



Lorain County Natural Hazards Mitigation Plan

Prepared for
Lorain County, Ohio

December, 2004

EXECUTIVE SUMMARY

The Lorain County Emergency Management Agency (EMA)/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 full participation from the County as well as the incorporated jurisdictions.

Lorain 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 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 Lorain 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.

Lorain County has experienced many natural disasters in the past one hundred years. The Core Group evaluated these hazards and chose to address the following six hazards based on their impact on human health and property damage: severe storms (thunderstorms, high winds, lightning, hail), floods, tornadoes, droughts (extreme heat and extreme cold), erosion, and earthquakes.

With the hazards identified, a vulnerability assessment was completed for Lorain 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 evaluated the location and likely damage to critical facilities and other structures from different scenarios of strikes by the different 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 Lorain County's All Natural Hazard Mitigation Plan was an Action Plan for the communities to track progress on the implementation of their mitigation alternatives.

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LIST OF ACRONYMS

AOC	Area of Concern
BFE	Base Flood Elevation
BMPs	Best Management Practices
CAUV	Current Agricultural Use Value
CEA	Coastal Erosion Area
CEAP	Coastal Erosion Area Program
CMAQ	Congestion Mitigation Air Quality
CREP	Conservation Reserve Enhancement Program
CUAV	Current Agricultural Use Valuation
DMA2K	Disaster Mitigation Act of 2000
EMA	Emergency Management Agency
EMS	Emergency Management Services
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FLC	Firelands Land Conservancy
FMA	Flood Mitigation Assistance
GIMS	Geographical Information Management System
GIS	Geographical Information System
GPS	Global Positioning System
HAZUS	Hazards United States
HAZMAT	Hazardous Materials
HMGP	Hazard Mitigation Grant Program
HUD	Housing and Urban Development
HVAC	Heating, Ventilating, and Air-Conditioning
ITS	Intelligent Transportation System
LaMP	Lake Erie Lakewide Management Plan
LCBC	Lorain County Building Code
LCCDD	Lorain County Community Development Department
LCHS	Lorain County Historical Society
LORCO	Lorain County Wastewater District
mi ²	square miles
Mitigation Plan	All Natural Hazards Mitigation Plan
mph	miles per hour
NCDC	National Climatic Data Center
NFIP	National Floodplain Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NOACA	Northeast Ohio Area Coordinating Agency
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWS	National Weather Service
OCMP	Ohio Coast Management Program
ODNR	Ohio Department of Natural Resources
ODOT	Ohio Department of Transportation
OEMA	Ohio Emergency Management Agency
ORC	Ohio Revised Code
PDM	Pre-Disaster Mitigation
PSA	Public Service Announcement

PUCO	Public Utilities Commission of Ohio
RC&D	Resource Conservation and Development
RAP	Remedial Action Plan
SWCD	Soil and Water Conservation District
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USGS	United States Geographical Survey
WMSC	Water Management and Sediment Control

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 Lorain 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. Lorain County used this analysis for guidance when choosing their hazards. They include but are not limited to:

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

As part of the Disaster Mitigation Act (DMA2K, 42 USC 5165), communities that desire to remain eligible for Federal and State mitigation funds must have an approved mitigation plan in place.

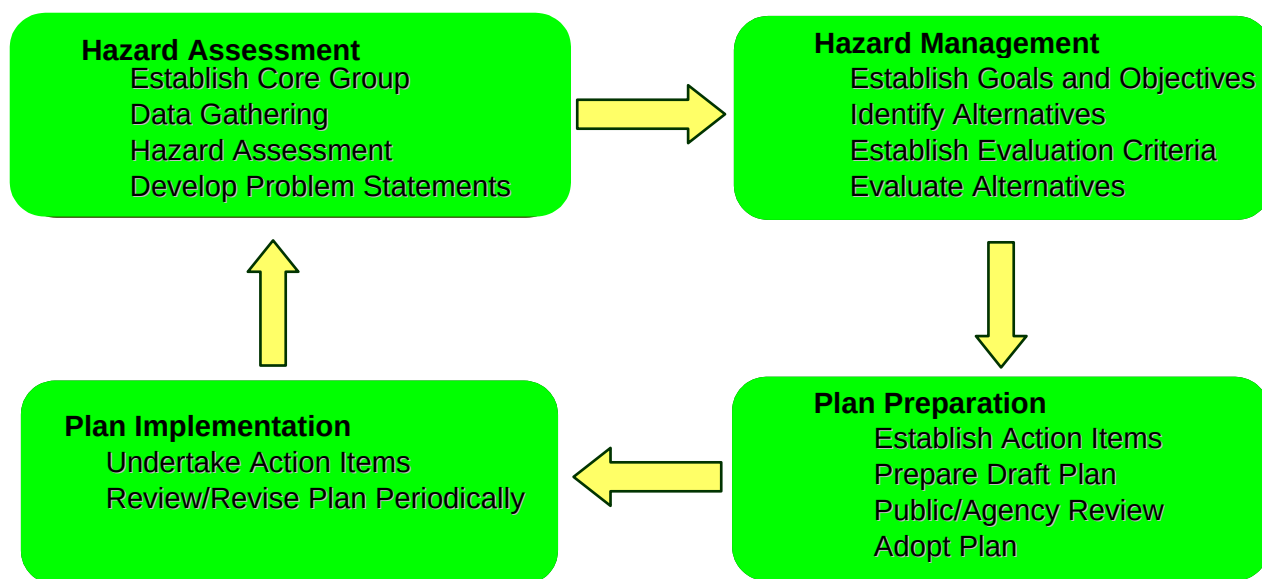
According to the DMA2K, incorporated jurisdictions within a County must participate as well as representatives from the unincorporated areas. Townships are not required to participate because the county commissioners can represent them on mitigation projects. However, if a township would like to take 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 Natural Hazard Mitigation Planning effort, then the community will become 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 and wet-floodproofing, lightning prediction systems, interoperable siren system, stream restorations or any other activity potentially funded with mitigation dollars.

The mitigation planning process that Lorain 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 Lorain 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 Lorain County, the County Commissioners desired to create the Lorain County Mitigation Plan for their community and its residents. Lorain 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 Lorain 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 Lorain 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 Lorain County Emergency Management Agency (EMA), the Regional Planning Commission, Lorain Soil and Water Conservation District (SWCD), the Farm Service Agency, American Red Cross, and any other agencies that were involved in planning efforts for the County.

1.2 Participating Communities

Lorain County has 10 incorporated areas within its borders. All 10 incorporated communities chose to participate in this planning effort. 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 “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:

- Lorain County Community Development
- Lorain County EMA
- 9-1-1 Facility
- City of Elyria Fire Department
- City of Avon
- City of Elyria
- City of Lorain
- City of North Ridgeville
- City of Sheffield Lake
- City of Oberlin
- City of Vermillion
- Village of LaGrange
- Village of Sheffield
- Village of Wellington
- Carlisle Township
- Eaton Township

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

Lorain County is located in northern Ohio. Its physical location is both one of Lorain County's greatest assets and one of the biggest challenges to its development future. Lake Erie along with Cuyahoga, Medina, Ashland, Huron, and Erie Counties form the boundaries of Lorain County. Lorain County is comprised of 492.6 square miles in land area.



The City of Lorain is the largest metropolitan area in the County, with almost 72,000 residents according to the 2000 Census. The City of Elyria, the county seat of Lorain County, has the second largest population with 56,000 residents.

Other cities, in the order of descending population, include North Ridgeville, Avon Lake, Amherst, Sheffield Lake, Oberlin, Avon and Vermilion. Villages in the County, in order of descending population, include Wellington, Grafton, Sheffield, South Amherst, LaGrange, Kipton and Rochester.

There are 18 townships in Lorain County. The townships, in order of descending population, are Carlisle, Columbia, Eaton, Amherst, Sheffield, Elyria, LaGrange, Grafton, Russia, Henrietta, Pittsfield, Brownhelm, Penfield, Wellington, Camden, Huntingdon, Brighton and Rochester.

2.2 County History

On December 26, 1822, the Ohio Legislature formed a new county called Lorain. Lorain was comprised of portions of Cuyahoga, Medina and Huron Counties. Jeremiah McLene, the Ohio Secretary of State, gave Nehemiah King, Jesse Ladd, and Edward Paine, Jr. each a commission on January 1, 1823 to choose Lorain County's permanent seat of justice. The three communities of Black River (now the City of Lorain), Elyria and Sheffield were considered. The State Commissioners visited each community and heard each case in February of 1823.

A letter in the Lorain County Historical Society (LCHS) Ely Papers described how important the meeting of the State Commissioners in Elyria was to Heman Ely, the founder of Elyria and leading proponent for establishing Lorain County. He found this meeting so important that he postponed meeting his wife in Rochester, NY, as she returned from a visit to her family in Massachusetts, so that he could meet with the State Commissioners. He offered to donate land adjacent to the park he had given to Elyria, donate \$2,000 toward the construction of a

permanent courthouse, build a jail and sheriff's residence behind the courthouse and build a temporary courthouse to use until the permanent structure was completed.

After much deliberation, the State Commissioners reported on February 14, 1823 that they chose Elyria. Almost a year after this decision, and five years after Heman Ely had first suggested a new county, Lorain officially was organized as a county on January 21, 1824, with its seat of justice in Elyria, Ohio.

2.3 Jurisdictions

City of Amherst

The City of Amherst is located in north central Ohio, approximately 30 miles west of Cleveland and nine miles west of Elyria. According to the 2000 Census, Amherst is comprised of 7.2 square miles in land area, with a population of 11,797. There are 4,459 households and 3,388 families residing in the city. The population density is 1,646.1 people/mi². There are 4,603 housing units at an average density of 642.3 units/mi².

Amherst is known for its large formation of high-quality sandstone, which runs roughly from the City of Berea in Cuyahoga County to the City of Amherst. The area has been labeled the "Sandstone Center of the World." John Baldwin, founder of what is now Baldwin-Wallace College, is credited with discovering the sandstone formation in 1842. The City Hall was built of this native stone in 1884 and is listed in the National Register of Historic Places (NRHP).



Amherst City Hall

The town of Amherst was established by German immigrants in 1807. The immigrants established several stone quarries in the area, with nine quarries operating at once during the peak of production years in the mid to late 1800s. In July 1886, The Cleveland Stone Company bought out several of the smaller businesses in the area. In 1903, The Ohio Quarries, owned by John R. Walsh, was organized and created competition for The Cleveland Stone Company. In 1929, The Cleveland Stone Company purchased The Ohio Quarries and became The Cleveland Quarries Company. They are still in operation today and quarry Birmingham Buff Sandstone and Berea Sandstone.

(<http://www.amst.com/aboutus.html>)

City of Avon

The City of Avon, Ohio, is located in northeast Lorain County, approximately 21 miles west of Cleveland. As of the Census of 2000, the City is comprised of 11.1 square miles of land, with a population of 11,446. There are 4,088 households and 3,143 families residing in the city. The population density is 548.4 people/mi². There are 4,291 housing units at an average density of 205.6 units/mi².

Some of the early settlers of Avon include the Schwartz, Miller and Faber families from Bavaria, Germany, arriving in the early 1830s. Another early settling family in the area, The Townshend family, became very successful with farming techniques. In 1830, Joel Townshend arrived from England with his family and established one of the finest herds of Leicester sheep in Ohio. The Townshends also introduced field tile to the area. Installation of field tile required removal of glacial boulders from the fields as well as draining of malarial swamps. Joel Townshend's son, Dr. Norton S. Townshend, became a founder of The Ohio State University.

A saw mill and a grist mill were built to process raw materials produced by the settlers. A Roman Catholic Church was erected after the saw and grist mills were built. In 1911, the residents of the northern portion of Avon Township voted to form the incorporated Village of Avon Lake. The County Commissioners separated Avon Lake and Avon in 1915. The remaining part of Avon Township was incorporated as the Village of Avon in 1917.

(<http://www.avonhistory.org/hist/hto74.htm#TOP>)

City of Avon Lake

Avon Lake, located between Cleveland and Lorain, is part of the Lorain - Elyria metropolitan area. The city, with a total area of 12 square miles, stretches for five miles along Lake Erie forming a northward arch into the lake. From north to south, its widest point measures approximately 2.5 miles. As of the Census of 2000, there are 18,145 people, 6,711 households, and 5,133 families residing in the city. The population density is 1,630.0 people/mi². There are 6,934 housing units at an average density of 622.9 units/mi².

One of the major employers for residents of Avon Lake is The Ford Motor Company's Ohio Assembly Plant in the City of Lorain, which began operations in 1974. The plant is responsible for assembling the Ford Econoline and Mercury Villager. The facility employs over 3,000 individuals. Avon Lake is also home to the first Fortune 500 Company in Lorain County. PolyOne, an international leader in the chemical industry, has three different types of facilities located in Avon Lake that employ local residents.

Most of the early growth of the area was in the southern section of the township, but the building of the Nickel Plate Railroad in 1882 and the construction of the Lake Shore Electric Railway in 1897 stimulated growth in the northern part of Avon Township. The rapid population growth of the northern sector led to the formation of a new political division called the Township of Avon Lake. The County Commissioners separated Avon Lake and Avon in 1915. In May, 1917, the Village of Avon Lake was incorporated with a mayor and a five-person council of to run the government.

Originally a farming community, Avon Lake specialized in grape production. However, in 1926, the Cleveland Electric Illuminating Company built its power plant on Lake Road. An industrial base was then established. The 1950 Census indicated a large enough population to attain city status. Therefore, a city charter was drafted and became effective January 1, 1952. (www.avonlake.org/history.htm)

City of Elyria

The City of Elyria is the county seat of Lorain County. It is located in the north central portion of Lorain County and is approximately 30 miles west of Cleveland. As of the 2000 Census, the City is comprised of 20 square miles of land with a total population of 55,953. There are 22,409 households and 14,834 families residing in the City. The population density is 2,813.7 people/mi². There are 23,841 housing units at an average density of 1,198.9 units/mi².

The founder of Elyria was Heman Ely, who was a native of West Springfield, Massachusetts. He was the son of Justin Ely, a prominent merchant, land developer and a heavy investor in the northeast Ohio (Western Reserve) lands of the Connecticut Land Company of Hartford. In 1816, the younger Ely planned a settlement within his 12,500 acres of land, in the future Lorain County. Heman named the town after himself and the Austrian province of Illyria, which he visited while in Europe.

On July 5, 1816, Heman Ely's agent, Simon Perkins, built a dam, grist mill and saw mill at a site that would become Main Street. A small log cabin was also erected to house the workmen and settlers would arrive the following year to build the settlement. In January of 1817, three axemen began clearing trees for the new settlement. The men stayed at the log house near the mills, staffed by the Jacob Bacon family.

On February 20, 1817, Heman Ely and his party of six left West Springfield, Massachusetts to travel to the new settlement. The group consisted of Heman Ely, Ebenezer Lane (who later became Chief Justice of the Ohio Supreme Court), housekeeper Ann Snow, a servant boy named "Ned," teamster Luther Lane and Artemas Beebe, who worked as a joiner.

Mr. Ely's large home was the second frame building in Elyria, built in the summer of 1817 on the northwest corner of Main Street (Broad) and East Bridge Street. By the summer of 1818 the settlement grew to 14 people.

On October 20, 1819, the Commissioners of Huron County created the township of Elyria (originally comprising present day Elyria and Carlisle Townships). The first election in the new township was held on April 3, 1820, with 20 votes cast. Heman Ely, Sherman Minot and Jonathan A. Sexton were elected as the first township trustees.

