PORTAGE COUNTY

Multi-Jurisdictional Hazard Mitigation Plan

TABLE OF CONTENTS

5.0 APPENDICES

1.0   INTRODUCTION

1.1   COMMUNITY PROFILE

Portage County is one of 88 counties in the State of Ohio. The county contains 26 municipalities including the cities of Aurora, Kent, Ravenna, Streetsboro; the villages of Brady Lake, Garrettsville, Mantua, Sugar Bush Knolls, and Windham; and the townships of Atwater, Brimfield, Charlestown, Deerfield, Edinburg, Franklin, Freedom, Hiram, Mantua, Nelson, Palmyra, Paris, Randolph, Ravenna, Rootstown, Shalersville, Suffield, and Windham. Ravenna serves as the county seat. Kent is the largest city in the county, whose population is 32,345 according to the US Census 2013 estimate. Portage County is bordered to the east by Trumbull County and Mahoning County. The southern border is comprised of Mahoning and Stark Counties. Geauga County is located to the north and Summit County to the west. The land currently occupied by Portage County was initially included in Jefferson County, which was organized in 1797. In 1800, Trumbull County occupied the current Portage County land area. It was not until 1807 that the Ohio state legislature passed the act to create Portage County. A map depicting all municipal areas in Portage County is available on Page 5.

1.1.1   Aurora City

The City of Aurora is located in the northwestern portion of Portage County. State routes 43, 82, and 306 travel through Aurora. Aurora has a population of 15,577 according to the 2013 US Census estimate. The median household for Aurora is $80,400. Aurora contains 6,396 housing units.

1.1.2   Kent City

The City of Kent is located in western Portage County. State routes 43, 59 and 261 travel through Kent. Kent is home to Kent State University. Kent's population is 32,345 according to the 2013 Census estimate. The median household income for Kent is $31,035. There are 11,174 housing units located in the City of Kent.

1.1.3   Ravenna City

The City of Ravenna is centrally located in Portage County. State routes 14, 59, and 88 travel through Ravenna. The population in Ravenna is 11,556 according to the 2013 US Census estimate. The median household income for Ravenna is $35,756. There are

5,566 housing units located in the City of Ravenna.

1.1.4   Streetsboro City

The City of Streetsboro is located in the northwestern portion of Portage County, south of Aurora. Interstate 80 and state routes 14, 43, and 303 travel through Streetsboro. The population of Streetsboro is 16,130 according to the 2013 Census estimate. The median household income is $61,940. There are 7,104 housing units in the City of Ravenna.

1.1.5   Brady Lake Village

The Village of Brady Lake is located in the western portion of Portage County, east of Kent. Brady Lake is situated along State Route 59. The population of Brady Lake is 464 according to the 2010 US Census. There are 226 housing units in Brady Lake.

1.1.6   Garrettsville Village

The Village of Garrettsville is located in the northeastern portion of Portage County. State routes 82 and 88 travel through Garrettsville. Garrettsville has a population of 2,325 according to the 2010 US Census. There are 1,054 housing units in Garrettsville.

1.1.7   Mantua Village

The Village of Mantua is located in the northcentral portion of Portage County. State routes 44 and 256 travel through Mantua. Mantua has a population of 1,043 according to the 2010 US Census. There are 410 housing units in Mantua.

1.1.8   Sugar Bush Knolls Village

The Village of Sugar Bush Knolls is located in the western portion of Portage County, south of Streetsboro. Sugar Bush Knolls is situated along state route 43. Sugar Bush Knolls has a population of 177 people according to the 2010 Census. There are 74 housing units in Sugar Bush Knolls.

1.1.9   Windham Village

The Village of Windham is located in the northeastern portion of Portage County. Windham. Interstate 80 and state route 303 travel through Windham. Windham has a population of 2,209 according to the 2010 US Census. There are 1,045 housing units in Windham.

1.1.10 Topographical Information

The elevation of Portage County ranges from approximately 600 feet to 1,330 feet, but the majority of the county falls in the range of 950-1,150 feet. Portage County serves as part of the major divide between the Lake Erie and Ohio River basins. The county has five major watersheds: Mahoning River and Tuscarawas River of the Ohio River Basin and Cuyahoga, Chagrin, and Grand Rivers of the Lake Erie Basin. Portage County lies in the Glaciated Appalachian Plateau physiographic region of Ohio. The soils and topography of Portage County reflect the influence of the glaciers that scoured the landscape some 10,000 years ago, which deposited thick layers of glacial till, comprised of sand, gravel, and clay. Urban land cover is the most prominent in the incorporated areas of the county. However, the majority of the county's land is wooded. The most forested areas include the land around M.J. Kirwan and Mogadore Reservoirs, Lake Rockwell, the Ravenna Training & Logistics Site, and riparian that may be too steep or wet to farm. The graphic below displays current land use percentages in Portage County.
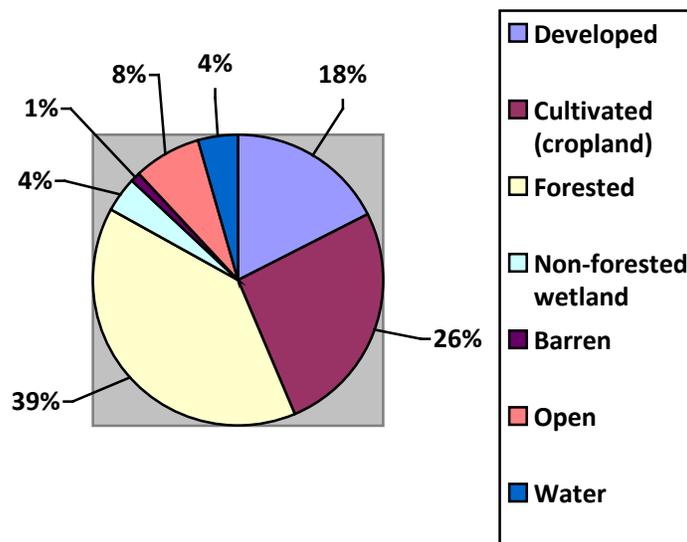
Oil and gas wells are widespread in Portage County with higher concentrations in eastern Randolph, Atwater, and Deerfield Townships and in Freedom Township. Sand and gravel resources are highly correlated to the glacial deposit of unconsolidated materials throughout the western half of the county.

1.1.11 County Census Statistics

According to the US Census 2013 estimate, Portage County has a population of 163,862. The cities of Aurora, Kent, Ravenna, and Streetsboro have the highest housing density with more than 5,000 housing units. The Ravenna Township jurisdiction is the only other jurisdiction with more than 4,000 housing units as of 2000. This could be due to certain variables. For example, the location of Kent State University weighs heavily on the population of the City of Kent. According to the 2010 US Census, Portage County averages 331.2 persons per square mile. 15.1% of Portage County's population is considered living below poverty level, 0.3% less than the state average. According to the Portage Development Board, the 2011 unemployment rate was 8.3% (http://www.portagedevbd.org/ExplorethePossibilities/LaborMarketInformation.aspx).

The top five employers in Portage County are as follows: Kent State University (1), Robinson Memorial Hospital (2), Portage County Government (3), GE Lighting, Inc. (4), and the Kent City School District (5) (www.development.ohio.gov). There are 11 public school districts located in Portage County. According to the Public School Review, public schools in Portage County serve 23,026 students (http://www.publicschoolreview.com/county_schools/stateid/OH/county/39133).

According to the 2012 USDA Census of Agriculture, there are 847 farms in Portage County, which is a 2% decrease from 2007's 862 farms. However, the land coverage of farms has increased from 82,759 acres in 2007 to 83,321 acres in 2012. The average size farm is 98 acres. Grains, oil seeds, dry beans, and dry peas are the county's leading crop category. The market value of all products sold is $43,681,000.

The Ravenna Arsenal (now referred to as the National Guard's Ravenna Training and Logistics Site), established by the Department of Army in 1940, sits on 21,427 acres. This site was one of sixty plants constructed at the onset of World War II for the purpose of loading, assembling, and packing a variety of conventional ammunition, including medium and major-caliber projectiles, bombs, fuses, boosters, primers, and percussion elements.

On the following pages are maps that depict the municipal areas and the population density in Portage County.
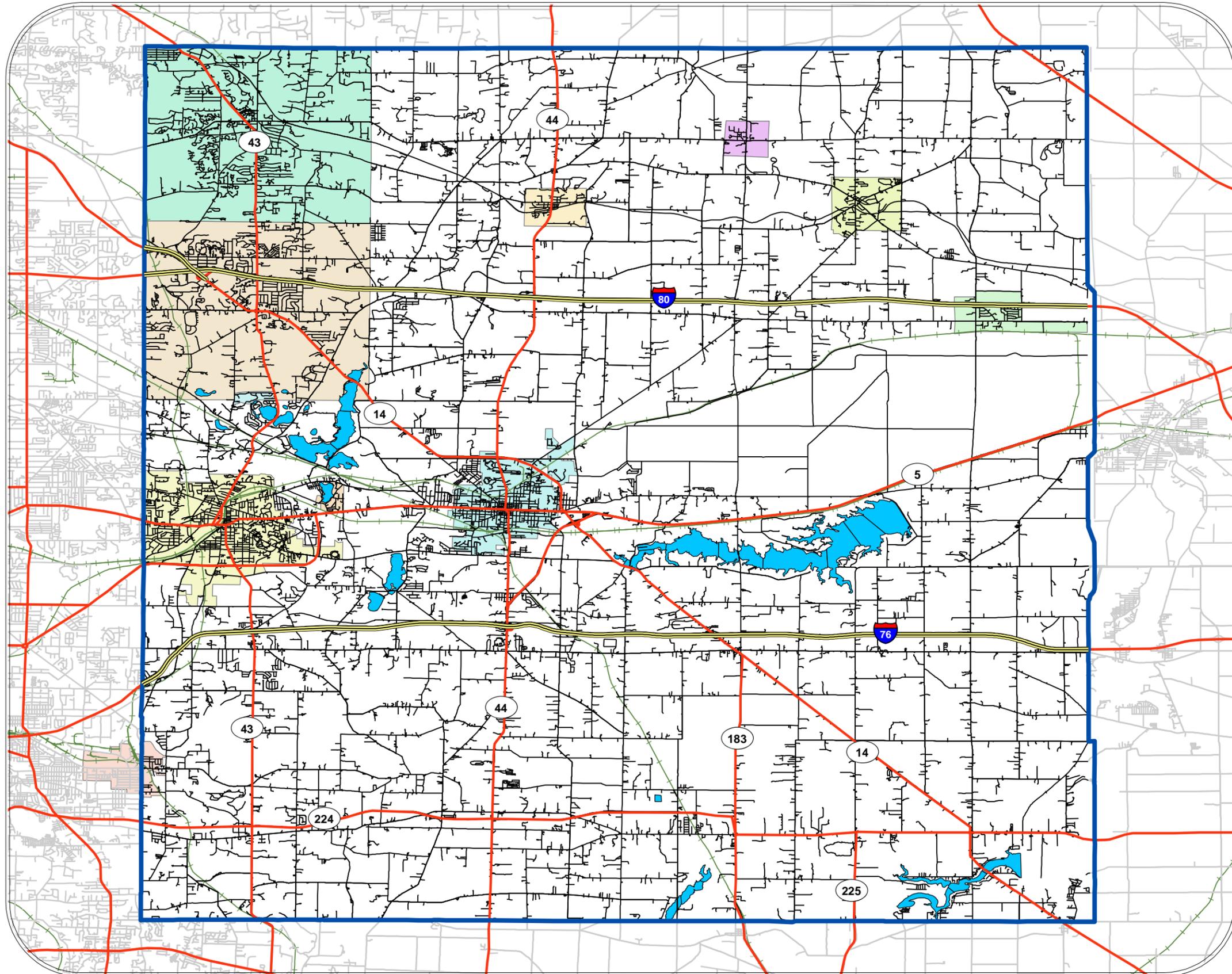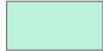
PORTAGE COUNTY
HAZARD MITIGATION PLAN

Municipal Areas
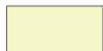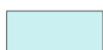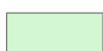
Legend:
- Aurora
- Brady Lake
- Garrettsville
- Hiram
- Kent
- Mantua
- Mogadore
- Ravenna
- Streetsboro
- Sugar Bush Knolls
- Windham

PORTAGE COUNTY HAZARD MITIGATION PLAN
POPULATION DENSITY
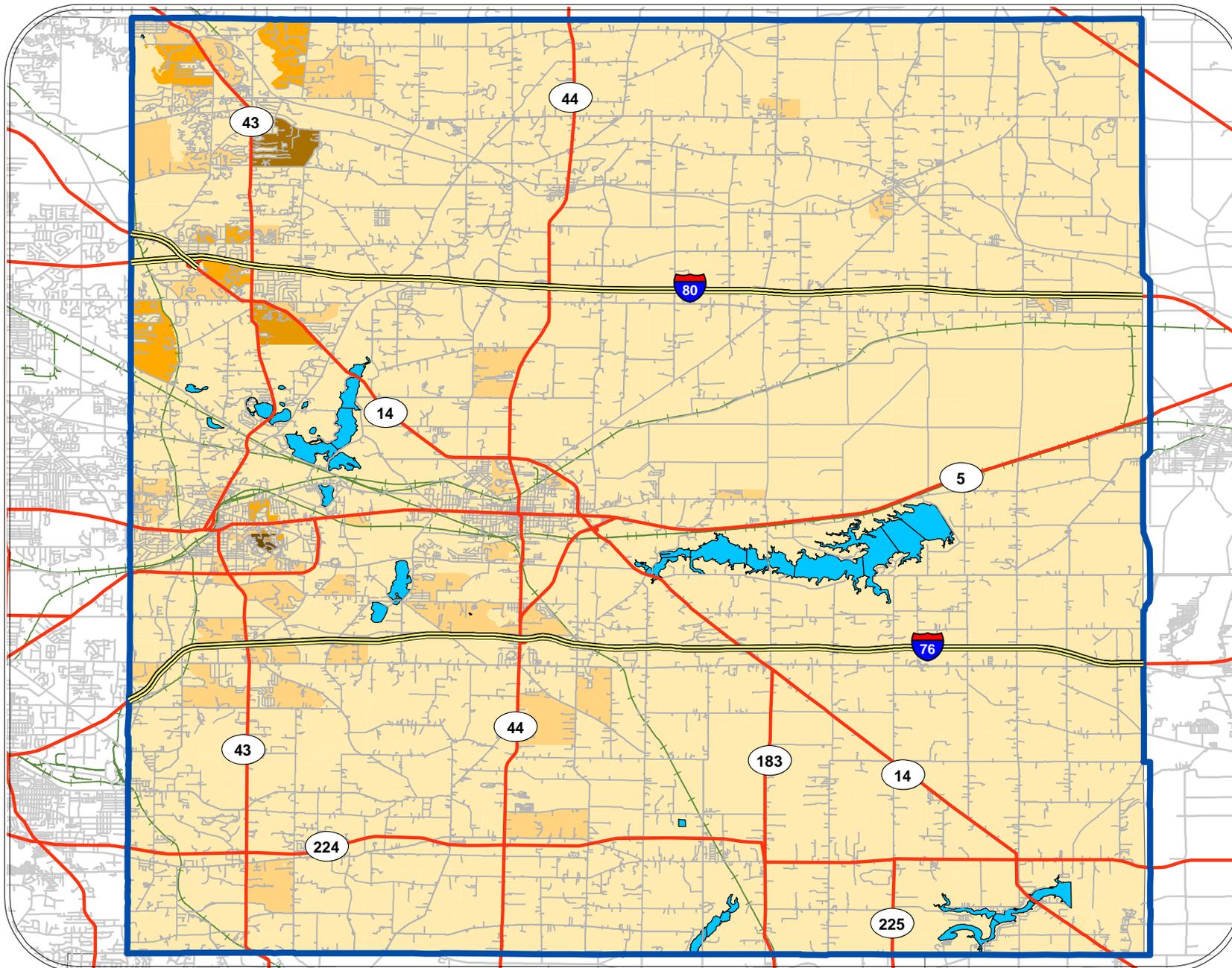
Legend:
- Pop < 300
- Pop = 301-600
- Pop = 601-900
- Pop = 901-1200
- Pop = 1201-1500
- Pop > 1501

1.2 DOCUMENTATION OF THE PLANNNING PROCESS

This plan was developed in accordance with Part 201.6 of Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as enacted by Section 104 of the Disaster Mitigation Act of 2000. Several resources were used during the development of the plan, including the *Local Mitigation Planning Handbook* (USDHS FEMA, 2013), the governing regulations in the Code of Federal Regulations (CFR), and documents provided by the Ohio Emergency Management Agency.

To guide the completion of the plan at the local level, a multi-jurisdictional core planning team was established. The following organizations were sent invitations to participate in the process.

- Aurora City
- Brady Lake Village
- Garrettsville Village
- Hiram Village
- Kent City
- Mantua Village
- Ravenna City
- Streetsboro City
- Sugar Bush Knolls Village
- Windham Village
- Atwater Township
- Brimfield Township
- Charlestown Township
- Deerfield Township
- Edinburg Township
- Franklin Township
- Freedom Township

- Hiram Township
- Mantua Township
- Nelson Township
- Ohio Department of Agriculture
- Ohio Department of Transportation
- Palmyra Township
- Paris Township
- Portage County Commission
- Portage County Engineer's Office
- Portage County GIS Office
- Portage County Sheriff's Office
  Randolph Township
- Ravenna Township
- Rootstown Township
- Shalersville Township
- Suffield Township
- Windham Township

Of the organizations that were invited, the following attended planning meetings and, thus, comprised the *planning team*.

2014/2015 Portage County Hazard Mitigation Planning Team	
Organization	*Representative*
Atwater Township	Dan Derreberry, Trustee
Edinburg Township	Mike Pittinger, Firefighter
Kent City	Michelle Lee, Police Chief
Ohio Department of Transportation	Mark Griffith
Ohio National Guard	Patrick Finnegin, Sergeant Major Brian Fowler, SFC
Palmyra Township	James Deffenbaugh, Trustee
Portage Area Regional Transportation Authority	Jim Smith
Portage County Building Department/Floodplain Management	Randy Roberts, Manager
Portage County Commission	Maureen Frederick, Commissioner Kathleen Chandler, Commissioner Sabrina Christian Bennett
Portage County Development Board	Bradford Ehrhart
Portage County Economic Development	Bradford Ehrhart, Director
Portage County Office of Homeland Security/Emergency Management	Ryan Shackelford, Director Patricia Corley, Administrative Assistant
Portage County Engineer's Office	Butch Helming, General Superintendent
Portage County GIS	Joe Reichlin, Manager
Portage County Regional Planning Commission	Todd Peetz, Director
Portage County Sheriff's Office	Dennis Missimi, Major
Portage County Water Resources	Jeff Lonzrick, Director
Portage Soil & Water Conservation District	James Bierlair, District Coordinator
Randolph Township	Susan White, Trustee
Ravenna City	Geoff Cleveland, Fire Chief
Ravenna School District	Bill Wisniewski, Business Manager
Ravenna Township	Steve Bosso, Chief
Robinson Memorial Hospital	Robert Walker, EMS Coordinator
Streetsboro City	Kevin Grimm, FD Lieutenant
Sugar Bush Knolls Village	Elizabeth Hartley, Councilwoman

In order to complete this plan, the Portage County Office of Homeland Security/Emergency Management (PCOH/EM) recognized the importance of ensuring involvement from all jurisdictions in Portage County. At key points in the planning process (e.g., completion of the study area profile, the completion of a draft risk assessment, and to generate the project list), the PCOH/EM and its contractor contacted jurisdictions unable to attend meetings directly to gain their feedback. This feedback was both presented to the planning team at subsequent meetings and incorporated into this document. The following individuals were the points of contact for these remaining

jurisdictions.

- **Aurora City**: Ann Womer Benjamin, Mayor
- **Brady Lake Village:** Hal Lehman, Mayor
- **Garrettsville Village:** Rick Patrick, Mayor

- **Hiram Village:** Lou Bertrand, Mayor
- **Mantua Village:** Linda Clark, Mayor
- **Windham Village:** Rob Donham, Mayor

Portage County also reached out to several different types of organizations in order to broaden the lens of experiences. This action was made in an attempt to provide further insight into the hazards the county could face. The following list represents the types of organizations that were contacted.

- Chagrin Rivershed Partners, Inc.
- East Manufacturing (*participated via meeting attendance*)
- Friends of Crooked River
- Grand River Partners, Inc.
- Grand Wild and Scenic River Advisory Council
- Kent State University (*participated via meeting attendance*)
- McMaster-Carr Supply Co.
- Ohio National Guard, Ravenna Arsenal (*participated via meeting attendance*)
- Pond Brook Watershed Initiative
- Portage Area Regional Transportation Authority (*participated via meeting attendance*)
- Portage County Economic Development (*participated via meeting attendance*)
- Portage County Water Resources (*participated via meeting attendance*)
- Portage Soil & Water Conservation District (*participated via meeting attendance*)
- Ravenna City Schools (*participated via meeting attendance*)
- Robinson Memorial Hospital (*participated via meeting attendance*)
- Saint Gobain
- Step2 Company
- Tinkers Creek Watershed Partners
- Tinkers Creek Watershed Land Conservancy
- Tuscarawas River Buried Valley Watershed Council

- Upper Cuyahoga River Watershed Task Force
- Upper Cuyahoga Association

Throughout the planning process, the planning committee, county citizens, state and local agencies were provided the opportunity to participate in the creation of this plan. Committee members from governmental entities, academia, and public and private agencies provided needed information to make this a valuable document. Three planning committee meetings involving stakeholders took place over the course of four months. The first meeting, yielding the largest attendance, took place on July 30, 2014. The second planning meeting was held on August 26, 2014. The third and final planning meeting was held on November 12, 2014. Meeting topics included the following.

- **Meeting 1:** Committee members reviewed the hazards contained in previous versions of the plan and commented on their applicability. Members also added data for consideration in the risk assessment update. For instance, committee members wanted to add data about the polar vortex events of 2014. The committee also discussed specific areas subject to such hazards as flooding. Finally, the committee shared knowledge of any complementary planning efforts managed by other agencies in the county.
- **Meeting 2:** The primary focus of meeting was to update the project list. Committee members reviewed the existing list, noted which projects had been completed and provided status updates for others. Committee members then brainstormed new projects to add to the list. Committee members were also provided an opportunity to review draft hazard profiles at the second meeting.
- **Meeting 3:** Committee members reviewed the hazard profiles for the final time as well as the updated project list at the third meeting. The primary purpose of the third meeting was to prioritize projects.

Community Involvement

The public was given the opportunity to provide input in the planning process. The public was invited to participate in all planning meetings. Notices were posted at the Portage County Justice Center. Notices were also disseminated through social media by the Portage County Office of Homeland Security/Emergency Management. A copy of this plan was made available to the public on the county's webpage, in addition to being available at local libraries. A news release was also submitted to

local media outlets informing the public about this plan.

Neighboring counties were contacted by the PCOH/EM Director via email (Cuyahoga, Geauga, Mahoning, Stark, Summit, and Trumbull Counties). Two of the six neighboring counties replied (Cuyahoga and Trumbull Counties). These communication channels between neighboring counties will remain open in order to add value to the mitigation process. The initial email for mitigation collaboration can be found in Appendix 2.

<u>Methodology</u>

The risk assessment phase of the mitigation plan was completed using a variety of research methods. The National Climatic Data Center (NCDC) was the primary in the process of researching natural hazards. News outlets were also used to determine the extent of damages during the occurrences of past incidents. The planning committee added valuable input regarding past occurrences. The Portage County Asset Mapping system provided information regarding the locations of assets in the county. These locations were compared against problematic areas identified by research and public input. Using GIS mapping information, risk estimates were created for hazard areas.

There are already plans in use by jurisdictions within Portage County that cover themes addressed in the *Portage County Multi-Jurisdictional Hazard Mitigation Plan*. The Portage County Health Department has seven emergency response plans available for public view on its website. The Public Health Response EOP 2014 lists mitigation practices under the "Phases of Emergency Management" heading. The Regional Planning Commission addresses concerns dealing with flooding, including, but not limited to, educating the public, building ordinances requiring storm water management for subdivisions, and minimizing repetitive flood loss structures. Ravenna includes emergency planning within its 2013 strategic plan. Streetsboro has signified 17 top priority areas regarding storm water flooding from a survey taken in 2005.

Plans Referenced in the Portage County Multi-Jurisdictional Hazard Mitigation Plan	
State of Ohio	*How was it used?*
State of Ohio Hazard Mitigation Plan 2011	Used in All Hazard Profiles
Portage County	*How was it used?*
Communications Plan 2014	Used in the Infrastructure Profile (Section 2.2.7)
Containment Plan 2014	Used in the Epidemic Profile (Section 2.2.4)
Epidemiology Plan 2014	Used in the Epidemic Profile (Section 2.2.4)
Health Department COOP January 2014	Used in the Epidemic Profile (Section 2.2.4)
Public Health Response Plan 2014	Used in the Epidemic Profile (Section 2.2.4)
Kent	*How was it used?*
Stormwater Management Program	Used in Jurisdictional Activities (Section 3.2.2)
Mantua	*How was it used?*
Comprehensive Plan	Used in Jurisdictional Activities (Section 3.2.2)
Ravenna	*How was it used?*
Areawide Stormdrain Improvement 2015-B	Used in Jurisdictional Activities (Section 3.2.2)

After the risk assessment, hazard profiles were distributed to members of the planning committee before the second and third planning meetings. Information within the hazard profiles was discussed during the subsequent planning meetings in order to add value to the hazard profile drafts. For example, planning committee members were given maps to indicate flood prone areas.

Mitigation projects were reviewed and listed as completed, ongoing, or no longer valid projects. After the second planning meeting (8/26/14), a list of ongoing and new projects was provided for planning committee members. Members were then given the opportunity to rank mitigation projects according to their opinion of importance at the third planning meeting (11/12/14). These rankings were averaged out to come up with a list of the mitigation projects in order of importance.

Plan Adoption

The *Portage County Multi-Jurisdictional Hazard Mitigation Plan* was sent to the Ohio Emergency Management Agency and FEMA Region 5 for approval. Following Federal approval pending adoption, the County and participating jurisdictions intend to formally adopt the plan by passing a Resolution or Ordinance.

2.0   HAZARD ANALYSIS

2.1   OVERVIEW

The hazard analysis section of the *Portage County Multi-Jurisdictional Hazard Mitigation Plan* provides a snapshot of hazards that pose a threat to Portage County. The information provided in these profiles will be used to guide mitigation activities. This risk assessment gives insight on two specific areas, severity and probability.

In order to initiate a risk assessment, hazards were identified as those that have or could possibly affect Portage County. This was done through research and information provided by the planning committee. Following hazard identification, hazard profiles were created in order to establish a better understanding of the potential threats. Within each profile, there is information provided to give a general overview of the threat itself. This information was gathered from federal state level agencies, such as the Ohio Emergency Management Agency (OEMA). The community profile provides insight on how each hazard affects Portage County. Mapping components were used to demonstrate vulnerability in specific areas of the county. GIS (Geographic Information Systems) mapping was provided by Portage County GIS. Vulnerability analysis was compounded through the information provided by all forms of research. This analysis is depicted in the risk assessment decision matrix. Following the risk assessment matrix, an asset inventory table was created to depict how the previous hazards affect the listed assets. The asset inventory includes a map showing the locations of assets throughout the county. Appendix 4 displays a chart ranking the possible severity of each hazard for Portage County assets.

2.2 HAZARD IDENTIFICATION

Hazards that affect Portage County have been identified through multiple avenues. Historical occurrence provides significant precedent for a hazard to be included within this plan. The National Climatic Data Center (NCDC) provided information used to determine if a hazard belonged in this plan. The planning committee provided significant insight on what hazards pose a threat that may not have occurred in recent history. The planning committee played an integral part of leading discussion in order to signify which hazards required the most attention. Media outlets (i.e., WKYC Channel 3) also provided data to support hazard inclusion.

Based upon the sources previously stated, there are a number of threats that have potential for adversely impacting Portage County. These hazards are as follows:

- Class I Dams,
- Drought/Extreme Heat,
- Earthquake,
- Epidemic
- Flood,
- Hazardous Material,
- Infestation,
- Infrastructure,
- Severe Weather,
- Terrorism,
- Transportation, and
- Winter Storm.

The following hazards were not included in the project.

- **Avalanches:** There is no threat of avalanche in Portage County. The general elevation is not high enough to cause snow to cap mountains year-round. Further, any snow slides would be covered in the winter storm profile.
- **Coastal Erosion:** Portage County has no coastal land.
- **Dust/Sand Storm:** Portage County is historically not threatened by dust or sand storms. Any type of debris flow associated with wind would be covered in the severe weather profile.

- **Expansive Soils:** There is no historical evidence of expansive soils in Portage County.
- **Geomagnetic Storm:** Geomagnetic storms have not presented itself as a hazard in Portage County.
- **Hurricane:** Hurricanes present a limited threat due to geographical location. Hurricane remnants typically present as thunderstorms in Portage County.
- **Iceberg:** There is no evidence of icebergs threatening Portage County due to a lack of large, navigable bodies of water.
- **Subsidence/Landslide:** Historically subsidence and landslide have not been threatened in Portage County.
- **Tsunami:** Portage County is located inland; the closest border of Portage County is approximately 20 miles from the nearest Lake Erie shoreline.
- **Volcano:** There is no historic precedent to include volcanoes.

The following hazards are outside the scope of this project:
- Financial issues/economic depression/Inflation,
- Fuel/resource shortage,
- Enemy attack/war,
- Insurrection,
- Disinformation,
- Physical or information security breach,
- Misinformation, and
- Social waste disposal problems.

The listed threats can affect Portage County in varying degrees of severity and frequency. The risk assessment will also provide a matrix that displays the probability and severity of the included threats. The proximity of hazards to critical facilities played a major role in determining the potential impact of hazards. This information is covered in the individual hazard profiles. Loss estimates also played a role in the classification of severity and probability.

2.2.1 Class I Dams

A dam is a barrier constructed across a valley for impounding water or creating a reservoir. The dam failure hazard is created when this barrier experiences a *hydraulic failure* (uncontrolled flow of water over, around, and/or adjacent to the dam causing erosion), *seepage failure* (uncontrolled water seepage through the structure causing erosion), and/or *structural failure* (rupture of the structure).

According to the Ohio Department of Natural Resources (ODNR), Class I dams are selected on the basis of three criteria: height (greater than 60 feet), storage volume (greater than 5,000 acre-feet), and potential downstream hazard (probable loss of life, serious hazard, and structural damage to high value property). Only one of these criteria must be met for a dam to be classified as Class I. According to data provided by the ODNR, there are 10 Class I dams in Portage County. Class I dams found in Portage County are as follows.

Portage County Dams			
Name of Dam	*Dam Class*	*Hazard Level*	*NID Height/Storage*
Tucaway Lake Dam	I	**HIGH**	24.7ft/1025ft
Lake Rockwell Dam	I	**HIGH**	35ft/18250ft
Mogadore Reservoir Dam	I	**HIGH**	50ft/21000ft
Brimfield Lake Dam	I	**HIGH**	16ft/27ft
Michael J. Kirwan Dam	I	**HIGH**	83ft/124000ft
Schultz Lake Dam	I	Low	15.2ft/78ft
Ohio Farmettes Lake Dam	I	N/A	N/A
Muddy Lake Dam	I	N/A	N/A
Wingfoot Lake Dam	I	Medium	14.2ft/3429ft
Berlin Dam	I	**HIGH**	96ft/140000ft

Hazard Profile

There is no record of past Class I dam failure in Portage County but the Brimfield Lake Dam nearly failed in 1979 due to overtopping. No downstream damage was reported. Ohio Farmettes Lake Dam experienced embankment erosion on January 29, 2001. However, the dam did not fail (http://npdp.stanford.edu/npdphome/damdir.htm). The probability of a Class I dam

failure is considered low. However, dams can be a destination for those looking to cause harm in Portage County.

