www.erie-county-ohio.net/ema/create_plan.htm). However, as part of the mitigation effort, the County would also like to use this website as a resource for dissemination of educational materials concerning the natural hazards that affect their communities.

Matrix Results

8.0 MATRIX RESULTS

8.1 Matrix Results

The Core Group chose a total of 40 potential mitigation activities. Of those 40 activities, 20 were labeled as "prioritized" activities and are listed in the following sections. The Core Group evaluated the activities by first taking into account the risk assessment ranking of hazards located in Section 4.0 of this report. The various hazards had been ranked according to past historical events and the cumulative costs of each potential disaster.

The following matrices' results show the average rating for all the Core Group members. Each member filled out an individual matrix, and then the results for each hazard were averaged. The hazard of flooding had the most activities associated with it. The three top rated activities have been highlighted (earthquakes has two top rated activities); however the other activities are important and should be re-evaluated during the monitoring process of the Mitigation Plan for Erie County. To see the complete list of mitigation alternatives for each hazard please see the complete matrix in Appendix I.

8.1.1 Matrix Results for Summer Storms

Erie County Mitigation Altermatives Results		Marrix Totals	Matrix Totals	Marix Totals	Matrix Totals	Matrix Total	and Province ited
Severe Storms - Summer							
Provide more NOAA radios in critical facilities to move toward achieving a "Storm Ready" community status. Provide additional NOAA radios for other facilities such as businesses.	23	29	13	31	35	7	30.1
Provide more back-up generators for critical facilities, which need to maintain continuous power to protect life and human health.	24	34	7	29	33	7	30.2
Provide additional interoperable sirens to provide early warnings to citizens of approaching severe weather.	27	25	13	35	29	7	29.9

The three highest rating activities within the summer storms hazard category include:

- Provide more NOAA radios in critical facilities to move toward achieving a "Storm Ready" community status. Provide additional NOAA radios for other facilities such as businesses.
- Provide more back-up generators for critical facilities, which need to maintain continuous power to protect life and human health.
- Provide additional interoperable sirens to provide early warnings to citizens of approaching severe weather.

8.1.2 Matrix Results for Flooding

Erie County Mitigation Altermatives Results		Marix Totals	Marix Totals	Marix Totals	Marry Totals	Marix Total	and Provintation	Augrage .
Flooding								
Provide maintenance for ditches and waterways to avoid overflow due to sediment and debris build up.	26	36	6	34	27	6	30.2	
Update flood insurance rate maps (FIRMs). Current maps are from the 1970s and 1980s.	26	32	6	29	33	6	29.8	
Provide back-up generators for pumping and lift stations in sanitary sewer systems to ensure that drainage infrastructure is not impeded.	24	30	6	33	30	6	27	

The three highest rating activities within the flooding hazard category include:

- Provide maintenance for ditches and waterways to avoid overflow due to sediment and debris build up.
- Update flood insurance rate maps (FIRMs). Current maps are from the 1970s and 1980s.
- Provide back-up generators for pumping and lift stations in sanitary sewer systems to ensure that drainage infrastructure is not impeded.

8.1.3 Matrix Results for Winter Storms

Erie County Mitigation Altermatives Results		Marrix Totals	Marix Totals	Marix Totals	Marix Totals	Matrix Total	and Provintation	Andrews .
Severe Storms - Winter								
Provide more back-up generators for critical facilities, which need to maintain continuous power to protect life and human health.	23	29	11	29	31	5	28.1	
Provide more NOAA radios in critical facilities to move toward achieving a "Storm Ready" community status. Provide additional NOAA radios for other facilities such as businesses.	21	27	11	29	30	5	27.8	
Develop a broader public outreach program to reach outlying areas to educate citizens on the hazards associated with winter storms, such as driving in snow storms, as well as the health hazards, like hypothermia.	23	23	5	31	25	5	26.4	

The three highest rating activities within the winter storms hazard category include:

- Provide more back-up generators for critical facilities, which need to maintain continuous power to protect life and human health.
- Provide more NOAA radios in critical facilities to move toward achieving a "Storm Ready" community status. Provide additional NOAA radios for other facilities such as businesses.
- Develop a broader public outreach program to reach outlying areas to educate citizens
 on the hazards associated with winter storms, such as driving in snow storms, as well
 as the health hazards, like hypothermia.