During the winter, Heman Ely journeyed to Columbus on horseback to secure an act for the establishment of a new county which he desired to name for the French province of Lorraine, an area in Europe he had visited previously. On December 22, 1822, an act was passed for the establishment of Lorain County, including land from several townships in Huron, Cuyahoga, and Medina Counties. Elyria was chosen as the county seat. On February 14, 1823, the County Commissioners marked the site of the proposed court house, on land donated by Heman Ely, just south of the village park (now Ely Park), which was dedicated to the inhabitants of the township on February 2, 1822, by Heman Ely.

Ozias Long was contracted in 1825 to build a new brick court house on the village square. The building was finished in 1828, featuring the classic Greek architecture and a cupola for the bell. Village government was established in Elyria on February 23, 1833, when the Ohio General Assembly passed legislation to incorporate "all the part of the township of Elyria...which is included within the branches of the Black River," and that it "hereafter be known and distinguished by the name of the Town of Elyria."

(www.drelocation.com/ohio/lorainco/elyria.htm)

City of Lorain

The City of Lorain is located in northern Lorain County on the shores of Lake Erie, approximately 30 miles west of Cleveland and 90 miles east of Toledo. Lorain has a total land area of 24.2 square miles. As of the Census of 2000, there are 68,652 people. There are 26,434 households and 17,975 families residing in the city. The population density is 2,858.6 people/mi². There are 28,231 housing units at an average density of 1,175.5 units/mi².

The first permanent settlement at the mouth of the Black River was made in 1807. The post office was established a few years later and since the settlement had no name, the post office was called the Mouth of Black River. This name was later shortened to Black River. When Lorain County was incorporated in 1822, the village at the mouth of Black River also became known as Lorain. In 1834, the village was incorporated as Charleston. Forty years later, in 1874, Charleston was re-incorporated as Lorain.

The town developed shipbuilding as its first major industry. In 1897, the Cleveland Shipbuilding Company was organized. This company purchased 20 acres on the east side of the Black River, near Erie Avenue. Work began at once to construct the dry dock, the launching slips and the building births. The local plant became a part of the American Shipbuilding Company organization in 1899. In 1906, the original site was outgrown and an additional 23 acres was purchased. An additional five acres has since been added.

The latest constructed drydock constructed by the shipbuilding company is 747 feet long and 125 feet wide. This drydock is the largest on fresh water and among the largest in the world. Some of the largest machinery of its kind in the United States is used at this local yard.

The Ford Motor Company's Ohio Assembly Plant is also located in the City of Lorain. This plant began operations in 1974 and is a major employer for the area. Ford uses the facility to assemble the Ford Econoline and Mercury Villager.

The symbol many people have come to identify with Lorain is the Lorain Lighthouse. Its image has been reproduced thousands of times in photographs. It is located at the north end of the West Harbor Breakwater in Lorain Harbor. The lighthouse represents the City of Lorain's historic relationship with Lake Erie shipping. In December 1978, the lighthouse was placed on the NRHP. (http://www.lorain.lib.oh.us/history/community/nor_history.html)



Lorain Lighthouse

City of North Ridgeville

The City of North Ridgeville is located in the north central portion of Lorain County, approximately 3.5 miles east of Elyria. The City has a total area of 23.5 square miles. According to the 2000 Census, North Ridgeville has a population of 22,338 people. There are 8,356 households and 6,434 families residing in the city. The population density is 955.8 people/mi². There are 8,587 housing units at an average density of 367.4 units/mi².

Seventeen men from the Terrell and Beebe families of Waterbury, Connecticut came to nearby Columbia Township in 1809 and entered Ridgeville on foot from the southeast. They stopped at present-day Bainbridge Road and built the first log building in the township. The first permanent settlement in North Ridgeville Township took place on May 10, 1810. The township was organized in 1813, and remained "Ridgeville Township" until 1958.

In 1829, due to frequent mail mistakes due to another village being named Ridgeville near Dayton, Ohio, the Postmaster General requested that the name of the post office be changed to "North Ridgeville." Thereafter, the community around the intersection of Center Ridge Road (now State Route 113 and U.S. Route 20) and Center Road or Station Road (later called Avon-Belden Road, State Route 76, and State Route 83) was known as "Ridgeville Center," and the post office was known as North Ridgeville.

The township's first permanent Town Hall was a frame structure erected in 1850 on the present site of the Old Town Hall, on land leased from Levi W. Terrell, who lived in the house just west of the site. In March 1882, the citizens of the township decided to vote at the April election upon the question of whether to build a new, larger town hall. The measure passed by a three to one margin, and bids were received, with Elah Terrell, a Ridgeville native, and a gentleman named Mr. Morris receiving the contract.

By November 1882, the foundation was completed, with the brick and interior work being finished in 1883. The new building was a two-story brick structure 42-feet wide and 64-feet long. The foundation, trim, and curved window arches were cut from Amherst sandstone. The eaves, braces, and wood trim were painted white. The roof was slate; the bell tower was covered with sheets of copper, and there were two large brick chimneys toward the back of the building's roof.

The lower story was designed for holding elections and general township business. The second story, used for public meetings, lectures, concerts, etc., was furnished with a stage on the south end, five chandeliers, and "298 fine opera chairs" on a sloping floor rising back from the stage. Many community events took place at the new hall. Family reunions were held in the buildings or on the grounds. For example, the annual reunion and picnic of the Terrell and Beebe families (Ridgeville's original pioneers) was held on the grounds.



Town Hall circa 2004

Lectures, performances by traveling opera companies, festivals, patriotic observances, plays, minstrel shows, Grange meetings, church dinners and programs, ice cream socials, spelling bees, and the eighth-grade Boxwell examinations and graduations were just some of the activities held at the Town Hall during its first 50 years.

At the end of 1958, Ridgeville Township was incorporated as a village. For approximately 1-1/2 years, a temporary village Council and Mayor maintained offices in what was now called Ridgeville Village Hall. By August of 1960 the village's population was sufficient (over 5,000) to allow the incorporation of the City of North Ridgeville. A new City Council was formed, a permanent police department replaced the previous Township constable and the fire department was expanded. (www.nridgeville.com)

City of Oberlin

Oberlin is located in central Lorain County approximately 9.5 miles southwest of Elyria. The City has a total land area of 4.4 square miles. According to the Census of 2000, there are 8,195 people, 2,678 households, and 1,395 families residing in the city. The population density is 1,871.5 people/mi². There are 2,836 housing units at an average density of 647.7 units/mi².



Oberlin College

Oberlin is best known for being the home of Oberlin College, a liberal arts and music school with approximately 3,000 students. The College was founded in 1833 by two Presbyterian ministers named John Shipherd and Philo P. Stewart. The two ministers decided to name their community after John Frederick Oberlin, a minister whose achievements had greatly impressed and inspired them.

During the middle of the nineteenth century, Oberlin became a major focus of the abolitionist movement in the United States. The town was conceived as an integrated community, with blacks attending Oberlin College from its early years. Many Oberlin College graduates were dedicated abolitionists who traveled throughout the South working to help slaves escape to the north. By 1852, the town of Oberlin was an active terminus on the underground railroad, and thousands had already passed through it on their way to freedom.

(http://www.cityofoberlin.com/city_history.html)

The residents of Oberlin participated in the Oberlin-Wellington Rescue, a pivotal event that contributed to the Civil War, and is described in the following excerpt of *The Town That Started the Civil War* by Nat Brandt:

“On September 13, 1858, a fugitive named John Price was captured and jailed in neighboring Wellington, Ohio. A large group of Oberlin residents consisting of townspeople, students and faculty, set out for the Wellington jail to release Price from captivity. Price was freed and eventually smuggled out of the country, but the authorities were not content to let the matter rest. President James Buchanan personally requested that the group (now referred to by sympathetic parties as “the Rescuers”) be prosecuted, and 37 of them were eventually tried and convicted by an all-Democrat jury. The group appealed to the Ohio Supreme Court for a writ of habeas corpus, but on May 30, 1859, their petition was denied. Ultimately, they bargained with the prosecutors, who granted the group their freedom in exchange for the promise that they would stay out of Northern Ohio.”

City of Sheffield Lake

The City of Sheffield Lake is located in northern Lorain County and is approximately 13 miles north of Elyria. The City has a total land area of 2.5 square miles. As of the Census of 2000, there are 9,371 people, 3,498 households, and 2,571 families residing in the city. The population density is 3,715.3 people/mi². There are 3,776 housing units at an average density of 1,497.1 units/mi².

Sheffield Lake Village, later known as the City of Sheffield Lake, separated from Sheffield Township in 1920. The population of the area was rising because of the steel mill production in the area, but Sheffield Lake Village remained mostly farmland. A decade later, the northern section of the Village was becoming urbanized while the southern remained large farmsteads. The farmers in the southern part of Sheffield Lake Village soon felt they were paying for improvements to the Village that were not affecting them, such as water and sewer line improvements along the lakeshore. In 1933, the northern part of the village separated from the southern. The northern section retained the name Sheffield Lake Village, while the south became Sheffield Village.

(<http://sheffieldlakeoh.usl.myareaguide.com/>)

City of 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.

Between 1808 and 1811, the first settlers arrived in what is now known as Vermilion. The first settler to arrive was William Hoady 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 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.

(<http://www.vermilion.net/history/settlers.htm>)

Village of Grafton

The Village of Grafton is located in eastern Lorain County approximately 8.5 miles east of Elyria. According to the 2000 Census, Grafton has a population of 2,302 residents, 832 households and 643 families residing in the Village. The total area of Grafton is 4.5 square miles. The population density is 510.0 people/mi². There are 853 housing units at an average density of 189.0 units/mi².

Grafton was settled in 1817 by Jonathan and Grindall Rawson from Massachusetts. They built a log cabin on a hill overlooking Willow Park on Main Street. A few years later, a homestead was built a short distance away. In 1818, the Rawson brothers and Nathaniel Boughton erected a sawmill near the homestead. In 1826, they built a grist mill in the same area.

The community's growth began in 1846, after the Cleveland, Columbus and Cincinnati Railroad finalized plans for the construction of a railroad that crossed Jonathan Rawson's property. The area was chosen because the nearby Black River could supply water for the steam locomotives. The railroad agreed to lay the tracks and build a station if Rawson would help develop the town. The town became known as Rawsonville until 1877, when the name Grafton was officially accepted.

(<http://www.villageofgraffton.org/History.htm>)

Village of Kipton

The Village of Kipton is located in western Lorain County, approximately 15 miles west of Elyria. The total land area of the Village is 0.5 square miles. As of the Census of 2000, there are 265 people, 105 households, and 76 families residing in the village. The population density is 573.2 people/mi². There are 108 housing units at an average density of 233.6 units/mi².

When the Toledo, Norwalk and Cleveland railroad was established in 1852, the Village of Kipton became the center of trade in Camden Township. William W. Whitney, who owned the land where Kipton lies, proceeded to lay out a village extending south from the tracks. He named it Binghampton, in honor of his native place, Binghampton, N.Y. The name was later changed to Kipton when the railroad adopted that name for its station.

(<http://www.kipton.org/history.html>)

Village of LaGrange

LaGrange is located in southeastern Lorain County, approximately nine miles south of Elyria. The Village has a total land area of 1.8 square miles. According to the 2000 Census, there are 1,815 people, 618 households, and 501 families residing in the village. The population density is 1,031.9 people/mi². There are 648 housing units at an average density of 368.4 units/mi².

LaGrange Village was incorporated and held its first election on April 5, 1875. There were 103 voters that participated in the election. The following officials were the first elected officials in the Village of LaGrange: Judson E. Willard, Mayor; D.D. Gott, Clerk; D.L. Gott, Treasurer; P. Holcomb, Marshall; and the following were elected as Councilmen: A. Ryan, G.H. Robbins, O. Dale, D. Holcomb, W. Hopkins and E.L. Gott.

A variety of businesses flourished during the late 1800s to early 1900s in LaGrange. Aside from the stores and hotels, a carriage shop made wagons and buggies for prospective customers. A

shoe repair shop, millinery shops, a band and a meat market also served the public. The Belle Vernon Company built a creamery, where milk from nearby farms was brought for processing. Historical documents describe a fire occurring in 1897 that destroyed the buildings in the southwest section of the square but the area was quickly rebuilt. (http://www.lagrangeohio.net/township_history.shtml)

Village of Rochester

Rochester is located in southern Lorain County, approximately 24 miles southwest of Elyria. The Village has a total land area of 1.1 square miles. As of the Census of 2000, there are 190 people, 68 households, and 56 families residing in the Village. The population density is 172.4 people/mi². There are 69 housing units at an average density of 62.6 units/mi².

Village of Sheffield

Sheffield is located in northeastern Lorain County, approximately five miles north of Elyria. The Village has a total land area of 10.8 square miles. According to the 2000 Census, there are 2,949 people, 1,089 households, and 866 families residing in the Village. The population density is 272.6 people/mi². There are 1,147 housing units at an average density of 106 units/mi².

Sheffield Village was established in 1933 due to the expanding industrial population from steel mill production that had divided the northern and southern portions of the Village of Sheffield Lake. The northern section of the Village was becoming urbanized while the southern remained large farmsteads. The farmers in the southern part of Sheffield Lake Village soon felt they were paying for improvements to the Village that were not affecting them, such as water and sewer line improvements along the lakeshore. In 1933, the northern part of the village separated from the southern part. The northern section retained the name Sheffield Lake Village, while the southern section became Sheffield Village.

(<http://sheffieldlakeoh.usl.myareaguide.com/>)

Village of South Amherst

The Village of South Amherst is located in northwest Lorain County. According to the 2000 Census, the Village has a total land area of 2.5 square miles. As of the Census of 2000, there are 1,863 people, 669 households, and 535 families residing in the Village. The population density is 760.0 people/mi². There are 681 housing units at an average density of 277.8 units/mi².

South Amherst is known for its quarries of Berea Sandstone. The sandstone quarries at South Amherst are the largest and deepest in the world, one measuring 160-feet deep. In 1869, Cleveland Stone Company opened in South Amherst. By 1887, the company employed 2,000 workers. The Cleveland Stone Company, now known as the Cleveland Quarries Company, is still in operation today and quarries Birmingham Bluff and Berea Sandstones.

(http://www.amst.com/news_2002_09_24.html)

The following text is an excerpt from the *1879 History of Lorain County* by William Brother describing the Village of South Amherst:

“The little village in the southern part of the township is known as South Amherst, though the post office is Amherst. Its early settlers have been noticed in the early part of this chapter, and as the village is not incorporated, and in fact consists of only a few people and a small cluster of houses, there remains little to be said about it. The place was known many years ago by the unpoetical title of “Podunk”. It was also known as the “Little Whig hole,” for nearly all of its residents were whigs. All of the postmasters up to the time the party died were of this political persuasion. Eliphalet Redington was the first. He was followed by A. H. Redington, his son, and he by Peter Lunt. Joseph Reynolds was the next postmaster, and then came J. C. Jackson. The present incumbent, Henry Jackson, followed him.”

Village of Wellington

The Village of Wellington is located in southern Lorain County. According to the 2000 Census, the Village has a total land area of 3.0 square miles, with a population of 4,511. There are 1,723 households, and 1,173 families residing in the Village. The population density is 1,536.2 people/mi². There are 1,850 housing units at an average density of 630.0 units/mi².

In 1818, four men from Massachusetts settled in Wellington Township. By the 1840's, a thriving carriage making industry had developed. The railroad was laid through town in 1850, and further solidified the growth and prosperity of the Village. In 1855, Wellington Township was incorporated as a Village.

Wellington played a pivotal part in an event that contributed to the Civil War. In September 1858, a runaway slave named John Price was seized by United States Marshall Lowe in Oberlin, Ohio, with plans to return him south by the first train in Wellington. A large crowd at the American House Hotel in Wellington freed Price and eventually helped to smuggle him out of the country. The people involved were indicted by the United States Grand Jury for violation of the "Fugitive Law".