Impacts Profile

Flooding of nearby homes and other occupied structures would be considered a likely outcome should a breach of a Class I dam occur. Roadways within close proximity to the dams and some adjacent agricultural property may also be affected. All Class I dams in Portage County have emergency action plans (EAPs) on file with the Portage County Office of Homeland Security/Emergency Management.

La Due Reservoir, located in Geauga County has an inundation area that will probably cross over into Portage County. The dam is owned by the City of Akron and is currently developing and EAP. The City of Akron and owner of the Lake Rockwell Dam are in the process of developing an EAP. Lake Rockwell is located in Summit County and provides drinking water for the City of Akron.

The Mogadore Reservoir Dam and the Lake Rockwell dam are listed as high priority dams in the Ohio Hazard Mitigation Plan (2011). This presumes that a failure of either could result in the loss of at least 50 lives.

Below is a table that present loss estimates for dam failure in Portage County. The table is a depiction of the properties that are exposed to dam failure in their entirety. Parcels that would be affected by any sort of dam failure were included in the loss estimates. In order to create these loss estimates, dollar amounts were taken from parcel information provided by Portage County GIS, including the improved market value and land. The parcel data was cross referenced with dam inundation. However, calculations included the entire parcel value if the dam inundation intersected with the parcel even if the dam inundation does not affect structures within that parcel. Stanford University's Nation Performance of Dams Program Dams Directory revealed no previous dam incidents in Portage County

Portage County						
Type of Parcel (Occupancy Class)	*Number of Parcels*			*Value of Parcels*		
	# in County	*# in Hazard Area*	*% in Hazard Area*	*$ in County*	*$ in Hazard Area*	*% in Hazard Area*
Residential	83,154	704	0.85	$9,234,639,800	$82,990,490	0.90
Commercial	3,545	52	1.47	$1,348,284,340	$41,801,900	3.10
Industrial	820	16	1.95	$452,798,580	$8,032,000	1.77
Agricultural	6,016	129	2.14	$582,517,840	$10,889,420	1.87
Government	1,747	164	9.39	$1,496,255,800	$57,909,260	3.87
Utility	5	1	20.00	$2,588,100	$0	0.00
Education/Non-Profit	1,105	42	3.80	$510,096,900	$3,757,600	0.74
Total	**96,392**	**1,108**	**1.15**	**$13,621,781,360**	**$205,380,670**	**1.51**

Portage County (SHARPP Conversion)		
Type of Parcel (Occupancy Class)	*# in Hazard Area*	*$ in Hazard Area*
Residential	704	$82,990,490
Non-Residential	198	$60,723,320
Critical Facilities	206	$61,666,860
Total	**1,108**	**$205,380,670**

➢ Ohio Department of Natural Resources

www.ohiodnr.com

➢ HAZUS Instruction and Technical Information

http://www.fema.gov/hazus

➢ National Inventory of Dams

http://crunch.tec.army.mil/nid/webpages/nid.cfm

➢ Stanford University National Performance of Dams Programs

http://npdp.stanford.edu/npdphome/damdir.htm

2.2.2 Drought/Extreme Heat

FEMA describes drought as "a persistent and abnormal moisture deficiency having adverse effects on vegetation, animals, and/or people" (www.training.fema.gov). Extreme heat, which may accompany drought conditions, is considered to involve conditions where temperatures are 10 degrees or more above the average high temperature for the region lasting several weeks (www.training.fema.gov).

Hazard Profile

The following is a listing of annular periods of drought and related periods of extreme heat that have occurred in Portage County since 1900.

- 1930-36 Drought/Extreme Heat
- 1939-46 Drought/Extreme Heat
- 1952-57 Drought/Extreme Heat
- 1959-68 Drought/Extreme Heat
- 1995-96 Drought
- 1999 Drought/Extreme Heat
- 1988 Extreme Heat
- 2002 Drought
- 2012 Drought

The drought of the late 1989's followed a milder drought in the Southeastern United States and California the year before. This drought spread from the Mid-Atlantic, Southeast, Midwest, Northern Great Plains, and Western United States. It was widespread, unusually intense and accompanied by heat waves which killed around 4,800 to 17,000 people across the United States and also killed livestock across the county. One particular reason that the Drought of 1989 became very damaging was because farmers might have farmed on land which was marginally arable. Another reason was pumping groundwater near the depletion mark. The Drought of 1989 destroyed crops almost nationwide, residents' lawns went brown and water restrictions were declared in many cities. This drought was very catastrophic for multiple reasons; it continued across the Midwest States and North plains States during 1989, not officially ending until 1990.

The drought in 1996 included dry weather that persisted throughout the month across northern Ohio. Rainfall averaged from a few tenths of an inch in north central and northwest Ohio to one to two inches in extreme northeast Ohio. August rainfall normally averages between three and four inches. Rainfall totals were .76 inches at Toledo Airport and .71 inches at Cleveland Airport, which rank among the five driest Augusts on record. Crops that normally mature during August were affected by the dry weather and crop losses were predicted at ten to thirty percent. The actual dollar amount of crop loss was unknown.

The 1999 drought rendered $4 million in economic losses. Drought conditions continued across most of northern Ohio from June to September. Widespread heavy rain occurred on the 29th of September but did little to help crop conditions. For the month, only 1.63 inches of rain fell in Mansfield, making it the 9th driest September on record. Of the 1.63 inches, 1.14 inches fell on the 29th. Even with an inch of rain on the 29th, both Toledo and Cleveland finished with below two inches of rain for the month. Losses from reduced crop yields are estimated at $200 million for northern Ohio alone.

The 2012 drought caused nitrate issues preventing normal plant photosynthesis. Drought caused deer to congregate at small watering holes where disease-carrying midges infected the deer population (University of Illinois, 2012). The 2012 North American Drought is an expansion of the 2010-2012 United States Drought which began in the spring of 2012, when the lack of snow in the United States caused very little melt water to absorb into the soil. The drought includes most of the US and included Ohio. Among counties, Portage County was designated with moderate drought conditions by mid-June. It has been equaled to similar effects as droughts in the 1930's and 1950's but it has not yet been in place as long. However, the drought has inflicted, and is expected to continue to inflict, catastrophic economic ramifications. In most measures, the drought has exceeded the 1988-1989 North American Drought, which is the most recent comparable drought.

On July 30, 2012, the Governor of Ohio sent a memorandum to the USDA Ohio State Executive Director requesting primary county natural disaster designations for eligible counties due to agricultural losses caused by drought and additional

disasters during the 2012 crop year. The USDA reviewed the Loss Assessment Reports and determined that there were sufficient production losses in 85 counties to warrant a Secretarial disaster designation. On September 5, 2012, Portage County was chosen as one of those counties. Below is a map illustrating Secretarial Disaster Declarations due to the 2012 drought.
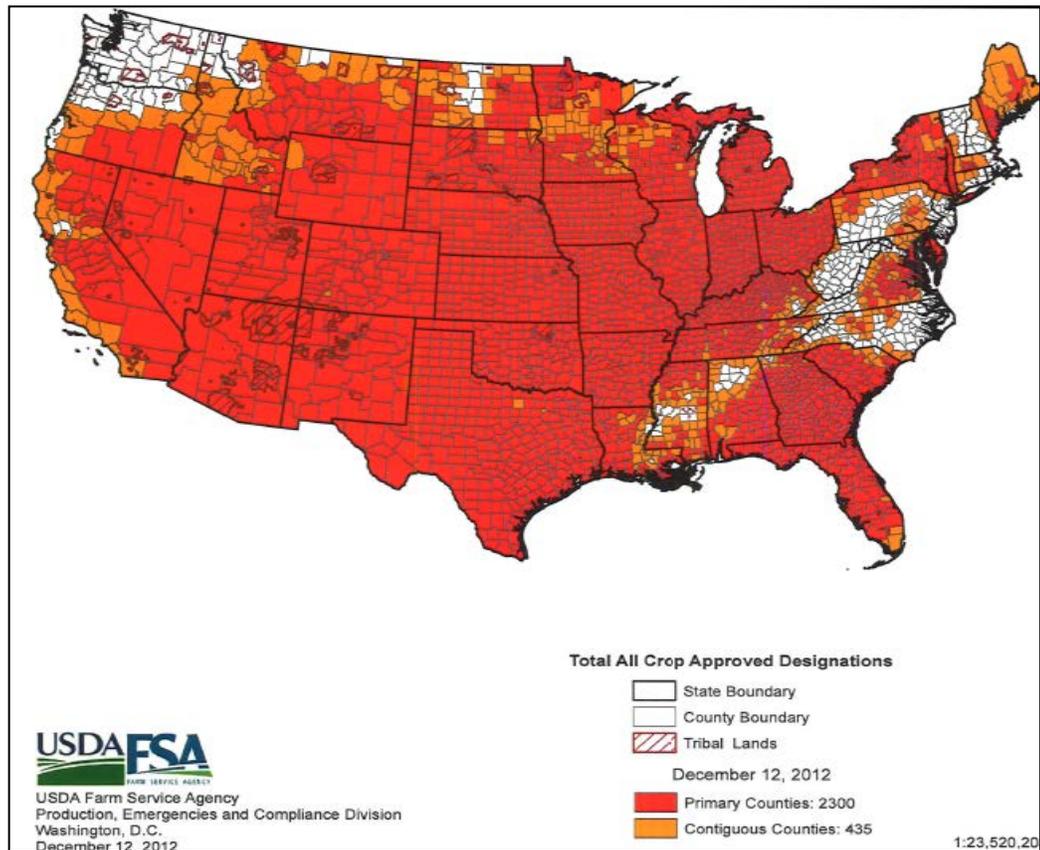
Impacts Profile

Drought is a countywide hazard that affects all areas and jurisdictions of the county.

Seasons of drought and periods of extreme heat can potentially occur during any particular year when climatic conditions are conducive, and effects could be expected to impact the entire county. Agricultural losses to crops and livestock would primarily be affected during periods of drought. Extreme heat could result in adverse health-related affects to both humans and animals. Structures are rarely affected by drought or extreme heat. Below is the Palmer Drought Severity Index displaying the effects of moisture or the lack thereof.

Palmer Drought Severity Index		
	<-4.0	Extreme Drought
	-3.99 to -3.0	Severe Drought
	-2.99 to -2.0	Moderate Drought
	-1.99 to -1.0	Mild Drought
	-0.99 to -0.5	Incipient Dry
	-0.49 to 0.49	Near Normal
	0.50 to 0.99	Incipient Wet
	1.0 to 1.99	Slightly Wet
	2.0 to 2.99	Moderately Wet
	3.0 to 3.99	Very Wet
	>4.0	Extremely Wet

The PDSI ratings for the State of Ohio corresponding with the droughts in 1996, 2002 and 2012 can be somewhat misleading. The PDSI ratings are as follows: 1996 was 2.65, 2002 was -.038 and 2012 was 3.33. For example, despite a PDSI rating of 3.33 in 2012, damages were evident throughout Portage County because of drought conditions.

Financial losses to structures would not be applicable during periods of drought. As mentioned, losses of agricultural productivity would indeed be an issue. Drought usually affects people, animals, and crops.

Corn and soybean comprise the majority of crops grown in Portage County. Estimations of percentage of crop loss due to drought were calculated by taking the average yield over 10 years and comparing that with the yield in a drought year. The year used for this comparison was 2002 and the percent loss was approximately 3.6%. Data was provided by the United State Department of Agriculture Nation Agriculture Statistics Service. The USDA ERS (Economic Research Service) reported that 2012 was the worst drought year since 1950 in terms of acres affected. The total gross income from Portage County farm sources in 2012 was $1,961,000.

The estimated loss in revenue during drought is between 20%-24%. In dollar amounts, the loss of revenue would be between $392,200-$470,640.

The following graphic displays the effects on crop during drought and non-drought years in Portage County.

Drought/Non-Drought Year Comparison					
Commodity	*Non-Drought Year 2011*	*Drought Year 2012*	*Units*	*Change*	*Amount*
Corn-planted	12,900	16,200	acres	up	3,300
Corn, grain-harvested	12,800	14,300	acre	up	1,500
Yield-percentage	99.22%	88.27%		down	10.95%
Corn, grain-production	1,814,000	2,025,000	bushels	up	211,000
Corn, grain-yield	141.7	141.6	bushels/acre	down	0.1
Hay-harvested	6,500	6,500	acres	unchanged	0
Hay-Production	13,000	11,190	tons	down	1,810
Hay-yield	2.00	1.85	tons/acre	down	0.15
Oats-planted	600	1,100	acres	up	500
Oats-harvested	500	750	acres	up	250
Yield-percentage	83.33%	68.18%		down	15.15%
Oats-production	25,000	25,000	bushels	up	15,900
Oats-yield	50.0	50.0	bushels/acre	up	4.5
Soybeans-planted	15,900	15,900	acres	up	3,600
Soybeans-harvested	15,800	15,800	acres	up	3,600
Yield-percentage	99.37%	99.37%		up	0.12%
Soybeans-production	750,000	911,000	bushels	up	161,000
Soybeans-yield	47.5	47.0	bushel/acre	down	0.5
Wheat-planted	4,100	1,700	acres	down	2,400
Wheat-harvested	3,900	1,360	acres	down	2.540
Yield-percentage	95.12%	80.00		down	15.12%
Wheat-production	199,000	85,400	bushels	down	113,600
Wheat-yield	51.0	62.8	bushel/acres	up	11.8

Considerations for Extreme Heat

Projected financial loss to structures and parcels due to extreme heat would not be applicable. Health-related effects to both humans and animals from extreme heat would also be difficult to project and quantify. There have been twelve documented

fatalities in the last 50 years (NCDC). Yet the number of deaths caused by extreme heat is likely higher due to difficulty in tracking heat-induced medical emergencies. Functional access needs populations (i.e., elderly, infants, homeless) are especially vulnerable during periods of extreme heat. Mitigation activities related to extreme heat (e.g., public education, special attention to Portage County's elderly, and information releases) would be valuable in limiting these effects on the community. Mitigation planning activities are addressed in a subsequent section of the plan.

Several methods of research identified drought and extreme heat as a hazard in Portage County, including discussion with local representatives. Drought information was also collected from the following Internet sites.

> United States Department of Agriculture National Agricultural Statistic Services
>> http://www.usda.gov
> National Oceanic Atmosphere Administration (NOAA)
>> http://www.ncdc.noaa.gov

2.2.3 Earthquakes

An earthquake is a sudden and rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface (www.training.fema.gov). Effects of earthquakes can range from minor ground motion to severe ground surface faults. Earthquake severity, in terms of magnitude, is measured using several different scales. For the purpose of this document, the Richter Magnitude Scale (RMS) and Modified Mercalli Index will be used.

According to the US Geographical Survey (USGS), the Peak Acceleration Level (%g) for Portage County is 2-3%. This level is on a scale of 0-180 and would be considered relatively low risk. Below is an illustration of the Modified Mercalli Index that explains earthquake severity, along with a table illustrating relativity between the Modified Mercalli Index and the Richter scale because the historical data that was available for earthquakes in portage County was described by the Richter scale.

Intensity	Shaking	Description/Damage
I	Not felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felto nly by a few persons at rest,especially on upper floors of buildings.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Very strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

Modified Mercalli Intensity Scale

Mercalli Intensity	Equivalent Richter Magnitude	Witness Observations
I	1.0 to 2.0	Felt by very few people; barely noticeable.
II	2.0 to 3.0	Felt by a few people, especially on upper floors.
III	3.0 to 4.0	Noticeable indoors, especially on upperfloors, but may not be recognized as an earthquake.
IV	4.0	Felt by many indoors, few outdoors. May feel like heavy truck passing by.
V	4.0 to 5.0	Felt by almost everyone, some people awakened. Small objects moved. trees and poles may shake.
VI	5.0 to 6.0	Felt by everyone. Difficult to stand. Some heavy furniture moved, some plaster falls. Chimneys may be slightly damaged.
VII	6.0	Slight to moderate damage in well built, ordinary structures. Considerable damage to poorly built structures. Some walls may fall.
VIII	6.0 to 7.0	Little damage in specially built structures. Considerable damage to ordinary buildings, severe damage to poorly built structures. Some walls collapse.
IX	7.0	Considerable damage to specially built structures, buildings shifted off foundations. Ground cracked noticeably. Wholesale destruction. Landslides.
X	7.0 to 8.0	Most masonry and frame structures and their foundations destroyed. Ground badly cracked. Landslides. Wholesale destruction.
XI	8.0	Total damage. Few, if any, structures standing. Bridges destroyed. Wide cracks in ground. Waves seen on ground.
XII	8.0 or greater	Total damage. Waves seen on ground. Objects thrown up into air.

Hazard Profile

According to Ohio Seismic Network, there have been four recorded earthquakes with greater than a 2.0 Richter scale magnitude. The first occurred in 1988 in Nelson Township and had a magnitude of 2.8 (MMI II), which indicates a very minor earthquake; generally not felt, but recorded. The second occurred in 1991 in Aurora Township with a magnitude of 2.3 (MMI II). There was no additional information regarding the 1988 and 1991 earthquakes. The third occurred in Deerfield Township in 2000 and had a magnitude of 3.0 (MMI III), which indicates a minor earthquake; often felt, but rarely causing damage. The last one to occur happened in Aurora in 2007. A magnitude of 3.3 (MMI III) was recorded in Portage County. The following image displays earthquake epicenters in and around Portage County.

Residents of Alliance (Stark County) were jolted by a small earthquake on early Monday, August 7, 2000. The event was recorded throughout the state by seismograph stations of the Ohio Seismic Network (OhioSeis). Preliminary calculations indicate a magnitude of 3.0 (mbLg). No damage was reported. This is the first historic earthquake in this general location.

A small, but strongly felt earthquake struck a several-county area of northeastern Ohio on Monday, March 12. No damage was reported although many people were alarmed by the earthquake. The event was felt throughout an area of about 3,000 square miles as defined by contiguous zip codes from which felt reports were received. Maximum intensities (IV) were recorded at Aurora, Northfield, and Twinsburg. A small (2.3 magnitude) earthquake occurred in this general area in 1991.

These earthquakes appear to coincide with a linear zone in deep crystalline rocks known as the Akron Magnetic Boundary. This zone extends from Akron northeastward to eastern Lake County and northwestern Ashtabula County and then beneath Lake Erie. A number of small earthquakes have occurred along this zone in the lakeshore area and just offshore beneath the lake. The 5.0-magnitude earthquake in 1986 occurred in this zone in southern Lake County.
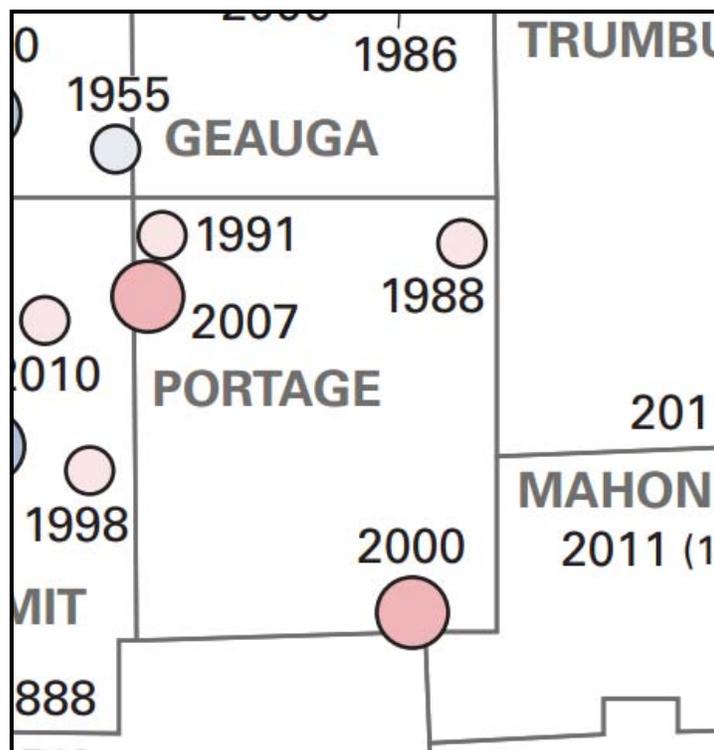
Impacts Profile

Earthquakes are a countywide hazard that affects all areas and jurisdictions of the county.

Structural effects may be possible from future incidents of an earthquake within Portage County. Past earthquake events have resulted in neither structural damage nor human loss (injuries or death). Based upon those historical data, Portage County will continue to be susceptible to earthquakes but estimated losses would be minimal based on historical losses. However, according to loss estimations provided by HAZUS, an earthquake registering a 5.0 (MMI VI) on the Richter scale could result in losses of $11,454,000,000 ($8.2 billion residential, $1.6 billion commercial, and $1.6 billion other).

Hazards US – Multi Hazard (HAZUS-MH) version 2.1 built on an ArcGIS 10.0 platform with ArcView license was used to project a vulnerability assessment for both a plausible earthquake scenario that could occur in Portage County. The scenario was selected from OhioSEIS maps demonstrating that the strongest quake experienced to date is a 5.4 magnitude wave. A depth of zero kilometers was selected as the epicenter would cause the most damage, therefore creating a worst-case scenario for planning purposes. The results are displayed from the HAZUS run in a format that is ready for input to Ohio EMA's State Hazard Analysis and Resource Planning Portal (SHARPP):

Building Exposure for Portage County – Earthquake (5.4 Mw @ 0 km depth)

Building Type	Number of Structures	Estimated Loss
Residential	4,843	$ 976,596,355.82
Non-Residential	3,398	$ 614,221,342.98
Critical Facilities	93	$ 16,810,648.88
TOTAL	**8,334**	**$ 1,607,628,347.68**

Injection sites also raise concern regarding earthquakes. Portage County is #1 in Ohio for injecting drilling wastes. Injecting drilling wastes along an unknown fault line could cause earthquakes.

➢ Ohio Seismic Network
➢ John Carroll University Seismic Observatory
➢ US Geographical Survey

2.2.4 Epidemic

An epidemic is a disease, usually contagious, that recurs in a community and attacks a large number of people at the same time. The potential impacts of an epidemic are illness or fatalities, disruption or closing of schools, or the forced closure of businesses and industrial operations (www.training.fema.gov).

Hazard Profile

An epidemic can affect all parts of Portage County, but is more probable to occur in densely populated areas, particularly large, multi-unit residential developments associated with the population.

Epidemics can develop with little or no warning and quickly erode the capacity of local medical care providers. A fast developing epidemic can last several days and extend into several weeks. In some extreme cases, they can last for several months. An epidemic can occur at any time of the year, but the warm summer months, when bacteria and microorganism growth are at their highest, present the greatest risk.

The Portage County Health Department has taken many steps to ensure a base level of preparedness for epidemic and pandemic conditions. Initiatives surrounding general preparedness for Avian flu (beginning in 2006) and most recently for H1N1 (swine flu) have led other local governments to create and adopt business continuity plans. The Portage County Health Department continues to promote influenza vaccinations, educate the public with information from the Centers of Disease Control, and participate in exercises to ensure collaboration with other agencies throughout the county. Since various residents in Portage County travel and because groups/individuals from out of county (or state) frequently travel to Portage County destinations, the possibility does exist for novel strains to be introduced to the local population, thus validating epidemic/pandemic planning efforts. This can especially be a concern for students that travel from all over the world to colleges such as Kent State University and Hiram College.

A contained case of Ebola was documented in Tallmadge. A nurse from Dallas, Texas spent the weekend in Tallmadge before being diagnosed with Ebola the next week. Tallmadge police cordoned off the house as a precautionary measure

(http://www.cleveland.com/akron/index.ssf/2014/10/neighbors_cautiously_eye_tallm.html).

Impacts Profile

Ohio ranks first in the country for measles. This is due to an outbreak caused by unvaccinated travelers from the Philippines. No cases were reported in Portage County but in-state cases raise slight concern. Portage County's epidemiology plan further addresses research, preparedness, and response to epidemics.

Epidemics rarely affect structures; they usually affect people. Billings (1997) indicated the impact of the 1918 pandemic was a 2% drop in the GDP (gross domestic product) of the world. Further, the US Bureau of Economic Analysis indicates that a community can use its median household income multiplied by its total number of households to determine an approximate GDP for its area. $52,697 (Portage County median household income) multiplied by 60,992 (number of households in Portage County according to 2013 Census estimates) equals a gross domestic product of $3,214,095,424. A 2% drop in the GDP would equal a loss of $64,281,908.

➤ Billings, M. (June, 1997). The Influenza Pandemic of 1918. Online. http://virus.stanford.edu/uda/

➤ http://www.cleveland.com/akron/index.ssf/2014/10/neighbors_cautiously_eye_tallm.html

➤ Ohio Department of Health

2.2.5 Flooding

Flooding is defined as a general temporary condition of partial or complete inundation of normally dry land areas from: overflow of inland or tidal waters; unusual and rapid accumulation of runoff or surface water from any source; mudflows; or the sudden collapse of shoreline land. A flash flood is a rapid flooding of low-lying areas, rivers, and streams that is caused by intense rainfall and is often associated with thunderstorms (www.training.fema.gov).

Hazard Profile

Portage County contains a number of rivers, streams, and ditches that have and will continue to flood portions of Portage County. Severe flooding would affect most of Portage County waterways and impact properties from a variety of use groups. Depiction of flooding for the entirety of the county during a 100-year flood is presented in Appendix 3, Figure 5. Waterways of most concern are the Cuyahoga River, Breakneck Creek and its tributaries, the Mahoning River and its watershed, the Grand River, and the northwest area of the county that is comprised of several watersheds. The flooding of these waterways poses the most prominent threat to residential populations within the county.

Flooding in Portage County could result from torrential rains occurring for a short period of time (flash floods), moderate to heavy rains lasting for an extended period of time, normal level rains on saturated land areas from melting snow and ice, or from ice jams in waterways that release during increased water flow in the winter. The development in Portage County has also drastically increased, thus, increasing the threat of flash flooding due to the increase in impervious surfaces. As seen below in the list of historical occurrences, there are areas that are especially prone to flash flooding (e.g., Shalersville, Streetsboro, Ravenna, and Garrettsville). Ravenna houses a mobile home park that is prone to flooding. SR 303 in Streetsboro is liable to flood, though a plan is in place to fix this issue. The flooding area in question was originally built on a bog.

Another flooding area within the county also includes Aurora East, which has a bowl-shaped indentation that houses multiple residential structures. Flooding there is incited by small amounts of rain. In addition, The Village of Garrettsville Fire

Department is an example of a structure that is prone to experiencing flooding issues.

In 2003, FEMA reports show extensive flooding in July. The City of Ravenna was hit especially hard (13 flooded areas). Several floods were reported along SR 59. Twenty other flooding areas were noted throughout the Ravenna Township. Franklin (one flooded area) and Shalersville (three flooded areas) Townships also suffered from flooding.

According to county stakeholders, several areas throughout Portage County have been identified as problematic concerning flooding. The Bolingbrook neighborhood, located in the Shalersville Township, has been pinpointed as a neighborhood that is highly prone to flooding. The Fair Acres Mobile Home Park, located in the Ravenna Township, has also been noted as a flood prone area. SR 303 is noted as a troublesome area in the Aurora Township. Throughout the county, beavers have been cited as troublesome regarding flooding.

Repetitive loss structures are also of concern when considering flooding of county properties. A repetitive loss structure is defined as one that is damaged in excess of $1,000; occurring at a frequency of less than 10 years (www.fema.gov/national-flood-insurance-program/defnitions). An identification of those structures is maintained by FEMA and the Ohio Emergency Management Agency. According to information obtained in accordance with the National Flood Insurance Program (NFIP), there are six total repetitive loss structures in Portage County. The following table displays Portage County's repetitive loss properties.

Repetitive Loss Properties						
Community	*Number*	*Number of Losses*	*Building Payments*	*Contents Payments*	*Total Payments*	*Average Payment*
Portage County	5	10	$183,932.01	$12,211.11	$196,143.12	$19,614.31
Village of Aurora	2	4	$3,516.43	$4,528.71	$8,045.14	$2,011.29
County & Jurisdictional Totals	**7**	**14**	**$187,448.44**	**$16,739.82**	**$204,188.26**	**$14,584.88**
There are no Severe Repetitive Loss properties in Portage County, Ohio.						

The table below provides data on past flooding events. This data was obtained from a variety of sources including, but not limited to, the National Climate Data Center, the U.S. Geological Survey, FEMA, NOAA, personal interviews, Ohio Department of Natural Resources, and the Portage County Historical Society. NOAA lists 28 individual flooding events in Portage County since 1994. Only the most significant are mentioned below; however, mitigation planning for floods will consider all occurrences.

Historical Flooding Events			
Date of Occurrence	*Location*	*Description of Losses*	*$ in Losses*
7/07/1994	N. Portion	Not Available	$500K
8/13/1994	N. Portion	Not Available	$5.0 Million
7/21/2003	Countywide	Damage to roads, homes, streams left banks	$20.0 Million
7/23/2003	Countywide	Damage to homes and flooded roadways	$500K
7/27/2003	Countywide	Damages to homes, road, several vehicles swept away	$500K
5/22/2004	Countywide	Almost 300 homes and businesses sustained flooding damage, several road closures through the county	$2.4 Million
1/01/2005	Countywide (10 Counties)	3 inches of rain/rapid snowmelt flooded homes, roads-ice storms several days earlier caused power outages, sump pump failures	$5.4 Million
8/05/2005	Countywide (4 Counties)	Up to 4 inches and rain, flooding to lowlands and streets	$250K
8/30/2005		Up to 5.3 inches of rain, 40 homes flooded, streams left banks	$325K
6/25/2006	Countywide (16 Counties)	3-5 inches of rain, mobile home park flooded (near Ravenna), streams left banks	$1.0 Million
7/10/2013	Shalersville, Garrettsville	3-4 inches of rain in an hour, homes evacuated, closed most roads, fire station flooded	$2.4 Million

The flash flood on July 21, 2003 caused approximately $20 million in property damage. Thunderstorms dumped heavy rains on Portage County. Rainfall rates at the time exceeded two inches per hour. Rainfall totals for the day exceeded four inches in some areas with highest amounts across the central portion of the county. Spotters in Kent measured 4.13 inches of rain by 8:30 p.m. and a total of 4.6 inches fell at the water treatment plant in Kent. Mantua received 4.7 inches of rain by 9:00 p.m. and 3.6 inches of rain fell at Ravenna between 7 and 9 p.m. Extensive lowland and urban flooding occurred as many streams and creeks left their banks. Boats had to be sent out to a mobile home park to pick up 103 residents.

Flash flooding on May 22, 2003 caused $2.4 million in damages. Three separate thunderstorms in a 24-hour period accumulated up to 3.77 inches of rain, according to a spotter in Kent. Dozens of roads and streets were flooded, leading to many stranded

vehicles.

Flooding on July 10, 2013, caused approximately $2.5 million in damages. Damages were documented in Shalersville, Ravenna, and Streetsboro. Shalersville experienced the majority of the damages. Following 16 consecutive days of rain, three to four inches of rain fell within an hour. Saturated ground could no longer absorb any more water, which led to severe flooding.

Impacts Profile

In the future, for the purpose of this hazard analysis, projections of affected parcels and associated monetary losses will be based on impacts resulting from a 100-year flood. The NFIP is available to the public as long as the jurisdiction is in compliance with FEMA requirements regarding ordinances to reduce the risk of flooding.

Portage County began their floodplain map modernization with ODNR in Fiscal Year 2006. This process began with a scoping meeting held on September 6, 2007 and culminated with revised maps becoming effective on August 18, 2009 when they were formally adopted by the county. Under the Portage County Building Department, Floodplain Regulations are currently in effect. Section 3.0 designates a Floodplain Administrator and duties of that office, to include updating regulations and enforcement of such regulations under Section 6.0. Additionally, the Floodplain Administrator routinely monitors flood hazard areas to enforce regulations and provide community assistance such as encouraging owners to maintain flood insurance policies.

Below is a chart showing dates of compliance for cities and villages within Portage County.