8.1.4 Matrix Results for Lake/Stream Bank Erosion

The three highest rating activities within the lake/stream bank erosion hazard category include:

- Update flood insurance rate maps (FIRMs). Current maps are from the 1970s and 1980s.
- Provide additional monitoring of water levels in streams and rivers with stream gauges and trained personnel. Erie County currently has only one river gauge and that is located on the Huron River.
- Construct elevated or alternative roads that are unaffected by flooding to eliminate repairs and replacements due to deterioration caused by repeated flooding and erosion.

8.1.5 Matrix results for Tornadoes

Erie County Mitigation Altermatives Results		Matrix Totals	Matrix Totals	Matrix Totals	Matrix Totals	Matrix Total	and Productation	Average
Tornadoes								
Provide additional interoperable sirens to provide early warnings to citizens of approaching severe weather.	23	21	15	31	25	3	25.9	
Provide more NOAA radios in critical facilities to move toward achieving a "Storm Ready" community status. Provide additional NOAA radios for other facilities such as businesses.	19	25	9	27	28	3	25.8	
Provide more back-up generators for critical facilities, which need to maintain continuous power to protect life and human health.	21	30	7	27	29	3	26.1	

The three highest rating activities within the tornado hazard category include:

- Provide additional interoperable sirens to provide early warnings to citizens of approaching severe weather.
- Provide more NOAA radios in critical facilities to move toward achieving a "Storm Ready" community status. Provide additional NOAA radios for other facilities such as businesses.
- Provide more back-up generators for critical facilities, which need to maintain continuous power to protect life and human health.

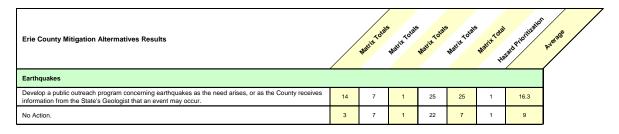
8.1.6 Matrix results for Droughts

Erie County Mitigation Altermatives Results		Matrix Totals	Marrix Totals	Matrix Totals	Matrix Totals	Matrix Total	and Profittation	Augends.
Droughts								
Develop a public education program for restrictions on water usage during drought conditions.	22	26	2	26	25	2	19.7	
Develop a public education program on the hazards associated with droughts and extreme heat.	18	20	2	26	26	2	18.8	
No Action.	4	14	2	19	8	2	9.8	

The three highest rating activities within the drought hazard category include:

- Develop a public education program for restrictions on water usage during drought conditions.
- Develop a public education program on the hazards associated with droughts and extreme heat.
- No Action.

8.1.6 Matrix results for Earthquakes



The two highest rating activities within the earthquake hazard category include:

- Develop a public outreach program concerning earthquakes as the need arises, or as the County receives information from the State's Geologist that an event may occur.
- No Action.

8.2 Mitigation Alternatives for Each Participating Community

Each of the participating communities was required to select a mitigation alternative or alternatives for their community to support. Individual communities are responsible for implementing these activities. The alternatives chosen by each community are as follows:

Bay View

The Village felt comfortable with the Core Group results, and the highest prioritized mitigation alternatives are what they selected as their mitigation alternatives.

Berlin Heights

The Village felt comfortable with the Core Group results, and the highest prioritized mitigation alternatives are what they selected as their mitigation alternatives.

Castalia

The Village felt comfortable with the Core Group results, and the highest prioritized mitigation alternatives are what they selected as their mitigation alternatives.

Huron

The City felt comfortable with the Core Group results, and the highest prioritized mitigation alternatives are what they selected as their mitigation alternatives.

Kelleys Island

The Village felt comfortable with the Core Group results, and the highest prioritized mitigation alternatives are what they selected as their mitigation alternatives.

Milan

The Village felt comfortable with the Core Group results, and the highest prioritized mitigation alternatives are what they selected as their mitigation alternatives.

Sandusky

Severe Storms (Summer)

 Provide more NOAA radios in critical facilities to move toward a "Storm Ready" community status. Provide additional NOAA radios for other facilities such as businesses.

Flooding

 Provide maintenance for ditches and waterways to avoid overflow due to sediment and debris build up.

Severe Storms - Winter

 Provide more back-up generators for critical facilities, which need to maintain continuous power to protect life and human health.

Lake/Stream Bank Erosion

 Update flood insurance rate maps (FIRMs). Current maps are from the 1970s and 1980s.

Tornadoes

 Provide additional interoperable sirens to provide early warnings to citizens of approaching severe weather.

Droughts

 Develop a public education program for restrictions on water usage during drought conditions.

Earthquakes

 Develop a public outreach program concerning earthquakes as the need arises, or as the County receives information from the State's Geologist that an event may occur.