Wellington was known as the "Cheese Capital of the World" from 1868 until 1910. In 1878, approximately 6,470,000 pounds of cheese were shipped out of Wellington along with approximately 1,000,000 pounds of butter. One of the largest companies in this industry was Horr, Warner & Company. The president of the company built a large home on South Main Street, where it still stands today.

The Wellington Town Hall was constructed in 1885 using a unique mix of Byzantine, Greek, Gothic, and Spanish architectural features. The Opera House as well as the government offices were housed here. In Wellington, there are more than 200 buildings listed on the NRHP.

(<http://www.villageofwellington.com/history.html>)



Wellington Town Hall

2.4 Census Information

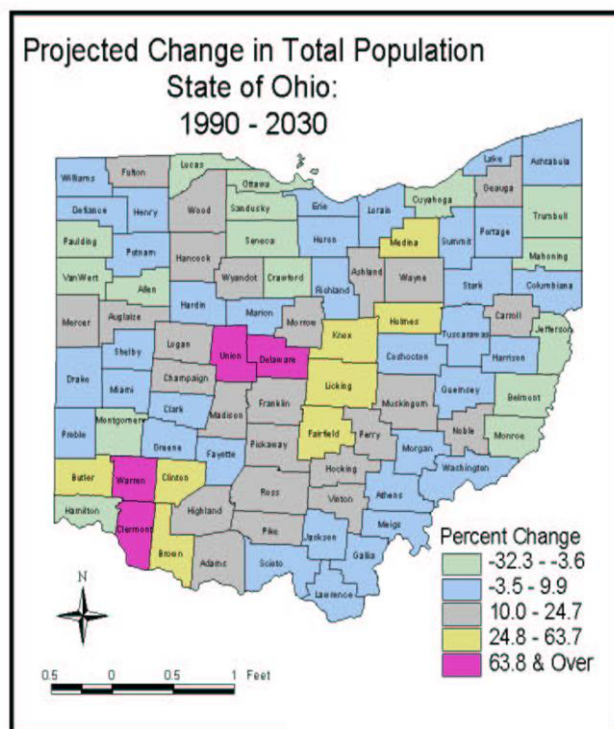
2.4.1 State Population

2.4.2 County Population Projection

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.



The population of Lorain County has increased over the last 100 years. The most dramatic increase in population took place between 1950 and 1960 with a net change of 69,338 people, equivalent to a 46.8% change. From 1960 to 1980, Lorain County's population increased by a total of 20.8%. However, from 1980 to 1990, the population declined by 1.4%, which was the only decline recorded between 1830 and 2000. In 2000, Lorain County recorded its highest population in the last 100 years. According to U.S. Census figures, the 2000 total population of Lorain County was 284,664. The County is expected to keep growing over the next 30 years, with an expected increase in population to 312,543. See Table 2-1 for additional demographical information.

**Table 2-1
TOTAL POPULATION-CENSUS**

Year	Total Population	Year	Total Population
1800	NA	1910	76,037
1810	NA	1920	90,612
1820	NA	1930	109,206
1830	5,696	1940	112,390
1840	18,467	1950	148,162
1850	26,086	1960	217,500
1860	29,744	1970	256,843
1870	30,308	1980	274,909
1880	35,526	1990	271,126
1890	40,295	2000	284,664
1900	54,857		

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

2.5 County Land Use and Future Land Use

2.5.1 Topography

Lorain County includes portions of four major watersheds. The Vermilion Drainage encompasses 28,881 acres (about 9% of the County) toward the western border of the County. The Rocky River drains a small portion of land (around 15,390 acres or about 5% of the county) in the eastern section of the County. Small areas encompassing around 39,434 acres (approximately 12% of the County) are drained by several small streams that empty directly into Lake Erie. Beaver Creek is the largest of these streams, with the surface area identified as the Beaver Creek watershed. The majority of the County (around 232,295 acres, or 74 percent) is drained by the Black River, including portions of the West Branch and East Branch of the Black River. Within each watershed there are numerous, smaller, sub-watersheds that act to create the conditions present in each parent stream.

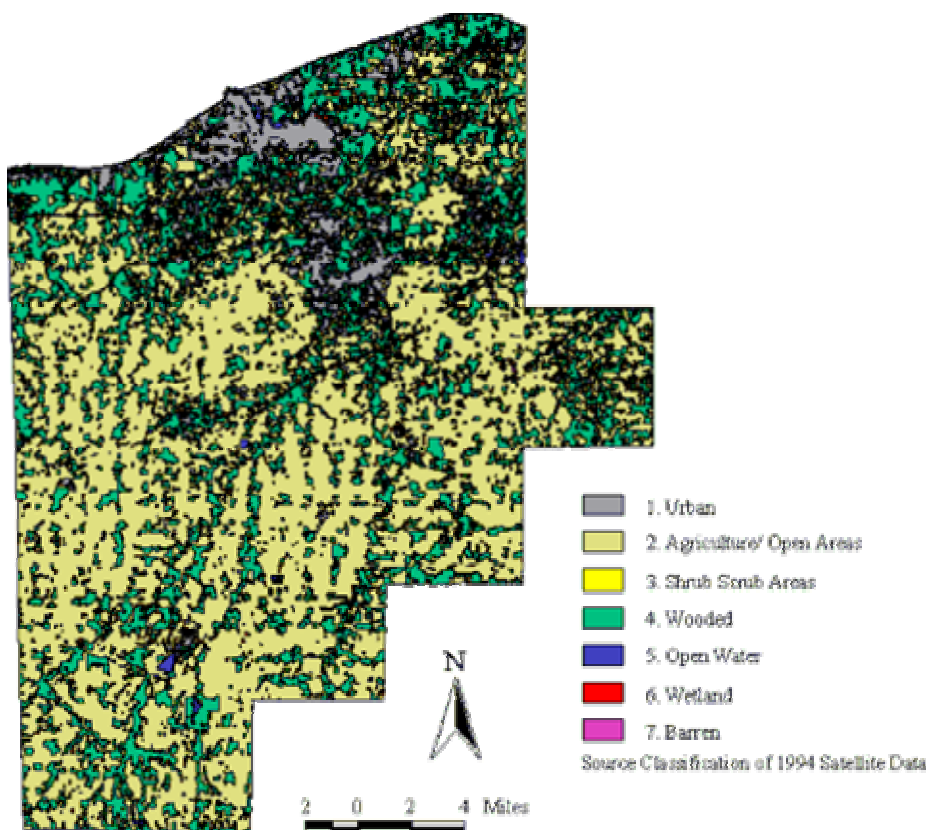
Lorain County has approximately 70,000 acres of hydric soils. In addition, over 193,144 acres of land are covered by non-hydric soils with hydric inclusions. Extensive areas of hydric soils occur within Lorain County. The largest areas of hydric soils occur in the north, below the old beach ridges, particularly in the northeast. Allis, Luray, and Miner soils cover large areas here. In the southern portion of Lorain County, hydric soils are limited to depressions and the areas surrounding very small, intermittent drainageways. Trumbull soils are very common in parts of the County. Somewhat poorly drained soils cover much of Lorain County, particularly in the south. Mahoning and Fitchville soils are dominant in most of these areas.

2.5.2 Land Use

Approximately 28% (88,034 acres) of Lorain County is wooded. Forestland occurs sporadically across the entire county, with more extensive areas found on the Lake Plain in the northwest and northeast corners.

Trees within the cities and villages of Lorain County comprise the urban and community forests of the County. Avon Lake, Elyria, and Oberlin received funding for tree planting and urban forestry management through the Ohio Department of Natural Resources (ODNR) Urban Forestry Department. These communities have taken positive steps toward maintaining sustainable urban forests.

The following map illustrates Lorain County's land use in 1994.



2.5.3 Future Land Use

In July 2000, the Lorain County Comprehensive Plan was prepared for the Lorain County Planning Commission at the request of the Board of Commissioners. Based on an analysis performed during this plan, approximately 50% of new residential growth projected to occur within the planning period can be located within the existing municipalities. Over the next 10 years, the cities of North Ridgeville and Avon Lake are expected to be the primary areas where development will take place.

At the county level, the Comprehensive Plan has a number of specific areas of action recommended. The actions recommended are divided into Wastewater Treatment Plan, Transportation and Thoroughfare Plan, Environmental Strategic Plan, Subdivision Regulations, Capital Improvement Program, Stormwater Management Plan, Joint Economic Development Districts, Housing, Involvement of Rural Utilities in Planning and Continued Planning and Planning Assistance. Some of the following actions include:

- Recommend preparing a countywide wastewater treatment plan.
- Recommend studying a broader multi-modal transportation issues is recommended.
- Adopt an environmental strategic plan within the next three years.
- Update the Subdivision Regulations to include areas not required to file for a zoning change and establish a desired pattern of development for these areas.
- Establish a formal process of selecting and scheduling projects for which the capital improvements budget is allocated through a Capital Improvement Program.
- Complete a Stormwater Management Plan.
- Adhere to mechanisms the Ohio legislature has created that allow adjoining townships and municipalities to enter into agreements that remove annexation conflicts.
- Ensure the County takes a more active role in providing affordable housing in all areas of the County.
- Involve the Lorain-Medina Rural Electric Cooperative and the Lorain County Rural Water Authority in the planning and development process.
- Establish a policy that implements periodic review and updates to plans to ensure they are always up to date.

2.6 County Utilities

2.6.1 Water and Wastewater

There are 6,000 groundwater wells found in Lorain County. Almost all of the County's groundwater wells are privately owned. There are no municipal groundwater supply wells in Lorain County, and only five public water supply systems in the entire county rely on groundwater as a source of water supply.

The Lorain County Rural Wastewater District (LORCO) under the provisions of Chapter 6119 of the Ohio Revised Code (ORC) services the majority of the County. LORCO serves the 13 townships and three villages in Lorain County, and is dedicated to providing sanitary sewer service to areas of Carlisle and Easton Townships. In the Lorain County Comprehensive Plan of 2000, later phases to provide service in other areas are discussed.

2.6.2 Other Utilities

Private companies that are considered public utilities regulated by the Public Utilities Commission of Ohio (PUCO) in the County operate other utility services. Electric Utility Service in the northern section of the County is supplied primarily by the First Energy Corporation; although several smaller communities have their own municipal electric systems. Some other providers of electricity for the County include Dayton Power & Light, Ohio Edison, and Pioneer Rural Electrification Administration. The majority of electric service in the townships of southern Lorain County is provided by the member owned Lorain-Medina Rural Electric Cooperative, which operate on a non-profit basis. See Map B-1, Service Areas of Ohio Electric Companies, in Appendix B.

Columbia and Vectren provide gas utility service to Lorain County. Columbia Gas of Ohio is an investor owned public utility that sells natural gas and provides gas transportation services to customers in Ohio. Vectren Corporation, headquartered in Evansville, Indiana, is an energy and applied technology holding company. Vectren's energy delivery subsidiaries provide gas and/or electricity to nearly one million customers in adjoining service territories that cover nearly two-thirds of Indiana and west central Ohio. See Map B-2, PUCO regulated Natural Gas Companies, in Appendix B.

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

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 Pre-Disaster Hazard Mitigation Core Committee for Lorain 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 Lorain County. Further, by researching and planning for future natural hazards and implementing appropriate mitigation techniques, all of Lorain 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 Lorain 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 Lorain 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, Lorain County notified adjacent counties as well as the general public regarding this mitigation planning process. The Lorain County EMA sent letters to adjacent counties with contact information for learning more about the planning effort. Lorain County also issued a press release dated October 11, 2004 inviting concerned citizens in all jurisdictions of the County. The Lorain 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 Lorain 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 Lorain 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 Lorain County have 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 (Winter, Snow, Ice, Thunderstorms, High Winds, Hail, Lightning)
2. Flooding (100-year flood zone, non-flood zone, flash flooding)
3. Tornadoes
4. Droughts, Extreme Heat, Extreme Cold
5. Erosion
6. Earthquakes

Please see Appendix C 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 Lorain 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 – Meeting 4

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. Then, 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. Please see Appendix C Meeting 4 minutes.

3.4.5 Public Meeting

Public input is necessary in order to gauge the opinion of the community and build support for the Mitigation Plan. A public meeting was held on January 11, 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: economically justifiable; technically feasible; socially equitable; environmentally sound; and publicly acceptable.

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 Lorain County focus their mitigation strategies on the highest rating activities.

The matrix results will be discussed in more detail in a later section of this report.

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 Lorain 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. Lorain 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

Lorain 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 Lorain 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 Lorain County.

4.1 Initial Hazard Assessment

In order to properly evaluate the natural hazards to which Lorain 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 Lorain County should prepare, and potentially mitigate, in the future.

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 include: 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 (Winter, Snow, Ice, Thunderstorms, High Winds, Hail, Lightning)
2. Flooding (100-year flood zone, non-flood zone, flash flooding)
3. Tornadoes
4. Droughts, Extreme Heat, Extreme Cold

5. Erosion
6. Earthquakes

4.3 Severe Storms

Hazards that fit into the severe storm category include snow, ice, thunderstorms, high winds, hail, and lightning. 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.

4.3.1 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.

4.3.1.1 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.

According to the NCDC, there were 22 snow and ice events recorded from 1950 to 2004. Of these events, 15 were considered heavy snow events, causing 15 injuries and \$31 million worth of property damage. In addition, seven winter storms were recorded, causing 56 injuries and \$8.7 million worth of property damage. For all the events, total injuries reported were 77, total property damage reported was \$45.2 million, and \$500,000 of crop damage was reported.

4.3.1.2 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.

According to the NCDC, there were two snow and ice events recorded from 1950 to 2004, which caused six injuries and \$5.5 million worth of property damage.

4.3.2 Thunderstorms and High Winds

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 is 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

4.3.2.1 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.

There were 250 thunderstorm and high wind events recorded by the NCDC from 1950 to 2004 for Lorain County. Of these events, 35 were considered only high or strong wind events. Property or crop damage over \$1 million was recorded for eight of these events. Total property damage for all events was \$39.4 million, with crop damage of \$2.5 million.

4.3.2.3 Lightning

Lightning kills between 75-100 people a year. It is the second largest killer, 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.

According to the NCDC, there have been eight lightning events recorded from 1950 to 2004. Total property damages of \$890,000 were reported for five of these events. The remaining three events caused three injuries, with no property damage losses.

4.3.2.4 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 occur in summer, 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.

Eighty hail events were recorded from 1950 to 2004, according to the NCDC. Property damage was reported for 11 of the 80 recorded events. Total property damage for these events was \$69,000. Damage ranging from \$1,000 to \$5,000 was reported for 10 of these 11 events. On September 14, 2002, walnut sized hail (1.5 inches) was reported in LaGrange, which resulted in \$25,000 worth of property damage.

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.

The NCDC has recorded 44 flood events from 1950 to 2004 for Lorain County. The property damage total for these events was \$20.7 million, with \$225,000 in crop damage.

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.

Lorain 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 unincorporated Lorain County is in compliance with state floodplain management standards and participates in the National Flood Insurance Program (NFIP). The County has been involved since October 19, 1991. The following list gives the incorporated jurisdictions that participate in the NFIP and the date in which they entered the program:

- Amherst August 1, 1980
- Avon July 12, 1983
- Avon Lake October 2, 1977
- Elyria July 2, 1980
- Grafton July 2, 1980
- Kipton September 22, 1978
- Lorain (city) August 15, 1978
- North Ridgeville June 4, 1980
- Oberlin June 18, 1980
- Sheffield June 18, 1980
- Sheffield Lake March 1, 1978
- South Amherst May 1, 1980
- Vermilion December 31, 1970
- Wellington June 4, 1980

According to the FEMA Federal Insurance Administration, LaGrange is a village who has special flood hazard areas identified within its jurisdiction, but is not participating in the program as of November 9, 2004. The Village of Rochester has not had special flood hazard areas identified within its boundaries and is not participating in the program at this time.