		NFIP Compliance					
CID	Name	Init FHBM Identified	Init FIRM Identified	Curr Eff Map Date	Reg-Emer Date	Sanction Date	Does Not Participate
390453	Portage County	12/27/1974	9/18/1987	8/18/2009	9/18/1987		
	City of Aurora						X
390456	City of Kent	10/26/1973	3/15/1978	8/18/2009	3/15/1978		
390458	City of Ravenna	11/5/1976	9/4/1987	8/18/2009 (M)	9/4/1987		
390797	City of Streetsboro	5/26/1978	12/18/1984	8/18/2009	12/18/1984		
390533	City of Tallmadge	8/15/1975	4/15/1981	7/20/2009	4/15/1981		
	Village of Brady Lake						X
390455	Village of Garrettsville	4/12/1974	3/5/1990	8/18/2009	3/5/1990		
	Village of Hiram						X
390457	Village of Mantua	2/8/1974	7/5/1984	8/18/2009	3/5/1984		
390528	Village of Mogadore	2/8/1974	9/3/1979	7/20/2009 (M)	9/3/1979		
	Village of Sugar Bush Knolls						X
390459	Village of Windham	3/15/1974	12/14/1979	6/18/2010		7/29/1978	
	(M) No Elevation Determined – All Zone A, C, and X						

Portage County is divided in the center by the Lake Erie/Ohio River Divide. Roughly, the northwestern half of Portage County drains to Lake Erie and the southeastern half drains to the Ohio River. Each side is then divided into several watersheds. The Lake Erie watershed is divided into the Tuscarawas River, the Cuyahoga River, the Little Cuyahoga River, Breakneck Creek, Tinkers Creek and Pond Brook, the Aurora Branch of the Chagrin River, the Grand River, the Black Brook, and LaDue Reservoir. The Ohio River watershed is broken into Eagle Creek (Mahoning River), West Branch of the Mahoning River and the Mahoning River. For the purpose of this hazard analysis, the Cuyahoga River will be analyzed as an individual waterway; the others will be analyzed as grouped waterways. The Tuscarawas River watershed will be omitted due to the very small area that it occupies in the county. The grouped waterways are as follows:

1. The Grand River,
2. The Mahoning River (includes Eagle Creek, West Branch Mahoning and Mahoning River watersheds),
3. Cuyahoga Breakneck Creek Watershed, and

4. Northwestern Portion of the County (Tinkers Creek and Pond Brook, Aurora Branch Chagrin River, Black Brook and LaDue Reservoir).

HAZUS-MH (Hazard US-Multi-Hazard) provides loss estimates for Portage County regarding the FEMA 100-year floodplain. HAZUS data reflects structure based loss estimates. HAZUS estimates that about 472 buildings will be at least moderately damaged. There are an estimated 184 buildings that will be completely destroyed. All of the buildings estimated to be completely destroyed are residential buildings. Of the essential facilities (19 fire stations, 1 hospital, 14 police stations, and 63 schools), only one fire station will lose capabilities.

Portage County (SHARPP Conversion)		
Type of Parcel (Occupancy Class)	# in Hazard Area	$ in Hazard Area
Residential	4,265	$472,887,040
Non-Residential	1,602	$314,341,910
Critical Facilities	758	$558,296,700
Total	**6,625**	**$1,345,525,650**

Specific estimated losses for the county and municipalities therein are depicted in the charts below. In order to create these figures, dollar amounts were taken from parcel information provided by Portage County GIS, including the improved market value and land. The parcel data was cross referenced with the FEMA 100-year floodplain. However, calculations included the entire parcel value if the 100-year floodplain intersected with the parcel even if the floodplain does not affect structures within that parcel. In accordance with National Floodplain Insurance Program (NFIP) requirements, the table below displays jurisdictions listed in the FEMA Community Status Book Report.

Communities Participating in the National Flood Program				
Community Name	Initial FHBM Identified	Initial FIRM Identified	Current EFF Map Date	Reg-Emer Date
Aurora, City of	5/10/74	5/17/90	8/18/09	5/17/90
Garrettsville, Village of	4/12/74	3/5/90	8/18/09	3/5/90
Kent, City of	10/26/73	3/15/78	8/18/09	3/15/78
Mantua, Village of	2/8/74	7/5/84	8/18/09	7/5/84
Mogadore, Village of	2/8/74	9/3/79	7/20/09 (M)	9/3/79
Portage County	12/27/74	9/18/87	8/18/09	9/18/87
Ravenna, City of	11/5/76	9/4/87	8/18/09 (M)	9/4/87
Streetsboro, City of	5/26/78	12/18/84	8/18/09	12/18/84
Community Not in the National Flood Program				
Community Name	Initial FHBM Identified	Initial FIRM Identified	Current EFF Map Date	Sanction Date
Windham, Village of	3/15/74	12/14/79	8/18/09	8/19/09 (S)

*(M) No Elevation Determined
*(S) Suspended

Jurisdictional loss estimates reflect data provided by Portage County GIS. Estimates reveal worst-case scenarios for the 100-year floodplain

Portage County					
Type of Parcel (Occupancy Class)	Number of Parcels			Value of Parcels		
	# in County	# in Hazard Area	% in Hazard Area	$ in County	$ in Hazard Area	% in Hazard Area
Residential	83,154	4,265	5.13	$9,234,639,800	$472,887,040	5.12
Commercial	3,545	291	8.21	$1,348,284,340	$115,691,120	8.60
Industrial	820	101	12.32	$452,798,580	$48,311,660	10.67
Agricultural	6,016	1,208	20.08	$582,517,840	$148,948,730	25.57
Government	1,747	548	31.37	$1,496,255,800	$524,690,500	35.07
Utility	5	2	40.00	$2,588,100	$1,390,400	53.72
Education/Non-Profit	1,105	210	19.00	$510,096,900	$33,606,200	6.59
Total	**96,392**	**6,625**	**6.87**	**$13,627,181,360**	**$1,345,525,650**	**9.88**

Aurora City					
Type of Parcel (Occupancy Class)	Number of Parcels			Value of Parcels		
	# in County	# in Hazard Area	% in Hazard Area	$ in County	$ in Hazard Area	% in Hazard Area
Residential	6,581	419	6.37	$1,359,856,030	$83,945,530	6.17
Commercial	183	9	4.92	$195,962,800	$2,308,400	1.18
Industrial	56	6	10.71	$73,654,460	$5,838,400	7.93
Agricultural	95	30	31.58	$16,929,120	$3,592,150	21.22
Government	139	59	42.45	$23,627,800	$11,932,500	50.50
Utility	2	0	0.00	$1,043,600	0	0.00
Education/Non-Profit	58	4	6.90	$38,136,800	$3,939,400	10.33
Total	**7,114**	**527**	**7.41**	**$1,709,210,610**	**$111,556,380**	**6.53**

Kent City					
Type of Parcel (Occupancy Class)	Number of Parcels			Value of Parcels		
	# in County	# in Hazard Area	% in Hazard Area	$ in County	$ in Hazard Area	% in Hazard Area
Residential	6,258	294	4..70	$658,734,440	$44,087,880	6.69
Commercial	683	18	2.64	$285,381,500	$20,617,800	7.22
Industrial	141	12	8.51	$56,094,600	$5,180,300	9.23
Agricultural	115	12	10.43	$15,488,180	$955,900	6.17
Government	306	55	17.97	$967,659,900	$47,745,200	4.93
Utility	0	0	0.00	0	0	0.00
Education/Non-Profit	150	6	4.00	$83,861,300	$641,300	0.76
Total	**7,623**	**397**	**5.19**	**$2,067,220,220**	**$119,228,402**	**5.77**

Ravenna City					
Type of Parcel (Occupancy Class)	Number of Parcels			Value of Parcels		
	# in County	# in Hazard Area	% in Hazard Area	$ in County	$ in Hazard Area	% in Hazard Area
Residential	4,719	53	1.12	$341,371,750	$3,203,260	0.94
Commercial	502	9	3.78	$117,020,900	$7,695,800	6.58
Industrial	141	12	8.51	$61,353,920	$4,729,360	7.71
Agricultural	26	5	19.23	$3,281,490	$619,150	18.87
Government	156	6	3.85	$35,251,490	$3,850,400	10.92
Utility	0	0	0.00	0	0	0.00
Education/Non-Profit	136	2	1.47	$105,971,300	$1,018,100	0.96
Total	**5,680**	**97**	**1.71**	**$664,250,750**	**$21,116,070**	**3.18**

Streetsboro City					
Type of Parcel (Occupancy Class)	Number of Parcels			Value of Parcels		
	# in County	# in Hazard Area	% in Hazard Area	$ in County	$ in Hazard Area	% in Hazard Area
Residential	5,411	75	1.39	$759,344,640	$9,282,120	1.22
Commercial	314	9	2.87	$286,751,360	$6,990,500	2.44
Industrial	96	3	3.13	$144,715,410	$12,692,500	8.77
Agricultural	203	21	10.34	$27,996,230	$3,774,130	13.48
Government	122	19	15.57	$23,630,300	$11,635,300	49.24
Utility	3	2	66.67	$1,544,500	$1,390,400	90.02
Education/Non-Profit	62	6	9.68	$35,619,700	$301,700	0.85
Total	**6,211**	**135**	**2.17**	**$1,279,602,140**	**$46,066,650**	**3.60**

Garrettsville Village					
Type of Parcel (Occupancy Class)	Number of Parcels			Value of Parcels		
	# in County	# in Hazard Area	% in Hazard Area	$ in County	$ in Hazard Area	% in Hazard Area
Residential	1,235	176	14.25	$137,215,230	$18,472,230	13.46
Commercial	110	30	27.27	$30,686,900	$9,164,800	29.87
Industrial	22	2	9.09	$6,490,000	$355,500	5.48
Agricultural	32	6	16.22	$3,100,520	$275,3850	8.88
Government	27	14	51.85	$5,730,000	$4,278,200	74.66
Utility	0	0	0.00	0	0	0.00
Education/Non-Profit	28	4	14.29	$16,531,100	$138,300	0.84
Total	**1,459**	**232**	**15.90**	**$199,753,750**	**$32,684,380**	**16.36**

Hiram Village

Type of Parcel (Occupancy Class)	Number of Parcels			Value of Parcels		
	# in County	# in Hazard Area	% in Hazard Area	$ in County	$ in Hazard Area	% in Hazard Area
Residential	222	0	0.00	$74,880,230	0	0.00
Commercial	37	0	0.00	$5,433,270	0	0.00
Industrial	7	0	0.00	$1,410,000	0	0.00
Agricultural	25	1	4.00	$3,193,260	$84,250	2.64
Government	11	0	0.00	$1,278,200	0	0.00
Utility	0	0	0.00	0	0	0.00
Education/Non-Profit	63	0	0.00	$46,461,100	0	0.00
Total	**365**	**1**	**0.27**	**$132,656,060**	**$84,250**	**0.06**

Mantua Village

Type of Parcel (Occupancy Class)	Number of Parcels			Value of Parcels		
	# in County	# in Hazard Area	% in Hazard Area	$ in County	$ in Hazard Area	% in Hazard Area
Residential	686	41	5.98	$67,112,270	$9,574,600	14.27
Commercial	79	30	37.97	$7,780,910	$4,389,560	56.41
Industrial	24	17	70.83	$4,078,200	$3,224,800	79.07
Agricultural	25	8	32.00	$2,792,510	$740,280	26.51
Government	19	13	68.42	$1,592,200	$903,700	56.76
Utility	0	0	0.00	0	0	0.00
Education/Non-Profit	14	6	42.86	$11,144,000	$570,440	5.12
Total	**847**	**115**	**13.58**	**$94,500,090**	**$19,403,380**	**20.53**

Mogadore Village

Type of Parcel (Occupancy Class)	Number of Parcels			Value of Parcels		
	# in Village	# in Hazard Area	% in Hazard Area	$ in Village	$ in Hazard Area	% in Hazard Area
Residential	625	1	0.16	$53,145,000	$46,900	0.09
Commercial	30	3	10.0	$6,219,600	$812,700	13.07
Industrial	34	0	0.00	$5,423,800	0	0.00
Agricultural	4	0	0.00	$103,300	0	0.00
Government	4	0	0.00	$1,363,100	0	0.00
Utility	0	0	0.00	0	0	0.00
Education/Non-Profit	1	1	100.00	$41,700	$41,700	100.00
Total	**698**	**5**	**0.72**	**$66,296,500**	**$901,300**	**1.36**

Windham Village					
Type of Parcel (Occupancy Class)	Number of Parcels			Value of Parcels		
	# in County	# in Hazard Area	% in Hazard Area	$ in County	$ in Hazard Area	% in Hazard Area
Residential	923	14	1.52	$61,422,840	$921,200	1.50
Commercial	118	2	1.69	$7,366,100	$102,300	1.39
Industrial	12	2	16.67	$2,831,300	$85,100	3.01
Agricultural	17	5	29.41	$1,540,920	$563,960	36.60
Government	41	3	7.32	$5,636,800	$3,342,200	59.29
Utility	0	0	0.00	0	0	0.00
Education/Non-Profit	27	1	3.70	$13,465,100	$15,700	0.86
Total	**1,138**	**27**	**2.37**	**$92,263,060**	**$5,130,460**	**5.56**

2.2.6 Hazardous Materials

A hazardous material incident is a technological hazard refers to the origins of incidents that can arise from human activities such as the manufacture, transportation, storage, and use of hazardous materials. Hazardous material raises concern in several different aspects. The highway system is the main form of transportation of hazardous material. Railways also transport hazardous materials to and through Portage County. Some of these materials are merely passing through. Others are being stored at facilities within Portage County. It is nearly impossible to track every hazardous material that travels on the highways. A commodity flow study could assist in determining what hazardous materials pose the biggest threat on Portage County highways. However, fixed facilities are required by law to notify state and local authorities what materials are being stored. Fixed facilities are installations, structures, or premises, above ground or underground, in which hazardous materials are stored.

Hazard Profile

According to US Department of Transportation Pipeline and Hazardous Material Safety Administration, Ohio ranks third, only behind Texas and California, in hazmat accidents from 2005-2014. However, only one of those incidents during that time period resulted in a fatality. Below are hazmat traffic incidents that took place in the cities of Portage County since 2000: Aurora, Kent, Ravenna, and Streetsboro. This data depicts Streetsboro as the city most likely to experience a hazmat incident on the highway.

Aurora		
Date	*Total Amount of Damages*	*Commodity Involved*
10/2/2001	$66	Environmentally Hazardous Substance, Liquid
8/29/2003	N/A	Flammable Liquid
1/12/2005	$4,150	Flammable Liquid
4/4/2012	$3,800	Petroleum Distillates
4/23/2012	N/A	Resin Solution

Kent		
Date	*Total Amount of Damages*	*Commodity Involved*
6/16/2000	$50	Combustible Liquid
6/20/2000	$100	Paint
4/18/2001	$115	Flammable Liquid
7/16/2001	$25	Petroleum Oil
4/8/2003	$9,000	Environmentally Hazardous Substance, Liquid
10/19/2005	N/A	Corrosive Liquid
6/1/2011	N/A	Toluene

Ravenna		
Date	*Total Amount of Damages*	*Commodity Involved*
1/4/2003	$40,600	Flammable Liquid
1/17/2013	$5,000	Resin Solution
2/3/2013	$86,814	Diesel Fuel

Streetsboro		
Date	*Total Amount of Damages*	*Commodity Involved*
2/7/2002	N/A	Corrosive Liquid
2/24/2003	N/A	Sodium Hydroxide
5/1/2003	N/A	Sulfuric Acid
6/5/2003	N/A	Liquefied Gas
8/26/2003	N/A	Sodium Hydroxide
8/26/2003	N/A	Corrosive Liquid
7/10/2003	N/A	Dichloromethane
7/28/2004	N/A	Sulfuric Acid
8/20/2004	N/A	Printing Ink
11/8/2004	N/A	Isopropanol
1/18/2005	$152,000	Corrosive Liquid
8/9/2005	N/A	Paint
9/16/2005	N/A	Flammable Liquid
2/11/2006	N/A	Flammable Liquid
3/13/2006	N/A	Sodium Hydroxide
7/26/2006	N/A	Corrosive Liquid
10/10/2006	N/A	Corrosive Solid
4/4/2007	N/A	Petroleum Distillate
1/24/2008	N/A	Corrosive Solid
9/12/2008	N/A	Articles Pressurized Pnuematic
1/14/2009	N/A	Printing Ink
4/29/2009	N/A	Sodium Hydroxide
12/15/2009	N/A	Paint
8/17/2010	$50,000	Hydrochloric Acid
9/16/2010	N/A	Sodium Hydroxide
9/27/2010	N/A	Acetone
9/29/2010	N/A	Toxic Liquid
11/10/2010	N/A	Amine
12/17/2010	N/A	Corrosive Solid
1/5/2011	N/A	Corrosive Liquid
3/10/2011	N/A	Corrosive Liquid

According to the Record-Courier, an oil tank exploded when struck by lightning on July 23, 2013. The explosion launched the tank 250 feet into the air, spilling 1,500 to 2,000 gallons of crude oil.

Neighboring counties present a hazard due to the transport of hazardous material through Portage County. Cuyahoga County has many EHS facilities that transport through Portage County, in addition to three airports. Trumbull County has historical

events involving hazmat accidents on the freeway.

Waste from coal and drilling also raises concern. Injection of drilling waste could cause environmental complications. Pipelines carrying hazardous material travel through Portage County. On the following image, red lines signify pipelines carrying hazardous materials. Blue lines indicate pipelines carrying natural gas. There is a hazardous material pipeline that intersects I-76.
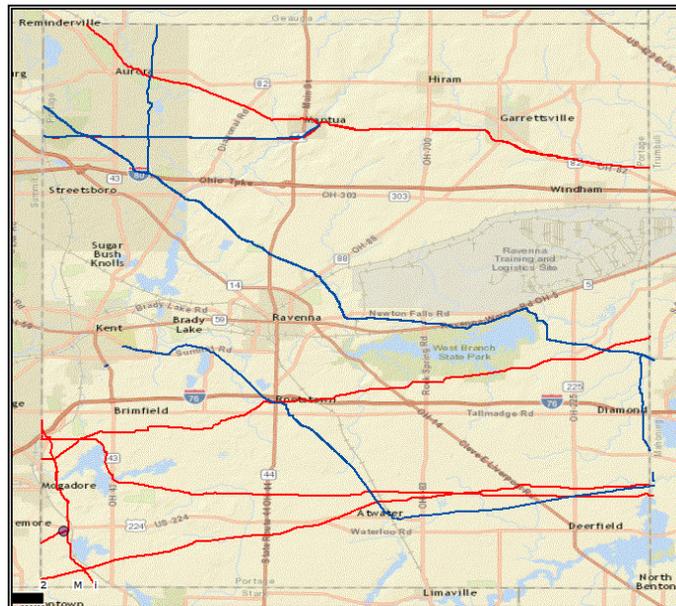
Impacts Profile

Countywide, hazardous material incidents are most likely to occur on the roadways. However, there are facilities within Portage County that house hazardous materials. These facilities are required to provide Tier 2 information to county officials in order for response to be more efficient in the case of an incident. Larger cities in Portage County house more facilities, making them more susceptible to a hazardous material incident. Ravenna, Kent, Streetsboro, and Aurora house the majority of hazardous material sites according to the United States Environmental Protection Agency. Streetsboro's higher numbers can be equated to Interstate 80 and Interstate 480.

A report prepared for the Federal Motor Carrier Safety Administration revealed the average non-explosion loading/unloading incident results in a loss of $5,000. Regarding hazmat incidents by train, PHSMA calculates the average of $17,500 per

train incident. This figure was calculated by dividing $126,276,887 in total losses by 7,211 total incidents. Using the same methodology, the average loss per highway incident is $4051.37

- ➤ Federal Motor Carrier Safety Administration
- ➤ US Department of Transportation Pipeline and Hazardous Material Safety Administration
- ➤ US Environmental Protection Agency
- ➤ National Pipeline Mapping System
- ➤ Record Courier

2.2.7 Infestation

An infestation is to spread or swarm in or over in a troublesome manner. Also, an infestation may mean to live in or on as a parasite (www.training.fema.gov) Infestation in Portage County quickly refers to the issues caused by Emerald Ash Borers (EAB). The Emerald Ash Borer was first discovered in 2002, infesting and devouring ash trees throughout the State of Ohio.

Hazard Profile

Figure 1

The destruction caused by the EAB has warranted quarantine per the Plant Protection Act limiting the transfer of EAB. Characteristics of the EAB depict them as strong flyers. However, they rarely fly over ½ mile. As a result, the transfer of this pest was assisted by commerce. The red dots in Figure 1 indicate areas recognized as "EAB Positive." There are five dots in or in close proximity of Portage County. All Ohio counties are currently under federal regulation for EAB.
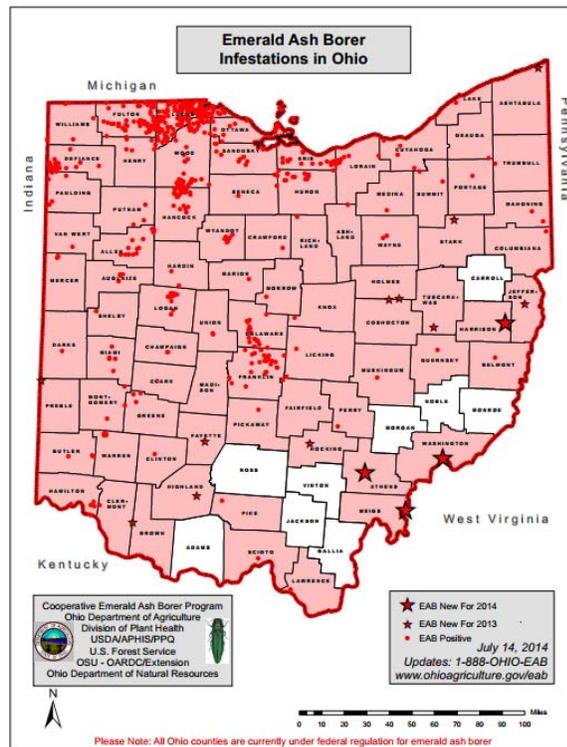
In addition to the statewide infestation of EAB, Portage County has experienced a different infestation that was limited to a single facility, U.S. Liquids in 2012. Located in Nelson Township, this property's initial purpose was for the recycling of materials that contained perishable products. U.S. Liquids went bankrupt and was abandoned. However, the products sat and spoiled over the course of four to five years. Rats began to occupy the facility causing a serious infestation. This presented a hazard for homes located in proximity of this facility. According to news reports, citizens were highly concerned about the possibility of this infestation spreading to their homes (WKYC Channel 3).

Impacts Profile

Infestations rarely result in structural damage; instead, they usually impact crops and other flora.

Fiscally, the amount can be catastrophic, substantially damaging the $15.2 billion in annual value within Ohio's forest product industry which employs 119,000 Ohio citizens. According to a study performed by Ohio State University, the total amount of assets exposed to EAB infestation is up to $148,185,000.

➢ Ohio Department of Agriculture-Division of Plant Health
➢ Ohio Department of Natural Resources-Division of Forestry
➢ Ohio State University
➢ WKYC Channel 3

2.2.8 Infrastructure Failure

Infrastructure is the basic physical and organizational structures needed for the operation of a society or enterprise (www.google.com). Failures within this system would make it extremely difficult to perform the necessary duties for society to strive. Power failures can leave any municipality extremely vulnerable. However, there are other aspects of infrastructure that can cause severe damage if services are interrupted. Water failures impose implications upon sewage. Gas outages also affect the power infrastructure. Road damage can also present complications concerning infrastructure. The inability to transport people or materials upsets infrastructure operations.

Hazard Profile

Power is the basis of infrastructure in Portage County. The graphic below portrays coal as the leading resource in electricity generation throughout the State of Ohio. Therefore, coal raises the highest concern when considering electrical infrastructure. Nuclear power and natural gas also play a significant role in electrical infrastructure. The location of the Perry Power Plant, a nuclear facility, is in close proximity of Portage County.
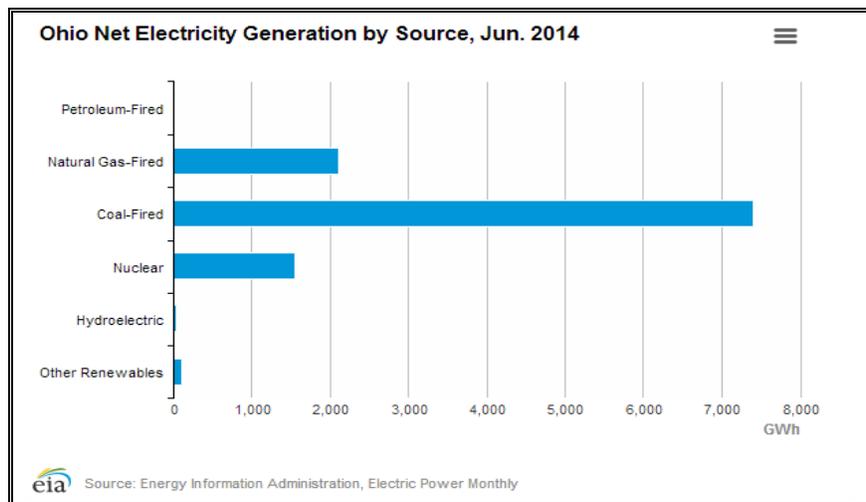
Water systems play a major role in the infrastructure of Portage County. The image on the next page displays the water systems within and around Portage County. Gray tags indicate surface-water sites. Red tags indicate groundwater sites. Portage County houses five water treatment facilities: Shalersville, Brimfield, Rivermoor, City

of Ravenna Water Connection, and Village of Mantua Water Connection. These facilities treat 8,020,000 gallons per day. Drilling, crop fertilization, and erosion are examples of ways water sources can become contaminated. The risk of intentional contaminations is also a potential hazard.
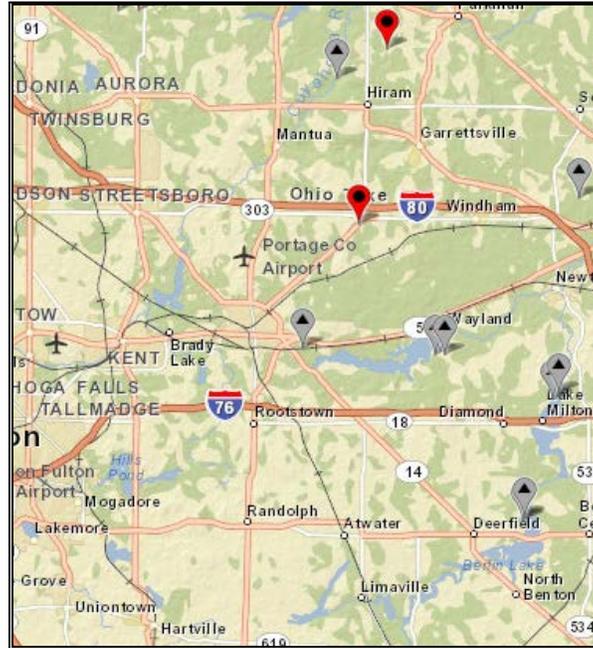
Impacts Profile

The worst losses associated with infrastructure failure typically do not result in structural damage; they are economic (i.e., structure use) in nature.

Loss of power raises several concerns for Portage County, one of them being power outages at manufacturing facilities. Campbell (2012) reports that the loss of power at a manufacturing facility could cost as much as $20,000 per hour. The Ohio Department of Development reported 273 manufacturing facilities in Portage County. Therefore, $20,000 x 24 hours in a day x 273 facilities = $131,040,000 for a one day outage. More than likely, a power outage won't affect the entire county. However, this statistic presents the worst-case scenario. Another would be its effects on communications. Communications capabilities pose extreme danger if critical services cannot be contacted (i.e., fire, police).

In early 2013, water contamination was a concern for Portage County. Residents

were concerned with water quality as a result of oil-field contamination. Methane levels in the water raised concerns as well. However, there were no reported violations. There has been only one violation since 2009. The violation can be found in the 2009 Shalersville Consumer Water Quality Report. Lead was the contaminant caused by corrosion of household plumbing systems and erosion of natural deposits.

➢ Campbell, R. J. (August, 2012) *Weather-Related Outages and Electric System Resiliency.* Congressional Research Service. Washington, D.C.
➢ Ohio Department of Development
➢ Portage County Water Resources

2.2.9 Severe Weather

Severe weather is any atmospheric condition potentially destructive or hazardous form human beings. Wind storms, thunderstorms, and hail are classified in this plan as severe weather (www.training.fema.gov). Wind storms can be characterized as periods where either of the following occurs:

- Sustained non-rotating surface winds (1-minute average) of 40 mph or greater lasting for one hour or longer; or

- Sustained non-rotating winds or gusts of 58 mph or greater for any duration (www.training.fema.gov).

The characteristics of the above items can also be considered "straight-line winds."

A severe thunderstorm contains any one of the following weather conditions: hail that is ¾ of an inch or greater in diameter, winds 58 mph or greater, or tornadoes (www.training.fema.gov). Hail is precipitation that originates in convective clouds in the form of balls or irregular pieces of ice. Hail is considered to have a diameter of 5 millimeters or more (www.training.fema.gov).

Profile of Hazard Events-Wind Storm			
Date of Occurrence	*Location*	*Description of Losses*	*$ in Losses*
8/14/1975	Kent	60 mph winds; trees and power lines down	$50,000
7/1/1977	Countywide (18 Counties)	Trees down; structure damage	$18 Million
7/7/1977	Countywide	Power Outage; structure damage	$100,000
3/10/1986	Countywide	No Data	No Data
4/13/1994	Ravenna	No Data	$50,000
11/27/1994 (2 occurrences)	Countywide (41 Counties)	Damage to homes; trees downed; utilities lost	$550,000
9/7/1996	Countywide (31 Counties)	Damage to homes, downed power lines; loss of life	$7.6 Million
6/14/2000	Kent	Damage to home; downed power lines and trees	$1.5 Million
12/11/2000	Countywide (39 Counties)	Structures damaged; trees and power lines downed	$4.4 Million
5/8/2008	Brady Lake/Garrettsville	Trees down	$75,000
7/24/2010	Streetsboro/Hiram/ Mantua/Ravenna	Large tree and power lines down	$76,000
5/23/2011	Mantua	Large trees down	$50,000
7/26/2012	Rootstown	Trees Down, at least 5 home damaged	$59,000
4/10/2013	Rootstown	Building collapse, 3 others damaged, another shifted on foundation	$150,000

During the early morning hours of May 23, 2011, an area of low pressure entered the Upper Great Lakes Region. Substantial amounts of warm air and deep moisture entered northern Ohio from the southern United States. That instability lead to widespread severe weather, which began early in the afternoon in the western portions of the county warning area and persisted late into the evening**.**

On July 26, 2012, an area low pressure passed to the north of Lake Erie. A cold front trailing the low pressure swept east across northern Ohio causing showers and thunderstorms to develop. A few of the thunderstorms became severe. At least five houses were damaged by fallen trees.

Severe weather presents potential damaging effects on structures and other personal

property throughout Portage County. This is evident from the microburst that took place in Kent in 2013, covering approximately 12 blocks. This small area experienced extensive property damage.

On April 10, 2014, a 56 knot thunderstorm wind gust was measured by the AWOS in Ravenna. Emergency management reported on building collapsed with three other damaged. One of the damaged buildings may have shifted off its foundation. Broadcast media relayed report of pine trees down in the area.