Florence Township

Severe Storms (Summer)

- Provide additional shelters for mobile home parks.
- Provide more NOAA radios in critical facilities to move toward a "Storm Ready" community status. Provide additional NOAA radios for other facilities such as businesses.

Flooding

- Provide additional shelters for mobile home parks.
- Provide maintenance for ditches and waterways to avoid overflow due to sediment and debris build up.

Severe Storms - Winter

- Provide additional shelters for mobile home parks.
- Provide more back-up generators for critical facilities, which need to maintain continuous power to protect life and human health.

Lake/Stream Bank Erosion

 Update flood insurance rate maps (FIRMs). Current maps are from the 1970s and 1980s.

Tornadoes

- Provide additional shelters for mobile home parks.
- Provide additional interoperable sirens to provide early warnings to citizens of approaching severe weather.

Droughts

 Develop a public education program for restrictions on water usage during drought conditions.

Earthquakes

 Develop a public outreach program concerning earthquakes as the need arises, or as the County receives information from the State's Geologist that an event may occur.

Oxford Township

Severe Storms (Summer)

- Provide back-up generators for township facilities.
- Provide more NOAA radios in critical facilities to move toward a "Storm Ready" community status. Provide additional NOAA radios for other facilities such as businesses.

Flooding

- Provide back-up generators for township facilities.
- Provide maintenance for ditches and waterways to avoid overflow due to sediment and debris build up.

Severe Storms - Winter

- Provide back-up generators for township facilities.
- Provide more back-up generators for critical facilities, which need to maintain continuous power to protect life and human health.

Lake/Stream Bank Erosion

 Update flood insurance rate maps (FIRMs). Current maps are from the 1970s and 1980s.

Tornadoes

- Provide back-up generators for township facilities.
- Provide additional interoperable sirens to provide early warnings to citizens of approaching severe weather.

Droughts

 Develop a public education program for restrictions on water usage during drought conditions.

Earthquakes

 Develop a public outreach program concerning earthquakes as the need arises, or as the County receives information from the State's Geologist that an event may occur.

Perkins Township

Severe Storms (Summer)

- Provide additional shelters for mobile home parks.
- Provide more NOAA radios in critical facilities to move toward a "Storm Ready" community status. Provide additional NOAA radios for other facilities such as businesses.

Flooding

- Provide additional shelters for mobile home parks.
- Provide maintenance for ditches and waterways to avoid overflow due to sediment and debris build up.

Severe Storms – Winter

- Provide additional shelters for mobile home parks.
- Provide more back-up generators for critical facilities, which need to maintain continuous power to protect life and human health.

Lake/Stream Bank Erosion

 Update flood insurance rate maps (FIRMs). Current maps are from the 1970s and 1980s.

Tornadoes

- Provide additional shelters for mobile home parks.
- Provide additional interoperable sirens to provide early warnings to citizens of approaching severe weather.

Droughts

 Develop a public education program for restrictions on water usage during drought conditions.

Earthquakes

 Develop a public outreach program concerning earthquakes as the need arises, or as the County receives information from the State's Geologist that an event may occur.

Vermilion Township

Severe Storms (Summer)

- Provide additional shelters for mobile home parks.
- Provide back-up generators for township facilities.
- Provide more NOAA radios in critical facilities to move toward a "Storm Ready" community status. Provide additional NOAA radios for other facilities such as businesses.

Flooding

- Provide additional shelters for mobile home parks.
- Provide back-up generators for township facilities.
- Provide maintenance for ditches and waterways to avoid overflow due to sediment and debris build up.

Severe Storms - Winter

- Provide additional shelters for mobile home parks.
- Provide back-up generators for township facilities.
- Provide more back-up generators for critical facilities, which need to maintain continuous power to protect life and human health.

Lake/Stream Bank Erosion

 Update flood insurance rate maps (FIRMs). Current maps are from the 1970s and 1980s.

Tornadoes

- Provide additional shelters for mobile home parks.
- Provide back-up generators for township facilities.
- Provide additional interoperable sirens to provide early warnings to citizens of approaching severe weather.

Droughts

 Develop a public education program for restrictions on water usage during drought conditions.

Earthquakes

 Develop a public outreach program concerning earthquakes as the need arises, or as the County receives information from the State's Geologist that an event may occur.

8.3 Action Plan

The culmination of Erie County's Mitigation Plan is an Action Plan. The general direction of the overall program is outlined in this document. Specific activities pursuant to the general direction are detailed in the Action Plan that is placed in Appendix J for ease of access. The overall direction of the Action Plan is to give the Core Group an easily accessible document to check their status on implementing their chosen mitigation alternatives.