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 considered at higher risk 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” and have repeated flooding in residential homes. There are 13 properties that have suffered from repeated flooding occurrences in Lorain County.

4.5 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 a hundred yards across. Not all tornadoes are the same, of course, 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 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 the risk of 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 tornadoes, because not all tornadoes occur in situations where the radar can "see" them. Ordinary citizen volunteers make up 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.

Annual Average Number of Tornadoes, 1950-1995

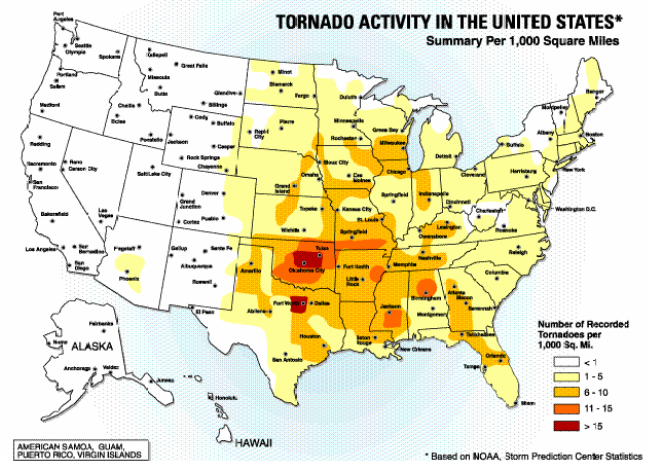
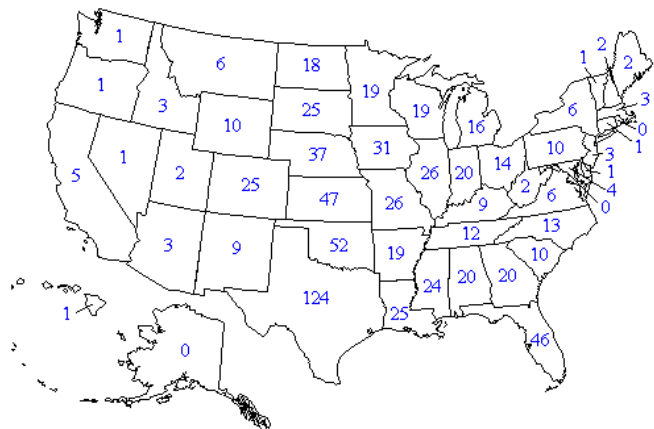


Figure 1.1 The number of tornadoes recorded per 1,000 square miles

Based on NOAA Storm Prediction Center Statistics

Table 4-2 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 4-2
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 4-3. This scale below 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 4-3
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 forest 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.

According to the NCDC, there have been 26 tornado events reported from 1950 to 2004 for Lorain County. The property damage totaled \$36.21 million, with \$50,000 worth of crop damage. Five events had over \$1 million worth of damage reported. The worst event occurred on April, 11, 1965, destroying \$25 million worth of property, causing 17 fatalities and injuring 100 people. Prior to 1950, a tornado was reported on June 28, 1924, destroying \$30 million worth of property and killing 85 people. On June 8, 1953, a tornado caused one death and 47 injuries, but no property damage was reported.

4.6 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.

4.6.1 Droughts as a 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/rural 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 portions of Lorain County are susceptible to land fires, no recorded information was readily available concerning wild land fires.

4.6.3 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.

There were seven drought events recorded by the NCDC from 1950 to 2004. Property damage and crop damage were not reported for six of the seven events. The event with recorded crop damage occurred September of 1999, affecting 28 counties throughout the State of Ohio. The monetary estimate for crop loss due to this drought was \$200 million.

4.7 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.

4.7.1 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 river banks through lateral (side) erosion and collapse often causes high sediment loads in creeks and rivers. The problem is often initiated by heavy rain falls 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 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.



Deposited stream sediment following erosion event

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.

In Lorain County, the area of greatest soil loss is the rolling till plain in southern Lorain County. This area comprises much of the upper portion of the Black River basin along both the East and West Branches of the river. The sub-basins within this area have greater than 20% of their land area eroding at a rate of more than five tons of soil per acre per year.

The most erosive of these sub-basins are: East Branch (West Fork to Crow Creek), Coon Creek, Charlemont Creek, West Branch (Headwaters to Charlemont Creek) and Buck Creek. The Northeast Ohio Area Coordinating Agency (NOACA) grouped the highly erodible land within the upper portion of the Black River basin, along both the East and West Branches, according to land use type. Over 17,000 acres were eroding at "excessive" levels in these basins. Cropland accounted for 82% of this total, followed by open space categories (e.g. grasslands, forestlands, and pastures) at 14% and developed lands at 4%. The open space categories are areas least disturbed by human activities and are representative of background erosion problems. Therefore, naturally occurring erosion and sedimentation rates are high in much of the upper basin along both the East and West Branches. Steep slopes and deep soil depth combine to create erosive conditions. The U.S. Army Corps of Engineers reported in *Erosion and Sedimentation Study, Lorain, Ohio*, August, 1982, that cropland in the Black River watershed is

eroding at an average rate of 4.7 tons per acre per year. According to the U.S. Army Corps study, 107,000 acres of cropland in the Black River watershed is eroding at approximately twice the tolerable soil loss rate. The Corps further determined 835,000 tons of sediment is produced annually within the watershed with 80% coming from cropland. Soil erosion in the Black River basin is detrimental in many ways. Soil loss from fertile cropland not only harms productivity, but does considerable damage to the drainage network throughout the watershed.

In recent history, two problem areas of erosion have been identified, according to the NRCS District Coordinator for Lorain County. Slippage and subsidence is located along the main stream of the Black River, along Gulf Road in Elyria between State Route 113 and Interstate 90. The second location is along the main branch of The Vermilion River in Brownhelm Township, just south of the City of Vermilion.

4.7.2 Coastal Erosion

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 affects of coastal erosion over a 30-year period of time and is taken from ODNR's Office of Coastal Management. Table 4-4 lists Ohio counties that lie along Lake Erie that describes the erosion distances and rates over long-term and short-term periods of time.

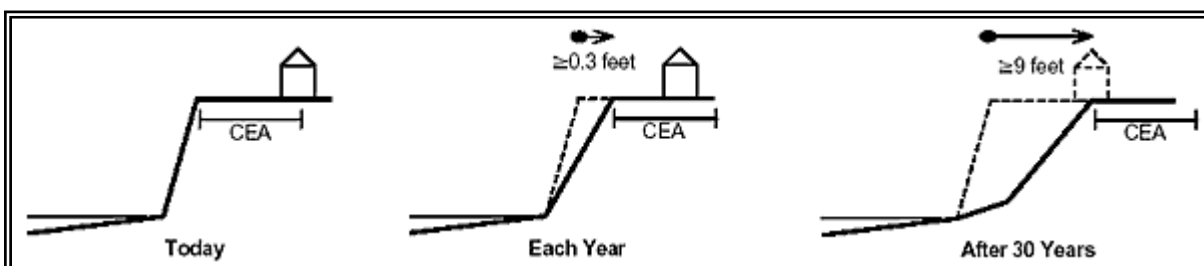


Table 4-4
Ohio Lake Erie Erosion Statistics by County

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

Lake Erie's shoreline encompasses 21 miles in Lorain County. The City of Vermilion, Amherst, Lorain, Sheffield Lake and Avon Lake City are all located within this shoreline.

Based on information obtained from the ODNR Office of Coastal Management, a report has been compiled by ODNR's Department of Geological Survey. The report discusses CEAs from the 1800s to 1973 for Lorain County. However, this data was determined to be outdated, and was not used to help identify specific problem areas that currently affect Lorain County.

4.8 Earthquakes

4.8.1 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.

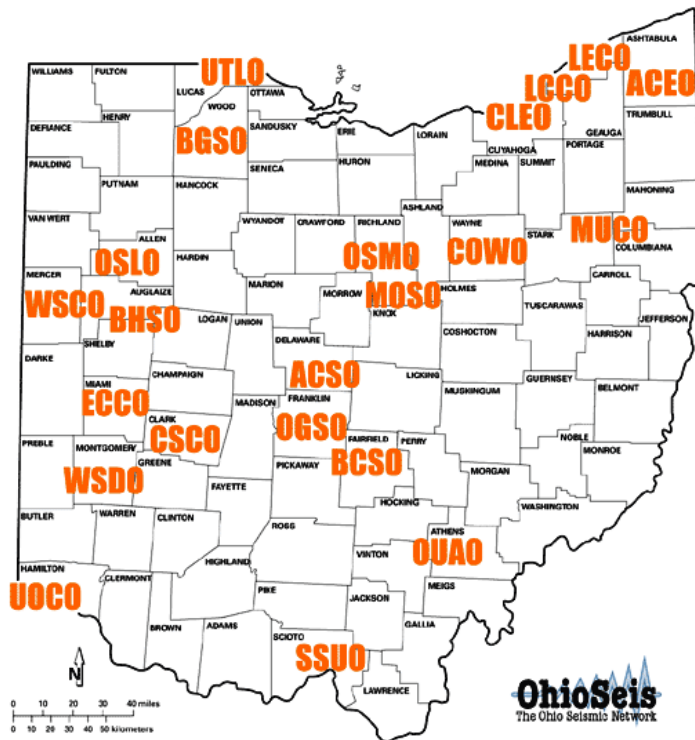
Although the New Madrid Line is in close proximity to the State of Ohio, there has not been an earthquake of any significance since 1875 caused by this fault line. An earthquake on June 18, 1975 caused damage in western Ohio, and affected a total area estimated at over 40,000 square miles. Walls were 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.

4.8.2 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 five-year gap during which there was only one operating station in Ohio. The State was dependent on seismographs in Kentucky 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.

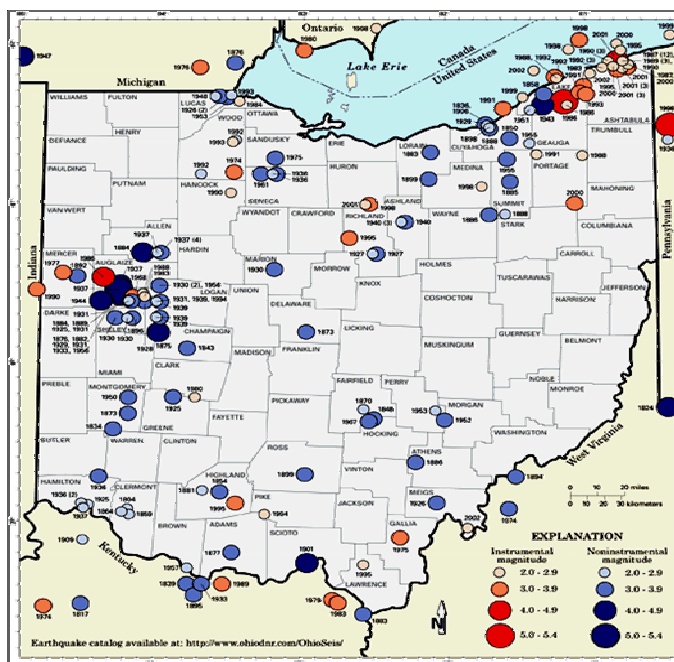


Each OhioSeis station is a cooperative effort. Seismometers, the instrument that detects Earth motions, and other seismic components were purchased by the Division of Geological Survey with funds provided by FEMA through the OEMA, as part of the National Earthquake Hazards Reduction Program. The computers 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 well cuttings, but has a specially constructed room for earthquake recording. The seismograph system allows for very rapid location of the epicenter and calculation of the magnitude of any earthquake in the State. The earthquake records, or seismograms, from at least three seismograph stations are needed to determine earthquake locations (epicenters). These records can be 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.

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.

Lorain County has had one recorded epicenter within its boundaries. The epicenter occurred in 1883, and was of non-instrumental magnitude ranging from 3.0 to 3.9 on the Richter scale. According to OEMA's Earthquake Program Manager, the risk in Lorain County's zone is low. Though Lorain County has had earthquake tremors in the past, the natural geology in the area lends itself to very stable conditions if an earthquake were to occur.



Epicenters of past earthquakes in Ohio.

4.9 Significant Events

Significant events pertaining to Lorain County were chosen by evaluating the NCDL tables that listed hazards in Lorain 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

Lorain 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. Because Lorain County has close to 284,000 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 Lorain, Elyria, and North Ridgeville.

This chapter reviews how vulnerable Lorain 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 Lorain 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 Lorain 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 'Lorain 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
Water/Wastewater Plants	4
Medical Facilities	4
Police/EMS/Fire	56
Schools/Churches	122
Air Fields	3
Total Critical Facilities	189

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 accessibility 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 their use. Averages and typical situations were used. This approach does not predict which facilities will be hit by which hazard, but it does provide 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 the 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.

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 some 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 moderate damage. For examples, 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	Average Value	Minor Damage	Moderate Damage	Major Damage
Residential	\$91,497	\$4,575	\$54,898	\$102,934
Commercial	\$189,970	\$9,499	\$151,976	\$284,955
Property Owned by Municipalities	\$148,096	\$7,405	\$118,477	\$222,144
Property Owned by Boards of Education	\$391,574	\$19,579	\$313,259	\$587,361

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.

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 Core 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

Lorain County is highly susceptible to severe storms, which encompass thunderstorms, high winds, lightning, snow, ice and hail. Since the County is located in the "snow belt", it is highly susceptible to winter storms and may see significant amounts of snowfall on an annual basis. See Appendix H for tables extracted from the NCDC that show the number of reported events since 1950.

5.4.1.1 Infrastructure Impacts

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. Because the area receives a significant amount of snowfall, all of the structures erected in the County are susceptible to damage if not designed to the proper snow loading parameter.

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 Impacts

Because severe thunderstorms are random in nature, the entire County population is susceptible and should be prepared. The populations located in mobile home parks and campgrounds should take particular care to seek adequate shelter with approaching severe weather.

Since winter storms occur countywide, the entire County population should be aware of the dangers of snow and ice. Motorists should be aware of declared snow emergencies and seek safety before becoming stranded. The sensitive populations will be the most susceptible to the deep snows and should prepare for such events prior to the winter months.

5.4.1.3 Property Damage

According to the NCDC, there have been 333 severe storm events, including thunderstorms, lightning and hail, in Lorain County reported since 1955. With no damage being recorded prior to 1993, the total property damage since 1993 was \$40.3 million with an additional \$2.5 million in crop damage. Since 1993, the average annual losses reported for the County were \$3.6 million. The year 2002 proved to be the most costly with losses totaling \$12.8 million in property damage with \$10.0 million in damage caused by only two events. The year 1995 was the most damaging for crops with one event causing \$2.3 million in damage. Furthermore, Lorain County has had over \$2.5 million in property damage in five separate years. This information shows that severe storms and high winds are extremely costly to the County.

According to the NCDC, there have been 24 winter storm events, in Lorain County reported since 1993, with total property damage of \$45.2 million and crop damage of \$500,000. Since 1993 the average annual losses reported for the County have been approximately \$3.8 million. This average includes the year 1998 in which the NCDC reported no property damage losses. The year 1996 proved to be the most costly with losses totaling \$21.4 million in property damage. Since 1999, the County's losses have been consistently in the millions of dollars, with the exception of 2001.

Since the County is located in the "snow belt", snow and ice will always be a natural hazard that has potential to cause significant property and crop damage.

5.4.1.4 Loss of Life

Since 1994, there have been 33 recorded injuries and 5 deaths due to severe storms, wind, lightning and hail. All of the injuries recorded were associated with high wind events. Seventeen of these injuries occurred during two separate thunderstorm high wind events in 1995 and 2002. Due to the frequency of the storms affecting Lorain County, the potential for death and injury is very high.