Profile of Hazard Events-Thunderstorm (Damage costs at least $50,000)			
Date of Occurrence	*Location*	*Description of Losses*	*$ in Losses*
4/13/1994	Ravenna	Roof torn off furniture store; trees and power lines down	$50,000
5/24/1995	Countywide	Trees down; structure damage	$150,000
7/13/1995	Countywide	No Data	$80,000
6/24/1996	Rootstown	No Data	$75,000
7/4/2003	Countywide	Over 35 trees down; structure damage	$100,000
7/7/2003	Countywide	Damage to home; trees downed	$50,000
7/8/2003	Countywide	Trees down; structure damage	$75,000
7/27/2003	Countywide	Up to 9,000 electric customers lost power	$100,000
5/21/2004	Countywide	Over 100 homes sustained damage; over 7,000 lost power	$750,000
6/14/2004	Countywide	Trees down	$50,000
7/8/2008	Brady Lake	Downed trees and large limbs	$50,000
7/24/2010	Ravenna	Downed trees and power lines	$50,000
5/23/2011	Mantua	Downed large trees	$50,000
7/26/2012	Rootstown	Trees Down, at least 5 home damaged	$50,000
4/10/2013	Ravenna	Building collapse, 3 others damaged, another shifted on foundation	$150,000

On May 24, 1995, thunderstorms with winds up to 60 mph were estimated in Ravenna. Large hail covered the ground in some areas. Considerable trees and limbs were downed, some on structures, cars, and power lines. Thunderstorms on May 21, 2004, caused over $750,000 in property damage. Over 100 homes were damaged in addition to over 7,000 residents losing power. Winds up to 63 mph were spotted in Ravenna. Several roads were closed due to severe tree damage. Portage County reported

$150,000 in property damages due to thunderstorms on May 10, 2013. Winds up to 64 mph were recorded in the county. One structure may have shifted on its foundation. Broadcast media reported several large limbs down around the county.

Profile of Hazard Events-Hail (Damage costs at least $50,000)			
Date of Occurrence	*Location*	*Description of Losses*	*$ in Losses*
7/7/2003	Ravenna/ Streetsboro	Vehicles damaged	$65,000
4/17/2004	Ravenna	Vehicles and homes damaged	$150,000
6/8/2007	Suffield/Atwater Randolph	Hundreds of home and vehicles damaged; crops damaged	$5.65 Million
7/22/2008	Kent/Brimfield	Many vehicles damaged	$205,000
5/13/2011	Ravenna	Vehicles and homes damaged	$100,000

A hail storm on June 8, 2007, caused property and crop damages amounting to $5.65 million. Tennis ball size hail was observed by a trained spotter. Several large limbs were reported down. Hundreds of homes and cars sustained damage from hail. A hail storm caused $205,000 in damages on July 22, 2008. Brimfield sustained the majority of the property damage. Penny to golf ball size hail was observed by a trained spotter.

Impacts Profile

Severe weather is a countywide hazard that affects all areas and jurisdictions of the county.

Damage historically has been generally limited and total destruction rare. Additionally, monetary losses identified in the wind storm table are either not available or represent losses over multiple county areas. Because of these conditions, quantifying losses to properties becomes difficult and will not be provided as a part of this document.

However, average property damage per event is calculable. Property damage has totaled $275,217,000 over the course of 409 events. This averages out to $672,902 per event. In regards to insurance coverage, insurance companies cover about 70% of losses on average due to severe weather. $2,147,799,686 is 30% of the improved

market value, $10,492,665,220, of all parcels within Portage County. This is the amount susceptible to being covered by government assistance. The following SHARPP vulnerability assessment portrays the worst-case scenario in the event of severe weather.

Portage County (SHARPP Conversion)		
Type of Parcel (Occupancy Class)	# in Hazard Area	$ in Hazard Area
Residential	83,154	$2,770,391,940
Non-Residential	10,381	$540,499,883
Critical Facilities	2,857	$602,682,240
Total	**96,392**	**$3,913,574,063**

> ➤ National Climatic Data Center

2.2.10   Terrorism

"Acts of terrorism include threats of terrorism; assassinations; kidnappings; hijackings; bomb scares and bombings; cyber-attacks (computer-based); and the use of chemical, biological, nuclear and radiological weapons. High-risk targets for acts of terrorism include military and civilian government facilities, international airports, large cities, and high-profile landmarks. Terrorists might also target large public gatherings, water and food supplies, utilities, and corporate centers. Further, terrorists are capable of spreading fear by sending explosives or chemical and biological agents through the mail." (FEMA)

Portage County contains numerous sites that might be of interest to terrorists. For example, tourist attractions (i.e., Wildwater Kingdom), universities (i.e., Kent State University, Hiram College, Northeast Ohio Medical University), dams (i.e., Michael J. Kirwan Reservoir Dam), and transportation sites (i.e., Portage County Regional Airport, Portage Area Regional Transportation) can attract terrorist activity. Effective security of local facilities could decrease the vulnerability to terrorist attacks

Terrorism is not always accomplished on a "grand scale", as is the case with international terrorists who are attempting to coerce the federal government. Such terrorism, while technically a hazard in Portage County, is more unlikely than what is known as "domestic terrorism". Domestic terrorism can involve disgruntled employees (in the case of large industrial plants), angry parents (at schools), upset citizens (at government facilities), etc. Domestic terrorists may often only intend to harm a single individual or a small group of individuals, but the threat of their actions can be highly disruptive. On the next page is a graphic that depicts terrorism "hot spots" in the Midwestern United States. This graphic shows numerous terrorism attacks taking place near Portage County from 1970-2008. The majority of terrorist events that took place in Ohio were single-issue events. Single-issue events are classified as events carried out by groups who obsessively focus on very-specific causes (e.g., anti-abortion, anti-Catholic).

Terrorism "Hot Spots"
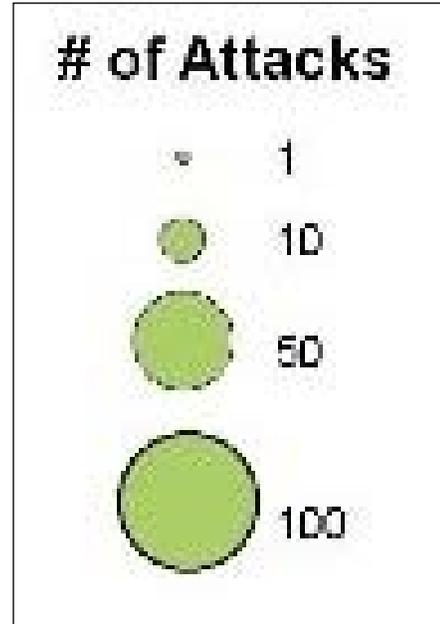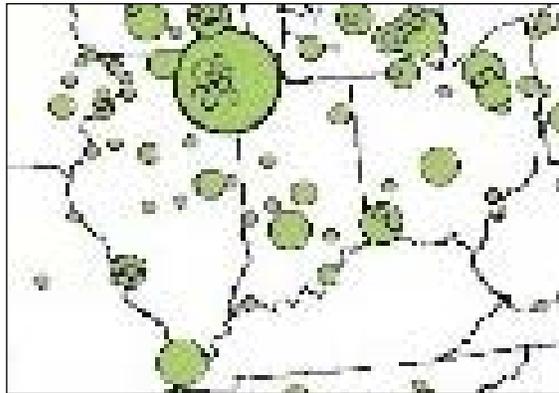
Hazard Profile

Terrorist have been known to use a plethora of different tactics. The accessibility of resources can play a part in the choice of force used by terrorists. For example, most homegrown terrorist groups would not have the resources to carry out large scale chemical terrorism. Below are brief descriptions of different forms of terrorism.

Chemical terrorism has a relatively low probability of occurring but can have an extremely high effect. It is most often mistaken as a hazardous material incident so responses are often similar, but these releases were purposefully made thereby directed to cause detrimental fiscal and demographic effects. The release is often placed in a certain location because of wind directions or confined areas such as buildings or railcars. These events occur quickly but can often cause long durations to recover depending on the chemical used. The demographic effect is more often higher than the fiscal effect since the use of chemicals is often aimed more at a population than a building. This could disrupt the availability of people, stop workflow, or change processes requiring more time for the same results.

Biological terrorism is the use of living organisms to attack a population. With the use of biological agents the demographic effect is aimed to be higher than fiscal effects even though structures must be decontaminated before being reused. Events of this

nature have a low probability of occurring within Portage County, but events similar to the release of salmonella in Dalles, Oregon by the Rajneeshees in 1984 to gain political power is possible (http://www.examiner.com/article/25-years-ago-bioterrorism-at-the-salad-bar). These events could have long durations both in response and recovery because biological terrorism could overwhelm the healthcare system. A long time is often needed to incubate the illness and then a long time to recover from it. There is often no warning time as biological terrorism is considered "detect to treat" (USAMRIID's Medical Management of Biological Casualties, 2005) which means that a biological agent already affecting an area and the only response can be to treat the physical symptoms.

Radiological events are the releases of radioactive material into a susceptible population or structure. These are often done in conjunction with explosives to create a "dirty bomb" allowing for a wider distribution of radioactive material. The probability is low since most radioactive sources are heavily regulated and secured, but sources can be found in medical facilities (i.e., x-ray machines, imaging serums, etc.), construction sites (i.e., depth gauges, structural integrity gauges, etc.), and mining locations (i.e., depth gauges, structural integrity gauges, etc.). The duration can be extremely long depending on the level of exposure and distribution within an area. If a dirty bomb has been detonated, a structure could become structurally unsound as a result of the explosives as well as unusable due to the radiation levels within the structure thereby increasing the fiscal effects, disrupting economic flow, or government activities. The radiological source can also cause demographic effects dependent on the time of exposure, distance from the radiation source, and shielding levels (i.e., lead, dirt, wood, etc. between the source and the individual) resulting in radiation sickness or even death (Radiological Emergency Management, 2013).

Nuclear terrorism involves the use of a nuclear bomb or device. Because nuclear bombs and devices are heavily regulated and controlled, the probability of one being used is extremely low, but if one did get used, the effects would be catastrophic. The duration of the incident would most likely be all within the recovery phase since recovery would take years to overcome (while the event duration is relatively short lasting seconds to minutes). The demographic effects could be significant; depending on the size of the device, a village or the whole county could be impacted,

killing or severely injuring all within the area. Fiscal effects would be extensive with buildings, infrastructure, and government systems all destroyed.

Explosives have the highest probability of occurring in Portage County being that explosives are readily available for consumer use in industry and the formula for ammonium nitrate can be found on the internet. Additionally, explosives are often used as a dissemination method most commonly in radiological, nuclear, and chemical attacks (Emergency Response to Terrorism, 1999). The duration is dependent on the size of the explosive used. It could take a few hours to weeks or even years to recover from an event.

The demographic and fiscal effects are dependent on where the explosive is placed and the time of day or activity occurring at the location when detonated. If the detonation occurs at a high school football game, it could have more demographic effect than a detonation at the courthouse at midnight because there are often more people present at the game than in the courthouse. However, the courthouse explosion could have more fiscal effect since both a nationally-registered landmark and government documents could be destroyed. The warning time can be a wide range depending on the perpetrator. A standard event trained for within schools is a "bomb threat" (Emergency Response to Terrorism, 1999). In cases of this nature, the warning time is often hours while an explosive can be used with no notification, thereby giving no warning time.

Impacts Profile

Terrorism can present itself in two forms: domestic or international. The characteristics of Portage County make it a possible target for both forms of terrorism. Facilities within the county present vulnerability to forms of sabotage as well as security breaches. The Ammunition Pit in Ravenna serves as a prime example for a facility that may be a target for domestic or international terrorists. Perry Nuclear Power Plant and Beaver Valley Power Station are facilities not located in Portage County, but could have major implications on the County if terrorist attacks were carried out at these facilities. In addition, Portage County could be used as a staging area for planning attack in the metropolitan area of Cleveland because of the proximity. Trumbull County recognizes the Ammunition Pit in Ravenna as a

hazard concern.

On average, there are 5.07 injuries ad 0.97 fatalities per terrorist incident in the US
(The Heritage Foundation). A report from the University of California, Irvine's School
of Social Sciences cites the USDOT (2005) suggests $5.8 MIL as the statistical value
of human life. Calculating theses number provides $5,626,000 as the numerical
value fatalities per terrorist incident in the United States.

Portage County (SHARPP Conversion)		
Type of Parcel (Occupancy Class)	# in Hazard Area	$ in Hazard Area
Residential	0	$0
Non-Residential	0	$0
Critical Facilities	2,857	$2,008,940,800
Total	**2,857**	**$2,008,940,800**

- ➤ FEMA Website: http://www.fema.gov/hazard/terrorism/info.shtm
- ➤ Internet research
- ➤ National Consortium for Terrorism and the Response to Terrorism
- ➤ National Fire Academy
- ➤ State of Ohio Hazard Mitigation Plan, 2011
- ➤ The Heritage Foundation
- ➤ University of California, Irvine School of Social Sciences:
  http://www.socsci.uci.edu/~mrgarfin/OUP/papers/Enders.pdf
- ➤ USAMRIID Handbooks
- ➤ USAMRICD Handbooks

2.2.11   Tornado

Tornados are violent storms with rotating winds of high velocity. They appear as funnel-shaped clouds extending toward the ground from the base of a thunderstorm cloud (wall cloud). Tornadoes are discerned by the velocity of their rotating winds (www.training.fema.com).

Ohio ranks 17th for frequency of tornadoes when compared with other states by square mile. Ohio was ranked 7th for fatalities, ranked 5th for injuries per area, and ranked 4th for costs per area based on data from 1990-1995. The Enhanced Fujita Scale below identifies the different types of tornadoes.

Enhanced Fujita Scale			
EF-Scale Number	*Intensity Phrase*	*Relative Frequency*	*Type of Damage Done*
EF0	(65-85 mph)	53.5%	Minor damage. Some damage to chimneys; breaks branches off trees, pushes over shallow-rooted trees; damage to sign boards.
EF1	(86-110 mph)	31.6%	Moderate damage/ The lower limit is beginning of hurricane wind speed; peels surfaces off roofs; mobile homes pushed off foundations or overturned; moving automobile pushed off the roans; attached garages may be destroyed.
EF2	(111-135 mph)	10.7%	Considerable damage. Roofs torn off frame houses; mobile home demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
EF3	(136-165 mph)	3.4%	Severe damage. Roof and some walls torn off of well-constructed houses' trains overturned; most trees in forest uprooted. Cars lifted off ground and thrown.
EF4	(166-200 mph)	0.7%	Extreme damage. Well-constructed houses leveled; Parcels with weak foundation blown off some distance; cars thrown and large missies generated.
EF5	(>200 mph)	<0.1%	Massive damage. Strong frame houses lifted off foundations and carried a considerable distances to disintegrate; automobiles sized missiles fly through the air in excess of 100 meters; trees debarked; steel reinforced concrete Parcels badly damaged.

Portage County is located to the east of a geographical area that is known as the Tornado Alley. However, the US Geographical Survey considers Portage County at a high risk for experiencing tornado activity According to the American Society of

Engineers (ASCE), Portage County is situated on the border of Wild Zone III (200 mph). Wind Zone III indicates that community shelters within this zone should be constructed to withstand a wind speed of 200 mph and a Zone IV requires shelters that can sustain winds up to 250 mph. Losses resulting from tornadoes within Portage County include those to personal property, agricultural components (crops, livestock, etc.), services, as well as, injuries and deaths of community residents.

Hazard Profile

According to the National Climatic Data Center, there have been nine tornadoes causing substantial damage in Portage County since April 1943. The tornadoes have ranged in strength (Fujita Scale) from F-0 to F-5. The F-5 tornado noted below severely affected areas just east of Portage County, as well as caused medium to high damages to homes within the county. Data below were obtained from the Record Courier, the National Climate Data Center, and the Portage County Historical Society.

Historical Tornados in Portage County			
Date of Occurrence	*Location*	*Description of Losses*	*$ in Losses*
4/27/1943	Mogadore	Structure damage	$9.5 Million
5/12/1956	Ravenna	Power lines and trees down	$500,000
5/23/1962	Portage	F1	$250,000
6/25/1968	Brimfield Township	F1-Trees uprooted, one home lost entire roof	$25,000
6/3/1973	Franklin Township	F3	$25,000
6/16/1981	Kent	F1-Damage to building and homes	$250,000
5/31/1985	Paris Township/Mahoning County	F5-Severe damage to all structures, loss of life	$250 Million
7/12/1992	Brimfield Township	F1-Trees downed, damage to structures	$250,000
7/4/2006	Deerfield/Hiram	2 F-0's-barn sustained major damage	$25,000

The average loss per tornado event equals $28.98 million. This average is particularly high due to the tornado event that took place on May 31, 1985. This tornado traveled for 6.5 miles, with a width of 440 yards. The strongest of the tornadoes touched down at the Ravenna Arsenal in eastern Portage County around 6:35 p.m. The tornado intensified to an F5 as it tracked east across southern

Trumbull County devastating the communities of Newton Falls and Niles. Nine people were killed in the business district of Niles. As the tornado continued east along its forty-one mile path of destruction, it crossed the state line and slammed into the community of Wheatland located in Mercer County, Pennsylvania. The tornado destroyed nearly the entire town of Wheatland, and seven more people were killed. The tornado finally lifted south of the town of Mercer after damaging or destroying more than a thousand homes. Injuries were in the hundreds.

The tornado that touched down on June 16, 1981 traveled for about a mile, stretching 150 yards wide. Several homes were reportedly damaged in this tornado event, as well as a school.

The tornado on July 7, 1992 has very little information provided on NCDC. The tornado destroyed trees but caused little damage other than the tree damage.

The EF-0 tornado on July 4, 2006 touched down in Deerfield in the late afternoon. The path of this tornado was mainly through open fields, but major structural damage to a barn was reported. No other property of crop damage was observed.

On September 10, 2014, Portage County was simultaneously hit by three EF-0 tornados. The tornados touched down in Franklin, Streetsboro, and Hiram Townships. In Franklin, a tree was reported down through a back porch. Trees were reported down in Streetsboro and Hiram. To the west in Summit County, significant damages were reported at a housing development.

Impacts Profile

A tornado is a countywide hazard that affects all areas and jurisdictions of the county. Damage to structures, personal property, injuries, and deaths are all possible. Below is the number of tornadoes in Portage County categorized by strength.

Tornados by Fujita Ranking	
Fujita Scale	*Number of Tornados*
F0	4
EF-0	3
F1	4
F2	1
F3	1
F4	0
F5	1

The following SHARPP vulnerability assessment presents the effects of if a tornado at the level of the tornado in 1985.

Portage County (SHARPP Conversion)		
Type of Parcel (Occupancy Class)	# in Hazard Area	$ in Hazard Area
Residential	83,154	$184,692,796
Non-Residential	10,381	$36,033,325
Critical Facilities	2,857	$40,178,816
Total	**96,392**	**$260,904,937**

- ➢ American Society of Engineers
- ➢ National Climatic Data Center
- ➢ Tornado History Project
- ➢ US Geographical Survey

2.2.12   Transportation

Transportation in itself can present hazard situations. Highway and air travel accidents have little to no predictability. Therefore, it is important to serve due diligence in taking preventative measures. Transportation incidents are especially difficult to prepare for. Compilations of information could provide insight on areas that see substantial amounts of difficulty concerning transportation.

Hazard Profile

According to the Bureau of Transportation Statistics, the United States averages 1,670 aircraft accidents a year from 2002-2012. Since 1990, there have been 24 aircraft accidents in Portage County. Cuyahoga County acknowledges that there are three airports within their county that could present a hazard to Portage County.

Portage County Plane Incidents			
Date of Occurrence	*Location*	*Accident Description*	*Injuries (I)/ Fatalities (F)*
9/19/2007	Ravenna	Forced landing; engine lost power	N/A
9/16/2007	Kent	Wind blew plane off runway	N/A
3/28/2007	Ravenna	Rough landing in a field	N/A
10/4/2005	Rootstown	2 planes collided mid-air	4 F
5/22/2005	Edinburg	Student pilot crash	1 F
1/14/2004	Ravenna	Rough landing	5 I
7/30/2002	Ravenna	Rough landing	1 I
12/8/2001	Ravenna	Student pilot loss control	N/A
6/16/2001	Atwater	Helicopter crash	1 I
4/14/2001	Kent	Student pilot accident	1 I
8/5/2000	Ravenna	Home-built helicopter crash	N/A
7/18/2000	Atwater	Loss engine power; collided into trees	N/A
6/30/2000	Ravenna	Student pilot had a stroke during flight	N/A
6/11/1999	Ravenna	Student pilot improper landing	N/A
5/27/1999	Ravenna	Improper landing	N/A
10/8/1998	Ravenna	Power loss; ran out of fuel	N/A
6/17/1994	Kent	Improper takeoff	N/A
2/18/1994	Ravenna	Improper takeoff	N/A
11/24/1993	Ravenna	Pilot flew plan with known deficiencies	1 F
4/5/1992	Paris	Crashed into trees	1 F 2 I
4/4/1992	Ravenna	Student improper takeoff	N/A
5/18/1991	Ravenna	Inadequate air speed	2 F
10/20/1990	Kent	Planes collided mid-air; landed safely	N/A
1/24/1990	Ravenna	Loss power; forced landing	N/A

According to the Bureau of Transportation Statistics, the United States averages

5,879,000 highway crashes a year from 2002-2012. The National Highway Traffic Safety Administration provides fatal crash statistics from 2008-2012. During that time, Portage County has averaged 14.8 fatal crashes a year. Below is a chart depicting the fatalities associated with specific details.

Fatal Crashes in Portage County					
Accident Scenario	*2008*	*2009*	*2010*	*2011*	*2012*
Alcohol-Related	3	2	4	0	5
Speeding	3	4	2	7	4
Pedestrian					
Motorcycle	0	3	1	1	2
Light Truck/ Van Occupants	3	3	3	8	1
Passenger	10	4	8	7	6
Intersection	5	1	4	3	3
Roadway Departure	10	8	9	9	7
Large Truck	2	2	4	6	2
Single Vehicle	6	7	7	7	6

Impacts Profile

Transportation accidents rarely result in structural damage. They usually impact people, roadways, and the economy.

The entirety of Portage County is at risk for the occurrence of highway and airplane accidents. The flight school in Ravenna is responsible for the higher number of airplane accidents. This would put Ravenna at a higher risk for airplane accidents than the rest of the County. However, the majority of airplane accident fatalities have taken place in villages other than Ravenna. At this time, flight training has been temporarily suspended at the Portage Flight Center. Therefore, it is important that the entire county is knowledgeable of the hazard.

Regarding hazardous material on the roadways, a commodity flow study would be useful in determining what materials need to be considered pertinent traveling through Portage County. A commodity flow study observes what hazardous materials travel along the highways, railways, and pipelines. It also includes hazardous materials stored at fixed facilities within the county.

In general, areas in Portage County with higher density traffic are more probable to

experience transportation incidents. Below is a road map of Portage County. As depicted below, there are two interstates that travel completely across the county. These routes will experience higher traffic density. For example, an athletic event at Kent State University could cause traffic complications on I-76. I-76's daily traffic count is 45,000-60,000 near Kent State University. This could also be caused by commuter traffic. It is important to note that the majority of transportation losses would be private losses, ultimately covered by private insurance. According to the Rocky Mountain Insurance Information Association (2014), $3,073 is the average property damage claim for auto accidents. $14,653 is the average bodily injury claim. According to the Ohio Department of Public Safety, there were 3939 crashes in Portage County in 2012. In accordance with the statistics provided by the Rocky Mountain Insurance Information Association, Portage County experienced approximately $12,104,547 in property damage and $57,718,167 bodily injury.
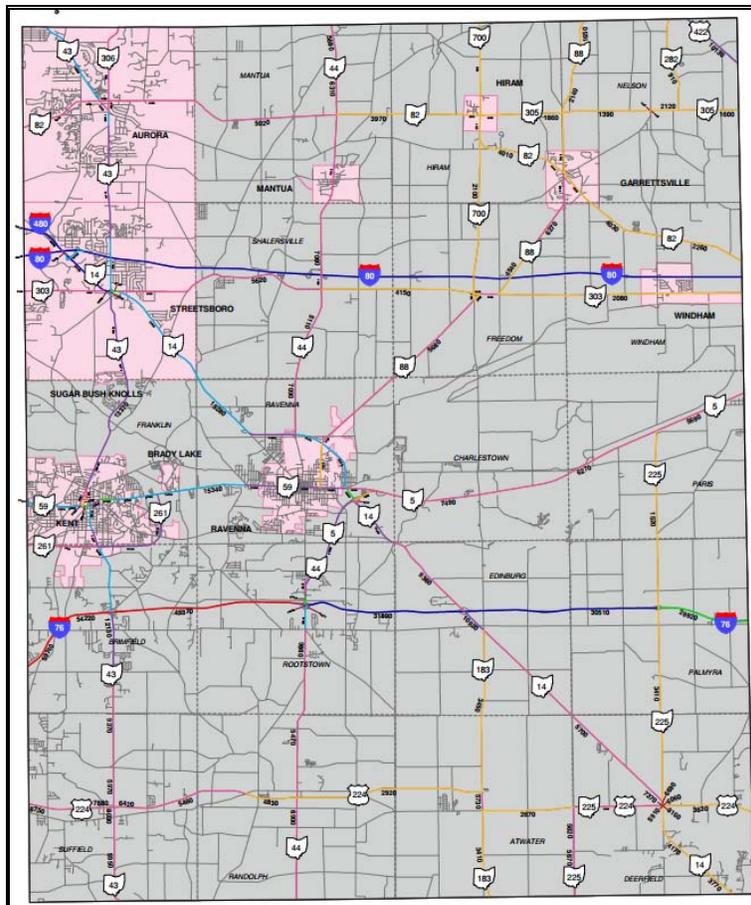
➢ US Department of Transportation: Bureau of Transportation Statistics

➢ National Highway Traffic Safety Administration

➢ Ohio Department of Public Safety

➢ Ohio Department of Transportation

➢ Rocky Mountain Insurance Information Association

2.2.13   Winter Storm/Extreme Cold

A winter storm is a type of storm in which the dominant varieties of precipitation are forms that only occur at cold temperatures such as snow or sleet, or a rainstorm where ground temperatures are cold enough to allow ice to form (www.training.fema.gov).

Severe winter storms can produce a variety of adverse weather conditions. These include heavy snow, blizzards, ice storms, and extreme cold. Damage to structures and parcels due to severe winter storms are not as likely to occur, except loss of services, primarily electrical services. Severe winter storms can contribute to other losses including vehicular accidents, personal injuries, and losses of life.

Hazard Profile

Winter storms are a countywide hazard that affects all areas and jurisdictions of the county. Over the past 100 years, there have been a number of severe storms as well as lake effect snow events that have affected Portage County and multiple neighboring counties. NOAA has recorded 32 winter weather events since 1997. Those most notable are described below. Due to the fact that severe winter weather involves multiple counties, quantifications of losses are typically based on the region affected.

Portage County specific loss estimates for winter storms are difficult to quantify. However, as shown on the following table where Portage specific data is available, the average event since 2007 yields a loss of $286,363. Further, Campbell (2012) reports that the loss to manufacturing facilities from a one-hour power outage could be as much as $20,000. The Ohio County Profile says Portage County houses 273 manufacturing facilities. Therefore, $20,000 x 24 hours in a day x 273 facilities = $131,040,000. For ten days, this figure will have increased to over $1 billion.

Winter Storms/Extreme Cold in Portage County			
Date of Occurrence	*Location*	*Description of Losses*	*$ in Losses*
4/18/1901	Countywide	Telephone & telegraph wires down, collapsed roofs, business closed	Data not available
11/9/1913	Countywide	Up to 2 feet of snow	Data not available
12/2/1974	Countywide	Up to 2 feet of snow	Data not available
1/28/1977	Countywide	Drifts as high as 12 ft. 45 mph winds	Data not available
12/25/1993	Countywide (8 Counties)	Snow up to 8 inches, closed roads	Data not available
2/8/1994	Countywide (23 Counties)	Snow/Ice accumulation	$500K
3/9/2005	Countywide (31 Counties)	Snow up to 8 inches-downed trees and power lines	$500K
1/2/1996	Countywide (15 Counties)	Snow up to 14 inches, roads closings, structure damage	$500K
11/9/1996	Countywide (9 Counties)	Snow up to 15 inches-trees and power lines downed	$3.4 Million
3/26/2002	Countywide (26 Counties)	Ice and snow accumulation	$21.0 Million
12/24/2002	Countywide (24 Counties)	Snow u to 10 inches-roads treacherous	$3.6 Million
3/16/2004	Countywide (16 Counties)	Snow up to 9 inches-road treacherous	$3.1 Million
12/22/2004	Countywide (7 Counties)	Snow up to 2 feet, Ice accumulation, power outages, treacherous roads	$10.1 Million
1/5/2005	Countywide (28 Counties)	Snow/Ice accumulation, downed trees and power lines, treacherous roads	$10.2 Million
1/23/2005	Countywide (17 Counties)	Snow up to 8 inches, treacherous roads	$4.5 Million
4/2/2005	Countywide (9 Counties)	Snow up to 10 inches-downed power lines and trees.	$3.7 Million
3/15/2007	Countywide (11 Counties)	Snow/Ice accumulation, power outages, car accidents	$50K (solely Portage)
3/4/2008	Countywide (27 Counties)	Freezing rain, quarter inch of snow, scattered power outages, trees and limbs down	$750K (solely Portage)

Winter Storms/Extreme Cold in Portage County			
Date of Occurrence	*Location*	*Description of Losses*	*$ in Losses*
3/7/2008	Countywide (27 counties)	Snow up to 1.5 feet, wind gusts around 30 mph	$600K (solely Portage)
1/27/2009	Countywide (29 Counties)	Snow up to 11 inches, wind gusts up to 30 mph	$250K (solely Portage)
2/5/2010	Countywide (17 Counties)	Snow up to 14 inches, many accidents reported	$350K (solely Portage)
2/1/2011	Countywide (29 Counties)	Rain/sleet mixture, accumulation up to 2 inches thick	$300K (solely Portage)
2/21/2011	Countywide (15 Counties)	Snow up to 6 inches, road closures	$200K (solely Portage)
2/5/2010	Countywide (17 counties)	Snow up to 13.5 inches, wind gusts around 30 mph	$350K (solely Portage)
3/18/2013	Countywide (4 Counties)	Ice accumulation, trees and limbs down, power outages	$50K (solely Portage)
2/4/2014	Countywide (22 Counties)	Snow up to 6 inches, slick road conditions	$100K (solely Portage)
2/17/2014	Countywide (7 Counties)	Snow up to 8.5 inches, wind gusts up to 35 mph	$150K (solely Portage)

On December 22, 2004, a winter storm caused approximately $1.2 million in damages in Portage County. Nearly two feet of snow was dumped in portions of Ohio. Visibility was extremely limited. Drop in temperature caused freezing rain. Travel during this storm was treacherous causing hundreds of accidents. On March 4, 2008, Portage County experienced freezing rain in the morning. Conditions continued to deteriorate after sunset. A drop in temperature escalated the icy conditions. Ice a quarter of an inch thick was observed on road and sidewalks.

Not only do actual winter storms pose a threat; extreme cold temperatures can be just as damaging to critical infrastructure. According to the National Climatic Data Center (NCDC), there have been two occurrences where extreme cold has cause monetary damage since 1996. On February 2, 1996, temperatures dropped as low

as -20 degrees Fahrenheit resulting in $60,000 property damage. On January 10, 1997, temperatures dropped as low as -15 degrees Fahrenheit, resulting in $5,000 property damage. In nearby Cuyahoga County, there were four reported deaths caused by hypothermia. Overall, NCDC has recorded $8,639,000 in property damage over the course of 50 winter storm events averaging approximately $172,780 in property damage per incident.

Impacts Profile

Winter storms are a countywide hazard that affects all areas and jurisdictions of the county.

In consideration that winter storms impact the entirety of Portage County during any winter season, with varying severity, projected losses cannot be estimated with any degree of certainty, with few exceptions. The 2013-2014 winter season reported record-setting temperatures, causing a large number of broken pipes. A polar vortex was responsible for some of the record breaking temperatures. Structural damage from future severe winter storms would be predicted as minimal. As previously indicated, losses of services and personal property through vehicular accidents would be more indicative of this type of natural disaster. Heavy snow would also delay emergency response times.

Lake-Effect Snow

Lake-effect snow is caused by cold, arctic air passing over large, comparatively warm bodies of water (i.e., the Great Lakes). The air picks up moisture which is later dumped on areas south and east of the Great Lakes. Lake-effect snow is not a low pressure system like "regular" snow storms. In addition, "regular" snow storms may last for a few hours to a few days on and off, while lake effect snow can go on for up to 48 hours continuously.

The NOAA only has five significant lake-effect snowfalls recorded since 1950. Monetary loss amounts only include those accounted for in Portage County.