8.4 Mitigation Plan Maintenance and Schedule

The Core Group, in conjunction with the Erie County EMA/Office of Homeland Security, will establish methods for monitoring and evaluating the Countywide All Natural Hazards Mitigation Plan for the County and its participating incorporated jurisdictions on a five-year cycle. The Core Group will initially meet on a yearly basis, as determined by the Erie County EMA/Office of Homeland Security's Director, once the Mitigation Plan has been approved by the State of Ohio and FEMA. At these initial yearly meetings it will be decided whether the Mitigation Plan needs to be updated immediately or to wait and collectively perform the updates on the five-year cycle. The Core Group will evaluate the Mitigation Plan and act as a forum for hazard mitigation issues. The Core Group's detailed Action Plan will act as a guide in evaluating the Mitigation Plan. The Action plan will also provide a method for monitoring the Mitigation Plan, as well as a schedule for the implementation of the mitigation alternatives. The success of the Mitigation Plan depends upon the efforts of the Core Group to become involved with other planning efforts in the community. Communities will be able to use the plan for a variety of activities, including implementing specific mitigation projects, as well as implementing changes in the daily operation of the local government. To ensure the success of an ongoing program, it is critical that the plan remains relevant to the County's growth and development. Thus, it is important for the County to conduct periodic evaluations and make revisions as needed, as well as incorporate changes into other planning documents in the County.

The Core Group will review the goals and action items on a yearly basis, as needed, to determine their relevance to changing situations in Erie County and ensure that they are addressing current and expected conditions. They will also review the risk assessment portion of the mitigation plan to determine if this information should be updated or modified, given any new available data.

The public will be involved on a continuous basis. The Core Group is considering establishing a website to accomplish public involvement whereby the mitigation action items that are slated for development that current year will be highlighted, and the public will be encouraged to participate in the continued development of the Mitigation Plan. In addition, the Core Group is considering continued efforts of press releases to accomplish effective public participation. There will also be a formalized press release developed for their annual review process.

8.5 Local Planning Mechanisms

There are several local planning mechanisms in place within the County, which are described in detail, in **Section 7.2 Preventive Measures**. This section of the Mitigation Plan describes existing plans and efforts in the community, when they were adopted and what the document does for the community.

Within three years of the formal adoption of the Mitigation Plan, the Core Group will strive to incorporate into the process of existing planning mechanisms any local policies recommended for revision by the Action Plan developed as part of this effort. The County utilizes comprehensive land use planning, development standards, and building codes, as well as various other regulatory mechanisms to guide and control development in the community. Since the County has autonomy over these various tools, the County can augment them as necessary to address applicable hazard mitigation requirements. However, as a community that exists in a rural area, many of these processes may also affect neighboring communities and development. To ensure that altering these standards does not negatively affect adjacent communities, Erie County will seek consistency and collaboration with its counterpart regulatory documents from surrounding jurisdictions. After adoption of the Erie County All Natural Hazards Mitigation Plan, the Core Group should encourage its incorporated jurisdictions to be aware of the hazards that are affected by the planning and development decisions they may make and implement. The Erie County All Naturals Hazard Mitigation Core Group will conduct periodic reviews of the planning documents described in Section 7.2. The Core Group will also analyze any plan amendments, and provide technical assistance if needed to any incorporated jurisdiction participating in this effort.

8.6 Resolution of Adoption

When the mitigation planning process is completed, all participating jurisdictions must formally adopt the *Erie County All Natural Hazards Mitigation Plan*. The Erie County Commissioners as well as the incorporated areas of Bay View, Berlin Heights, Castalia, Kellys Island, Huron, Milan, Sandusky, and Vermilion will be passing a Resolution of Support for the Erie County countywide Mitigation Plan after contingent approval from the State of Ohio EMA as well as FEMA.

Examples of the Resolution of Adoption that will be presented to the Commissioners, as well as the Ordinance that the participating incorporated jurisdictions will pass, are provided on the following pages.

RESOLUT	ION NO	
ILCOLUI	IOIN INO.	