In addition to the loss of life figures for severe storms, NCDC has also recorded 77 injuries due to snow and ice. Fifty-six of these injuries were the result of a winter storm that occurred in January 1999.

As the population of the County continues to grow, as forecasted by the 2000 Census, there is more potential for injury and/or loss of life. One of the biggest problems associated with severe weather 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 wet roads, ice and snow and medical conditions relative to frost bite and hypothermia.

5.4.1.5 Economic Losses

The economic losses a community suffers during a severe storm event can be high, especially a winter storm which can leave behind three to five feet of snow. In communities with hazard trees, these trees have the potential to destroy homes and businesses if uprooted. Fallen branches may also cause severe damage. 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. Residents and business owners then turn their efforts from work and running a business to clean up efforts and digging themselves out of the snow.

With the average house value at \$91,497 and the majority of the houses built prior to 1980, damage costs from severe storms would accumulate quickly due primarily to the age of the house and its susceptibility to damage. 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 Lorain County a disaster area on only four occasions due to damage suffered by severe thunderstorms and winter 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.

5.4.2 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.

See Appendix H for tables extracted from the NCDC that show the number of reported events since 1950.

5.4.2.1 Infrastructure Impact

There are a total of 2,008 structures in Lorain County considered to be at-risk. Of this total number, 510 of the structures are located in the unincorporated areas of the County. (This information was collected from the ODNR, Division of Water Floodplain Geographical Information Management System (GIMS) Project.) All the at-risk structures are located on the map in Appendix F. These at-risk structures are located within the 100-year floodplain and are therefore susceptible to damage during a flood. With the number of at-risk structures being so high, the potential for negative impacts to infrastructure is high.

At-risk structures in areas of flash flooding, 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 April 2004 time period, Lorain County's citizens have had to endure multiple flooding situations, including flash floods and river floods. 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. However, in Lorain County's history from 1950, no deaths or injuries have been reported due to flash flood events.

Unlike flash flooding, special zone flooding has a less likelihood of occurring but will impact a larger population. The streams and rivers within the floodplain will flood in special zone flood areas on average of once every 100 years. The populations occupying at-risk structures located in the floodplain shown on the Multi-hazard Map will be affected by this flood. See Appendix F for the Multi-hazard Map.

5.4.2.3 Property Damage

Based on information retrieved from the NCDC, river flooding in Lorain County has accounted for \$865,000 in property damage and \$60,000 in crop damage from 1993 through May 2004. Flash flooding has accounted for \$19.9 million in property damage and \$165,000 in crop damage. On average the County suffered \$1.8 million per year in total damage during that time period. This average also includes five years in which no property damage losses were recorded. The year 2004 has proved to be the most costly through the month of May with damages recorded equaling \$14 million. With the number of flooding events and at risk structures being large, the potential for property damage is high as the contents of these structures may be lost each time a flood occurs.

Approximately 30% of Lorain County is in a 100-year floodplain as shown on the Multi-Hazard Map in Appendix F. There are an estimated 2,008 at-risk structures in the 100-year floodplain. Of this number of at-risk structures, 25% are assumed to be commercial buildings with the rest of the buildings being residential. According to the County's Auditor's office, the average value of a residential housing unit in Lorain County is \$91,497. With 1,506 of the at risk structures being residential, the County's average potential dollars lost due to residential property complete destruction is \$137,794,482, not including contents replacement. The average commercial unit value is \$189,970, which would account for an average loss in property damage of \$95,364,940, not including contents replacement, assuming the structures were completely destroyed.

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. Homeowner's may not be prepared for the rising waters and the need to seek safety quickly. Motorists often think that they can drive through standing water and risk getting stuck in the flooded area. Due to the frequency of flash flooding in Lorain County, the risk to human life is high but can be reduced by educating the County's residents.

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 was 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. Roads may become blocked by debris such as tree limbs, which may strand some residents until the floodwaters recede.

Residents often cannot rely on federal assistance for the damages incurred. Since January 1, 1964, Lorain County has been declared a federal disaster area on eight 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 Tornadoes

As seen in the hazard profile and as determined by the Core Group, Lorain 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.

5.4.3.1. Infrastructure Impact

Because tornadoes are random in nature, no one area of the County is more susceptible to infrastructure damage than another area. In Lorain County, the occurrence of tornadoes is moderate with 26 occurring since 1953. Most of these tornadoes have been in the F0 and F1 range on the Fujita Scale. Therefore, Lorain County is susceptible to moderate damage to infrastructure which may include damaged chimneys, signboards, windows and rooftops, mobile homes pushed off foundations or overturned and some demolished outbuildings. On occasion, a major structure may be destroyed completely but a high frequency of this extent of damage will not be expected.

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

5.4.3.2 Population Impact

Since tornadoes typically present localized hazards, the overall population impact within the County is relatively low based on area affected. However, based on the number of events that have occurred in the past, the risk may be considered moderate. Since the strength of the tornadoes in this area tends to be low, several homes may need repair, but typically homeowners will have insurance to cover these expenses and will not suffer any long term financial hardship. The populations located in mobile home parks and campgrounds should take particular care to seek adequate permanent shelter with approaching severe weather.

5.4.3.3 Property Damage

According to the NCDC, there have been 26 tornadoes in Lorain County reported since 1953 with magnitudes ranging from F0 to F4. The majority of the tornadoes have been in the F0 to F1 range with only two being categorized as F4 tornadoes. These tornadoes caused total property losses of \$36.2 million. The majority of this damage was sustained in three separate years. In 1965, an F4 tornado struck the County causing \$25.0 million in damage. In 1986, an F2 tornado left behind \$2.5 million in damages. The tornado that struck in 1992 caused \$7.5 million in damage. Based on the frequency and low intensity of tornadoes in the County, there is a moderate impact relative to property damage.

5.4.3.4 Loss of Life

Since 1953, there have been 18 recorded deaths and 160 recorded injuries due to tornadoes. One death and 47 injuries were the result of an F4 tornado hitting the County in 1953. Seventeen deaths and 100 injuries occurred as a result of an F4 tornado that struck the County in 1965. There have been no recorded deaths and 10 injuries since 1970, all between 1970 and 1992. Since 1970, the potential for death and injury in Lorain County due to tornadoes has been 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.

5.4.3.5 Economic Losses

Due to the frequency and intensity of some of the tornadoes that have occurred in Lorain County, the overall impact on the economy can be considered low to moderate. If a tornado were to touch down, the majority of the economic losses would be local versus countywide. However, the economy in the local area may be changed dramatically based on the amount of damage that has been known to occur. Businesses may be completely destroyed and unable to reopen. It is unlikely that a Presidential Disaster Declaration would occur, therefore the all clean up costs would be funded locally. Lorain County has been declared a federal disaster area on three occasions since 1964 due to tornado damage.

5.4.4 Drought and Temperature Extremes

As seen in the hazard profile and as determined by the Core Group, Lorain County has a low to moderate 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.

5.4.4.1 Infrastructure Impact

Because droughts are a non-site specific hazard, the effects of a drought should be evaluated countywide. By themselves droughts and temperature extremes do not damage developed property. However, over long periods 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.

5.4.4.2 Population Impact

Since droughts and temperature extremes are non-site specific, the entire County population could be affected by the hot, dry and extremely cold conditions. The overall impact on the Lorain County population is moderate since 19 drought and extreme temperature events in only five separate years have been recorded by the NCDC since 1993. The County’s residents, especially the sensitive populations, should be aware of the dangers of extreme heat and cold, such as heat exhaustion, heat stroke and hypothermia. Those populations that still rely on wells for water supply also need to have a contingency plan in case their wells run dry.

5.4.4.3 Property Damage

According to the NCDC, there have been four droughts and four cold spells in Lorain County reported since 1993. The drought of 1999 was the most significant event, lasting four months and causing \$200.0 million in crop damage. The droughts recorded in 1995 and 1996 had no significant property or crop damage associated with them. There have been two summers in which the County suffered from extreme heat. The summer of 1995 produced a heat wave that caused \$1.1 million in property damage. No damage was incurred by the extremely hot weather during the summer of 1999.

In addition, extremely cold temperatures occurring in five separate years caused a total of \$4.4 of property damage. The extreme cold that hit the County in early 1996 caused \$3.4 million in damage. No damage has been recorded due to extreme cold since 1997.

With the exception of the heat wave and cold spell in 1995 and the 1999 drought, the County has not suffered significant property or crop damage due to extreme heat and drought conditions. Therefore, based on the number of occurrences, there is a low impact relative to property damage.

5.4.4.4 Loss of Life

Since 1993, there have been 31 recorded deaths and 76 recorded injuries due to extreme heat and cold. Twenty-five of the deaths and all of the injuries occurred in 1995. Because 1993, 1995, 1997 and 1999 were the only years with recorded deaths and injuries and the overall number of drought and extreme heat events that have affected Lorain County is small, the potential for death and injury is low. As the population of the County continues to grow, as forecasted by the 2000 Census, there is more potential for injury and/or loss of life. Since drought and extremely cold conditions in the County are infrequent the potential for death or injury will still be relatively low, even with a growing population.

One of the biggest problems associated with extreme heat is the lack of public education and awareness. Citizens are not aware of the warnings and dangers associated with conditions like heat exhaustion, heat stroke and hypothermia and thus may not be prepared.

5.4.4.5 Economic Losses

Due to the infrequency of drought and extreme temperature events in Lorain County, the overall impact on the economy is very low. However, if a drought does occur, the economic losses would be countywide hitting the farming community the hardest. It is very unlikely that a Presidential Disaster Declaration would occur, therefore the all mitigation costs would be funded locally.

5.4.5 Stream Bank and Coastal Erosion

As seen in the hazard profiles and as determined by the Core Group, Lorain County has a countywide risk of incurring damage from coastal erosion and stream bank erosion. The coastal area of Lorain County extends inland on average from about 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 and Black River 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 coastal erosion along Lake Erie, the risk of damage to or loss of property, possessions, infrastructure and life are greatly increased.

5.4.5.1 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 Lorain County and its watersheds. The bridges in Lorain 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.

5.4.5.2 Population Impact

Since the threat of stream bank erosion and coastal 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.

5.4.5.3 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 Amherst, Avon Lake, Lorain, Sheffield Lake and Vermilion. 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.

5.4.5.4 Loss of Life

Stream bank and coastal 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.

5.4.5.5 Economic Losses

Based on the property damage expected from stream bank and coastal 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 Lorain 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 Earthquakes

As seen in the hazard profile and as determined by the Core Group, Lorain County has a very low risk of incurring damage from earthquakes. The County has had one epicenter within its boundaries in 1883.

5.4.5.1 Infrastructure Impact

Due to the infrequency of earthquakes occurring in Lorain County, the impact on the County's infrastructure is low. The one quake that was recorded registered between 3.0 and 3.9 on the Richter scale. An earthquake of this magnitude is not expected to cause damage to infrastructure.

5.4.5.2 Population Impact

Since the threat of an earthquake is minimal, the overall impact on the County's population will be very low.

5.4.5.3 Property Damage

The level of damage expected from an earthquake in Lorain County is very low. It would be expected to be on the order of 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.

5.4.5.4 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.

5.4.5.5 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 LORAIN COUNTY OHIO HAZARD RISK ASSESSMENT

In 2004, R. D. Zande & Associates completed an Ohio Hazard Risk Assessment for Lorain County as a requirement of the DMA2K. However, rather than submitting this assessment to OEMA to satisfy the Hazardous Assessment portion of a mitigation plan, the County's EMA Director chose to develop this Mitigation Plan to satisfy the requirements of the DMA2K. Therefore, the Lorain County Ohio Hazard Risk Assessment is attached in Appendix I in its entirety.

To satisfy the requirements of the DMA2K, Lorain County developed this Mitigation Plan. As directed by OEMA, the Hazard Risk Assessment was attached to this Mitigation Plan and discussed in this section.

Because of the different planning and assessment processes used, similarities and differences exist between the Hazard Risk Assessment and this Mitigation Plan. Both documents describe the demographics of Lorain County and its incorporated jurisdictions. This Mitigation Plan further describes the history of the participating jurisdictions based on input received from the Core Group. In addition, both documents describe the natural hazards that affect Lorain County, which include drought, earthquakes, flooding, hail, landslides, severe thunderstorms, tornadoes, high wind, severe winter storms, extreme temperatures, and wildfires. This Mitigation Plan addresses in more detail those natural hazards that the Core Group, who represented multiple jurisdictions within the county, prioritized by amount of damaged caused and frequency of events. The Hazard Risk Assessment included interviews conducted only with the Lorain County EMA Director as stated in its text and did not involve the local communities. Furthermore, this Mitigation Plan addresses only natural hazards selected by the Core Group while the Hazard Risk Assessment addresses additional non-natural hazards including epidemic, infestation, communication failure, heating, ventilation and air conditioning (HVAC) failure, resource fuel shortage, structural damage from fire, transportation accident, utility failure, bomb threats, civil disturbance, hazardous materials (HAZMAT) incident and terrorism, some of which are not pertinent to Lorain County.

The two documents also describe Lorain County's vulnerability to hazards by determining assets, or critical facilities, and potential dollar losses that may occur due to disaster events. The Hazard Risk Assessment used HAZUS, a risk assessment software program developed by FEMA for analyzing potential losses from floods, hurricane winds and earthquakes. The HAZUS program uses current scientific and engineering knowledge coupled with the latest Geographic Information Systems (GIS) technology to produce estimates of hazard related damage before, or after, a disaster occurs. Census 2000 information and GIS based mapping were used to compile an asset inventory of structures. These three tools were also used to determine values of structures and estimate losses.

The Lorain County Core Group also used GIS mapping and 2000 Census data to compile an asset inventory or critical facilities list. However, the local knowledge of the Core Group helped them to further develop this inventory by including various structures used by smaller villages for congregating other than churches and schools. The estimate losses determined for this Mitigation Plan were determined using dollar figures obtained directly from the County's Auditor office. These average structure values were used to determine minor, moderate and major loss estimates. A percentage of structural value loss was assumed for each degree of loss to determine the potential dollars lost.

7.0 GOALS

7.1 Background

Goals are needed for this planning effort to guide the review of the possible mitigation measures. This plan needs to make sure that the recommended actions are consistent with what is appropriate for Lorain County. Mitigation goals need to reflect community priorities and 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.

7.2 Goals

Severe Storms – Winter, Snow, Ice, Thunderstorms, High Winds, Hail, Lightning

Overall Goal: To increase awareness of severe storms and the reduce property damage.

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

Overall Goal: To save lives and property, reduce damage and to increase education (awareness) of community.

Tornadoes

Overall Goal: To save lives, reduce potential damage, and to increase awareness of the hazards of tornadoes.

Droughts (Extreme Heat, Extreme Cold)

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

Erosion

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

Earthquakes

Overall Goal: To reduce potential loss of lives and damage of property and to increase awareness.

8.0 HAZARD MITIGATION PRACTICES

As required by the DMA2K, this Mitigation Plan summarizes policies, plans, regulations, programs and projects that Lorain 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.

8.1 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.

8.1.1 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.

8.1.2 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.



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 floodproofing are elevating a flood-prone building above the flood level, creating barriers around a flood-prone structure, dry floodproofing a structure to make it water-tight and wet floodproofing to intentionally allow flood waters 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 can mitigate damage that may occur. Another retrofit is 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, Lorain County has not implemented any property protection measures on a countywide basis.

8.2 Preventive Measures

8.2.1 Planning and Zoning

8.2.1.1 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.