Lake-Effect Snow in Portage County			
Date of Occurrence	*Location*	*Description of Losses*	*$ in Losses*
12/7/2006	Countywide (7 Counties)	Snow up to 5.7 inches, major accident on I-76, another 20-40 accidents	$175K (solely Portage)
4/5/2007	Countywide	Snow up to 11 inches	$25K (solely Portage)
12/4/2010	Countywide (9 Counties)	Snow up to 28 inches, travel severely hampered	$150K (solely Portage)
12/12/2010	Countywide (8 Counties)	Snow up to 25.3 inches, treacherous travel	$300K (solely Portage)
1/1/2012	Countywide (6 Counties)	Snow up to 8.5 inches,	$50K (solely Portage)

On December 12, 2004, a lake-effect snow event caused approximately $300,000 in damages. Heavy snow was dumped onto Portage County. The peak amount of snow was recorded in Kent at 25.6 inches. Snowfall rates were approximated at about two inches per hour. Snow and wind gust limited visibility near zero.

➤ NOAA National Climatic Data Center

➤ Campbell, Richard J. (August, 2012). *Weather-Related Power Outages and Electric System Resiliency*. Congressional Research Service. Washington, D.C.

2.3 CONCLUSIONS

In order to depict the impact of this plan's hazards, several processes were followed. First, information was obtained in order to identify relevant hazards that will continue to affect Portage County's population and property. Once identified, the hazards underwent intense research. After the completion of the hazard profiles, this information was used to develop specific mitigation strategies.

Risks associated with the hazards are further analyzed to determine the probability of hazard events taking place. Some events occur frequently, while others may occur sporadically. Therefore, ranking hazards by probability and severity depicts what hazards should be handled with the most urgency.

Using a risk assessment matrix, hazards requiring the most attention are appropriately marked (Brauer, 1990). Those hazards appearing in the red areas require immediate attention; those in the yellow areas require some sort of corrective action in the near future; and those in the white areas represent hazards whose risks can be incurred with little exposure at the present time. Each hazard has its own ranking that is displayed with each hazard's description. The hazard tables with each of the hazards are combined to create Table 2.3.c. Hazard rankings take into consideration the information collected from sources including, but not limited to, profiles, planning committee meetings, electronic communications with stakeholders, and existing state and local plans.

Table 2.1.a   **Hazard Probability Classifications**

Label	Specific Hazard Event	Frequency
Frequent	Likely to occur frequently	Continuously experienced
Probable	Will occur several times in the life of an item	Experienced several times
Occasional	Likely to occur sometime in the life of an item	Experienced
Remote	Unlikely but possible to occur in the life of an item	Unlikely that it has been experienced
Improbable	So unlikely that it can be assumed occurrence may not be experienced	Not experienced

Table 2.1.b   **Hazard Severity Classifications**

Description	Mishap Definition
Catastrophic	Death or major structural loss
Critical	Severe injury, severe illness, or marginal structural damage
Marginal	Minor injury, minor illness, or structural damage
Negligible	Less than minor injury, illness, or structural damage

Table 2.1.c   **Risk Assessment Decision Matrix**

Hazard Severity	Hazard Probability				
	Frequent	Probable	Occasional	Remote	Improbable
Catastrophic				• **Class I Dams** • **Infrastructure** • **Hazardous Material**	• **Terrorism**
Critical	• **Flooding**	• **Severe Weather**	• **Epidemic**	• **Infestation**	
Marginal	• **Transportation**	• **Winter Storm**	• **Drought/ Extreme Heat**	• **Earthquake**	
Negligible					

➢ Brauer, Roger L. (1990) *Safety and Health for Engineers.* New York.

3.0 MITIGATION STRATEGY

3.1 MITIGATION GOALS

In order to form mitigation activities, it was the job of the planning committee to establish achievable goals. From those goals, mitigation activities were created at the last two planning meetings. Existing county plans were also reviewed prior to the creation of mitigation goals as a means of documenting existing authorities, policies, programs, and resources available to support mitigation.

Existing Capabilities

Jurisdiction	Planning Comm.	Comp. Plan	Flood-plain Regs.	Building Codes[1]	Zoning Ord.	Capital Budget[2]	Public Works Budget[2]
Portage County	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only
Aurora City	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only
Kent City	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only
Ravenna City	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only
Streetsboro City	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only
Brady Lake Village	NO	NO	NO	YES	YES	(none)	Limited in-kind wages only
Garrettsville Village	YES	NO	YES	YES	YES	(none)	Limited in-kind wages only
Hiram Village	YES	YES	NO	YES	YES	(none)	Limited in-kind wages only
Mantua Village	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only
Sugar Bush Knolls Village	YES	NO	NO	YES	YES	(none)	Limited in-kind wages only
Windham Village	NO	NO	NO	YES	YES	(none)	Limited in-kind wages only

1. *All jurisdictions within Ohio now follow the state building code (Ohio Administrative Code 4101:1).*
2. *Refers to a budget that would allow local jurisdictions to devote financial resources toward mitigation activities.*

Multi-Hazard Goals

Goal: Ensure countywide implementation of the National Incident Management System.

Goal: Ensure smooth transition from a local emergency to a state and federally-declared disaster.

Goal: Coordinate local mitigation efforts in Portage County.

Goal: Ensure good disaster communications.

Class I Dams

Goal: Provide an evaluation of Class I dams in Portage County.

Flooding

COMPLETED – Goal: Educate the public on the importance of storm water quantity and quality management.

COMPLETED – Goal: Utilize current technology to re-map Portage County to determine base flood elevation as well as floodplains.

Goal: Minimize repetitive flood losses to structures/parcels in Portage County.

Goal: Minimize flooding due to ditches and other storm waterways in Aurora City, Brady Lake Village, Brimfield, Garrettsville Village, Hiram Village, Kent City, Mantua Village, Mogadore Village, Ravenna City, Streetsboro City, Sugar Bush Knolls Village, and Windham Village.

Snow/Ice/Wind Storms

Goal: Develop an urban tree risk management plan to create and maintain a safe and useful urban forest.

Temperature Extremes

Goal: Ensure that general preparedness for extreme temperature events (both cold and heat) are supported.

Hazardous Materials

Goal: Accurately document the hazardous materials risk of the county.

General Emergency Preparedness Goal Related to Hazard Mitigation

Goal: Continue to develop an understanding of the evolving nature of the hazards that could impact Portage County.

3.2 MITIGATION ACTIVITIES

These mitigation activities are those adopted by the planning committee. For each goal, there are one or more activities. Each activity provides a list of tasks to be completed. In addition, each activity is given its own specific status that determines whether the activity is new, on-going, completed, or deleted. Deleted activities include explanations as to why they are no longer included.

3.2.1 County-Wide Activities

Multi-Hazard Goals

Goal: Ensure countywide implementation of the National Incident Management System.

Activity: Create a training forum for the new National Incident Management System to limit confusion during disaster response.

Status: Completed *(All jurisdictions have adopted the NIMS system per resolution and response agencies have completed initial requirements as per grant funding eligibility. There is some question, though, as to on-going NIMS training requirements, including the levels to which local individuals need to be trained.)*

Activity: Determine the on-going levels to which elected officials, emergency responders, and leadership from partner agencies need to be trained.

Status: New

Task 1: Coordinate with the Ohio Emergency Management Agency (OEMA) and/or USDHS/FEMA to determine the levels that are required.

Estimated Start Date: July 2015

Estimated End Date: June 2020

Lead Organization/POC: Portage County OHS/EM Director

Potential Funding Source: N/A (Coordination should not require additional funding.)

Task 2: Make local agencies aware of classroom training opportunities from around the region and/or state.

Estimated Start Date: July 2015

Estimated End Date: June 2020

Lead Organization/POC: Portage County OHS/EM Director

Potential Funding Source: Existing Budget

Task 3: Support local agency efforts to complete independent study training online.

Estimated Start Date: July 2015

Estimated End Date: June 2020

Lead Organization/POC: Portage County OHS/EM Director

Potential Funding Source: N/A (Independent study courses are free of charge.)

Goal: Ensure smooth transition from a local emergency to a state and federally-declared disaster.

Activity: Create/update local emergency action plans (EAPs) as required by the NIMS system.

Status: Deleted *(Portage County is re-formatting the planning structure as per emergency support functions (ESFs) and plans to work with jurisdictions to integrate local, jurisdiction-level plans into this new paradigm. It is significant to note that some jurisdictions, such as the City of Ravenna, do maintain their own emergency operations plans (EOPs). In those jurisdictions, the county will work with local officials to ensure that the municipal EOPs are consistent with updated ESFs.)*

Activity: Update the ESFs in the county emergency operations plan.

Status: New

Task 1: Determine a schedule by which ESFs should be updated.

Estimated Start Date: July 2015

Estimated End Date: June 2016

Lead Organization/POC: Portage County OHS/EM Director

Potential Funding Source: Existing Budget

Task 2: Review current ESFs to determine which are in the most need of update.

Estimated Start Date: July 2015

Estimated End Date: June 2017

Lead Organization/POC: Portage County OHS/EM Director

Potential Funding Source: Existing Budget

Task 3: Convene relevant planning meetings for the ESFs undergoing an update.

Estimated Start Date: July 2015

Estimated End Date: June 2017

Lead Organization/POC: Portage County OHS/EM Director

Potential Funding Source: Emergency Management Performance Grant (EMPG)

Task 4: Revise ESFs, as necessary, and re-distribute to partner agencies.

Estimated Start Date: July 2015

Estimated End Date: June 2017

Lead Organization/POC: Portage County OHS/EM Director

Potential Funding Source: EMPG

Task 5: Revisit update needs list.

Estimated Start Date: July 2017

Estimated End Date: June 2020

Lead Organization/POC: Portage County OHS/EM Director

Potential Funding Source: Existing Budget

Activity: Complete jurisdictional standard operating guidelines (SOGs).

Status: New

Task 1: Work with previously-identified emergency action plan teams for the jurisdictions (to include responders for those areas) to create a jurisdictional standard operating guideline that is consistent with the county emergency operations plan.

Estimated Start Date: July 2017

Estimated End Date: June 2020

POC: Portage County OHS/EM Director

Potential Funding Source: Existing Budget

Activity: Provide relevant operational training throughout Portage County to support large-scale emergency operations.

> **Status:** New

>> **Task 1:** Continue damage assessment training throughout the county.
>> **Estimated Start Date:** July 2015
>> **Estimated End Date:** June 2016
>> **Lead Organization/POC:** Portage County OHS/EM Damage Assessment Team Lead
>> **Potential Funding Source:** Existing Budget

>> **Task 2:** Set up an incident management team (IMT) for Portage County.
>> **Estimated Start Date:** July 2015
>> **Estimated End Date:** December 2015
>> **Lead Organization/POC:** Portage County OHS/EM Director
>> **Potential Funding Source:** Existing Budget

>> **Task 3:** Continue to support community emergency response team (CERT) training opportunities throughout the county.
>> **Estimated Start Date:** July 2015
>> **Estimated End Date:** June 2020
>> **Lead Organization/POC:** Portage County OHS/EM CERT Oversight Committee
>> **Potential Funding Source:** Citizen Corps Grant

Goal: Coordinate local mitigation efforts in Portage County.

> **Activity:** Create a vehicle for educating active EAP team members that will assist them in making decisions within their roles and responsibilities as team members as well as their everyday civic duties.

> **Status:** On-going

>> **Task 1:** Explore funding options for incident command training locally from the Emergency Management Institute.

Estimated Start Date: July 2015

Estimated End Date: June 2020

Lead Organization/POC: Portage County OHS/EM Director

Potential Funding Source: Existing Budget

Task 2: Create a training file of training opportunities and circulate it to all local jurisdictions and assist with the application and training process.

    Estimated Start Date: July 2015

    Estimated End Date: June 2020

    Lead Organization/POC: Portage County OHS/EM Director

    Potential Funding Source: Existing Budget

Task 3: Promote interaction among local jurisdictions by creating a resource list and mutual aid agreements.

    Estimated Start Date: July 2015

    Estimated End Date: June 2020

    Lead Organization/POC: Portage County OHS/EM Director

    Potential Funding Source: N/A (Coordination should not require additional funding.)

Task 4: Update critical facilities lists by sending letters out to potential critical facilities.

    Estimated Start Date: July 2015

    Estimated End Date: June 2016

    Lead Organization/POC: Portage County OHS/EM Director

    Potential Funding Source: Existing Budget

Task 5: Document attended training, identify future training needs, and identify resources for future needs.

    Estimated Start Date: July 2015

    Estimated End Date: June 2020

    Lead Organizations/POCs: Emergency Response Agencies (Chiefs and Directors)

    Potential Funding Source: Existing Budgets

Task 6: Revisit goals.

>> **Estimated Start Date:** July 2019

>> **Estimated End Date:** June 2020

>> **Lead Organization/POC:** Portage County OHS/EM Director

>> **Potential Funding Source:** Existing Budget

Goal: Ensure good disaster communications.

> **Activity:** Implement Phase II of the countywide communication project.

>> **Status:** Completed *(Repeater towers were strategically located throughout the county to enhance countywide coverage. Local officials have also studied the benefits of converting to the MARCS system versus upgrading existing communications systems. The Portage County Sheriff's Office converted to the MARCS system which took coverage from approximately 60% to an estimated 99%. All law enforcement agencies in the county plan to migrate to the MARCS system. All public safety answering points (PSAPs) in the county have MARCS radios to support interoperability. Currently, the fire service will remain on VHF; however, some departments have MARCS access as an alternate means and to support interoperability with other county agencies.)*

> **Activity:** Ensure that ESF #2 in the county emergency operations plan is representative of the communications capabilities in the county.

>> **Status:** New

>>> **Task 1:** Identify and convene a planning committee to meet annually to review ESF #2.

>>>> **Estimated Start Date:** July 2015

>>>> **Estimated End Date:** June 2017

>>>> **Lead Organization/POC:** Portage County OHS/EM Director

>>>> **Potential Funding Source:** EMPG

> **Activity:** Work with schools throughout Portage County to ensure they have access to the communications system.

>> **Status:** New

>>> **Task 1:** Determine which schools have access to radio communications

and if said access is adequate for establishing contact with emergency authorities.

Estimated Start Date: July 2015

Estimated End Date: June 2020

Lead Organization/POC: Portage County OHS/EM Director,

Support Organizations: Local Law Enforcement Chiefs, Sheriff's Office Communications Officer

Potential Funding Source: N/A (Coordination should not require additional funding.)

Task 2: Compile a list of schools that do not have radio access.

Estimated Start Date: July 2015

Estimated End Date: June 2020

Lead Organization/POC: Portage County OHS/EM Director

Support Organizations: Local Law Enforcement Chiefs, Sheriff's Office Communications Officer

Potential Funding Source: N/A (Coordination should not require additional funding.)

Task 3: Determine radio and other necessary equipment options for schools needing radios.

Estimated Start Date: July 2015

Estimated End Date: June 2020

Lead Organization/POC: Portage County OHS/EM Director

Support Organizations: Local Law Enforcement Chiefs, Sheriff's Office Communications Officer

Potential Funding Source: N/A (Coordination should not require additional funding.)

Task 4: Identify funding for the purchase of radios.

Estimated Start Date: July 2015

Estimated End Date: June 2020

Lead Organization/POC: School District Superintendent

Potential Funding Source: Existing Budget

Task 5: Purchase and deploy equipment.

Estimated Start Date: July 2015

Estimated End Date: June 2020

Lead Organization/POC: School District Superintendent

Potential Funding Source: Homeland Security Grant Program (HSGP)

Task 6: Provide training on equipment.

Estimated Start Date: July 2015

Estimated End Date: June 2020

Lead Organization/POC: Portage County OHS/EM Director

Support Organizations: Local Law Enforcement Chiefs, Sheriff's Office Communications Officer

Support Organizations: Local Law Enforcement Chiefs, Sheriff's Office Communications Officer

Potential Funding Source: Existing Budgets

Activity: Monitor and consider the integration of relevant technology into the county's communications capabilities.

Status: New

Task 1: Determine technological options that could enhance emergency communications (e.g., further integration of messages via websites, satellite communications, etc.).

Estimated Start Date: July 2015

Estimated End Date: June 2020

Lead Organization/POC: Portage County Communications Leader

Support Organizations: Portage County Sheriff's Office Communications Officer, Local Safety Force (Fire/Law) Chiefs, Portage County OHS/EM Director

Potential Funding Source: N/A (Coordination should not require additional funding.)

Task 2: Evaluate the feasibility of installing/integrating these options into

the network.

> **Estimated Start Date:** July 2015
>
> **Estimated End Date:** June 2020
>
> **Lead Organization/POC:** Portage County Communications Leader
>
> **Support Organizations:** Portage County Sheriff's Office Communications Officer, Local Safety Force (Fire/Law) Chiefs, Portage County OHS/EM Director
>
> **Potential Funding Source:** N/A (Coordination should not require additional funding.)

> **Task 3:** Continue to push such information as general preparedness tips, flood insurance information, etc. out to the community via social media.
>
> > **Estimated Start Date:** July 2015
> >
> > **Estimated End Date:** June 2020
> >
> > **Lead Organization/POC:** Portage County OHS/EM Director, Portage County OHS/EM Planner (Social Media Manager)
> >
> > **Support Organizations:** Portage County Sheriff's Office Communications Officer, Local Safety Force (Fire/Law) Chiefs, Portage County OHS/EM Director Office, Local Safety Forces (Fire/Law)
> >
> > **Potential Funding Source:** Existing Budget

Goal: Develop a comprehensive tree surveying program for the county.

> **Status:** Deleted *(Tree risk management planning is addressed by an activity listed elsewhere on this list. As such, this goal was consolidated into that activity.)*

Class I Dams

Goal: Provide an evaluation of Class I dams in Portage County.

> **Activity:** Develop a maintenance and inspection schedule for Class I dams.
>
> > **Status:** Completed *(A meeting was held, attended by emergency management, soil & water, etc. to work with and request all dam owners to compile an emergency action plan for their facilities. Local officials have also been working with the state regarding a regular inspection schedule.)*

Activity: Determine any Class I dams that may not be on the Ohio Department of Natural Resource's inspection list.

> **Status:** New

> > **Task 1:** Obtain the existing state inspection list of dams.

> > > **Estimated Start Date:** July 2015

> > > **Estimated End Date:** June 2017

> > > **Lead Organization/POC:** Portage County OHS/EM Director

> > > **Potential Funding Source:** Existing Budget

> > **Task 2:** Work with property owners throughout Portage County to determine if any impoundments exist that are not on the list.

> > > **Estimated Start Date:** July 2017

> > > **Estimated End Date:** June 2020

> > > **Lead Organization/POC:** Portage County OHS/EM Director

> > > **Support Organization:** Portage County Zoning Department Director

> > > **Potential Funding Source:** N/A (Coordination should not require additional funding.)

> > **Task 3:** For any identified, non-listed impoundments, determine the downstream risk should the facility fail.

> > > **Estimated Start Date:** As identified

> > > **Estimated End Date:** June 2020

> > > **Lead Organization/POC:** Portage County OHS/EM Director

> > > **Support Organizations:** Portage County GIS Director, Portage County Zoning Department Director

> > > **Potential Funding Source:** Existing Budget

Flooding

> **Goal:** Educate the public on the importance of storm water quantity and quality management.

> > **Activity:** Develop activities and workshops to make the public (of all ages) conscious of storm water management importance.

> > > **Status:** Completed *(The storm water management plan was written in 2003*

and a formal storm water management program was adopted in 2009. Storm water quality is currently being addressed in an on-going planning project. The current project is also adding storm water quantity considerations as well as identifying Section 17 to assist lower income communities with flooding concerns when it rains.)

Goal: Utilize current technology to re-map Portage County to determine base flood elevation as well as floodplains.

Activity: Improve ability to mitigate for flooding disasters by identifying floodplains, which at this time are misleading and sometimes inaccurate.

Status: Completed *(Floodplain mapping was re-done by FEMA in 2009.)*

Goal: Minimize repetitive flood losses to structures/parcels in Portage County.

Activity: Mitigate, as necessary, all repetitive loss structures within Portage County by implementing cost effective preventative measures.

Status: On-going

Task 1: Create a management system that collects and stores data on historical and new flooding problems.

Estimated Start Date: July 2015

Estimated End Date: June 2020

Lead Organization/POC: Portage County Floodplain Manager

Support Organization/POC: Portage County GIS

Potential Funding Source: Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM)

Task 2: Identify all repetitive loss/potential repetitive loss structures within Portage County.

Estimated Start Date: July 2015

Estimated End Date: December 2015

Lead Organization/POC: Portage County OHS/EM Director

Potential Funding Source: Existing Budget

Task 3: Determine specific cause of flooding for each structure (water course, inadequate sewer capacity, etc.).

Estimated Start Date: As incident occurs

Estimated End Date: June 2020

Lead Organization/POC: Portage County Floodplain Manager

Support Organizations/POCs: Portage County Water Resources Director, Portage County OHS/EM Director, Portage County Sewer/Water District Director

Potential Funding Source: Existing Budgets

Task 4: Determine most appropriate non-invasive corrective action for each structure.

Estimated Start Date: July 2015

Estimated End Date: June 2020

Lead Organization/POC: Portage County Floodplain Manager

Support Organizations/POCs: Portage County Water Resources Director, Portage County OHS/EM Director, Portage County Sewer/Water District Director

Potential Funding Source: Existing Budgets

Task 5: Assess other potential, more evasive strategies for corrective action (property buy-out/demolition of affected structures, relocation, and water course).

Estimated Start Date: July 2015

Estimated End Date: June 2020

Lead Organization/POC: Portage County Floodplain Manager

Support Organizations/POCs: Portage County OHS/EM Director, Portage County Regional Planning Commission Director, Portage County Engineer

Potential Funding Source: Existing Budgets

Task 6: Obtain applicable cost estimates for identified options.

Estimated Start Date: July 2015

Estimated End Date: June 2020

Lead Organization/POC: Portage County Floodplain Manager

Support Organizations/POCs: Portage County OHS/EM Director,

Portage County Regional Planning Commission Director, Portage County Engineer

Potential Funding Source: N/A (Coordination should not require additional funding.)

Task 7: Identify potential sources of funding.

Estimated Start Date: July 2015

Estimated End Date: June 2020

Lead Organization/POC: Portage County Regional Planning Commission Director

Support Organization/POC: Portage County OHS/EM Director

Potential Funding Source: Existing Budgets

Task 8: Implement corrective measures.

Estimated Start Date: July 2015

Estimated End Date: June 2020

Lead Organization/POC: Contractors (TBD)

Potential Funding Source: HMGP, PDM, Community Development Block Grant (CDBG)

Goal: Minimize flooding due to ditches and other storm waterways in Aurora City, Brady Lake Village, Brimfield, Garrettsville Village, Hiram Village, Kent City, Mantua Village, Mogadore Village, Ravenna City, Streetsboro City, Sugar Bush Knolls Village, and Windham Village.

Activity: Create and maintain a reasonable timetable for ditch maintenance that will ensure the process continues.

Status: On-going

Task 1: Identify all ditches and storm waterways in Portage County.

Estimated Start Date: July 2015

Estimated End Date: June 2020

Lead Organization/POC: Portage County Engineer

Support Organizations/POCs: Ohio Department of Transportation (ODOT) Local District Representative, Portage County Sewer/Water District Director, Portage County OHS/EM Director

Potential Funding Source: N/A (Coordination should not require additional funding.)

Task 2: Determine if poor ditches and storm waterway maintenance is responsible for flooding in certain areas.
    Estimated Start Date: July 2015
    Estimated End Date: June 2020
    Lead Organization/POC: Portage County Engineer
    Support Organizations/POCs: Ohio Department of Transportation (ODOT) Local District Representative, Portage County Sewer/Water District Director, Portage County OHS/EM Director
    Potential Funding Source: Existing Budgets

Task 3: Identify funding for cleaning/maintenance.
    Estimated Start Date: July 2015
    Estimated End Date: June 2020
    Lead Organization/POC: Portage County Engineer
    Support Organization/POC: ODOT
    Potential Funding Source: Existing Budgets

Task 4: Clean and maintain the ditch according to determined cause.
    Estimated Start Date: July 2015
    Estimated End Date: June 2020
    Lead Organization/POC: Portage County Engineer
    Support Organization/POC: ODOT Local District Representative
    Potential Funding Source: Existing Budgets

Task 5: Revisit priorities list.
    Estimated Start Date: July 2015
    Estimated End Date: June 2020
    Lead Organization/POC: Portage County Engineer
    Support Organizations/POCs: ODOT Local District Representative, Portage County Sewer/Water District Director, Portage County OHS/EM Director

Potential Funding Source: N/A (Coordination should not require additional funding.)

Snow/Ice/Wind Storms

Goal: Develop an urban tree risk management plan to create and maintain a safe and useful urban forest.

Activity: Start a process of inspecting and assessing trees for their potential to injure people or damage property in public places.

Status: On-going

Task 1: Assess the tree resources you have.

Estimated Start Date: July 2015

Estimated End Date: June 2020

Lead Organization/POC: Portage County Engineer

Support Organizations/POCs: ODOT Local District Representative, Portage County Sewer/Water District Director, Portage County OHS/EM Director

Potential Funding Source: N/A (Coordination should not require additional funding.)

Task 2: Review current tree management practices.

Estimated Start Date: July 2015

Estimated End Date: June 2020

Lead Organization/POC: Portage County Engineer

Support Organizations/POCs: ODOT Local District Representative, Portage County Sewer/Water District Director, Portage County OHS/EM Director

Potential Funding Source: N/A (Coordination should not require additional funding.)

Task 3: Assess fiscal and human resources available to manage the tree resource.

Estimated Start Date: July 2015

Estimated End Date: June 2020

Lead Organizations/POCs: Portage County Engineer, ODOT Local

District Representative (Partnership)

Potential Funding Source: N/A (Coordination should not require additional funding.)

Task 4: Identify program goals.

  Estimated Start Date: July 2015

  Estimated End Date: June 2020

  Lead Organizations/POCs: Portage County Engineer, ODOT Local District Representative (Partnership)

  Potential Funding Source: N/A (Coordination should not require additional funding.)

Task 5: Formulate a tree risk management strategy.

  Estimated Start Date: July 2015

  Estimated End Date: June 2020

  Lead Organizations/POCs: Portage County Engineer, ODOT Local District Representative (Partnership)

  Potential Funding Source: N/A (Coordination should not require additional funding.)

Task 6: Prioritize inspections and corrective action needs.

  Estimated Start Date: July 2015

  Estimated End Date: June 2020

  Lead Organizations/POCs: Portage County Engineer, ODOT Local District Representative (Partnership)

  Potential Funding Source: Existing Budgets

Task 7: Select a tree risk rating system.

  Estimated Start Date: July 2015

  Estimated End Date: June 2020

  Lead Organizations/POCs: Portage County Engineer, ODOT Local District Representative (Partnership)

  Potential Funding Source: N/A (Coordination should not require additional funding.)

Task 8: Write a risk management program policy.

> **Estimated Start Date:** July 2015
>
> **Estimated End Date:** June 2020
>
> **Lead Organizations/POCs:** Portage County Engineer, ODOT Local District Representative (Partnership)
>
> **Potential Funding Source:** N/A (Coordination should not require additional funding.)

Task 9: Implement the tree risk management strategy.

> **Estimated Start Date:** July 2015
>
> **Estimated End Date:** June 2020
>
> **Lead Organizations/POCs:** Portage County Engineer, ODOT Local District Representative (Partnership)
>
> **Potential Funding Source:** Existing Budgets

Task 10: Trim, remove, or address those trees.

> **Estimated Start Date:** July 2015
>
> **Estimated End Date:** June 2020
>
> **Lead Organizations/POCs:** Portage County Engineer, ODOT Local District Representative (Partnership)
>
> **Potential Funding Source:** Existing Budgets

Temperature Extremes

Goal: Ensure that general preparedness for extreme temperature events (both cold and heat) are supported.

Activity: Disseminate preparedness information for extreme heat as well as "polar vortex" extreme cold events.

Status: New

> **Task 1:** Compile relevant information on "preparedness tips" for temperature extreme events.
>
> > **Estimated Start Date:** July 2015
> >
> > **Estimated End Date:** June 2020
> >
> > **Lead Organization/POC:** Portage County OHS/EM Director

Potential Funding Source: Existing Budget

Task 2: Utilize such venues as social media to push preparedness information out.

Estimated Start Date: July 2015

Estimated End Date: June 2020

Lead Organization/POC: Portage County OHS/EM Director, Portage County OHS/EM Planner (Social Media Manager)

Potential Funding Source: Existing Budget

Task 3: Work with critical facilities regarding preparedness for such incidents as frozen pipes, ensuring continued access to heating and air conditioning, etc.

Estimated Start Date: July 2015

Estimated End Date: June 2020

Lead Organization/POC: Portage County OHS/EM Director

Support Organizations/POCs: Facility Representatives

Potential Funding Source: N/A (Coordination should not require additional funding.)

Hazardous Materials

Goal: Accurately document the hazardous materials risk of the county.

Activity: Ensure access to baseline data to ensure an accurate understanding of the hazardous material risk throughout the county is understood.

Status: New

Task 1: Continue to review Tier II reports as they are submitted.

Estimated Start Date: July 2015

Estimated End Date: June 2020

Lead Organization/POC: Portage County Local Emergency Planning Committee (LEPC) Chair

Potential Funding Source: N/A (Reports are submitted directly to the LEPC.)

Task 2: Work with covered facility representatives that are required to

compile and submit off-site emergency plans to the county to ensure that they do so.

> **Estimated Start Date:** July 2015
> **Estimated End Date:** June 2020
> **Lead Organization/POC:** Portage County LEPC Chair
> **Potential Funding Source:** N/A (Coordination should not require additional funding.)

> **Task 3:** Consider undertaking a commodity flow study to determine the types and quantities of hazardous material transport through the county.
> **Estimated Start Date:** July 2015
> **Estimated End Date:** June 2020
> **Lead Organization/POC:** Portage County LEPC Planning Team
> **Potential Funding Source:** Hazardous Materials Emergency Planning (HMEP) Grant

3.2.2 Jurisdictional Activities

Aurora City

Activity: Removing a dam along the Chagrin River, restoring the Aurora Branch in order to meet water quality standards. (Aurora Branch Restoration Project)

Brady Lake Village

Activity: Coordinate with the county OHS/EM to ensure local elected and other village officials are appropriately trained in the National Incident Management System. (Supports Countywide Mitigation Goal *as noted above*)

Garrettsville Village

Activity: Coordinate with appropriate individuals at the county (e.g., county engineer) and state levels (e.g., ODOT) to determine problem areas with respect to flooding along ditches and other small streams. (Flood Mitigation Support)

Hiram Village

Activity: Coordinate with the county OHS/EM, neighboring township, and Hiram

College to develop an area-specific standard operating guideline for emergency operations. (Supports Countywide Mitigation Goal *as noted above*)

<u>Kent City</u>

Activity: Public education and outreach recommending eco-friendly products for lawn and gardening activities to minimize chemicals in storm runoff. (Storm Water Management Project)

<u>Mantua Village</u>

Activity: Enhance wetland buffer requirements in order to help protect water quality. (Mantua Comprehensive Plan)

<u>Ravenna City</u>

Activity: Fixing storm pipes to improve storm water management. (Area-Wide Storm Drain Improvement 2015-B)

<u>Streetsboro City</u>

Activity: Raise roadway profile above flood elevation. (Tinkers Creek Project)

<u>Sugar Bush Knolls Village</u>

Activity: Coordinate with the county OHS/EM to develop a standard operating guideline for the village during emergencies. (Supports Countywide Mitigation Goal *as noted above*)

<u>Windham Village</u>

Activity: Coordinate with appropriate individuals at the county (e.g., county engineer) and state levels (e.g., ODOT) to determine problem areas with respect to flooding along ditches and other small streams. (Flood Mitigation Support)

3.3 MITIGATION GOAL PRIORITIZATION

During the third and final planning committee meeting on November 12, 2014, planning committee members were given a prioritization matrix in order to prioritize the established mitigation goals. The prioritization matrix measured the following aspects: cost benefit, property protection, life safety, environmental impacts, social impacts, legal impacts, political impacts, and overall feasibility.