ADOPTION OF THE ERIE COUNTY COUNTYWIDE ALL NATURAL HAZARDS MITIGATION PLAN COUNTY NATURAL HAZARDS MITIGATION PLAN AND ESTABLISHMENT OF A ERIE COUNTY COUNTYWIDE ALL NATURAL HAZARDS MITIGATION PLAN COUNTY HAZARD MITIGATION CORE GROUP

WHEREAS, on ______, the Erie County Commissioners passed Resolution No. adopting the ERIE COUNTY COUNTYWIDE ALL NATURAL HAZARDS MITIGATION PLAN (the Mitigation Plan) pursuant to ______ which established goals to minimize and reduce stormwater damages to existing structures and land use in order to maximize the protection of public health, safety, and welfare, and identify and develop revenue sources to complete the goals and objectives; and

WHEREAS, the mission of the Erie County Countywide All Natural Hazards Mitigation Plan Core Group is: "To develop a working document that fulfills the mandates of the Federal Disaster Mitigation Act of 2000, and satisfies the requirements of FEMA and the Ohio EMA, as well as meets the needs of all of Erie County. Further, by researching and planning for future natural hazards and implementing appropriate mitigation techniques, all of Erie County can save lives and protect property, reduce the cost of disasters and provide for a rapid and efficient recovery by coordinating response efforts, and increasing the educational awareness of natural hazard events and their effects on the people, property, and resources of all Erie County."; and

WHEREAS, on May 25th, 2004, the Erie County Emergency Management Agency Director approved the development of a Mitigation Plan on behalf of the Erie County Board of County Commissioners; and

WHEREAS, a Mitigation Plan for Erie County will be required beginning in November 1st, 2004 to receive any state or federal mitigation funding such as flood prone property improvement or buyout funds; and

WHEREAS, the County of Erie County is subject to flooding, tornadoes, winter storms, and other natural hazards that can damage property, close businesses, disrupt traffic, and present a public health and safety hazard; and

WHEREAS the Mitigation Planning Core Group, comprised of representatives from the County, municipalities and stakeholder organizations, has prepared a recommended Mitigation Plan that reviews the options to protect people and reduce damage from these natural hazards; and

WHEREAS, the recommended Mitigation Plan has been widely circulated for review by the County's residents and federal, state and regional agencies and has been supported by those reviewers.

NOW, THEREFORE BE IT RESOLVED by the Erie County Commissioners that:

1. ERIE COUNTY COUNTYWIDE ALL NATURAL HAZARDS MITIGATION PLAN is hereby adopted as an official plan of Erie County.

- 2. The Mitigation Planning Core Group is hereby established as a permanent advisory body. It shall be composed of representatives from the existing Mitigation Planning Core Group, as recommended by the Erie County Emergency Management and Homeland Security Office. This includes those municipalities that pass a resolution to adopt for the Mitigation Plan.
- 3. The Core Group shall meet as often as necessary to prepare or review mitigation activities and progress toward implementing the Mitigation Plan. It shall meet at least once each year to review the status of ongoing projects.
- 4. The schedule of Core Group meetings shall be posted in appropriate places. All meetings of the Core Group shall be open to the public.
- 5. By November 30 each year, the Core Group shall prepare an annual evaluation report on the Mitigation Plan for the County Board of Commissioners and the municipalities.

The report will cover the following points:

- a. A review of the original plan.
- b. A review of any natural disasters that occurred during the previous calendar year.
- c. A review of the action items in the original plan, including how much was accomplished during the previous year.
- d. A discussion of why any action items were not completed or why implementation is behind schedule.
- e. Recommendations for new projects or revised action items. Such recommendations shall be subject to approval by the County Board of Commissioners and the affected municipality's governing boards as amendments to the adopted plan.
- 6. The director of each County office identified as "responsible agency" for the Mitigation Plan's action items shall ensure that the action item is implemented by the listed deadline subject to fiscal and staff time constraints.

Vote:	
Yes	
No	

ORDINANCE	NO	
AN ORDINANCE APPROVING AND ADO HAZARDS MITIGATION PLAN	PPTING THE COUNTYWIDE ALL NAT N PREPARED BY EMH&T, INC.	TURAL
WHEREAS, the County County County by resolution, and	ommissioners have approved the afor	rementioned
WHEREAS, the Plan will fulfill the man 2000, satisfies the requirements of FEMA and County,	<u> </u>	
NOW, THEREFORE, Be it ordained by State of Ohio:	y the Council of the City/Village of $_$,
SECTION 1: That the Countywide All EMH&T, Inc., and approved by theand adopted.	Natural Hazards Mitigation Plan as p	prepared by by approved
SECTION 2: That this Ordinance shall earliest period allowed by law.	take effect and be enforced from a	nd after the
ADOPTED:		, 2005.
ATTEST:		
Clerk of Council	President of Council	
Date filed with Mayor:		, 2005.
Date approved by Mayor:		, 2005.
	Mover	
	Mayor	
Approved as to form:		
Director of Law		