Lorain County Comprehensive Land Use Plan

The Lorain County Comprehensive Plan, adopted in July of 2000, was prepared for the Lorain County Planning Commission at the request of the Lorain County Board of Commissioners. It represents a vision for the overall development of the County over a period of two decades, extending through the year 2020. It also represents the first effort at countywide comprehensive planning in over 30 years. The plan begins with an introduction and then defines the planning processes that were used. Following this is data collection and analysis. Lastly, goals and policies are discussed, along with implementation on a county and township level. Some of the goals and policies of the plan include:

- Designate growth areas in the plan and lay out a strategy through which the County and the local communities can steer the expected development into the designated areas.
- Designate agricultural areas in the County where farming can remain a viable part of the County's economic structure for the foreseeable future.
- Revise the Subdivision Regulations to consider environmental concerns and to protect such sensitive areas as riparian corridors, wetlands and other environmentally sensitive areas.
- Implement a schedule of fees associated with developmental approval for Lorain County.

Please see Section 2.4.3 Future Land Use for discussion concerning implementation actions on a county level.

2000 Lorain County Farmland Retention Report

This report explains how the County Farmland Retention Committee utilized a public process to develop its conclusions concerning current agricultural status and potential land use policies for Lorain County. The results of these public meetings were a series of recommendations that provide Lorain County with a direction to retain farmland.

The recommendations were divided into three areas of concentration. These areas included education, public sector initiatives, and private sector initiatives. In the education subdivision, recommendations included providing concise statistics in the form of an article, a pamphlet or a brochure, to the general public relative to the economic impacts and benefits of agriculture in the County. This subdivision also recommended conducting seminars on existing programs including Current Agricultural Use Valuation (CAUV), Agricultural Districts and the Forestry Tax. Under the public sector initiatives, recommendations included encouraging farmers to enroll in the CAUV, Agricultural District and Forestry Tax programs through the County Auditor's Office. The private sector initiatives included promoting the Firelands Land Trust for the purpose of receiving voluntary donations of land or easements for agricultural preservation.

The Lorain County Community Development Department (LCCDD)

The Lorain County Community Development Department (LCCDD) serves as the community and economic development representative for the Lorain County Board of Commissioners. The LCCDD offer services in planning and zoning, housing and community development and economic development. Their mission is to serve the residents of Lorain County through development initiatives by striving to improve quality of life, foster smart growth, promote economic vitality, encourage development and redevelopment and provide community leaders with tools for management policy decisions. Each year they publish the LCCDD Annual Report. The report discusses the LCCDD's programs and projects for the year including details on spending of the County's Community Development Block Grant allocations, the ongoing economic development of the County and any planning activities with which the LCCDD is involved.

2002 Lorain County Multi-Modal Transportation Plan

In 2002, Lorain County completed work on its Multi-modal Transportation Plan. This plan is the product of a 15-month planning process that involved 51 local citizen meetings and nearly 150 hours of committee discussions and is the first such plan that has been completed for Lorain County since the late 1960's. Seven separate committees including: roadways, transit, rail, water ports, bike and pedestrian, airport and information technology worked with the LCCDD and its planning consultant, Poggemeyer Design Group, Inc., to develop vision statements, identify challenges and gain consensus for recommendations as to how Lorain County should progress in transportation planning over the coming years.

Northeast Ohio Areawide Coordinating Agency

As part of their responsibilities for carrying out transportation and environmental planning, under local direction and in accordance with federal and state mandates, pursuant to authority granted under ORC Section 307.14 et. Seq, the local officials of the five Ohio counties of Cuyahoga, Geauga, Lake, Lorain and Medina established the NOACA. The NOACA developed and adopted a code of regulations with a mission of pursuing responsibilities for transportation and environmental planning for the region. The NOACA aims to improve the quality of life of the region's citizens by enhancing the region's long term economic development potential and by protecting the environmental quality, assisting member local governments and agencies in addressing local and regional issues in a cooperative manner and assuring equitable flow and prudent expenditure of public funds.

NOACA supports these goals by serving as a forum for local public officials to engage in regional debate and intergovernmental cooperation. The agency also encourages local decision making to be in harmony with the region's transportation and environmental plans. NOACA maintains federal designations and planning processes and meets state requirements for regional programs. In addition, the agency seeks equitable returns of state and federal funds to the region to meet locally determined needs. Furthermore, members of NOACA provide information and technical planning support to benefit member communities in order to best use public resources. Members of the NOACA also advocate interests of the region with state and federal decision-makers.

8.2.1.2 Zoning

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 when coupled with a comprehensive plan or "road map" for future development.

8.2.1.3 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.

Conserving farmland may have the additional effect of maintaining open space and preserving sensitive components of the environment. Such "environmental infrastructure" may include jurisdictional wetlands, groundwater recharge areas, floodplains, and wildlife habitats. As a part of a viable farmland preservation program, farmers should be educated relative to the positive elements of preserving sensitive lands.

Lorain County is a member of the Western Reserve Resource Conservation and Development (RC&D) Council, which is a non-profit organization representing nine counties in Ohio, including Ashtabula, Cuyahoga, Geauga, Lake, Lorain, Medina, Portage, Summit and Wayne. The purpose of the Western Reserve RC&D Council is to promote the conservation, development and utilization of natural resources to improve the general level of economic activity, and to enhance the environment and the standard of living in the nine county area. Programs are natural resource based, and they work toward achieving a balance between conservation and development.

One project of the Western Reserve RC&D Council is the Center for Farmland Preservation in Northeast Ohio. The Center works with communities in the Western Reserve to protect rich and scenic farmland through policy development, education, technical assistance and regional cooperation. There is a variety of alternatives that preserve farmland, protect and promote agricultural viability and efficient use of environmental and economic resources. The Center works with elected officials, planners, citizen boards, farmers and others to disseminate those alternatives.

8.2.1.4 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.

The purpose of the Lorain County Subdivision Regulations, which were adopted in 1997 and revised on June 22, 2002, is to give guidance to all development in the County. The provisions of these regulations are made with reasonable consideration, among other things, the character of the County, of conserving the value of the building place upon the land, providing the best possible environment for human habitation and encouraging the most appropriated use of land throughout the County.

These regulations will support future mitigation efforts because of the stringent requirements that have been required through proper development of the 100-year floodplain. One such requirement is the regulation that states the "Planning Commission may, when it deems necessary for the health, safety or welfare of the present and future population of the area and necessary to the conservation of water, drainage and sanitary facilities, prohibit the subdivision of any portion of the property which lies within the floodplain of any stream or drainage course. These floodplain areas shall be preserved from any and dumping of earth, waste material of stumps except at the discretion of the Planning Commission, its designee and the office of the County Engineer."

8.2.1.5 Building Codes

Building codes provide some of the best methods of addressing all the hazards in this plan. It is 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.

In the spring of 2003, the Lorain County Board of Commissioners passed resolution 03-262 adopting the Lorain County Building Code (LCBC). The LCBC incorporates the 1999 Ohio Building Officials Association Ohio Residential Code for one, two, and three family dwellings. The LCBC provides additional language, incorporating by reference the International Plumbing Code, the National Electrical Code and the Lorain County Board of Health Plumbing Code.

The purpose of the LCBC Code is to provide basic, uniform regulations and performance objectives to achieve reasonable safeguards for the safety, health and welfare of the occupants of one, two and three family residential dwellings.

The LCBC can be adopted by any township of Lorain County, Ohio in which the Board of Trustees passes a resolution requesting that its township be a district regulated by the Lorain County Building Code. As of December 31, 2003, Columbia, Sheffield, Eaton and Elyria Townships have passed resolutions, becoming a district regulated by the Lorain County Building Code. Penfield Township has also joined the district effective January 3, 2004.

8.2.1.6 Manufactured Homes

Previously, the location and installation of manufactured and mobile homes were 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 Lorain 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 "tied owns" of mobile and manufactured homes. Permanent foundations to which a mobile or manufactured home may be affixed must also be approved by the Commission.

8.2.1.7 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.

The LCCDD made six formal floodplain determinations and issued five Special Flood Hazard Area Development Permits as part of Lorain County's Flood Hazard Prevention Program in 2003. A Special Flood Hazard Area Development Permit is required whenever construction projects such as filling, grading, or building occur within the floodplain.

The LCCDD regularly receives calls from citizens and lenders for floodplain determinations. Most of these determinations can be handled informally over the phone. When the property status is questionable, a formal determination is necessary. A formal determination consists of overlaying the FEMA Flood Insurance Rate Maps (FIRMs) with the county tax maps and aerial photos of the property to determine if the house site is within the 100-year floodplain.

Currently, the County's FIRMs are outdated. The County has been notified by FEMA that new FIRMs will be issued for the County through the Map Modernization Program. The County's Floodplain Administrator makes determinations for unincorporated areas of Lorain County. The Administrator also makes determinations for the incorporated areas on a limited basis. The County follows the minimum NFIP standards. Each township has their own floodplain zoning. Most have a two-foot freeboard requirement for building in the floodplain.

All of Lorain County is in compliance with state floodplain management standards and participates in the NFIP as previously discussed in Section 4.4.1.

8.2.1.8 Drainage Regulations

In order to protect a County's natural resources a community can implement regulations such as County Water Management and Sediment Control (WMSC) 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 WMSC 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.

Lorain County currently does not have official drainage regulations in place. However, when correcting an existing drainage problem which involves more than one land owner, the owners may mutually agree to cooperate to provide the necessary drainage improvements. The Ohio County Ditch Law provides for the mutual agreement procedure, which is used frequently in Ohio. The mutual agreement procedure provides for plans to be filed with the county clerk, along with information on the proposed costs, review by the county engineer and placement of the improvement in a permanent maintenance program conducted by the county government. This procedure is one of the simplest mechanisms to make a drainage improvement involving one or more landowners. Currently, the Lorain County Engineer's Office maintains 35 various ditch and detentions throughout the County through a Ditch Petition Process.

8.3 Natural Resource Protection

8.3.1 Wetlands Protection

8.3.1.1 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.

Currently, the County and its incorporated areas do not have codes for the development and protection of wetlands. The Lorain SWCD uses the State and Federal programs as they become available for issues associated with wetlands protection.

8.3.1.2 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 our 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 that was under 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, Lorain County, its villages and townships do not have codes for issues concerning urban forestry. The Lorain SWCD uses the State and Federal programs as they become available for issues associated with reforestation.

The ODNR Urban Forester for Lorain County has worked with individual communities for training and implementing programs concerning tree maintenance and identifying hazard trees. The City of Wellington is the only community within Lorain County that participates in the Tree City USA program, and has been involved for 17 years. They also have arborists on staff that maintain trees. Avon Lake does not have a forestry staff but the Service Director for the City works closely with the ODNR Forester in managing trees. The City of Elyria has a forester on staff who is a certified arborist. They implement tree maintenance and some hazard tree removal.

8.3.1.3 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.

A detention basin on Lorain Kay Drive in Lorain, Ohio was recently constructed and completed in November of 2004 by Mosser Construction, Incorporated.

8.3.2 Watershed Planning Efforts

Four different watersheds influence drainage in Lorain County. The East Fork of Vermilion River drains the eastern portion of the County. Beaver Creek drains the northeast portion of the County. The Black River and its seven tributaries drain throughout the County, and Plum Creek of Rocky River drains the northwest portion of County.

Lorain County currently does not have a countywide watershed management plan implemented.

8.3.2.1 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 stream bank 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.

The Stream Management Guide #10 lists two projects undertaken by Lorain County. In the Black River Reservation in Elyria, 75 linear feet of fascines in swale areas and evergreen revetment along the stream bank were installed in March of 1996. Installation of fascines aids in preventing gully erosion into the stream bank. Along the East Branch Black River in LaGrange Township, 432 linear feet of evergreen revetment, willow posts, fascines and hardwood tree plantings were installed in December of 1995 to help prevent bank erosion.

8.3.2.2 Conservation Reserve Enhancement Program (CREP)

The Conservation Reserve Enhancement Program (CREP) is a voluntary program that uses financial incentives to encourage farmers to commit to protect land for either 15, 20 or 30 years, depending on the enrolled practice. This program will help protect Lake Erie and 5,000 miles of streams by reducing soil erosion and runoff pollution in northwest Ohio. In addition to reducing runoff of soil sediment, nutrients and pesticides, watercourse buffers also help lower water temperatures, increase dissolved oxygen and provide additional habitat for fish and wildlife.

The new \$201 million Ohio Lake Erie CREP, supervised by the SWCD, is jointly funded by the ODNR and the United States Department of Agriculture (USDA). The program pays eligible farmers and other landowners to plant trees and establish conservation buffers along tributary streams in Lorain and 26 other northwest Ohio counties.

From 1998 to 2005, Lorain County has 28 CREP contracts in place with local area farmers. The total acres contracted are 115.9, with a total estimated cost share of \$59,031.

8.3.2.3 Water-Resources Investigations Report 03-4215

A hydrologic and hydraulic analyses of selected streams in Lorain County was prepared in 2003 by the USGS in cooperation with the Lorain County Engineer. The report describes methods and results of hydrologic and hydraulic analyses of Battenhouse Ditch, Beaver Creek, Brighton-Camden Ditch, Engle Ditch, Gable Ditch, Heider Ditch, Plum Creek, Ridgeway Ditch and Schroeder Ditch. Two sets of analyses resulted from this report. The first includes estimates of flood-peak discharges corresponding to floods with recurrence intervals of 2, 5, 10, 25, 50, and 100 years. The second is a determination of water-surface-elevation profiles and floodplain boundaries corresponding to the 10-year-recurrence-interval flood. Floodplain boundaries were delineated for the nine streams using the digital mapping data and the results from the 10-year flood water-surface profiles. The 10-year flood profiles were developed along the nine streams to assist Lorain County officials in assessing various alternatives to mitigate flood damages.

8.3.3 Watershed Groups

Black River Remedial Action Plan (RAP) Coordinating Committee

The Black River Remedial Action Plan (RAP) Coordinating Committee was formed in 1991 to restore any of the 14 beneficial uses in the Black River Area of Concern (AOC) throughout the Black River watershed. An AOC is defined as a severely degraded geographic area within the Great Lakes Basin. Lorain, Medina, Ashland, Cuyahoga, and Huron Counties participate in this committee. The Black River AOC is the only AOC in Ohio that encompasses an entire watershed. The Black River RAP helped to lift a 21-year Contact Advisory in April 2004, issued by the Department of Health, warning people not to swim, wade or waterski in the lower 6 to 7 miles of the river because of contamination. The Black River RAP continues to monitor improvements in the watershed and is initiating a sub-watershed survey and local stakeholder involvement program. The Committee also continues to work on riparian corridor restoration and has recently started pilot programs for home sewage disposal systems and mercury reduction. They release an annual report that informs the watershed community on the progress of the Black River RAP and provides background information on many of the projects being undertaken annually.

Black River Watershed Project

The Black River Watershed Project was initiated by the Lake Erie Binational Public Forum in January of 2004. The Lake Erie Binational Public Forum is implementing two local projects in the Lake Erie Basin that promote the goals of the Lake Erie Lakewide Management Plan (LaMP). The Forum is a committee of approximately 40 public stakeholders from around the Lake, including: farmers, fishermen, elected officials, planners, environmentalists, educators, tribal representatives, business/industry and health professionals. The Forum provides input to the United States Environmental Protection Agency (USEPA) and Environment Canada on the LaMP and related Lake Erie issues, and is conducting watershed-based implementation projects with local partners in recent years.

The project is located in a sub-watershed situated along the West Branch of the Black River that includes the city of Oberlin and the villages of Rochester, Wellington and LaGrange. The project area includes 14 townships (Russia, Carlisle, Camden, Pittsfield, LaGrange, Clarksfield, Brighton, Wellington, Penfield, New London, Rochester, Huntington, Troy, and Sullivan) situated in Lorain, Huron and Ashland counties. The majority of the sub-watershed is situated in Lorain County.

The watershed strategy process for the West Branch of the Black River Watershed involves the combination of technical and community input. This input is being gathered through an inventory of existing information and through public meetings, dialogues with stakeholders and guidance from local partners.