- **Economic Impacts/Cost Benefit**: Consider comparing the overall cost to the overall benefit to citizens, and property. Maximizing the use of available funds would positively affect a project's priority.

- **Property Protection**: Consider how significant the action will be at eliminating or reducing damage to structures and infrastructure.

- **Life Safety**: Consider how effective the action will protect lives and prevent injuries.

- **Environmental Impacts**: Consider whether there would be negative consequences to environmental assets should the action be implemented. If assets are impact, priority would be likely to fall.

- **Social Impacts**: Consider whether the public would support implementation of the action. If so, priority likely rises.

- **Legal Impacts**: Consider whether the action can be lawfully implemented. If not, the action cannot be listed.

- **Political Impacts**: Consider the acceptability of the action from the political frame. If it is likely to cause political upheaval, it would receive a lower priority.

- **Overall Feasibility**: Consider whether local policies, capabilities, and officials align with this action.

Within these categories, each activity with a status of new or on-going was rated 1-5 followed by the scores being added up for each activity. The activity with the highest total score was given the highest priority. Planning committee members also considered changes from the previous mitigation process due to development that has taken place since the last mitigation planning process. Committee members took into account the changes in priorities in order to reflect the progress of local mitigation efforts.

Action Prioritization		
Activity	*Status*	*Activity Ranking*
Determine any Class I dams that may not be on the Ohio Department of Natural Resource's inspection list.	New	1
Ensure access to baseline data to ensure an accurate understanding of the hazardous material risk throughout the county is understood.	New	2
Create a vehicle for educating active EAP team members that will assist them in making decisions within their roles and responsibilities as team members as well as their everyday civic duties.	On-going	3
Update the ESFs in the county emergency operations plan.	New	4
Minimize repetitive flood losses to structures/parcels in Portage County.	On-going	5
Work with schools throughout Portage County to ensure they have access to the communications system.	New	6
Complete jurisdictional SOGs.	New	7
Disseminate preparedness information for extreme heat as well as "polar vortex" extreme cold events.	New	8
Provide relevant operational training throughout Portage County to support large-scale emergency operations.	New	9
Create and maintain a reasonable timetable for ditch maintenance that will ensure the process continues.	On-going	10
Ensure that ESF #2 in the county emergency operations plan is representative of the communications capabilities in the county.	New	11
Monitor and consider the integration of relevant technology into the county's communications capabilities.	New	12
Determine the on-going levels to which elected officials, emergency responders, and leadership from partner agencies need to be trained.	New	13
Start a process of inspecting and assessing trees for their potential to injure people or damage property in public places.	On-going	14

4.0   PLAN MAINTENANCE

Progress since Previous Adoption

Portage County made progress in hazard mitigation between the previous adoption of this plan and the 2014-2015 update process. For instance, repeater towers were strategically located throughout the county to enhance countywide communications coverage. Local officials also studied the benefits of converting to the MARCS system versus upgrading existing communications systems. All public safety answering points (PSAPs) in the county have MARCS radios to support interoperability.

Additionally, a meeting was held, which was attended by homeland security/emergency management, soil & water, etc. to work with and request all dam owners to compile an emergency action plan for their facilities. Local officials have also been working with the state regarding a regular inspection schedule. A storm water management plan was written in 2003 and a formal storm water management program was adopted in 2009. Storm water quality is currently being addressed in an on-going planning project. The current project is also adding storm water quantity considerations as well as identifying Section 17 to assist lower income communities with flooding concerns when it rains. Finally, the county supported substantial National Incident Management System (NIMS) training efforts for emergency services and other local officials.

Implementing mitigation measures was not without challenges, though. The Portage County Office of Homeland Security/Emergency Management experienced significant personal turnover since the last adoption of the plan. As such, a consistent coordinating approach was, at times, missing. Governments throughout Ohio experienced challenges associated with downturns in local economies. Smaller amounts of available funding have hampered abilities to locally fund mitigation projects.

Monitoring, Evaluating, and Updating the Plan

The jurisdictions adopting this plan have established a method for the systematic and periodic review of this document. The plan will be reviewed, at a minimum, every five years (or following major disaster events) to gauge its effectiveness in predicting hazard susceptibility areas, update the asset inventory, and update the timelines assigned to mitigation projects. Portage County Office of

Homeland Security/Emergency Management (PCOHS/EM) Director will monitor the plan on a quarterly basis and make notes in the master plan where information needs to be updated. During the review process, the following factors should be reviewed (similarly to the way in which these items were addressed during the original development of the plan).

- **Cost Effectiveness:** Is sufficient funding available to implement the project at a cost manageable by the local government? If not, is funding available? Will the costs of implementing the project be significantly less than the cumulative future costs potentially incurred by an un-corrected situation?

- **Property Protection:** How significant will the action be at eliminating or reducing damage to structures and infrastructure?

- **Life Safety:** How effectively will the action protect lives and prevent injuries?

- **Environmental Impacts:** Will implementing the project adversely affect the environment in any way? Will implementing the project actually benefit the environment?

- **Social Impacts:** Will the public perceive the project as positively lessening hazard-related losses? Will implementing the project adversely affect any segment of the population?

- **Legal Impacts:** Do your governmental organizations and/or partner agencies have the authority to implement the actions?

- **Political Impacts:** Will implementing the project create negative political issues?

- **Overall Feasibility:** Do local policies and capabilities currently allow for the implementation of the project? Are programs available to assist in funding the implementation of the project? Do local leaders generally agree that implementing the project will be beneficial to the community?

As such, the Portage County Office of Homeland Security/Emergency Management (PCOHS/EM) will update the plan on an annual basis following meetings with the planning committee and agreed changes to be made to the master plan. During future review processes, the PCOHS/EM will thus provide information critical to the success of the update.

In general, local policies have not hindered hazard mitigation efforts. The jurisdictions participating in this planning process have used a variety of funding to

complete mitigation projects in the past, including the Hazard Mitigation Grant Program (HMGP), Homeland Security Grant Program (HSGP), Emergency Management Performance Grant (EMPG), Community Development Block Grant (CDBG), and local funding. Local government policies and programs have supported the use of this funding and, thus, the implementation of mitigation projects. Further, all participating government jurisdictions have demonstrated a capability to successfully implement and administer mitigation projects. The monitoring of this plan also includes methods for ensuring that projects are successfully implemented and contribute to the achievement of the mitigation goals outlined in Section 3.1.

Incorporation into Existing Planning Mechanisms

The members of the planning committee are leaders within the communities and agencies that they represent. They are often involved in the overall community, economic development, and capital improvements planning efforts of their jurisdictions. As members of the mitigation planning team, these individuals will carry mitigation concepts into other planning areas.

The PCOHS/EM incorporates mitigation principles into its emergency operations planning in an effort to predetermine the hazards to which responders may respond. The PCOHS/EM's operations plan works to primarily address the negative effects of natural, technological, and man-made hazards. Information from previously created plans provided a foundation for this hazard mitigation project.

Continued Public Involvement

All adopting jurisdictions maintain copies of this plan. Citizens will be able to review the plan and provide comments at any time from these locations. Citizens may also access the plan through the county emergency management agency.

Further, the PCOHS/EM intends to notify neighboring counties of the adoption of updated copies of this plan. Initially, this notification will be by letter with an offer to send an electronic copy of the plan upon request. Via social media, PCOHS/EM should continue to remind the public of the opportunity to look, review, and comment about this plan.

This plan is updated every five years. The evaluating and updating process will begin with the PCOHS/EM Director reconvening the core planning committee and also involve the general public. The planning committee will meet as often as is

necessary during a review year to revise, add, or remove mitigation projects. The final committee meeting will be properly advertised and open to the public to provide the public with an opportunity to comment on the proposed changes.

5.0   APPENDICES

The following appendices have been attached to supplement Portage County's hazard mitigation plan. Information in these appendices support many of the decisions made throughout this document.

Appendix 1: Glossary

Appendix 2: Evidence of Public & Stakeholder Involvement

Appendix 3: Hazard Maps

Appendix 4: Asset Inventory

Appendix 5: Adopting Resolutions

APPENDIX 1: GLOSSARY

This appendix contains definitions of commonly-used terms throughout the hazard mitigation plan. These terms are considered because they are either unique to the mitigation planning process or used in a different way in a mitigation context as compared to other emergency preparedness contexts. This appendix also contains a list of the acronyms used throughout this document and their corresponding definitions.

Definition of Terms

Asset Inventory: A listing of critical facilities, historical facilities, facilities housing vulnerable populations (e.g., schools, nursing homes, hospitals), large economic assets in the community, and other, community-designated special considerations on which a risk assessment is completed.

Benefit Cost Review: A process by which a community considers both the potential benefits of mitigation projects in comparison with their costs. It is a way to determine if the costs are achievable and feasible based on the benefits that can be realistically anticipated.

Hazard Risk Assessment: The process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from hazards by assessing the vulnerability of people, buildings, and infrastructure to hazards.

Loss Estimate: A mathematical calculation of the potential damage – structural, contents, and functional – a facility and/or community could occur as a result of a specific hazard.

Mitigation: Activities providing a critical foundation in the effort to reduce the loss of life and property from natural and/or man-made disasters by avoiding or lessening the impact of a disaster and providing value to the public by creating safer communities. Mitigation seeks to fix the cycle of disaster damage, reconstruction, and repeated damage. These activities or actions, in most cases, will have a long-term sustained effect.

Natural Resource Protection: Action that, in addition to minimizing hazard losses, also preserves or restores the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.

Prevention: Government administrative or regulatory actions or processes that influence the way land and buildings are developed and built. These actions also include public activities to reduce hazard losses.

Property Protection: Actions that involve the modification of existing buildings or structures to protect them from a hazard, or removal from the hazard area.

Robert T. Stafford Disaster Relief and Emergency Assistance Act: Section 322 was added as part of the Disaster Mitigation Act (DMA) of 2000 to take a new and revitalized approach to mitigation planning. This new section emphasizes the need for local entities to closely coordinate mitigation planning and implementation efforts. In succinct terms, this is the mandate requiring local communities to compile and adopt a mitigation plan as an eligibility requirement for mitigation funding.

Definition of Acronyms

ASCE	American Society of Civil Engineers
CDC	Center for Disease Control
CERT	Community Emergency Response Team
CFR	Code of Federal Regulations
EAB	Emerald Ash Borer
EAP	Emergency Action Plan
EMA	Emergency Management Agency
EOP	Emergency Operations Plan
EPA	Environmental Protection Agency
ESF	Essential Support Function
FEMA	Federal Emergency Management Agency
FMD	Foot and Mouth
GIS	Geographic Information System
IMT	Incident Management Team
MPH	Miles Per Hour

NCDC	National Climatic Data Center
NFIP	National Flood Insurance Program
NIMS	National Incident Management System
NOAA	National Oceanic and Atmospheric Administration
ODA	Ohio Department of Agriculture
ODNR	Ohio Department of Natural Resources
ODOT	Ohio Department of Transportation
OEMA	Ohio Emergency Management Agency
RMS	Richter Magnitude Scale
PCOHS/EM	Portage County Office of Homeland Security/Emergency Management
PDSI	Palmer Drought Severity Index
SOG	Standard Operating Guidelines
SR	State Route
US	United States
USACOE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USDHS	United States Department of Homeland Security
USDOT	United States Department of Transportation
USGS	United States Geological Survey
WMD	Weapon of Mass Destruction

APPENDIX 2: EVIDENCE OF PUBLIC & STAKEHOLDER INVOLVEMENT

This appendix contains evidence of attempted community involvement through social media notifications and flyers posted at the PCOHS/EM Headquarters.

HAZARD MITIGATION PLANNING MEETING #3

When: November 12, 2014 at 0900 to 1100

Where: 8240 Infirmary Rd. Ravenna Ohio

Subject: To discuss final changes/ recommendations for the Hazard mitigation plan prior to State/ FEMA approval.

The General Public is encouraged and welcomed to attend

Portage County Office of Homeland Security and Emergency Management
8240 Infirmary Road, (Justice Center) Ravenna, Ohio 44266
Phone: 330-297-3607   **Fax**: 330-297-4569
Director Ryan Shackelford
E-mail: rshackelford@portageco.com **Toll Free:** 1-800-772-3799
http://www.co.portage.oh.us/portageprep/
Facebook: https://www.facebook.com/PortagePrepares
Twitter: @PortagePrep   **YouTube**: Portage Prepares
A Program of Portage County Commissioners

NEWS RELEASE

For Immediate Release
March 24, 2015

CONTACT: Ryan Shackelford, Director, Portage County Office of Homeland Security and
Emergency Management, 330-297-3607

PORTAGE COUNTY HAZARD MITIGATION PLAN NOW AVAILABLE
FOR PUBLIC REVIEW AND COMMENT

Over the past year, the Portage County Office of Homeland Security and Emergency
Management along with JH Consulting and numerous planning partners within local
communities has updated the Portage County Hazard Mitigation Plan.

The purpose of mitigation planning is to identify all the hazards that impact Portage County.
While doing so, PCHSEM and its partners identified goals and objectives to reduce or lessen the
impacts from those hazards.

The planning process allows PCHSEM to engage many community leaders with open dialogue
and incorporate many ideas, said Ryan Shackelford, PCHSEM director.

He explained that the local mitigation plan is Portage County's commitment to reduce the risks
of all hazards. The plan can be used as a template for community leaders when committing the
necessary resources for local response and allows the state to prioritize projects in the county.

"It is essential that the public becomes a planning partner and we encourage all to take the
opportunity to review our plan and submit comments and suggestions to enhance its
capability," Shackelford said.

Residents can download the county Hazard Mitigation Plan on Portage County's website at www.co.portage.oh.us and or www.co.portage.oh.us/emergencymanagement.htm. Comments can be submitted until April 8, 2015. Written comments can be mailed to PCHSEM, 8240 Infirmary Rd., Ravenna, Ohio 44266, faxed to 330-297-4569 or emailed to rshackelford@portageco.com.

-more-

Shackelford thanked the following local officials for assisting in the process: Portage County Commissioners Maureen Frederick and Kathleen Chandler; former Portage County Commissioner
Sabrina Christian-Bennett; Patricia Corley, PCHSEM staff; Butch Helmling, general superintendent of the Portage County Engineer's Office; Major Dennis Missimi, Portage County Sheriff's Office; Todd Peetz, director of Portage County Regional Planning; Jeff Lonzrick, director of Portage County Water Resources; James Bierlair, district coordinator of the Portage Soil & Water Conservation District; Bradford Ehrhart, director of Portage County Economic Development; Randy Roberts, Portage County Building Department / Flood Plain Manager ; Joe Reichlin, Portage County GIS Manager; Robert Walker, Robinson Memorial Hospital EMS coordinator; Jim Smith, PARTA; Dan Derreberry, Atwater Township trustee; Susan White, Randolph Township trustee; James Deffenbaugh, Palmyra Township trustee; Elizabeth Hartley, Sugar Bush Knolls councilwoman; Bill Wisniewski, Ravenna Schools business manager; Kent Police Chief Michelle Lee; Ravenna Fire Chief Geoff Cleveland, former Ravenna Township Fire Chief Steve Bosso: Lt. Kevin Grimm, Streetsboro Fire Department; Mike Pittinger, Edinburg Fire Department; Mark Griffith, Ohio Department of Transportation; Patrick Finnegin, Ohio National Guard, Camp Ravenna; Brian Fowler, Ohio National Guard, Camp Ravenna; and consultants Jeffrey Harvey and Martin Faison with JH Consulting.

Residents can find preparedness information at the Portage Prepares webpage on the Portage County government site at www.co.portage.oh.us/portageprep and on social media at Portage Prepares on Facebook and @PortagePrep on Twitter.

To reach the Portage County Office of Homeland Security and Emergency Management, call 330-297-3607 or email pcorely@portageco.com.

MEETING SIGN-IN SHEET   HAZARD MITIGATION PLANNING   7/30/14   PLACE: EOC @9 AM

Name	Title	Phone	Email
Danny Derflebery	Trustee	330-947-2837	DannyDerflebere@gmail.com
Steve Bosso	Chief	330-297-2191	Steve.bosso@Ravennatownship.com
Sabrina (Christina) Bennett	Portage Co Commiss	330320 0390	Schristia+bennett@portagecoco
Kathleen Chandler	" " "	330 297 3605	
Robert Walker	RMH	330-297-2860	Rwalker@RMH2.org
Kevin Grimm	SFD	3-626-Y66V	kgrimm@streetsboro fire.com
Mark Griffiths	ODOT	330-351-6936	
Emanuel Hartley	Village - Sugar Bush Knolls	216 244 4730	ehartley.sugarbushknolls@gmail.com
Patrick Finigan sem	Operations Camp Ravenna	614 336 8934	patrick.m.finigan.mil@mail.mil
Dennis Missy	Major PCSO		dmissy@portageco.com
Susan White	Randolph Trustee	330 388-3543	susanwhite@HowardHanna.com
Todd Peltz	Portage County RPC	330-297-3613	TPeltz@PCRPC.org
Jeff Lonzrick	Director, Water Resources	330-298-2072	jlonzrick@portageco.com
Mike Pittinger	Fire Fighter	330-351-8367	MikePittinger@edinburgtownship.com
Bradford R. Ehrhart		330.297.3470	behrhart@portagedevbd.com
Bill Wisniewski	Director - Ravenna Schools	330-296-7159 x 11	william.wisniewski@ravenna.portage.k12.oh.us
James A. Bierlair	District Coordinator PSWCD	330-297-7633 x101	Jbierlair@portageswcd.org
Joe Reichlin	GIS Manager	297-3510	jvreichlin@portageco.con
James H. Deffenbaugh	Trustee	330-654-2279	J.Deffenbaugh@palmyratownship.com

PORTAGE COUNTY HAZARD MITIGATION PLAN

Hazard Mitigation Planning Meeting #1 - Portage County Emergency Operations Center

07/30/2014 ~ 9:00 a.m.

Name (PRINT) - Last, First, MI	Rank (if applicable)	Signature	Agency Represented	Email
Ehrhart, Bradford D.		Bradford Ehrhart	Portage Development Board	behrhart @ portage dev.bd.com
TODD PEETZ			Portage County RPC	Tpeetz @ PCRPC.org
Steven Bosso	Fire Chief		Ravenna Township	Steve.bosso@ravennatownship.com
SUSAN White		Susan White	Randolph Trustee	SUSANWhite@HOWARDHANNA.COM
Robert Walker	Coordinator	Robert Walker	Robinson Memorial Hospital	RWalker@RMH2.org
MIKE P. HINGER	LT		Edinburg Township	MIKE P.Hinger@Edinburgtownship.com
Grimm, Kevin	Lieutenant	Kevin S. Grimm	Streetsboro FD	kgrimm@streetsborofire.com
GRIFFths mark			ODOT	MARK.Griffiths@DOT.STATE.OH.US
Lonzrick, Jeff S		JS129	Port. Co. WATER RES.	jlonzrick@portageco.com

PORTAGE COUNTY HAZARD MITIGATION PLAN
Hazard Mitigation Planning Meeting #2 - Portage County Emergency Operations Center
08/26/2014 ~ 0900 Hours

Name (PRINT)-Last, First, MI	Rank (if applicable)	Signature	Agency Represented	Email
SMITH, JIM			PARTA	
LONZRICK, JEFF			Port. Co. Water Res	jlonzrick@portageco.com
Finnegin, Patrick SGM	SGM		OHARNG	patrick.m.finnegin.mil@mail.mil
LEE, Michelle	CHIEF		KENT P.D.	Lee@KENT-OHIO.org
WISNIEWSKI, Bill	DIRECTOR OPTS.		Ravenna S.D.	william.wisniewske@ravennaschools.us
Bob Walker	EMS Coordinator		Robinson Mem. Hosp.	RWalker@RMHZ.org
Geoff Cleveland	Chief		Ravenna Fire	geoffrey.cleveland@ci.ravenna.oh.us
Dennis Missl	MAJOR		PCSO	
Kathleen Chandler				
Butch Helmling			PCE	
Randy Roberts	Flood Plan Administrator		BUILDING Dept.	rroberts@portageco.com

PORTAGE COUNTY HAZARD MITIGATION PLAN
Hazard Mitigation Planning Meeting #2 - Portage County Emergency Operations Center
08/26/2014 ~ 0900 Hours

Name (PRINT)-Last, First, MI	Rank (if applicable)	Signature	Agency Represented	Email
JAMES H. DEFFENBAUGH	TRUSTEE	James W Deffenbaugh	PALMYRA TWP	J.DEFFENBAUGH @ PALMYRATOWNSHIP.COM
ELIZABETH M. HARTLEY	COUNCIL WOMAN	Elizabeth M Hartley	Village of Sugar Bush Knolls	sugarbushknolls; ehartley @ gmail.com
Joe REICHLIN			PC GIS/HNG	

PORTAGE COUNTY HAZARD MITIGATION PLAN
Portage County Emergency Operations Center 11/12/14 ~ 0900 HOURS
HAZARD MITIGATION PLANNING MEETING #3

NAME (PLEASE PRINT)	RANK (IF APPLICABLE)	AGENCY	EMAIL
Kevin Casimon	LT.	Streetsboro FD	
Bob Walker	EMS Coord.	Robinson Mem. Hosp.	
Pat Finnegin	SGM OHARNG	National Guard	
Brian Fowler	SFC OHARNG	National Guard	brian.r.fowler.mil@mail.mil
Elizabeth Langley		Village Portage Co.	
Denn. M.	PCSO	PCSO	
Sabrina Christian Bennett	PBOC	PBOC	
Joe Rechts	IT GIS	Auditor	
Maure Fredrick	Comm.		

APPENDIX 3: HAZARD MAPS

This appendix contains hazards maps for all hazards included in the mitigation plan:

- Class I Dams,
- Drought/Extreme Heat,
- Earthquake,
- Epidemic,
- Flood,
- Hazardous Material,
- Infestation,
- Infrastructure,
- Severe Weather,
- Terrorism,
- Tornado,
- Transportation, and
- Winter Storm.

Tuckaway Lake Dam

Lake Rockwell Dam

Michael J Kirwan Dam

Muddy Lake Dam

Ohio Farmettes Lake Dam

Brimfield Lake Dam

Mogadore Dam

Berlin Lake Dam

Wingfoot Lake Dam

Schultz Lake Dam

Class I Dams

High Hazard Areas

Low Hazard Areas

Portage County

N

HAZARD MAPPING: Class I Dams
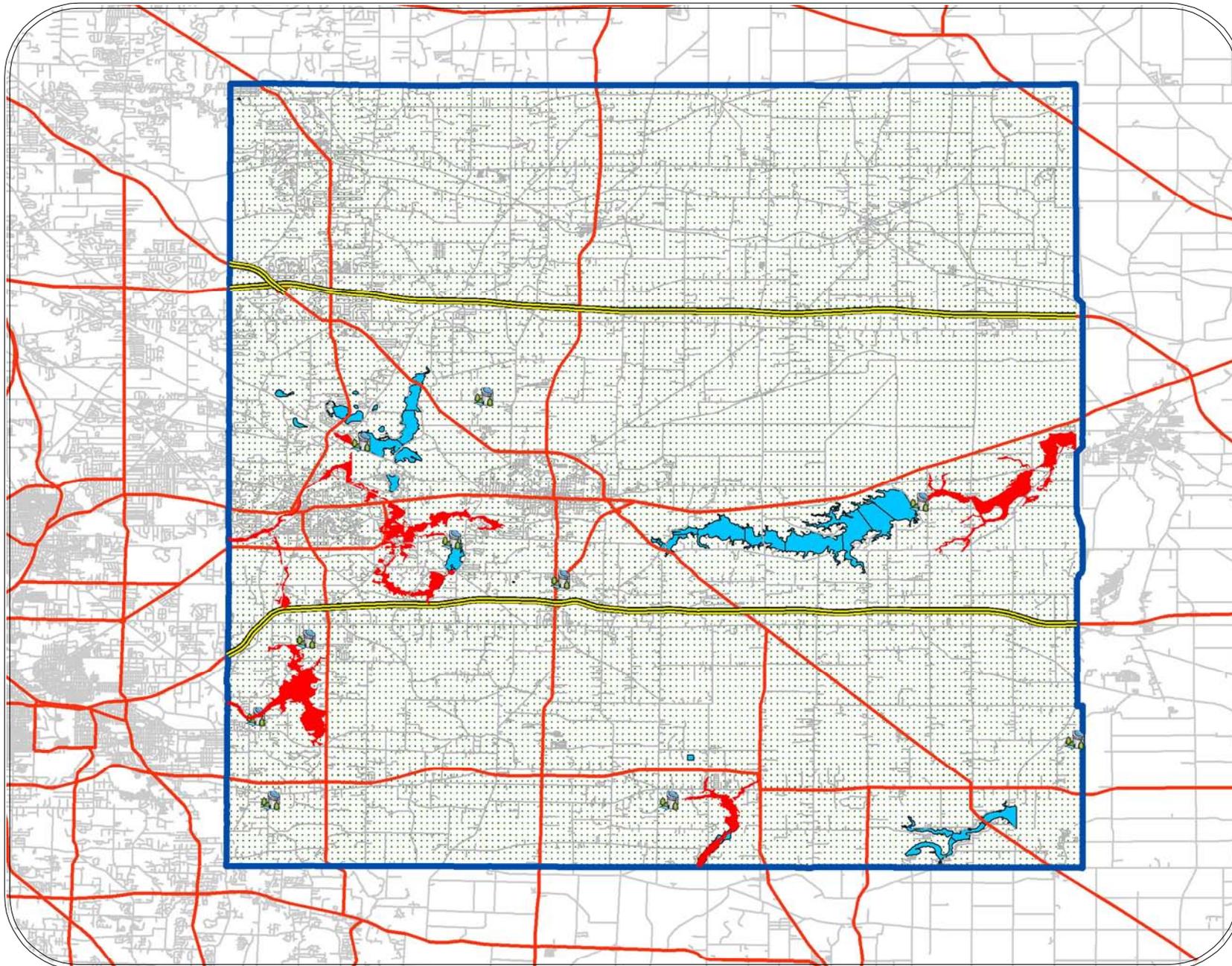
Class I Dams

High Hazard Areas

Low Hazard Areas

Portage County

HAZARD MAPPING: Drought/Extreme Heat
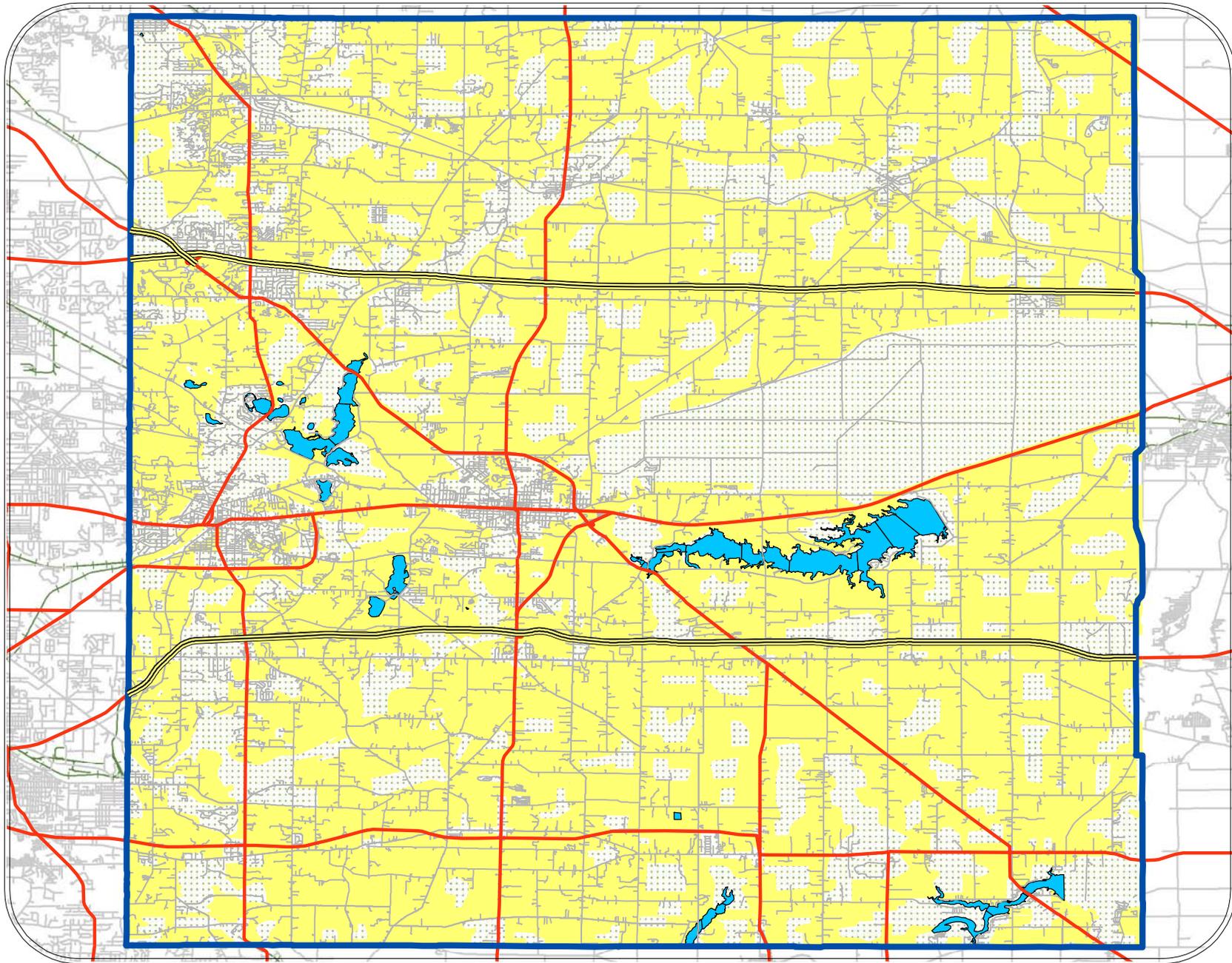
Legend:
- Mod Hazard Areas
- Low Hazard Areas
- Portage County

PORTAGE COUNTY HAZARD MITIGATION PLAN
HAZARD MAPPING: Earthquake
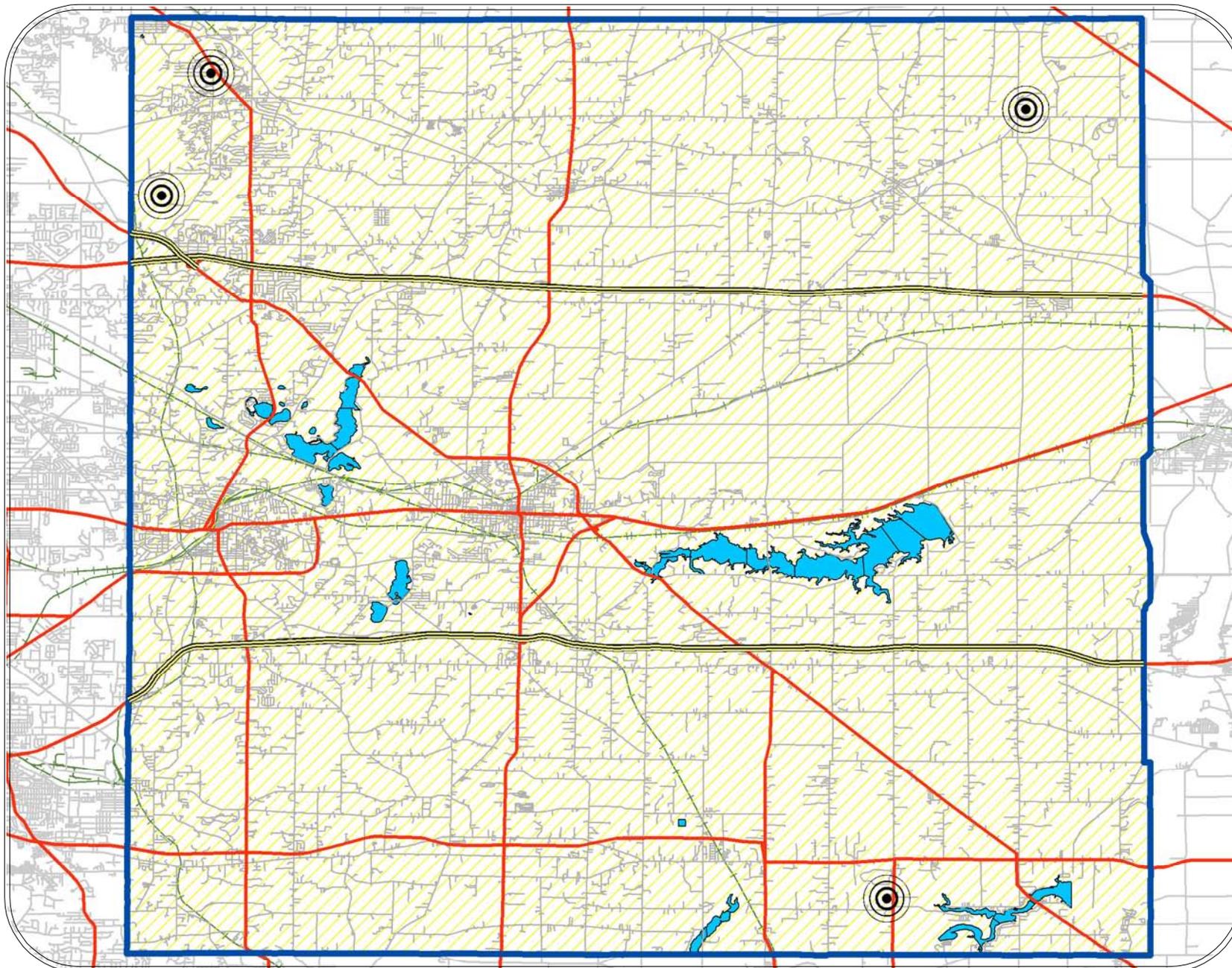
Earthquake Epicenters

Mod Hazard Areas

Portage County

N

HAZARD MAPPING: Epidemic
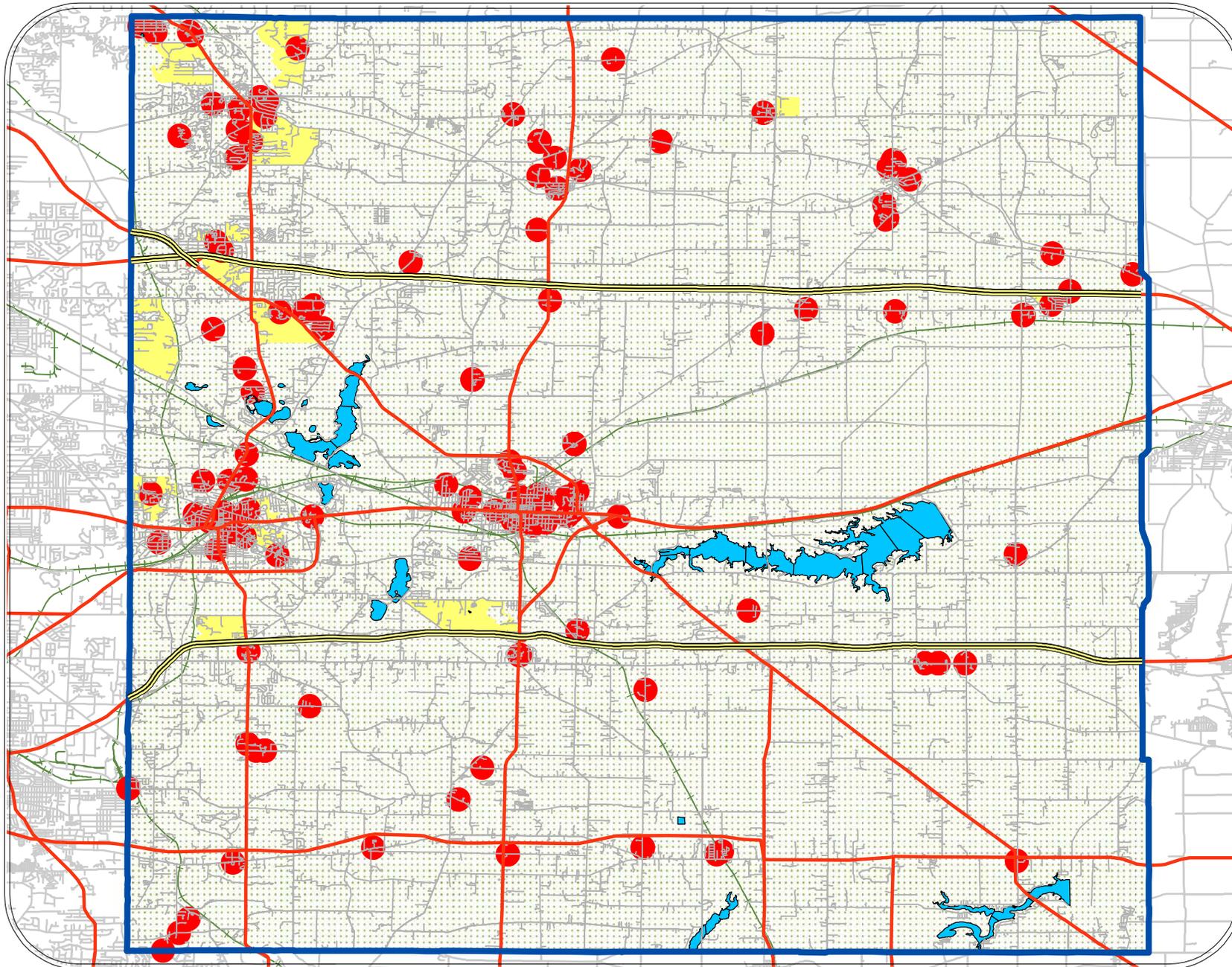
High Hazard Areas
Mod Hazard Areas
Low Hazard Areas
Portage County

N

JH Consulting LLC

PORTAGE COUNTY HAZARD MITIGATION PLAN
HAZARD MAPPING: Flood
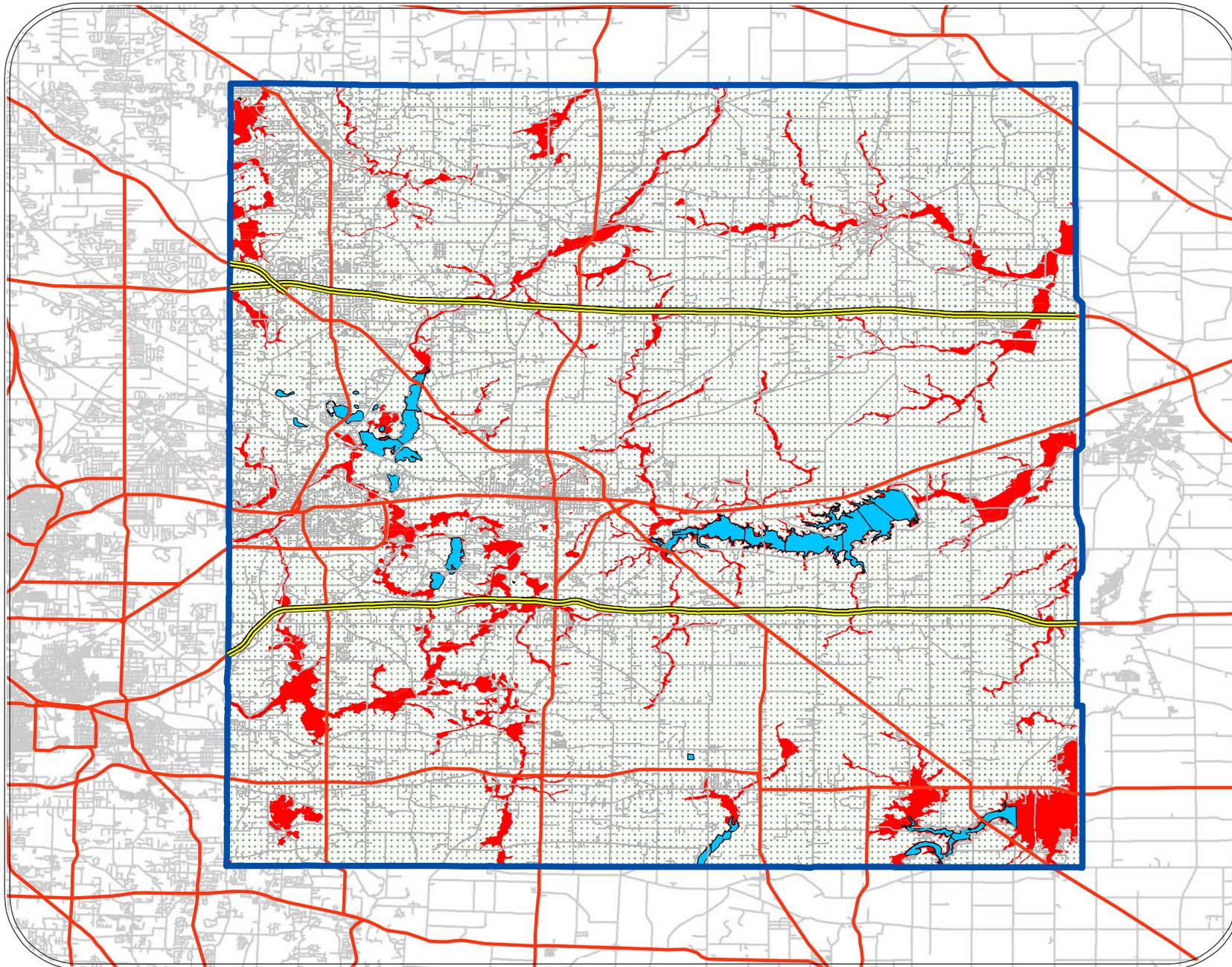
100-Year Floodplains
Low Hazard Areas
Portage County

PORTAGE COUNTY HAZARD MITIGATION PLAN
HAZARD MAPPING: Hazmat
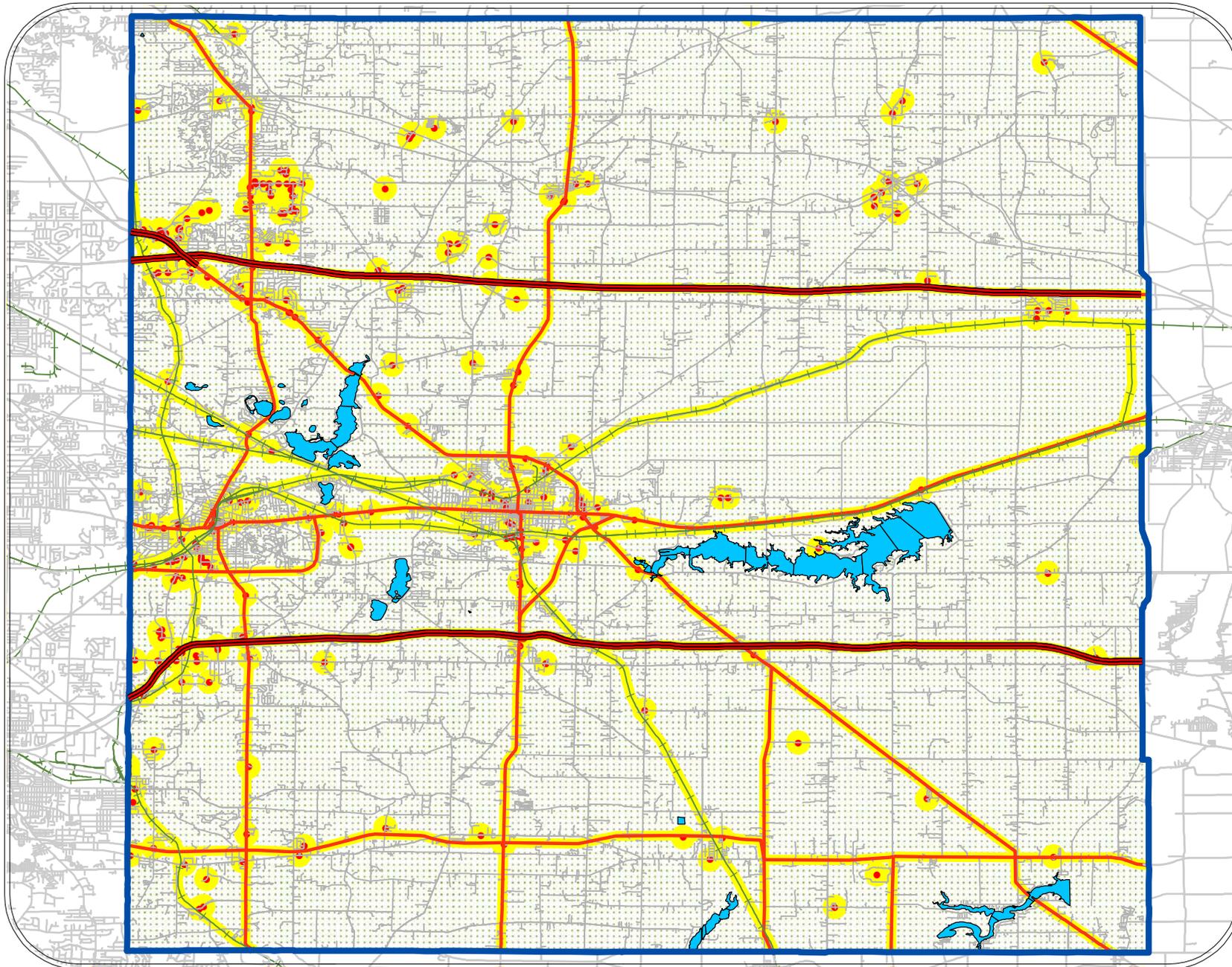
Legend:
- • High Hazard Areas
- ● Mod Hazard Areas
- Low Hazard Areas
- ☐ Portage County

N

JH Consulting LLC

PORTAGE COUNTY HAZARD MITIGATION PLAN
HAZARD MAPPING: Infestation
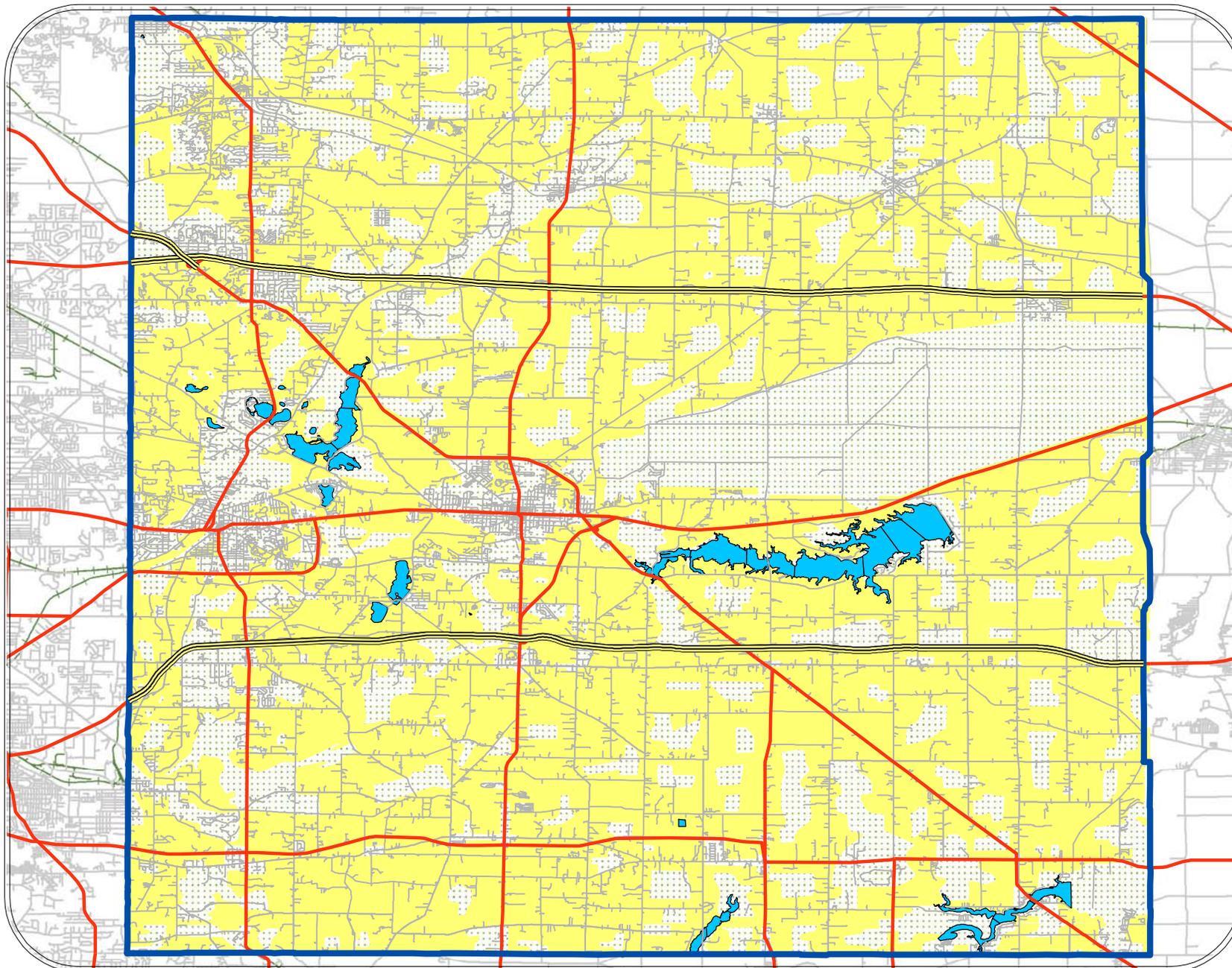
Mod Hazard Areas
Low Hazard Areas
Portage County

PORTAGE COUNTY HAZARD MITIGATION PLAN
HAZARD MAPPING: Infrastructure
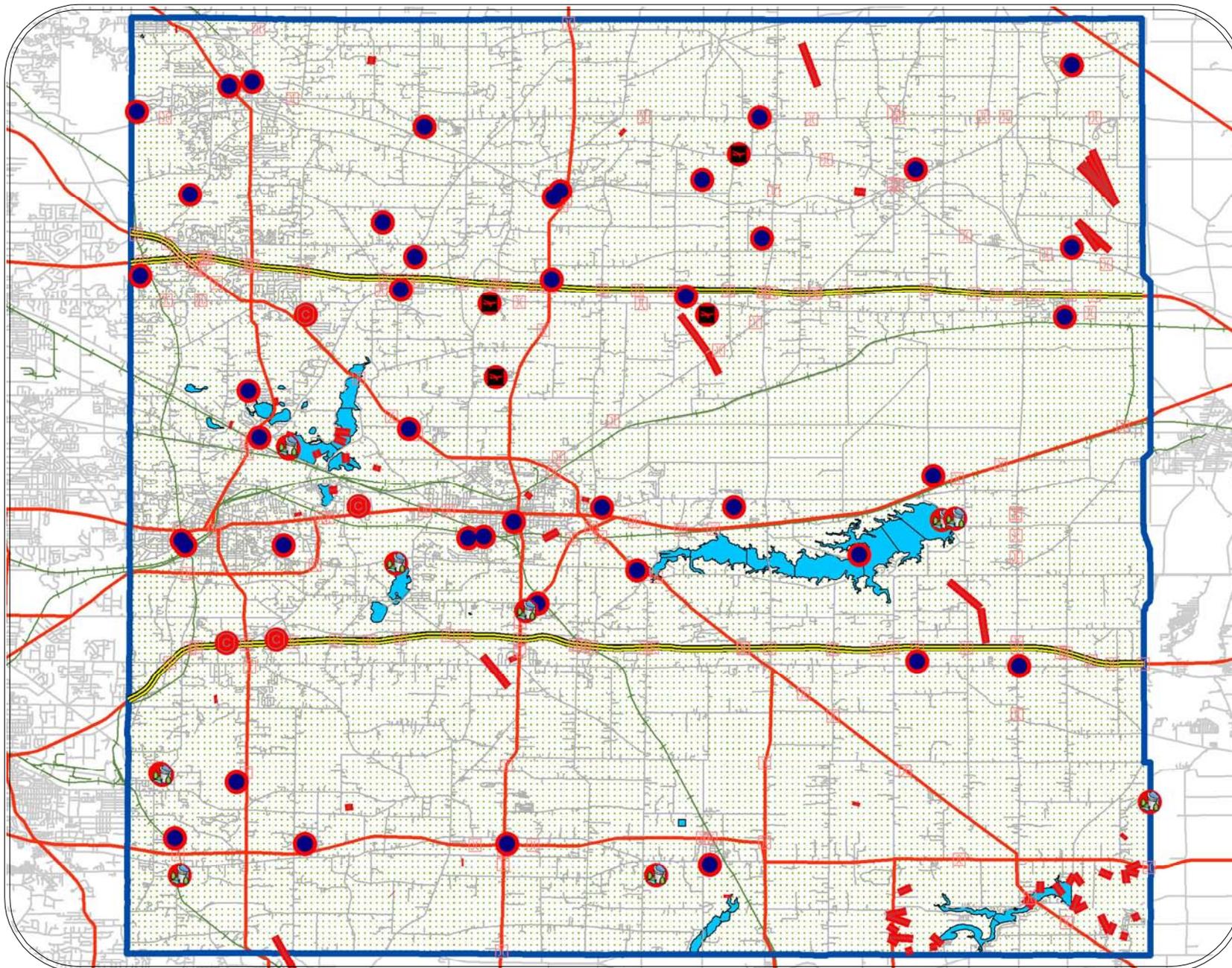
Legend:
- ✈ Airports
- ⋈ Bridges
- Class I Dams
- Ⓒ Communications Facility
- — Pipelines
- ● Wastewater Facilities
- ● High Hazard Areas
- Low Hazard Areas
- ▢ Portage County

N

J^H Consulting LLC

PORTAGE COUNTY HAZARD MITIGATION PLAN
HAZARD MAPPING: Severe Weather
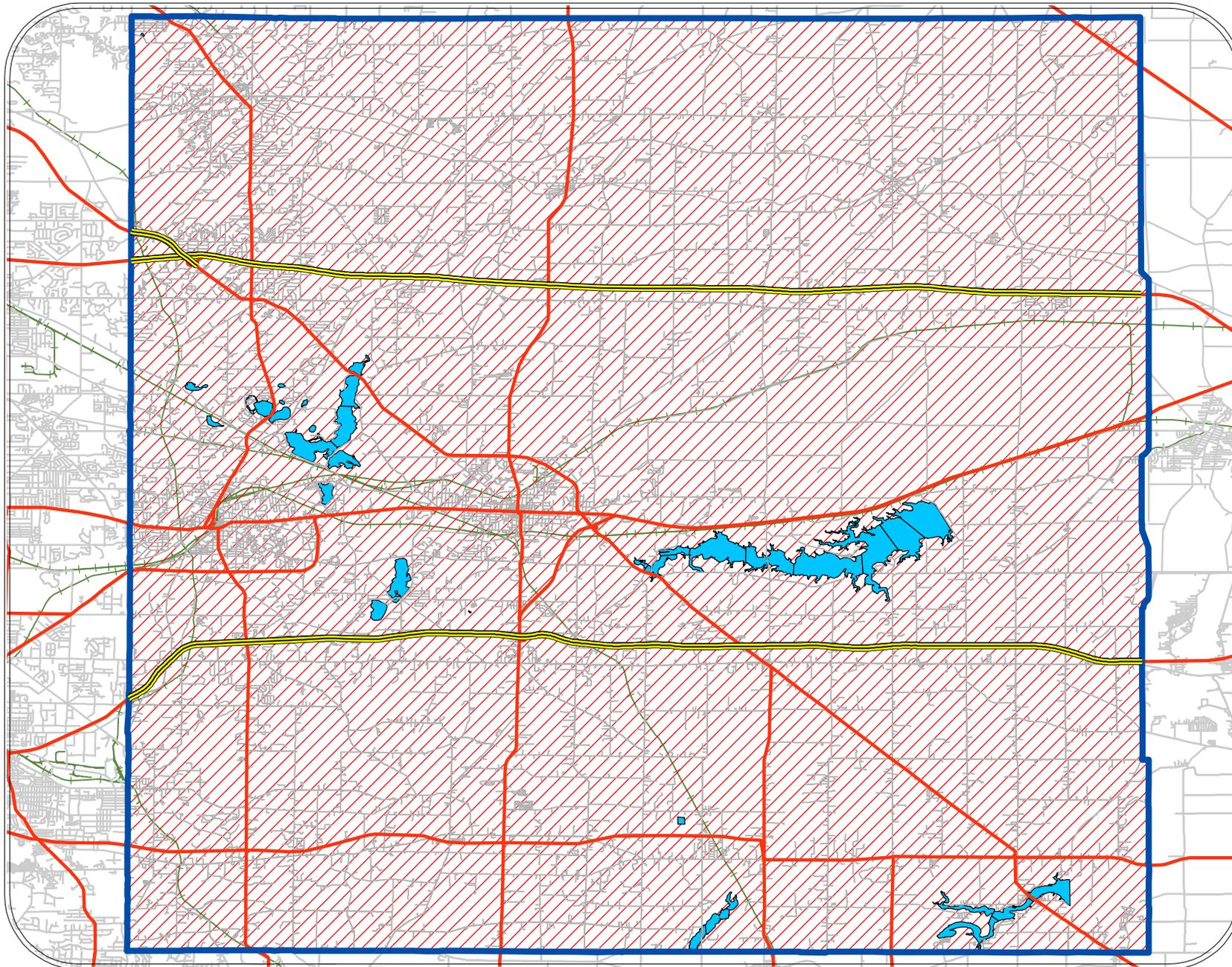
High Hazard Areas
Portage County

HAZARD MAPPING: Terrorism
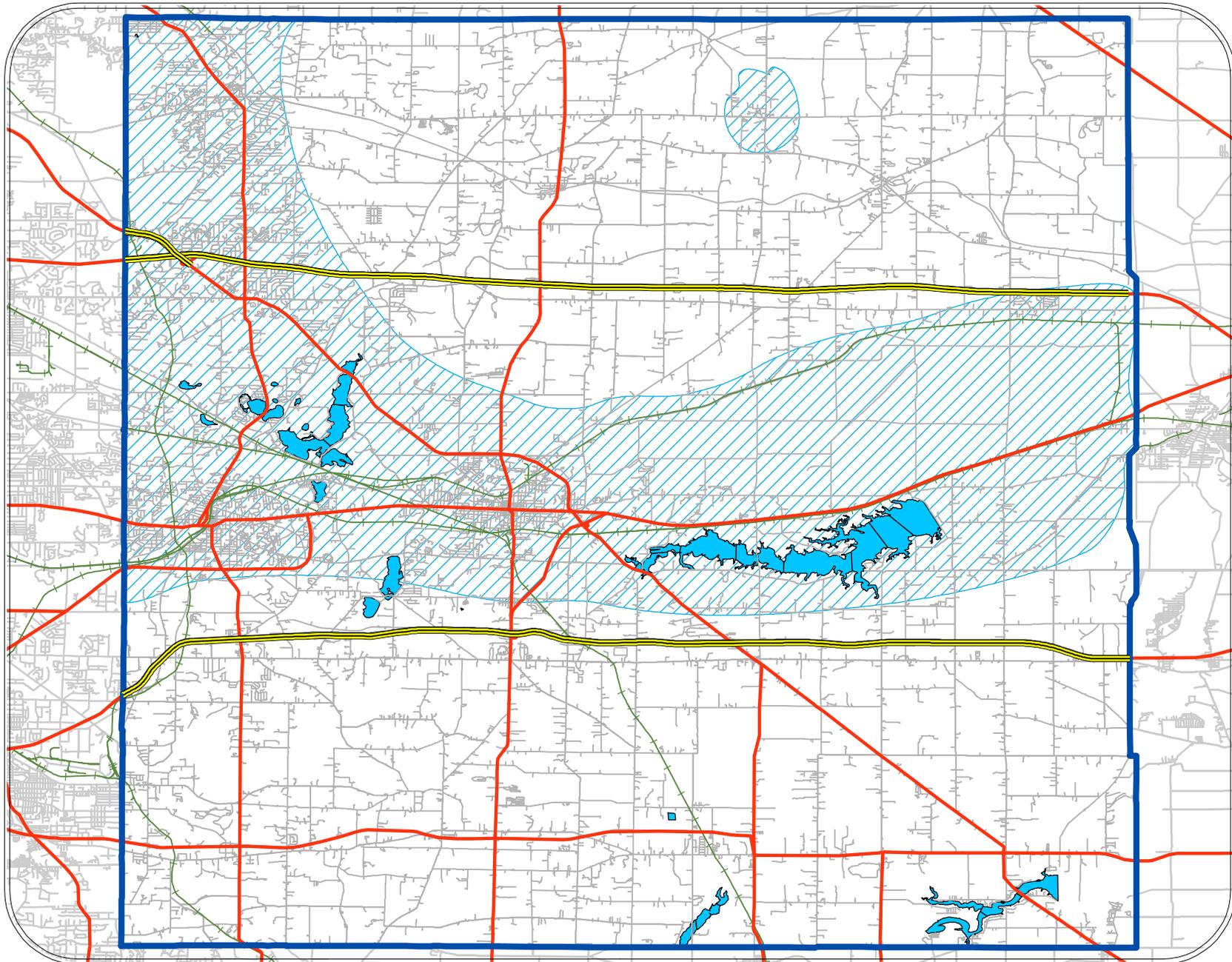
Potential Target Areas

Portage County

HAZARD MAPPING: Tornado
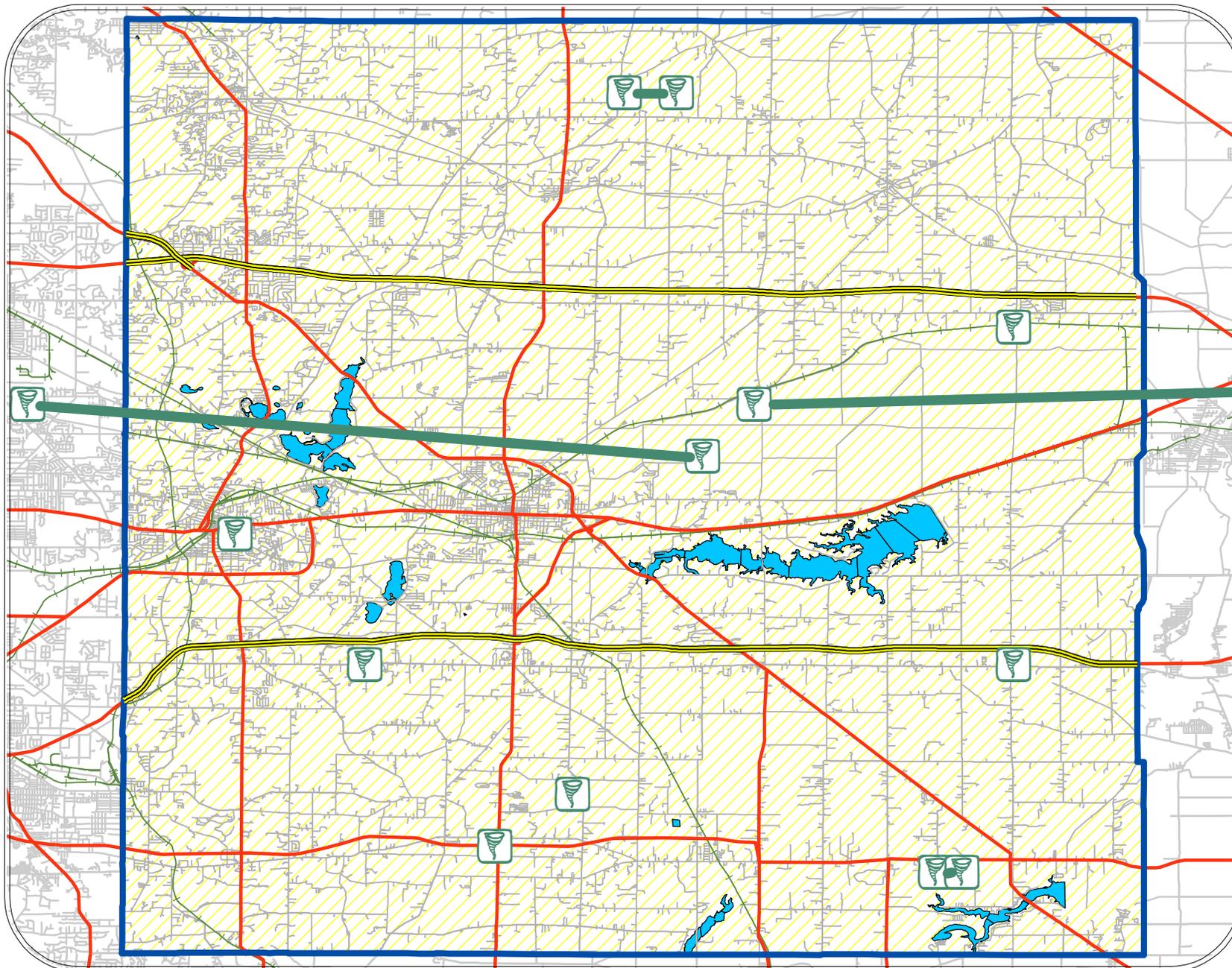
Tornado Start/End Points