The objectives of this project are to: prioritize community environmental concerns, identify activities to address those concerns, incorporate those activities into a watershed strategy, and identify resources for ongoing implementation of the watershed strategy.

This one-year project is funded by a grant from the USEPA, with additional funds provided by the Lorain County Commissioners. The Lake Erie Forum and the project's technical advisory group expect that the Coordinator position will become a permanent one. The project has already secured a grant through the USEPA Great Lakes National Program Office to continue the project for another year, and is currently seeking further funding to support the project for years to come.

Firelands Land Conservancy Watershed

The Firelands Land Conservancy (FLC), a land trust, is a member-supported, non-profit organization created to protect natural lands, waters, open spaces and historic resources in Huron, Erie, and Lorain counties. The organization was established in 1997 and is funded entirely by grants and individual contributions. The mission of the FLC is to serve 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.

The FLC advises landowners of the estate planning benefits of preserving land, which may include referrals to professionals such as tax attorneys and estate planners. The FLC has discussed land protection with landowners of over 2,600 acres of land, and has been instrumental in the protection of over 2,400 acres. They are presently working on the Black River, Old Woman Creek and the Vermilion River watersheds.

8.3.4 Coastal Conservation

8.3.4.1 Ohio Coastal Management Program

In recognition of the Lake Erie region's value and the pressures that threaten its resources, the Ohio General Assembly passed the Ohio Coastal Management Law in 1988. This law authorized ODNR to act as lead agency in developing and implementing a comprehensive Ohio Coastal Management Program (OCMP).

The purpose of the OCMP is to integrate management of Ohio's Lake Erie coastal region in order to preserve, protect, develop, restore and enhance its resources. OCMP policies attempt to establish a balance between resource protection and development, and to provide guidance to coastal property owners as well as government agencies and commercial interests. Each year, Ohio receives close to \$2 million from the Natural Oceanic and Atmospheric Administration (NOAA), which provides federal funding oversight. This money is used to help upgrade coastal neighborhoods, as well as improve lake access; relieve nonpoint pollution in tributary streams; preserve coastal wetlands; and protect historic shipwrecks and underwater preserves.

One of the many accomplishments of the OCMP is funding 14 local Lorain County projects to plan for waterfront revitalization and other community enhancements. Some of these 14 projects are described in the following paragraphs.

In May of 2004, the City of Sheffield Lake was awarded a \$4,500 grant for the Sheffield Lake Proposed Boat Ramp Sedimentation Study. A report will be produced describing the amount and nature of sedimentation that can be expected at the proposed ramp location and the effect of this sedimentation on the proposed boat ramp, dock and breakwater design.

The City of Lorain, located along Lake Erie in Lorain County, is advancing their waterfront development plans by approving the purchase of 408 acres on the east side of the City for a modern industrial and recreational park. The City unveiled its conceptual master plan for approximately 30 acres of lakefront land on November 13, 2003, before an audience of 50 people. The plan will be used to guide the City in redeveloping this key parcel on the waterfront. Key features include public access to the water with approximately 10 acres of green space, high density buildings varying in story heights from three to four story buildings to the potential of an 8-10 story building on the water. This plan was made possible in part from a \$30,000 grant from the Ohio Coastal Management Assistance Grant Program. The City is awaiting results from its Phase 2 environmental assessment before going forward with a nationwide Request For Quotation to solicit development proposals from developers across the country. The Phase 2 was funded by the State of Ohio Clean Ohio Grant award of \$260,000.

In May of 2003, a grant of more than \$40,000 was awarded to the Lorain Port Authority in Lorain County for dredging in the east basin of Lorain Harbor and improved waterway navigation.

In April of 2002, the City of Avon Lake received \$100,000 to help provide safe public access, as well as emergency access, to the Miller Park Beach area. This grant was the largest ever awarded under the Coastal Management Assistance Grant program and helped to construct a ramp from the existing fishing pier to the beach. Also in April of 2002, the City of Lorain received \$30,000 to help fund a feasibility study for using an iron ore pellet facility site at the mouth of the Black River for public access and commercial development, once owned by U.S. Steel LLC along the north bank of the Black River, this study was the first step in revitalizing the downtown waterfront area (as discussed in the previous paragraph).

8.3.4.2 Coastal Erosion Area Program

The Coastal Erosion Area Program (CEAP) is a subdivision of the OCMP. CEAs consist of land areas along Lake Erie that are anticipated to be lost due to erosion within a 30-year period if no additional approved erosion control measures are completed within that time. These CEAs are areas where recession is expected to exceed nine feet in the next 30 years. The ODNR Division of Geological Survey determined which areas to include in the CEA. They used scientific records and data to analyze recession of the Lake Erie shore and forecast erosion rates.

The purpose of the CEAP is to promote wise land use. Wise land use reduces the risk and loss to private landowners by promoting stabilization of the shoreline. ODNR promotes the CEAP through a permitting process. A permit must be obtained to construct a new building or septic system with a CEA. The CEA permit requires that measures be taken to effectively protect the building or septic system from shore erosion and bluff instability. All new, permanent structures and additions equal to or greater than 500 square feet at ground level must obtain a permit. This permitting applies to residential, commercial, industrial, institutional or agricultural buildings and septic systems.

8.4 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 departments and municipalities. Emergency services include:

- Threat recognition
- Warning
- Response
- Evacuation and sheltering
- Post-disaster recovery and mitigation

Further, an Emergency Operations Plan (EOP) 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. Lorain County has instituted an EOP to predetermine emergency management activities and operations for organizations within Lorain County that will allow expeditious response and recovery from emergencies.

8.4.1 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.

Lorain County has approximately 100 registered SKYWARN spotters within the county (Please see Section 4.5 for discussion on the SKYWARN program). Thirty-five to 40 of these spotters are actively participating in the program. Each year, Lorain County holds a training class through the NWS. These spotters are Lorain County's first line of defense when it comes to warning and preparing the communities for severe weather.

8.4.2 Warning

After there is a potential hazard recognized, following steps must be taken to notify the public of its possible onset. The earlier and more specific the warning, the greater the number of people will be able to set into motion protection procedures.

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 NOAA Weather Radio 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.

The following locations in Lorain County currently have sirens in place:

- Avon Fire Department
- Elyria Township Fire Department
- Wellington Fire Department
- Columbia Township Fire Department
- Eaton Township Fire Department
- Grafton Township Fire Department
- City of Oberlin

The County relies on local broadcast media to disseminate the warning to the general public by requesting them to activate the Emergency Alert System.

Weather Alert Radios are located in various places throughout Lorain County, including schools, nursing homes, institutions and places of public assembly, which can be used for public advisories. In some school districts, only the school designated as the “central office” has a Weather Alert Radio. When a warning is received, the central office notifies all other schools in the district.

As a contingency measure, the Lorain County Office of Emergency Management and Homeland Security has the capability to notify all schools in Lorain County via the ALERTCAST telephone system in case of any pending emergency.

8.4.3 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.

Lorain County EOP

The Lorain County EOP, originally adopted on February 26, 1991, is a requirement of the ORC, Section 5502.271, and is updated annually with new and relevant information. The purpose of this EOP is to define, to the extent possible, the roles and actions to be taken by the governmental jurisdictions of Lorain County to respond quickly and adequately to emergencies with an overall coordinated approach. The plan is meant to work in unison with local jurisdiction's standard operating procedures and/or other support agencies such as local hospitals, non-profit agencies and private emergency response organizations.

The EOP is designed to work for all types of natural and man-made disasters. The document has a Basic Plan, which defines hazards that affect Lorain County and then ranks whether a particular hazard is low, medium or high risk. In addition, the Basic Plan defines the terms that are useful in order to understand the EOP. The Basic Plan then discusses procedures for relocating and safeguarding vital records.

The Basic Plan is augmented with appendices that cover the details of various aspects of emergency response. The annexes are Emergency Operations Center/Direction and Control, Communications, Notification and Warning, Shelter and Mass Care, Damage Assessment, Resource Management, Law Enforcement, Fire and Rescue, Engineering, Utilities and Public Works, Public Health, EMS/Hospital/Medical, Evacuation, Special Needs Group/Evacuation Assistance, Evacuation if Response to a Nuclear Attack and Terrorism, including nuclear, radiological, and chemical terrorism response and the contamination of water supply.

The plan also contains guidelines with respect to response and operating the Emergency Operations Center (EOC). The Lorain County EOC is in Elyria. The person responsible for the operation of the EOC is the Director of the Lorain County Office of Emergency Management and Homeland Security. Upon the absence of the director, the Emergency Operations Manager is responsible for EOC operations.

8.4.4 Evacuation and Sheltering

8.4.4.1 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)

The ORC authorizes township and municipal police, fire departments and the County Sheriff, the power to protect the lives and property of citizens in their jurisdictions. Therefore, the Sheriff and the Chiefs of these organizations are empowered to determine the need and order evacuations during emergencies. In Lorain County, when time allows, all evacuation orders are to be coordinated with the chief executive officer of the affected jurisdiction before they are released to the public. Ohio Attorney General's Opinion #1532 states that municipal, county or EMA/civil defense officials have the authority to evacuate persons from an area under their jurisdiction in order to minimize the effects upon the civil population of an attack or other disaster. The Incident commander is responsible for direction and control of the evacuation at the scene.

The Director of the Lorain County Transit System will act as Transportation Coordinator for public transportation resources planned for use in an evacuation and will report to the EOC when requested. The Emergency Medical Coordinator in the EOC will cooperate with the Transportation Coordinator to provide listings of ambulances, vans and other vehicles that can be used to evacuate the handicapped and infirmed.

Most evacuees will evacuate in their own vehicles. Buses will pick up evacuees who do not own automobiles at announced assembly points. Notification of the pick-up locations shall be made through the Public Information Officer. The American Red Cross, in cooperation with local authorities at the shelter sites, will designate parking areas. Vehicle security will be provided by the jurisdiction's law enforcement officers or their designated volunteer forces.

8.4.4.2 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 in and the potential for an overcrowded facility.

Special care facilities, such as nursing homes, should have an evacuation plan and resources in place for emergencies that would involve their facility on a daily basis. This would include an alternate site plan to move their population to a previously identified safe area, transportation, and medical support.

In the event of an evacuation in Lorain County, fire and law enforcement response organizations, and the Lorain County EMA may contact the American Red Cross to coordinate the number of persons to be evacuated to shelters and requirements for any special needs sheltering. Provisions have been made with the American Red Cross Chapter to provide all required staffing, equipment and programs to adequately staff an evacuation shelter. These provisions include medical assistance as required.

8.4.5 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.

In Lorain County, responsibility for damage assessment ultimately lies with local government entities. Damage assessment personnel must be trained in order to provide fast and accurate information to the EOC so that effective response and recovery efforts may be utilized. Many financial assistance programs at the state and federal levels require extensive damage assessment information.

Local government officials will conduct an initial damage assessment using all available sources (fire, police, etc.) as soon as possible following a disaster. Early identification of problems affecting the population will enable the Executive Group to make prompt and efficient decisions concerning resources available and needed. This initial report will be submitted to the Lorain County Office of Emergency Management and Homeland Security by the Lorain County EMA within 24 hours of the incident.

8.5 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.

8.5.1 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.

8.5.1.1 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.

Findley Lake, located within Findley Lake State Park in the Village of Wellington, is a reservoir managed by the ODNR. Findley Lake is an 84-acre impoundment of Wellington Creek, a tributary of the West Branch of Black River. It was completed in 1956.

8.5.1.2 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 above are all common building materials in lowhead dams.

Table 8-1 lists the nine lowhead dams recorded in Lorain County.

**Table 8-1
Lorain County Lowhead Dams**

Waterway	Township	Longitude	Latitude	Descriptions
Black River	Elyria	-82.1	41.4	N/A
Black River, East Branch	Carlisle	-82.09	41.34	In a residential area where Chestnut Ridge Road meets East River Road in Elyria
Black River, East Branch	Elyria	-82.1	41.37	Above East Bridge Street bridge in Elyria
Black River, Main Branch	Carlisle	-82.12	41.34	Intake and lowhead dam for Bresler Reservoir at Agerter Road bridge northeast of Spencerville
Black River, West Branch	Eaton	-82.07	41.33	Above the S.R. 20 bridge south of Elyria, portage river right
Black River, West Branch	Carlisle	-82.12	41.35	At trailer court at Oberlin Road in Elyria below the railroad tracks
Charlemont	Huntington	-82.25	41.13	N/A
Black River, East Branch	Elyria	-82.11	41.37	N/A
Rocky River, West Branch	Columbia	-81.9	41.35	Dam and river gauge at Sprague Road bridge in West View

8.5.1.2 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.

8.5.1.3 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.

8.5.2 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.

Lorain County's drainage improvements and maintenance activities are implemented through the County Engineer's office. These activities include replacing deficient structures (i.e. pipes, culverts, bridges) in 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 those 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.

8.6 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 bring about voluntary mitigation activities at little or no cost to the government. Property owners mitigated their flooding problems long before there were government funding programs.

8.6.1 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 Lorain County. These activities serve to make people aware of the preparedness needed for a natural hazard on their personal level. The Lorain County EMA uses the County fair as a means to distribute educational materials to a large population attending 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.

The County also uses the local media to advise the public on the dangers of severe weather. Warnings and emergency preparedness issues are broadcast over local radio stations and television channels. The County is also moving toward establishing a website that will also contain public information concerning the natural hazards prevalent within Lorain County.

8.6.2 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.

8.6.2.1 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 FIRMs. 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.

8.6.2.2 State law

The State of Ohio's Department of Commerce has a Residential Property Disclosure Form pursuant to section 5302.30 of the ORC and rule 1301:1-4-10 of the Administrative Code. It is to be filled out by the owners who are looking 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 flood plain/Lake Erie CEA, whether there are drainage/erosion problems, and if there are zoning/code violations.

Lorain 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.

8.6.3 Libraries and Websites

The Lorain 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.loraincounty.com>). The website is currently not used as a tool for making relevant hazard mitigation information available to the public. However, as part of the mitigation effort, the County would like to use this website as a resource for dissemination of educational materials concerning the natural hazards that affect their communities.

9.0 HIGHEST RATED ACTIVITIES AND ACTION PLAN

9.1 Matrix Results

The Core Group chose a total of 50 potential activities. Of those 50 activities, 17 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 four top rated activities have been highlighted; however the other activities are important and should be re-evaluated during the monitoring process of the Mitigation Plan for Lorain County. To see the complete list of mitigation alternatives for each hazard please see the complete matrix in Appendix J.

9.1.1 Matrix Results for Severe Storms

Lorain County Mitigation Alternative Matrix Results							
	Matrix Total	Matrix Total	Matrix Total	Matrix Total	Matrix Total	Hazard Prioritization	Average
Severe Storms							
Provide an alternate power source, such as back-up generators, for lift stations to avoid sanitary sewers from backing up into homes creating a health hazard.	18	26	31	31	31	6	27.8
Coordinate with the electric company to better serve communities in times of crises (i.e. First Energy).	19	22	30	28	26	6	26.2
Provide an alternate power source, such as back-up generators, for those sensitive populations and critical facilities that must have continuous power to preserve and protect human health.	23	25	31	27	25	6	26.0

The three highest rating activities within the severe storm hazard category include:

- *Provide an alternate power source, such as back-up generators, for lift stations to avoid sanitary sewers from backing up into homes creating a health hazard.*
- *Coordinate with the electric company to better serve communities in times of crises (i.e. First Energy).*
- *Provide an alternate power source, such as back-up generators, for those sensitive populations and critical facilities that must have continuous power to preserve and protect human health.*

9.1.2 Matrix Results for Flooding

Lorain County Mitigation Alternative Matrix Results		Matrix Total					Hazard Prioritization	Average
		Matrix Total						
Flooding								
Creating a dedicated "radio" channel for decision-makers to utilize for coordination during a disaster.	30	30	27	30	30	5	26.2	
Seek solutions to the inflow and infiltration with regard to the sanitary systems, such as replacing deteriorating sanitary sewer piping.	19	30	28	26	21	5	25.5	
Coordinate a First Response Team and train them in techniques on search and rescue emergencies when there is fast moving water.The County wants to make sure the community has this resource to be able to save lives.	28	25	28	24	25	5	25.2	

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

- *Creating a dedicated "radio" channel for decision-makers to utilize for coordination during a disaster.*
- *Seek solutions to the inflow and infiltration with regard to the sanitary systems, such as replacing deteriorating sanitary sewer piping.*
- *Coordinate a First Response Team and train them in techniques on search and rescue emergencies when there is fast moving water. The County wants to make sure the community has this resource to be able to save lives.*

9.1.3 Matrix Results for Tornadoes

Lorain County Mitigation Alternative Matrix Results		Matrix Total					Hazard Prioritization		Average
		Matrix Total					Matrix Total		Matrix Total
Tornadoes									
Provide an alternate power source, such as back-up generators, for critical facilities serving as tornado shelters that must have continuous power to preserve and protect human health.	13	29	29	29	19	4	24.2		
Develop a large scale educational outreach program to teach County residents about the uses of a multi-use siren system and the different warnings to be sounded.	10	23	26	24	24	4	21.7		

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

- *Provide an alternate power source, such as back-up generators, for critical facilities serving as tornado shelters that must have continuous power to preserve and protect human health.*
- *Develop a large scale educational outreach program to teach County residents about the uses of a multi-use siren system and the different warnings to be sounded.*

9.1.4 Matrix Results for Droughts, Extreme Heat, Extreme Cold

Lorain County Mitigation Alternative Matrix Results	Matrix Total	Matrix Total	Matrix Total	Matrix Total	Matrix Total	Hazard Prioritization	Average
Droughts, Extreme Heat, Extreme Cold							
Create a Public Service Announcement (PSA) on extreme cold and its affects on the community. Develop and distribute information on the affects of extreme cold on how to protect yourself and others.	22	24	26	28	3	3	19.1
Evaluate regulations requiring landlords to maintain rental properties, indoor systems (e.g. heat) as well as outdoor facilities, during periods of extreme cold.	8	19	26	27	3	3	17.2
Develop an electronic map that delineates locations of sensitive populations and critical facilities throughout Lorain County to expedite getting help to those who need it.	8	8	27	22	3	3	16.3

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

- *Create a Public Service Announcement (PSA) on extreme cold and its affects on the community. Develop and distribute information on the affects of extreme cold on how to protect yourself and others.*
- *Evaluate regulations requiring landlords to maintain rental properties, indoor systems (e.g. heat) as well as outdoor facilities, during periods of extreme cold.*
- *Develop an electronic map that delineates locations of sensitive populations and critical facilities throughout Lorain County to expedite getting help to those who need it.*

9.1.5 Matrix Results for Erosion

Lorain County Mitigation Alternative Matrix Results	Matrix Total	Matrix Total	Matrix Total	Matrix Total	Matrix Total	Hazard Prioritization	Average
Erosion							
Streams and rivers often traverse multiple jurisdictions within Lorain County. Someone's activities upstream may become someone's problem downstream. The County wants to promote coordination between jurisdictions on stream/river usage to avoid erosion problems.	13	17	24	23	22	2	20.4
Evaluate roadway infrastructure in areas prone to erosion to determine structural stability and further action needed to eliminate future structural damage due to eroding soils.	13	17	24	20	17	2	19.2
Prior to commencing future construction projects, the County wants to evaluate the area and the construction activities involved in the project to determine the type of potential erosion problems associated with the construction.	12	15	21	22	22	2	18.5

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

- *Streams and rivers often traverse multiple jurisdictions within Lorain County. Someone's activities upstream may become someone's problem downstream. The County wants to promote coordination between jurisdictions on stream/river usage to avoid erosion problems.*

- Evaluate roadway infrastructure in areas prone to erosion to determine structural stability and further action needed to eliminate future structural damage due to eroding soils.
- Prior to commencing future construction projects, the County wants to evaluate the area and the construction activities involved in the project to determine the type of potential erosion problems associated with the construction.

9.1.6 Matrix Results for Earthquakes

Lorain County Mitigation Alternative Matrix Results							
Earthquakes							
Evaluate Building Code standards within the county and incorporated areas to determine if additional requirements need to be incorporated within the Building Codes.	6	19	22	16	1	1	13.3
Coordinate a Public Service Announcement (PSA) and/or outreach program about earthquakes and their threats.	6	9	20	11	1	1	11.8
Coordinate with NOACA to establish an Intelligent Transportation System (ITS) to help alleviate traffic problems. The County wants to make sure motorists have safe driving resources after an earthquake event.	6	6	20	11	1	1	11.5

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

- Evaluate Building Code standards within the county and incorporated areas to determine if additional requirements need to be incorporated within the Building Codes.
- Coordinate a Public Service Announcement (PSA) and/or outreach program about earthquakes and their threats.
- Coordinate with NOACA to establish an Intelligent Transportation System (ITS) to help alleviate traffic problems. The County wants to make sure motorists have safe driving resources after an earthquake event.

9.2 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.

Amherst

- TBD.

South Amherst

- TBD.

Avon

Flooding

- Seek funding for constructing detention basins to alleviate flooding.

Avon Lake

- TBD.

Elyria*Severe Storms*

- Provide an alternate power source, such as back-up generators, for lift stations to avoid sanitary sewers from backing up into homes creating a health hazard.

Flooding

- Seek solutions to the inflow and infiltration with regard to the sanitary systems, such as replacing deteriorating sanitary sewer piping.
- Coordinate efforts with watershed conservancy groups to determine need for retention/detention basins, focusing on communities with standing water issues.

Tornadoes

- Provide an alternate power source, such as back-up generators, for critical facilities serving as tornado shelters that must have continuous power to preserve and protect human health.

Droughts, Extreme Heat, Extreme Cold

- Create a Public Service Announcement (PSA) on extreme cold and its affects on the community. Develop and distribute information on the affects of extreme cold on how to protect yourself and others.

Erosion

- Streams and rivers often traverse multiple jurisdictions within Lorain County. Someone's activities upstream may become someone's problem downstream. The County wants to promote coordination between jurisdictions on stream/river usage to avoid erosion problems.

Earthquakes

- Evaluate Building Code standards within the county and incorporated areas to determine if additional requirements need to be incorporated within the Building Codes.

Grafton

- TBD.

Kipton

- TBD

LaGrange*Severe Storms*

- Provide an alternate power source, such as back-up generators, for lift stations to avoid sanitary sewers from backing up into homes creating a health hazard.

Flooding

- Seek solutions to the inflow and infiltration with regard to the sanitary systems, such as replacing deteriorating sanitary sewer piping.
- Coordinate efforts with watershed conservancy groups to determine need for retention/detention basins, focusing on communities with standing water issues.

Tornadoes

- Provide an alternate power source, such as back-up generators, for critical facilities serving as tornado shelters that must have continuous power to preserve and protect human health.

Droughts, Extreme Heat, Extreme Cold

- Create a Public Service Announcement (PSA) on extreme cold and its affects on the community. Develop and distribute information on the affects of extreme cold on how to protect yourself and others.

Erosion

- Streams and rivers often traverse multiple jurisdictions within Lorain County. Someone's activities upstream may become someone's problem downstream. The County wants to promote coordination between jurisdictions on stream/river usage to avoid erosion problems.

Earthquakes

- Evaluate Building Code standards within the county and incorporated areas to determine if additional requirements need to be incorporated within the Building Codes.

Lorain

- Because of the fast rate of development of the southern portion of the City of Lorain, the northern portion of the City is being inundated with additional stormwater runoff and debris, such as trees and stumps. This activity taking place by residents in the northern portion of the City negatively affects the residents of the southern portion of the City. The City wants to promote coordination between jurisdictions on stormwater detention and erosion control practices to avoid this problem.

North Ridgeville***Severe Storms***

- Provide an alternate power source, such as back-up generators, for lift stations to avoid sanitary sewers from backing up into homes creating a health hazard.

Flooding

- Seek solutions to the inflow and infiltration with regard to the sanitary systems, such as replacing deteriorating sanitary sewer piping.
- Coordinate efforts with watershed conservancy groups to determine need for retention/detention basins, focusing on communities with standing water issues.

Tornadoes

- Provide an alternate power source, such as back-up generators, for critical facilities serving as tornado shelters that must have continuous power to preserve and protect human health.

Droughts, Extreme Heat, Extreme Cold

- Develop an electronic map that delineates locations of sensitive populations and critical facilities throughout Lorain County to expedite getting help to those who need it.

Erosion

- Streams and rivers often traverse multiple jurisdictions within Lorain County. Someone's activities upstream may become someone's problem downstream. The County wants to promote coordination between jurisdictions on stream/river usage to avoid erosion problems.

Earthquakes

- Evaluate Building Code standards within the county and incorporated areas to determine if additional requirements need to be incorporated within the Building Codes.

Oberlin

- TBD

Rochester

- TBD

Sheffield***Severe Storms***

- Provide an alternate power source, such as back-up generators, for lift stations to avoid sanitary sewers from backing up into homes creating a health hazard.

Flooding

- Seek solutions to the inflow and infiltration with regard to the sanitary systems, such as replacing deteriorating sanitary sewer piping.
- Coordinate efforts with watershed conservancy groups to determine need for retention/detention basins, focusing on communities with standing water issues.

Tornadoes

- Provide an alternate power source, such as back-up generators, for critical facilities serving as tornado shelters that must have continuous power to preserve and protect human health.

Droughts, Extreme Heat, Extreme Cold

- Create a Public Service Announcement (PSA) on extreme cold and its affects on the community. Develop and distribute information on the affects of extreme cold on how to protect yourself and others.

Erosion

- Streams and rivers often traverse multiple jurisdictions within Lorain County. Someone's activities upstream may become someone's problem downstream. The County wants to promote coordination between jurisdictions on stream/river usage to avoid erosion problems.

Earthquakes

- Evaluate Building Code standards within the county and incorporated areas to determine if additional requirements need to be incorporated within the Building Codes.

Sheffield Lake

- TBD

Vermilion**Flooding**

- Evaluate projects to alleviate ice jams caused by ice moving downriver that picks up debris, blocks the river and causes flooding.

Wellington

- TBD

Eaton Township**Severe Storms**

- The County has several critical roadway intersections. When power is unavailable, back-up generators are needed to maintain those intersections.

Flooding

- Seek solutions to the inflow and infiltration with regard to the sanitary systems, such as replacing deteriorating sanitary sewer piping.
- Coordinate efforts with watershed conservancy groups to determine need for retention/detention basins, focusing on communities with standing water issues.

Tornadoes

- Provide an alternate power source, such as back-up generators, for critical facilities serving as tornado shelters that must have continuous power to preserve and protect human health.

Droughts, Extreme Heat, Extreme Cold

- Create a Public Service Announcement (PSA) on extreme cold and its affects on the community. Develop and distribute information on the affects of extreme cold on how to protect yourself and others.

Erosion

- Streams and rivers often traverse multiple jurisdictions within Lorain County. Someone's activities upstream may become someone's problem downstream. The County wants to

promote coordination between jurisdictions on stream/river usage to avoid erosion problems.

Earthquakes

- Evaluate Building Code standards within the county and incorporated areas to determine if additional requirements need to be incorporated within the Building Codes.

Carlisle Township

Severe Storms

- Coordinate with the electric company to better serve communities in times of crises (i.e. First Energy).
- Provide an alternate power source, such as back-up generators, for those sensitive populations and critical facilities that must have continuous power to preserve and protect human health.

Flooding

- Seek solutions to the inflow and infiltration with regard to the sanitary systems, such as replacing deteriorating sanitary sewer piping.
- Coordinate efforts with watershed conservancy groups to determine need for retention/detention basins, focusing on communities with standing water issues.

Tornadoes

- Provide an alternate power source, such as back-up generators, for critical facilities serving as tornado shelters that must have continuous power to preserve and protect human health.

Droughts, Extreme Heat, Extreme Cold

- Create a Public Service Announcement (PSA) on extreme cold and its affects on the community. Develop and distribute information on the affects of extreme cold on how to protect yourself and others.

Erosion

- Streams and rivers often traverse multiple jurisdictions within Lorain County. Someone's activities upstream may become someone's problem downstream. The County wants to promote coordination between jurisdictions on stream/river usage to avoid erosion problems.

Earthquakes

- Evaluate Building Code standards within the county and incorporated areas to determine if additional requirements need to be incorporated within the Building Codes.

9.2.1 Additional County Mitigation Alternatives

After the matrix results were tabulated and mitigation alternatives were chosen by each incorporated jurisdiction, the Core Group evaluated additional County alternatives that were not discussed at the Alternative Development meeting, and thus not included in the Alternatives Matrix. The following countywide alternative was developed by the Core Group to be addressed in this Mitigation Plan.

- Coordinate with the NOACA to obtain Congestion Mitigation Air Quality (CMAQ) funds that would establish a regional policy on signal pre-emption. Signal pre-emption is a type of technology that exists for emergency vehicles to preemptively override traffic signals in either a sound system or a light activated system. This alternative would decrease response time during an emergency situation for Lorain County emergency providers that resulted from any, if not all, of the natural hazards chosen by the Core Group.

9.3 Action Plan

The culmination of Lorain County's Mitigation Plan is an Action Plan. The general direction of the overall program is outline in this document. Specific activities pursuant to the general direction are detailed in the Action Plan that is placed in Appendix K for ease of access. The overall direction of the Action Plan is to give the Core Group an easily accessible document to ascertain how they are doing on implementing their chosen Mitigation Alternatives.

9.4 Mitigation Plan Maintenance

The Core Group, in conjunction with the Lorain County EMA, will establish methods for monitoring and evaluating the Mitigation Plan for the County and its participating incorporated jurisdictions on a five-year cycle. During the first review, the Lorain County will consider restructuring the Drought section of the Mitigation Plan to include three headings, one each for urban, suburban and rural areas. The Lorain County EMA will also refer to the Mitigation Plan wherever feasible within the existing documents that support mitigation and growth within Lorain County.

The Core Group will review the goals and action items to determine their relevance to changing situations in Lorain 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. This will be accomplished by the development of a website 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. There will also be a formalized press release developed for their annual review process.

9.5 Resolution of Adoption

The Lorain County Commissioners as well as the incorporated areas of Amherst, South Amherst, Avon, Avon Lake, Elyria, Grafton, Kipton, LaGrange, Lorain, North Ridgeville, Oberlin, Rochester, Sheffield, Sheffield Lake, Vermilion, and Wellington will be passing a Resolution of Support for the Lorain County countywide Mitigation Plan after contingent approval from the State of Ohio EMA as well as FEMA.

An example of the Resolution of Adoption that will be presented to the Commissioners as well as the participating incorporated jurisdictions is provided on the following pages.

RESOLUTION NO. _____

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

WHEREAS, on _____, the Lorain County Commissioners passed Resolution No. adopting the LORAIN 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 Lorain 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 Lorain County. Further, by researching and planning for future natural hazards and implementing appropriate mitigation techniques, all of Lorain 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 Lorain County."; and

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

WHEREAS, a Mitigation Plan for Lorain 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 Lorain 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 Lorain County Commissioners that:

1. LORAIN COUNTY COUNTYWIDE ALL NATURAL HAZARDS MITIGATION PLAN is hereby adopted as an official plan of Lorain 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 Lorain 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.

Passed by the Lorain County Board of Commissioners on

Vote:

Yes ____

No ____

R. D. Zande & Associates
Hazard Risk Assessment

Goals

Hazard Mitigation Practices

Highest Rated Activities and Action Plan