6-3-1973 Path

5-31-1985 Path

7-4-2006 (a) Path

7-4-2006 (b) Path

Mod Hazard Areas

Portage County

N

JH Consulting LLC

Legend:
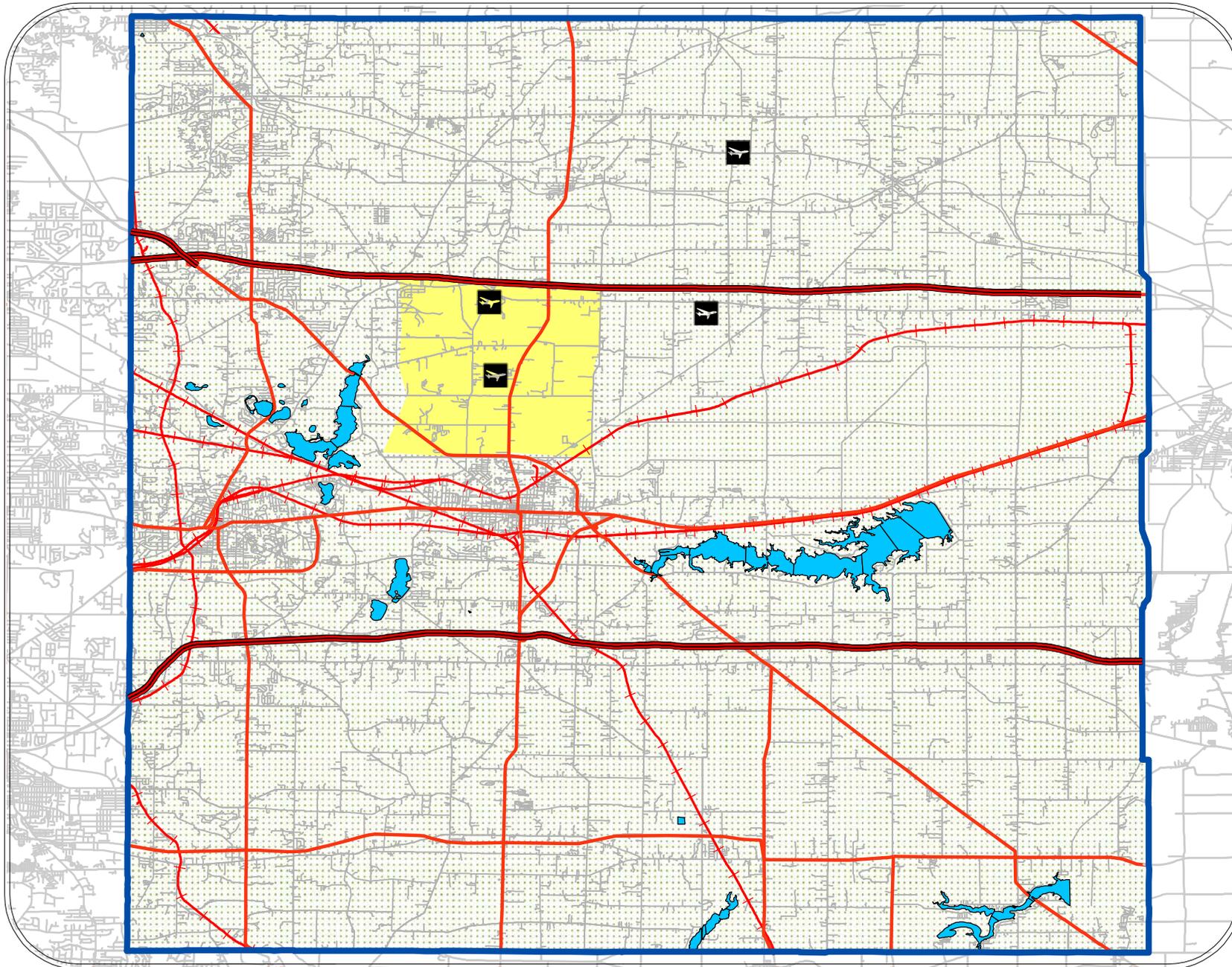
- ✈ Airports
- ⎯ High Hazard Areas
- ▭ Mod Hazard Areas
- ▦ Low Hazard Areas
- ▭ Portage County
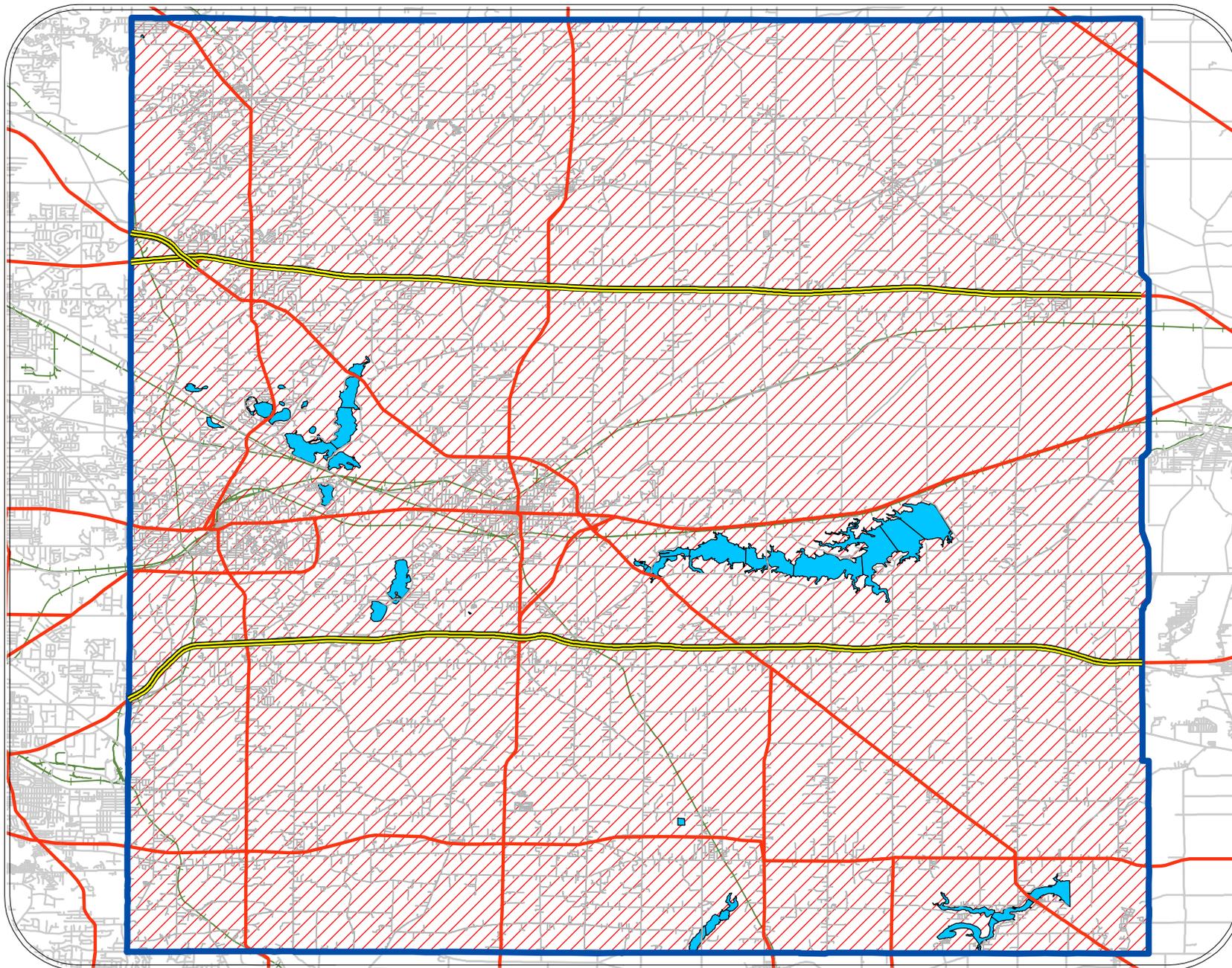
High Hazard Areas
Portage County

APPENDIX 4: ASSET INVENTORY

This appendix contains an asset inventory chart, detailing possible hazard severity for Portage County assets.

Portage County Asset Inventory

Name or Dscription of Asset	Address and Jurisdictional Location	Critical Facility	Vulnerable Populations	Economic Assets	Special Considerations	Historic/Other Considerations	Dam	Drought/Extrem	Earthquake	Epidemic	Flood	Hazmat	Infestation	Infrastructure	Severe Weather	Terrorism	Tornado	Transportation	Winter Storm
Portage County Regional Airport	Ravenna	X					L	M	M	L	L	M	M	H	H	M	M	M	H
Mills Airport	Ravenna	X					L	M	M	L	L	M	M	H	H	M	M	M	H
Freedom Airport	Ravenna	X					L	M	M	L	L	L	M	H	H	M	M	L	H
Gates Airport	Garrettsville	X					L	M	M	L	L	L	M	H	H	M	M	L	H
Mogadore Reservoir Dam	Mogadore	X					H	M	M	L	H	L	M	H	H	L	M	L	H
Lake Rockwell Dam	Kent	X					H	M	M	L	H	M	M	H	H	M	M	L	H
Michael J. Kirwan Dam	Ravenna	X					H	L	M	L	H	L	L	H	H	M	M	L	H
Commo 1	Kent	X					L	M	M	L	L	M	M	H	H	L	M	L	H
Commo 2	Ravenna	X					L	M	M	L	L	M	M	H	H	M	M	L	H
Commo 3	Kent	X					L	M	M	M	L	M	M	H	H	L	M	L	H
Commo 4	Streetsboro	X					L	L	M	H	L	M	L	H	H	M	M	L	H
Higher Ed 1	Rootstown		X				L	M	M	H	H	L	M	L	H	L	M	L	H
Higher Ed 2	Atwater		X				L	M	M	H	L	M	M	L	H	L	M	L	H
Maplewood Career Center	Ravenna		X				L	M	M	H	L	H	M	L	H	M	M	M	H
Kent State University	Kent		X				L	M	M	H	H	H	M	H	H	M	M	H	H
Higher Ed 5	Ravenna		X				L	L	M	H	L	H	L	H	H	M	M	L	H
Higher Ed 6	Rootstown		X				L	M	M	H	L	M	M	L	H	L	M	L	H
Higher Ed 7	Hiram		X				L	M	M	H	L	L	M	L	H	L	M	L	H
Higher Ed 8	Ravenna		X				L	L	M	H	L	M	L	L	H	M	M	L	H
North East Ambulance Service Inc	Ravenna	X					L	L	M	H	L	H	L	L	H	M	M	L	H
Geauga Lake Wild Water Kingdom EMS	Aurora	X					L	L	M	L	H	M	L	L	H	M	M	L	H

Portage County Asset Inventory

Name or Dscription of Asset	Address and Jurisdictional Location	Critical Facility	Vulnerable Populations	Economic Assets	Special Considerations	Historic/Other Considerations	Dam	Drought/Extreme	Earthquake	Epidemic	Flood	Hazmat	Infestation	Infrastructure	Severe Weather	Terrorism	Tornado	Transportation	Winter Storm
Community Ambulance Inc	Garrettsville	X					L	L	M	L	L	M	L	L	H	L	M	L	H
Suffield Township FD	Suffield	X					L	L	M	H	L	H	L	L	H	L	M	L	H
Atwater FD	Atwater	X					H	L	M	L	H	L	L	L	H	L	M	L	H
Mogadore Village FD	Mogadore	X					L	L	M	H	L	H	L	L	H	L	M	L	H
Randolph Township FD	Atwater	X					L	M	M	L	L	L	M	L	H	L	M	L	H
Kent FD Station 2	Kent	X					L	L	M	H	L	H	L	L	H	M	M	L	H
Mantua-Shalersville FD	Mantua	X					L	M	M	L	H	M	M	H	H	L	M	L	H
Brimfield FD	Kent	X					L	L	M	H	L	M	L	L	H	L	M	L	H
Rootstown FD	Rootstown	X					L	L	M	H	L	M	L	L	H	L	M	L	H
Charlestown Township VFD	Ravenna	X					L	L	M	L	L	L	M	L	H	M	M	L	H
Ravenna City FD	Ravenna	X					L	L	M	H	L	H	L	H	H	M	M	L	H
Kent FD	Kent	X					L	L	M	H	L	M	L	L	H	M	M	L	H
Hiram FD	Hiram	X					L	L	M	H	L	H	L	H	H	M	M	L	H
Brady Lake FD	Ravenna	X					L	M	M	L	L	M	M	L	H	M	M	L	H
Aurora FD Station 2	Aurora	X					L	L	M	L	L	M	L	L	H	M	M	L	H
Edinburg FD	Rootstown	X					L	M	M	L	L	M	M	L	H	M	M	L	H
Streetsboro FD	Streetsboro	X					L	L	M	L	L	M	L	L	H	M	M	L	H
Aurora FD Station 1	Aurora	X					L	L	M	H	L	M	L	L	H	M	M	L	H
Garrettsville Freedom Nelson Joint FD	Garrettsville	X					L	L	M	H	H	H	L	L	H	L	M	L	H
Ravenna Township FD	Ravenna	X					L	L	M	H	L	M	L	L	H	M	M	L	H

Portage County Asset Inventory

Name or Dscription of Asset	Address and Jurisdictional Location	Critical Facility	Vulnerable Populations	Economic Assets	Special Considerations	Historic/Other Considerations	Dam	Drought/Extreme	Earthquake	Epidemic	Flood	Hazmat	Infestation	Infrastructure	Severe Weather	Terrorism	Tornado	Transportation	Winter Storm
Windham VFD	Windham	X					L	L	M	H	L	M	L	L	H	L	M	L	H
Paris Township FD	Ravenna	X					L	M	M	L	L	L	M	L	H	M	M	L	H
Palmyra Township FD	Diamond	X					L	M	M	L	L	L	M	H	H	L	M	L	H
Deerfield FD	Deerfield	X					L	M	M	H	L	M	M	L	H	L	M	L	H
Portage County Court of Common Pleas Domestic Relations Division	Ravenna	X					L	L	M	H	L	H	L	H	H	M	M	L	H
Portage County Court of Common Pleas General Division	Ravenna	X					L	L	M	H	L	H	L	H	H	M	M	L	H
Portage County Court of Common Pleas Probate and Juvenile Divisions	Ravenna	X					L	L	M	H	L	H	L	H	H	M	M	L	H
Portage County Municipal Court Kent	Kent	X					L	L	M	H	L	H	L	L	H	M	M	L	H
Portage County Municipal Court Ravenna	Ravenna	X					L	L	M	H	L	H	L	H	H	M	M	L	H
Regency Haospital of Ravenna	Ravenna		X				L	M	M	H	L	M	M	M	H	M	M	L	H

Portage County Asset Inventory

Name or Dscription of Asset	Address and Jurisdictional Location	Critical Facility	Vulnerable Populations	Economic Assets	Special Considerations	Historic/Other Considerations	Dam	Drought/Extreme	Earthquake	Epidemic	Flood	Hazmat	Infestation	Infrastructure	Severe Weather	Terrorism	Tornado	Transportation	Winter Storm
Robinson Memorial Hospital	Ravenna		X				L	M	M	H	L	M	M	M	H	M	M	L	H
Kensington Care Center	Aurora		X				L	M	M	H	L	M	M	L	H	M	M	L	H
Aurora Manor-Specialty Care Centre	Aurora		X				L	M	M	H	L	M	M	L	H	M	M	L	H
Campus of Anna Maria	Aurora		X				L	M	M	H	L	M	M	L	H	M	M	L	H
Kent Healthcare Center	Kent		X				L	M	M	H	L	M	M	L	H	M	M	L	H
Kentway Apartments	Kent		X				L	L	M	H	L	L	L	L	H	M	M	L	H
Maple Wood Care Center	Streetsboro		X				L	M	M	H	L	M	M	L	H	M	M	L	H
Altercare of Ravenna	Ravenna		X				L	L	M	H	L	M	L	L	H	M	M	L	H
Loyalton of Ravenna	Ravenna		X				L	L	M	H	L	H	L	L	H	M	M	L	H
Longmeadow Care Center	Ravenna		X				L	M	M	H	L	M	M	L	H	M	M	L	H
The Woodlands at Robinson Nursing Home	Ravenna		X				L	M	M	H	L	M	M	L	H	M	M	L	H
American Red Cross Portage County	Ravenna		X				L	L	M	H	L	M	L	L	H	M	M	L	H
Med Center One	Kent		X				L	L	M	H	L	M	L	L	H	M	M	L	H
Portage County Sheriff's Office	Ravenna	X					L	M	M	L	L	L	M	L	H	L	M	M	H
Aurora PD	Aurora	X					L	L	M	H	L	H	L	L	H	M	M	L	H
Garrettsville PD	Garrettsville	X					L	L	M	H	L	M	L	L	H	L	M	L	H

Portage County Asset Inventory

Name or Dscription of Asset	Address and Jurisdictional Location	Critical Facility	Vulnerable Populations	Economic Assets	Special Considerations	Historic/Other Considerations	Dam	Drought/Extreme	Earthquake	Epidemic	Flood	Hazmat	Infestation	Infrastructure	Severe Weather	Terrorism	Tornado	Transportation	Winter Storm
Kent PD	Kent	X					L	L	M	H	L	M	L	L	H	M	M	L	H
Mantua PD	Mantua	X					L	L	M	L	H	H	L	L	H	L	M	L	H
Ravenna PD	Ravenna	X					L	L	M	H	L	H	L	H	H	M	M	L	H
Brady Lake PD	Ravenna	X					L	M	M	L	L	M	M	L	H	M	M	L	H
Hiram PD	Hiram	X					L	M	M	L	L	L	M	L	H	L	M	L	H
Kent State University PD	Kent	X					L	L	M	H	L	M	L	L	H	M	M	M	H
Streetsboro PD	Streetsboro	X					L	M	M	H	L	L	M	L	H	L	M	L	H
Brimfield Township PD	Kent	X					L	L	M	H	L	H	L	L	H	L	M	L	H
Ravenna Ohio State Highway Patrol	Ravenna	X					L	L	M	H	L	H	L	L	H	M	M	L	H
Hiram Ohio State Highway Patrol	Ravenna	X					L	M	M	H	L	L	M	L	H	M	M	L	H
Portage County Jail-Sheriff's Department	Ravenna	X					L	M	M	L	L	H	M	L	H	M	M	M	H
Windham PD	Windham	X					L	L	M	H	L	M	L	L	H	M	M	L	H
Randolph Library	Randolph				X		L	M	M	L	L	M	L	H	H	L	M	L	H
Kent Library	Kent				X		H	L	M	H	H	H	L	L	H	M	M	H	H
Reed Memorial Library	Ravenna				X		L	L	M	H	L	M	L	L	H	M	M	L	H
Brimfield Branch Library	Kent				X		L	L	M	H	L	H	L	L	H	M	M	L	H
Garrettsville Branch Library	Garrettsville				X		L	L	M	H	L	M	M	L	H	L	M	L	H
Pierce Streetsboro Library	Streetsboro				X		L	M	M	H	L	L	M	H	H	M	M	L	H

Portage County Asset Inventory

Name or Dscription of Asset	Address and Jurisdictional Location	Critical Facility	Vulnerable Populations	Economic Assets	Special Considerations	Historic/Other Considerations	Dam	Drought/Extreme	Earthquake	Epidemic	Flood	Hazmat	Infestation	Infrastructure	Severe Weather	Terrorism	Tornado	Transportation	Winter Storm
Aurora Memorial Branch Library	Aurora				X		L	L	M	H	L	H	L	L	H	M	M	L	H
Windam Library	Windham				X		L	L	M	H	L	M	L	L	H	L	M	L	H
Portage County EOC	Ravenna	X					L	M	M	L	L	H	L	L	H	M	M	M	H
Aurora City School District	Aurora		X				L	L	M	H	L	M	L	L	H	M	M	L	H
Crestwood Local School District	Mantua		X				L	L	M	H	L	M	L	H	H	M	M	L	H
Field Local School District	Mogadore		X				H	M	M	H	L	L	M	L	H	L	M	L	H
James A. Garfield Local School District	Garrettsville		X				L	M	M	H	L	M	L	L	H	L	M	L	H
Kent City School District	Kent		X				L	L	M	H	L	L	L	L	H	M	M	L	H
Ravenna City School District	Ravenna		X				L	L	M	H	L	M	L	L	H	M	M	L	H
Rootstown Local School District	Rootstown		X				L	L	M	H	L	M	L	L	H	L	M	L	H
Southeast Local School District	Ravennna		X				L	M	M	L	L	L	M	L	H	L	M	L	H
Streetsboro City School District	Streetsboro		X				L	M	M	H	L	L	L	H	H	M	M	L	H
Waterloo Local School District	Atwater		X				L	M	M	H	L	L	L	L	H	L	M	L	H
Windham Exempted School District	Windham		X				L	L	M	H	L	M	L	L	H	M	M	L	H
Wastewater Facility 1	Atwater	X					L	M	M	H	L	L	L	H	H	L	M	L	H

Portage County Asset Inventory

| Name or Dscription of Asset	Address and Jurisdictional Location	Critical Facility	Vulnerable Populations	Economic Assets	Special Considerations	Historic/Other Considerations	Dam	Drought/Extrem	Earthquake	Epidemic	Flood	Hazmat	Infestation	Infrastructure	Severe Weather	Terrorism	Tornado	Transportation	Winter Storm
Wastewater Facility 2	Aurora	X					L	L	M	H	L	M	L	H	H	M	M	L	H
Wastewater Facilty 3	Mogadore	X					H	M	M	H	L	L	M	H	H	L	M	L	H
Wastewater Facilty 4	Mantua	X					L	M	M	L	H	M	M	H	H	L	M	L	H
Wastewater Facility 5	Ravenna	X					L	L	M	L	L	M	L	H	H	M	M	L	H
Wastewater Facility 6	Kent	X					L	L	M	H	L	M	L	H	H	M	M	M	H
Wasteware Facility 7	Ravenna	X					L	M	M	L	L	H	L	H	H	M	M	M	H
Wastewater Facility 8	Garrettsville	X					L	M	M	H	L	M	L	H	H	L	M	L	H
Wastewater Facility 9	Aurora	X					L	L	M	L	H	L	H	H	M	M	L	H
Wastewater Facility 10	Windham	X					L	L	M	H	L	M	L	H	H	L	M	L	H
Wastewater Facility 11	Garrettsville	X					L	L	M	H	L	M	M	H	H	L	M	L	H
Wastewater Facilty 12	Diamond	X					L	M	M	L	L	L	M	H	H	L	M	L	H
Wastewater Facility 13	Mantua	X					L	M	M	L	H	M	M	H	H	L	M	L	H
Wastewater Facility 14	Ravenna	X					L	M	M	L	L	M	M	H	H	M	M	M	H
Wastewater Facility 15	Mantua	X					L	L	M	L	H	H	L	H	H	L	M	L	H
Wastewater Facility 16	Hiram	X					L	M	M	H	L	L	M	H	H	L	M	L	H
Wastewater Facility 17	Ravenna	X					L	L	M	H	L	H	L	H	H	M	M	L	H

Portage County Asset Inventory

Name or Dscription of Asset	Address and Jurisdictional Location	Critical Facility	Vulnerable Populations	Economic Assets	Special Considerations	Historic/Other Considerations	Dam	Drought/Extrem	Earthquake	Epidemic	Flood	Hazmat	Infestation	Infrastructure	Severe Weather	Terrorism	Tornado	Transportation	Winter Storm
Wastewater Facility 18	Kent	X					L	L	M	H	L	L	L	H	H	M	M	L	H
Wastewater Facility 19	Sugar Bush Knolls	X					L	L	M	H	L	L	L	H	H	M	M	L	H
Wastewater Facility 20	Ravenna	X					L	M	M	L	L	H	M	H	H	M	M	M	H
Wastewater Facility 21	Mantua	X					L	M	M	L	H	M	M	H	H	L	M	L	H
Wastewater Facility 22	Ravenna	X					L	L	M	H	L	M	L	H	H	M	M	L	H
Wastewater Facility 23	Streetsboro	X					L	M	M	H	L	L	L	H	H	M	M	L	H
Wastewater Facility 24	Hiram	X					L	L	M	H	L	H	L	H	H	M	M	L	H
Wastewater Facility 25	Ravenna	X					L	L	M	H	L	M	L	H	H	M	M	L	H
Wastewater Facility 26	Mantua	X					L	M	M	L	H	M	M	H	H	L	M	L	H
Wastewater Facility 27	Franklin	X					H	L	M	L	H	M	L	H	H	M	M	L	H
Wastewater Facility 28	Mantua	X					L	M	M	L	H	M	M	H	H	L	M	L	H
Wastewater Facility 29	Ravenna	X					L	M	M	L	L	M	M	H	H	M	M	L	H
Wastewater Facility 30	Streetsboro	X					L	M	M	H	L	M	M	H	H	M	M	L	H
Wastewater Facilty 31	Mantua	X					L	M	M	L	H	M	M	H	H	L	M	L	H
Wastewater Faciltiy 32	Atwater	X					L	M	M	H	L	L	L	H	H	L	M	L	H
Wastewater Facilty 33	Mogadore	X					H	M	M	H	L	L	M	H	H	L	M	L	H

Portage County Asset Inventory

Name or Dscription of Asset	Address and Jurisdictional Location	Critical Facility	Vulnerable Populations	Economic Assets	Special Considerations	Historic/Other Considerations	Dam	Drought/Extrem	Earthquake	Epidemic	Flood	Hazmat	Infestation	Infrastructure	Severe Weather	Terrorism	Tornado	Transportation	Winter Storm
Wastewater Facility 34	Suffield	X					L	M	M	L	L	M	M	H	H	L	M	L	H
Wastewater Facilty 35	Ravenna	X					L	L	M	H	L	H	L	H	H	M	M	L	H
Wastewater Facility 36	Aurora	X					L	M	M	H	L	M	M	H	H	M	M	L	H
Wastewater Facility 37	Palmyra	X					L	M	M	L	L	L	M	H	H	L	M	L	H
Wastewater Facility 38	Kent	X					L	M	M	H	L	M	M	H	H	M	M	L	H
Wastewater Facility 39	Mantua	X					L	L	M	H	L	M	L	H	H	M	M	L	H
Wastewater Faclility 40	Ravenna	X					L	L	M	H	L	M	L	H	H	M	M	L	H
Wastewater Facility 41	Windham	X					L	L	M	H	L	M	L	H	H	L	M	L	H
Wastewater Facility 42	Mantua	X					L	L	M	H	L	M	L	H	H	M	M	L	H

PORTAGE COUNTY HAZARD MITIGATION PLAN

Asset Inventory Map
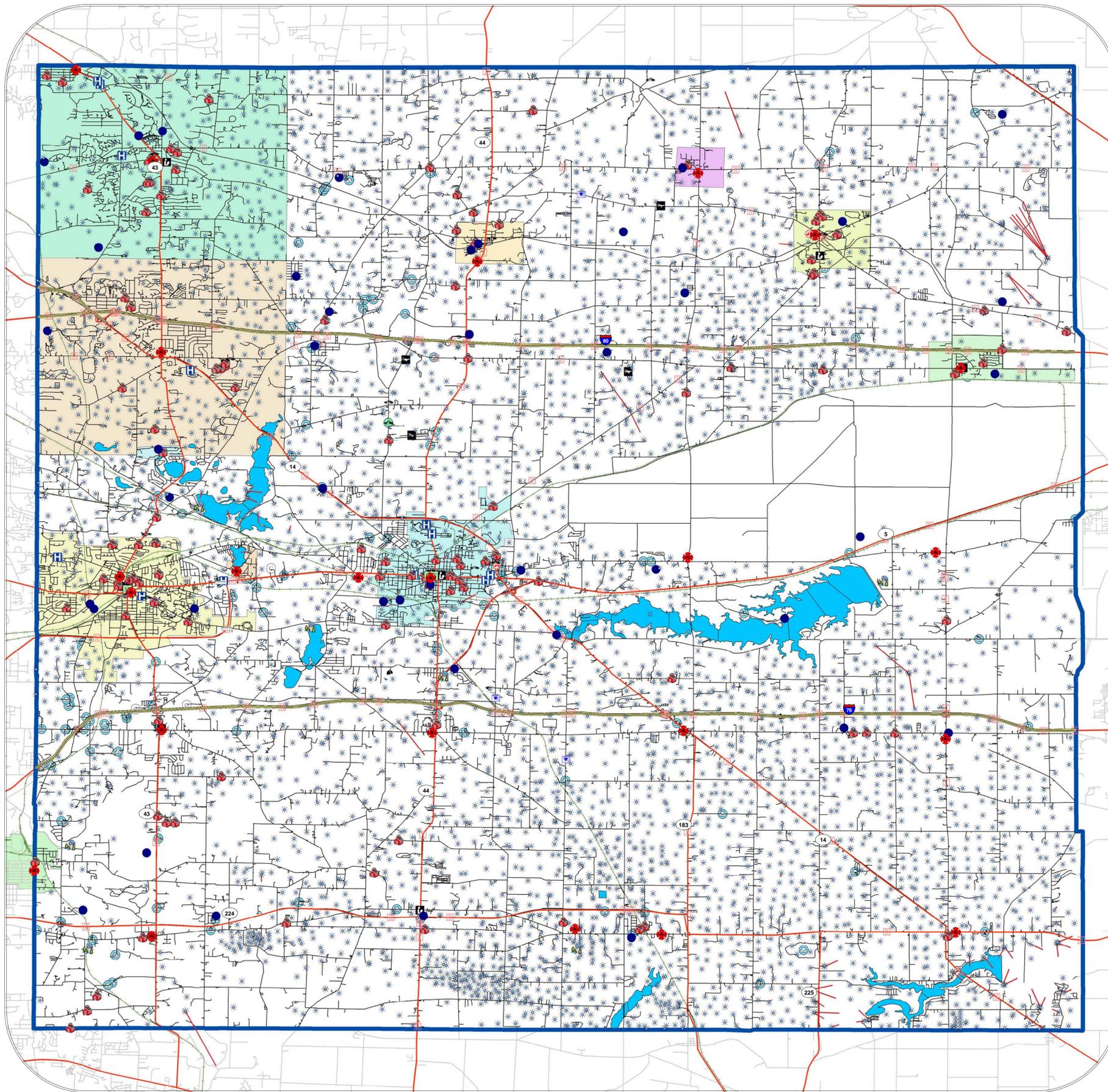
Legend:

Airports

Bridges

Bus Stations

Class I Dams

Communications Facilities

Colleges & Universities

EMS

Fire Departments

Government Facilities

Hazmat Facilities

Healthcare Facilities

Injection Wells

Law Enforcement

Libraries

Oil & Gas Wells

Portage Co. EOC

Schools

Wastewater Facilities

Pipelines

Interstates

Major Roads

Portage Co. Roads

Railways

Water Bodies

Aurora

Brady Lake

Garrettsville

Hiram

Kent

Mantua

Mogadore

Ravenna

Streetsboro

Sugar Bush Knolls

Windham

N

JH Consulting llc